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Special Edition

Design Education: Explorations and Prospects for a Better Built Environment

Ashraf M. Salama and Michael J. Crosbie (editors)

Includes
32 Regular Refereed Papers
Paradigms and Positions
Practices in Design Education
1 Book Review on Transformative Pedagogy in Architecture and Urbanism

Image taken from Queen's University, Kingston, Canada, 2010

Archnet-IJAR is published and archived by ARCHNET, the most comprehensive online community for architects, planners, urban designers, interior designers, landscape architects, and scholars working in these fields, developed at the MIT School of Architecture and Planning in close cooperation with, and with the full support of The Aga Khan Trust for Culture, an agency of the Aga Khan Development Network.

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Archnet- IJAR

ArchNet International Journal of Architectural Research – Archnet-IJAR is the first of its kind; an interdisciplinary comprehensive scholarly journal of architecture, planning, and built environment studies, that is blind reviewed and published on the World Wide Web three times a year.

Objectives

Archnet-IJAR objective is to establish a bridge between theory and practice in the fields of architectural and design research, and urban planning and built environment studies. It reports on the latest research findings and innovative approaches for creating responsive environments, with special focus on architecture and planning in developing countries.

Archnet-IJAR is truly international and aims at strengthening ties between scholars from different parts of the world with contributors and readers reaching across geography, boundaries, and cultures.

Archnet-IJAR articles come from architects, interior designers, planners, and landscape architects, and from those working in these fields in academic institutions, universities, research centers, government agencies, and private practice.

Reader

Archnet-IJAR addresses academics, practitioners, and students of archi-tecture, planning and interior design. It addresses those who are interested in developing their understanding and enhancing their knowledge about how environments are designed, created, and used in physical, social, cultural, economic, and aesthetic terms. Archnet-IJAR content keeps readers up-to-date on the latest ideas, designs, and developments in built environment related fields.

Archnet-JAR publishes research studies, criticisms and evaluation studies, and critical analyses about the creation, use, and evaluation of different types of environments at the macro and micro scales. The journal includes original empirical research papers, analytical case studies, and high quality position papers. Three major areas are covered by Archnet-IJAR:

Architectural and Design Research:

Topics include –but not limited to: architectural pedagogy and design studio teaching practices; architectural technology and sustainable design; design methods and architectural theories; design and project programming; environment-behavior studies; information technology; Islamic architecture; computer applications and virtual environments; post occupancy and facility performance evaluation; and social and cultural factors in design.

Urban and Built Environment Studies:

Topics include --but not limited to: administrative and political factors contributing to the shaping of communities, cities and urban regions, community planning; sustainable urban conservation; environmental planning and eco

development; housing policy, planning, and design; new urbanism; sustainable development; space syntax and GIS applications; and way-finding and signage systems.

Critical Essays on Architectural and Planning Projects:

Essays that cover the above topics; critically discussing projects in use; after they have been designed, built and occupied. Articles are preferred to utilize the case study approach as a critical method in built environment research.

Advisory and Editorial Boards

The Chief Editor is in charge of developing journal issues, seeking out resources and articles, establishing publishing strategies, coordinating the review process, and posting each issue and its articles online. Archnet-IJAR has two boards; advisory and editorial. The range of expertise of the boards that include the panel of referees –academics and professionals-- ensures high quality scholarly papers and allows for a comprehensive academic review of contributions that span wide spectrum of issues, methods, theoretical approaches, and professional practice.

Submission Process

Unlike other printed Journals where contributors wait for periods that reach two or three years for their work to get published, the value of Archnet-IJAR as an online journal is that it eliminates the large lead time needed for publication. However, submission, referee, and publishing processes are strict and adhere to the following procedures:

Interested contributors contact the chief editor expressing interest, and submitting a summary of their paper. One page will do.

The chief editor consults with the advisory and editorial board members according to their relevant expertise.

Soon after receiving feedback from the referees, author(s) are contacted to submit their full papers.

When full papers are received, they will be forwarded to two editorial board members for blind review, according to the referee form.

The chief editor contacts the author(s) with the referee form filled by the reviewers. While papers will be blind reviewed, in exceptional cases author(s) will be asked to communicate directly with the reviewers.

Author(s) revise their papers as noted by the reviewers and re-submit their work to the chief editor.

Author(s) should make sure that their submissions should be free of jargon, clear, simple and to the point.

Papers will be published in the next issue according to the following schedule:

March 30th (publishing date): December 15th (deadline to receive papers after reviews)
July 30th (publishing date): April 15th (deadline to receive papers after reviews)
November 30th (publishing date): August 15th (deadline to receive papers after reviews)

Interested reviewers and members of the advisory board may submit their work for publication in Archnet-IJAR. Their work will go

through the same blind review process and will follow the preceding procedures.

Notes to Contributors

1. Submission of Manuscripts

The language of the journal is English. All submissions will be online. One copy of the manuscript (in word document format) together with original figures and tables must be submitted to the editor: Ashraf Salama ijar@mit.edu

The name, mailing address, position, affiliation, telephone, fax, and email of each author must be supplied in a cover letter attached to an email. All papers will be blind reviewed and assessed by at least two referees.

2. Preparation of Manuscripts

Layout

Manuscripts should be typed in double spacing on one side of A4 (21x29.7 cm) paper with reasonable margins (2.5 cm). All pages should be numbered consecutively.

Title page (page 1)

The first page of the manuscript must contain a concise and informative title; names, affiliations and addresses (including e-mail) of all authors, and identify the corresponding author (who will be responsible for correspondence and reviewing proofs). An abbreviated title of less than 50 characters (including letters and spaces) should also be suggested.

Title of paper, abstract and keywords (page 2)

Title of the paper should be witten at the top of abstract without authors' name. A concise and informative abstract must not exceed 300 words in length, should summarize the objective, methods and major findings of the paper. Keywords must be carefully selected to facilitate the readers' search on Archnet Website, and should not exceed 5 key words.

Articles

Articles should not exceed 6000 words, including references.

Notes

Avoid the use of footnotes and endnotes, if unavoidable, label as (1), (2) and list all together at the end of the paper.

References

References in the text should give the surname of the author and the year of publication in brackets, for example, Rowe (1985) or (Rowe, 1985), followed by a, b,...when two or more references to work by one author are given for the same year. Page numbers should be given for quotes (Mitchell, 2003:33). At the end of the text the references should be listed in alphabetical order of authors' names and in chronological order for each author. Initial and final page numbers of articles and papers should be given. The names of books and periodicals should be given in full, and the publisher and the city of publication should be given for books, conference proceedings, etc. Details of availability should be given for unpublished conference papers. Full references should also be given for legal judgments, bylaws and regulations, and government publications, etc. Examples of reference citation are given below.

Dutton, T.A. (Ed.). (1991). Voices in Architectural Education: Cultural Politics and Pedagogy, Bergin & Garvey, New York, NY, USA.

Hegvold, L. (1999). "Seeking an Effective Cross-Cultural Design Pedagogy." In William O'Reilly (Ed.), Architectural Knowledge and Cultural Diversity,

Comportments, Lausanne, Switzerland, pp. 93-100.

Salama, A. (1998). "Integrating Environment-Behavior Studies into Architectural Education Teaching Practices," In J. Teklenburg, J. Van Andel, J. Smeets, & A. Seidel (Eds.), Shifting Balances: Changing Roles in Policy, Research, and Design, EIRSS Publishers, Eindhoven, Netherlands, pp.128-139.

Salama, A. (2006). "Learning from the Environment: Evaluation Research and Experience Based Architectural Pedagogy," Transactions, CEBE-Center for Education in the Built Environment, Cardiff, UK, 3 (1), pp. 64-83.

Salama, A., O'Reilly, W. & Nochis, K. (Eds.). (2002). Architectural Education Today: Cross Cultural Perspectives, Comportments, Lausanne, Switzerland.

Sanoff, H. (1992). Integrating Programming, Evaluation, and Participation in Design, Avery, London, UK.

Tables

Each table must be typed, and con-secutively numbered. They should have a brief informative title placed as a heading. Tables should be understand-able without reference to the text, but they should be referred to in the text. Explanatory captions should be brief and placed beneath the table.

Figures

Figures should be numbered consecuti-
- vely throughout the paper and identified with the authors' name and the figure number outside the reproduction area. Figures should be referred to in the text and should be placed within the body of the paper. However, all figures should be supplied in separate files as JPEG file format. Figure dimensions should not exceed 21x30 cm. Photographs should be used with restraint and must be of high quality. Explanatory captions should be brief, placed beneath the figure.

3. Submission Process, Copyright, and Originality of Work

Proofs will be sent to the corresponding author for checking. Proofs should be returned within one week of receipt. Authors should correct typesetting errors only; they should not add any new material to the paper at proof stage.

Please read the submission process and procedures, and copyright notes under the general outline of the ARCHNET-IJAR.

All correspondence should be addressed to the chief editor.

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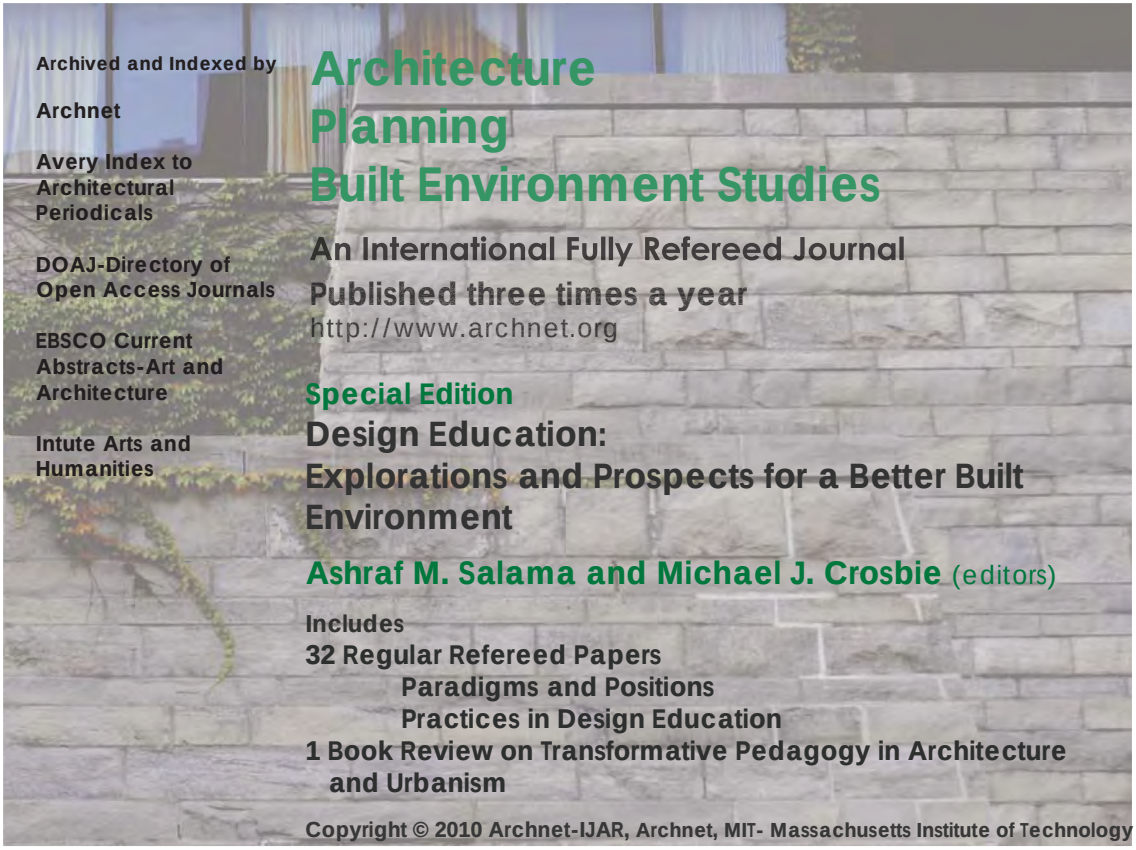

Image taken from Queen's University, Kingston, Canada, 2010

Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

DESIGN EDUCATION: EXPLORATIONS AND PROSPECTS FOR A BETTER BUILT ENVIRONMENT

Ashraf M. Salama and Michael J. Crosbie

"To remain silent about the values represented in what we do, either out of mistaken belief that professionals must remain ethically neutral or out of a romantic dismissal of all normative values, is to eliminate one of the main reasons for the profession's very existence."
Thomas R. Fisher (2006) In the Scheme of Things. Alternative Thinking on the Practice of Architecture, University of Minnesota Press, P.30.

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TThis volume marks the conclusion of the fourth year since Archnet-IJAR was established. A considerable effort has been put into this volume, which addresses timely and pressing questions that pertain to design pedagogy in the built environment related fields. This special edition combines the second and third issues of volume 4 and integrates the efforts of more than 45 contributors from 12 countries presented in 32 papers. In response to our call on the web in August 2009 for papers, we have received more than 80 expressions of interest and more than 65 abstracts. The papers included in this edition are those of the accepted abstracts that were developed into full papers and followed the typical review process of the journal. These figures underscore a rising interest in writing about educating future architects and urban designers. In fact, they manifest a commitment to the field of design education in its broadest sense.

Design education is the cornerstone of design professions. The approach to and the content of it are the backbone of design practices. This suggests that it has to be encountered and to be dealt with as a rich field of pedagogical discourse whose foundations, underlying theories, contents, and methods can be questioned and critically analyzed. Reaching across the boundaries of cultures and regions, the theme of this volume addresses design education in its fullest sense in order to reflect its worldwide status in 2010. Contributions to the volume exemplify worldwide efforts in shaping the future of design pedagogy.

Theorists, academics, researchers, and practitioners have been discussing the role of design education in shaping the built environment since professional education was established two centuries ago. Strikingly, research on design education continues to be marginalized in academia. While the practice

Editorial

of design professions has changed dramatically and keeps changing, design education in the built environment-related disciplines reacts in a very slow manner at best, or resists change or adaptation at worst. The work of the contributors in this volume, however, represents honest attempts to introduce change, and to tame and react to the demands placed on design professions by societal, environmental, and cultural needs. It addresses topical concerns that pertain to the goals and objectives, structures and contents, and delivery methods and techniques required for responsive design education, a type of education amenable to graduating designers capable of creating better built environments.

For the purpose of classification, the volume is divided into two main sections. The first represents paradigms and positions on design education, while the second embodies design teaching practices. Due to the archetypal difficulty inherited in any classification process, the reader may see some overlaps between the two sections where positions are typically fostered by practices and practices are normally based on positions, motivations, and drivers. Notably, on the one hand, papers classified under paradigms and positions address shifts and transformations in philosophical foundations, approaches, program contents and structures, curriculum development, teaching processes, models of teaching as adopted and advocated at the institutional level or by professional organizations. Other contributions under the same section explore specific ideologies and doctrines, as reflected in the development of theories (theorizing) on design pedagogy and as adopted by individual educators. On the other hand, papers classified under practices involve contributions that offer new ideas and visions through implemented and validated frameworks of teaching models undertaken in lecture halls and design studios. This includes alternative learning/teaching methods, underpinned by pedagogical theories or design key issues, and those that concern themselves with community-based design learning, service learning, experiential learning, inquiry-based learning, and outcome-based learning.

There are 17 papers under the positions-paradigms section. These can be looked at from different perspectives based on the context within which they were developed, the institutional setting, the quality and interests of both faculty and students, and many other factors. However, we look at these contributions within the context of this volume in terms of:

- positions on general teaching and curriculum issues,
- positions on process oriented pedagogies,
- research-based positions, and
- philosophical positions.

The works of Nikos Salingaros and Kenneth Masden, Michael Crosbie, Abdul Rahman, Avi Friedman, and Gregory Marinic offer positions and ideas on general—yet crucial teaching, learning, and curriculum-related issues. Salingaros and Masden present Intelligence-Based Design as a paradigm in which humans are engaged through a complex system of information. They define the theory behind Intelligence-Based Design through the direct neurological evaluations of surface, structure, pattern, texture, and form, through positive neuro-engagement with the physical world at the deepest level common to all people, i.e. “Innate Intelligence.” Applications and obstacles of their studio approach are articulated in support their argument of introducing intelligence as a way of

thinking in design.

Crosbie's article emphasizes the need for clarity in establishing a program mission, and the role it plays in guiding the overall teaching and learning processes. He explains how the mission of a program can be incorporated into the larger institutional context while at the same time serving as a roadmap for curriculum content, teaching approaches, and delivery. In another context, Rahman calls for accelerating change in the mindsets of architects as a whole towards designing for architectural sustainability, while arguing for the need to revamp Malaysian architectural programs and course contents in a manner that addresses sustainability effectively and efficiently.

Friedman argues, and rightly so, that architects are becoming more and more marginalized in the huge home-building industry where other professions are moving in to profit from the need for affordable housing. Architects need to expand the market for their services to include a far greater percentage of new buildings (houses and residential communities). Based on the contention that architectural education must play a key role in redefining what the profession should offer, Friedman calls for a change in education to reflect the needs of the profession by introducing behavioral psychology, demographics, and building economics as important curriculum areas that respond to the needs of the market so that architects are not seen as luxury but their services will be regarded as indispensable by developers and the overall housing industry. Along the same approach of calling for change, Marinic argues for introducing flexible and open learning environments as a reaction to the continuous transformations in and the emerging needs of the built environment. While there is a typical uncertainty in introducing new methodologies, alternative approaches to content delivery, and the utilization of advanced visualization techniques, Marinic believes that they can provide flexible learning environments amenable to addressing the future needs of the profession.

While the papers of Keith McAllister, Hatim Nabih, Ujawala Chakradeo, Stephen Temple, and Sujata Shetty and Andreas Luescher are diverse in terms of the issues they address, they share the placing of high value on teaching/ learning processes. McAllister argues that the consideration of "how" to design in addition to "what" to design presents architectural educators with that most pressing challenge of "how do we best teach the design process?" Based on this question, he presents scenarios for teaching frameworks and outcomes to demonstrate the effectiveness of introducing key strategies in making the design process in the studio more relevant and of greater value to architecture students. Along the same line of thought, yet utilizing different approaches, Hatim Nabih presents a process-based learning approach where lecture based course work is offered in a studio-like setting. Based on his belief that student motivation is increased by establishing a higher level of autonomy in the learning process, Nabih attempts to link theory with applied design work by synthesizing the principles of Constructivist Learning and Problem-Based Learning (PBL) where students are given a greater control over their learning. Ujawala Charadeo goes along these lines and illustrates the notion of the process as a critical element that speaks to the three components of architectural education: knowledge, skill, and design.

Stephen Temple's paper responds to the question of what beginning design learning experiences best support the remainder of design education. His work manifests a model of a beginning design pedagogy that is based on developmental relationships between concrete and abstract processes of learning as a foundation for transformative creative thinking that enables student self-development that progresses up the curriculum. Aligning with the theories of Piaget on developmental learning theories, a basic component of Temple's approach is that learning at the primary level of direct experience self-initiates brain changes where students form their own structure of learning. Therefore, beginning learning experiences are those that best enable decision-making consistent with the biological interactivity between body and mind, between, respectively, the concrete and the abstract. The paper of Temple is of particular note--especially that many of the students skills, attitudes, behaviors, habits, and routine thinking are developed early in their education and therefore, it is crucial to consider developmental learning aspects early in the students' education.

While analytically describing a process-oriented design experience, the work of Sujata Shetty and Andreas Luescher places emphasis on content-related issues. Arguing that urban design education should be able to respond to the new realities of shrinking cities. Examining a collaborative urban design studio, they conclude with a number of valuable lessons: "1) In a shrinking city, urban designers may need to focus less on designing the solids and more on meeting the challenges of the voids. 2) In spite of urban design's historical bias towards design, students need to be strongly grounded in the planning context, which inter-disciplinary collaboration can help achieve. 3) Now more than ever, even a small urban design project has to be viewed in a larger scale - in the context of the entire city and region. 4) In an era of shrinking resources, the urban design studio can be an important source of ideas for cities facing the physical consequences of shrinkage."

Research-based positions are articulated in the works of Beatriz Maturana, Ashraf Salama and Sherif El-Attar, Elmira Gur, and Ayman Ismail and Mona Soliman. The work of Maturana explores the architectural design studio and how it positions itself as part of the real world and how the real world is positioned in the studio. She examines three parameters that include consultation, need, and client in design briefs and handouts. Spike and the slum dwellers are two types of clients that place such an examination in focus. Maturana's analysis of 145 handouts from three architectural faculties in Australia reveals that the reality of architectural practice does not seem to be well represented and nor play a significant role in design studio teaching. In essence, she concludes that the absence of these parameters devalues their role in both education and practice. Interestingly, she closes her work by posing the crucial question of how reality and which reality is represented in the architectural design studio.

On student perceptions of the architectural design jury, Ashraf Salama and Sherif El-Attar's work arguably fills the informational gap that pertains to knowledge about the jury system within the context of the Middle East. Their work answers the questions of how jury practices are performed in the context of the Arab world and how students perceive the jury system

and its underlying practices in such a context. Inducting generalities between the Western and Middle Eastern contexts, they offer an analysis of an extensive literature review of the educational value and the communication processes involved. Two empirical studies are carried out with the intention of investigating jury practices and student perceptions within the context of selected cases from Egypt and Saudi Arabia. They propose a number of scenarios to improve the performance of the jury, its acceptability to architecture students, while raising its educational value in terms of process and outcomes.

The work Ayman Ismail and Mona Soliman analytically describes and assesses collaborative learning applied in the context of transforming the traditional single-level design studio into an multi-level combined design studio at King Abdul-Aziz University, Saudi Arabia, where students from different grade levels work collaboratively. Calling for the value of vertical design studios, the results of their survey of students' impressions, the skills acquired, and the assessment of project outcomes stress the importance of interaction to promote deep learning. On the other hand, Elmira Gur examines the impact of the physical setting on the students' learning and satisfaction within the context of Istanbul Technical University. Exploring the spatial use of open environment and cell type environment in the studio, she presents the results of student surveys on the way in which each type of setting supports communication and interaction and the overall learning process.

The last three papers of this section represent a number of philosophical paradigms or positional interpretations. The work of Anna Hooper is derived from the origins of western philosophy and attempts to explore the acquisition of knowledge, as well as the landscape of language to articulate the architectural. Her work stems from the ideological writings of Plato, Homer, Pan, and Gardener and places emphasis on form and language. However, the work of Iris Aravot attempts to establish an ethical platform for architectural education. She suggests that prior to debating or establishing form and design principles that vary in time and context, an ethical disposition should be nurtured and cultivated in a manner that relates architecture to a larger sense of life. Aravot's work outlines a platform for an ethically oriented architectural disposition, rooted in the triple cornerstone of "I," "The Other," and "Thing" based on the phenomenologist writings of Husserl, Levinas, and Merleau-Ponty. Departing from focusing on one single disposition, Deshpande and Khan suggest that there is a need for a total integration in the design studio. Their work is based on the contention that critical understanding of the importance of tangential knowledge and its integration within the design studio, leading to a comprehensive whole, is a significant aspect to be properly evolved and nourished in the studio.

Under the practices category, there are 15 papers representing disparate ideas and of wide range of distinct approaches to teaching, strengthened by theoretical foundations and pedagogical theories. Contributions in this section are classified in terms of:

- Practices that address learning styles, stimulating students interest through active engagement
- Practices that address the development of student skills
- Experiments that address design studio

teaching practices

The work of Elçin Tezel and Hernan Casakin, Ashraf Salama, Tasoulla Hadjiyanni and Stephanie Watson Zollinger, and Magda Mostafa and Hoda Mostafa places emphasis on key issues that pertain to learning styles, collaborative thinking, and active engagement in learning settings. Tezel and Casakin measure and examine design performance within a number of parameters that include form and spatial configuration, structural innovation and ergonomics, and craftsmanship. Their findings draw the attention of design educators that individual differences among students and that the application of experiential learning theory, which is basically a theoretical framework for understanding learning abilities, can contribute to the enhancement of individual skills and abilities under different design situations.

Ashraf Salama advocates the integration of interactive learning mechanisms into theory courses in architecture. Based on articulating a number of misconceptions in the delivery of lecture-based courses, he argues for the need to introduce active and experiential and inquiry-based learning (IBL) into theory courses in architecture. Salama proposes a framework, developed and employed to demonstrate the way in which these types of learning can be incorporated. The development and implementation of a series of in-class and off-campus exercises in two different contexts reveal that structured actions and experiences help students to be in control over their learning while invigorating their understanding of the body of knowledge delivered in a typical lecture format.

Two interior design educators from the University of Minnesota, Tasoulla Hadjiyanni and Stephanie Watson Zollinger, share techniques, assignments, and pedagogies that respond to important questions that concern themselves with the delivery of history courses in a design program. These questions are: What forms of history teaching capture student interest? How can the lessons of history resonate with youth in ways that tie the past to the present? How can assignments spark excitement in students and engender a passion for the subject? And, where can faculty draw inspiration from in re-envisioning the role that history can play in their program and profession? Going beyond traditional methodologies and discourses around the teaching of history, Hadjiyanni and Zolliner employ a number of techniques such as digital games and free-hand sketching, while challenging students to engage with the material first hand. They conclude that infusing history classes with creative and critical thinking that encompasses and responds to pressing social concerns fosters the meaning of history classes while positioning history as an integral component in the curriculum and students' learning.

Developing an understanding on how architecture students think and learn, rather than operating on assumptions, Magda Mostafa and Hoda Mostafa argue that more responsive and customized modes of learning and teaching in studios can be conceived and implemented. In essence, Mostafa and Mostafa explore effective ways in which spatial thinking skills can be developed. Utilizing empirical research methods in the form of experimentation on control and study groups at the American University in Cairo, the authors reveal a particular correlation between high spatial ability and active learning in the entire group of students and a strong correlation between high spatial ability and

visual learning--with a higher connection in architecture students, reaching 100% in some classes.

Underlying the category of practices that place emphasis on the development of student skills comes the work of Nabeel Elhady and Raghad Mofeed, Miki Desai, and Khaled Nassar, Magda Mostafa, and Amr Rifki. Similarities can be found in the work of Elhady and Mofeed and Desai articles where the focus is on the development of skills within a traditional built environment context. However, the work of Nassar, Mostafa, and Rifki reacts to current interests in digital technology and visualization skills and the way in which they may contribute to students' learning experiences.

Elhady and Mofeed suggest an approach that focuses on the aesthetic experience of students through the understanding and development of skills by critically and visually exploring elements of traditional architecture. Along the same line of interest, Miki Desai introduces teaching philosophy, content, and method of Basic Design I and II for first-year students of architecture at the Faculty of Architecture, Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad, India. His work, which has evolved over a period of three decades, is framed within the Indian perspective of architectural education from the British colonial times. On the other hand, the work of Nassar, Mostafa, and Rifki argues that architectural problems are unique in their nature, requiring volumetric visualization and problem-solving skills. While many of these skills can be replicated utilizing digital technology, they pose the question of whether digital technology can replace the cognitive development, which occurs through manual problem solving. In response, they present an experiment that could be used to investigate the processing and synthesis of visual information related to the new kinds of free form that characterize most current practices in architecture.

Experiments that address design studio teaching practices presented in eight papers show serious commitment towards shaping the content and process in design pedagogy. These are of May al-Ibrashy and Tammy Gaber on the utilization of senses in design studio teaching; Núbia Bernardi and Doris Kowaltowski on universal design in the teaching process in the design; Azza Kamal, Sedef Doganer, et al. on wayfinding and accessibility in urban design studios; Gabrielle Bendiner-Viani and Elliott Maltby on hybrid ways of teaching and learning; Ozen Eyuce and Ahmet Eyuce on introducing conservation through adaptive re-use of existing buildings in the studio; Buthayna Eilouti on biotecture and sustainable design; Murat Dundar and Sinem Kultur on international studios and learning in a multi-cultural context; and Dicle Aydin and Mehmet Uysal on implementing systematic design procedures in the studio.

While these practices place emphasis on key design issues with different degrees of successful outcomes, two contributions appear to be challenging the limitation of design teaching in their contexts in an effective manner. The work of al-Ibrashy and Gaber re-envisages the design studio and establishes the role of the senses by introducing alternative methods of instruction that stem from phenomenological approaches to the development mechanisms, tools, and procedures that they adopt in their studio to achieve a better utilization of the senses, thereby fostering the acquisition of knowledge and

enhancing the students learning experience. Bernardi and Kowaltowski, on the other hand, apply the concepts of universal design. With the goal to develop student awareness of users with special needs, they have developed innovative mechanisms and design communication instruments, such as tactile maps, to enable user participation of the visually impaired. It is our view that these two contributions deserve special attention.

By and large, the papers introduced in this issue corroborate that design education and its underlying teaching practices means different things to different educators and that each teaches according to contextual peculiarities and based on his/her own set of ideologies and beliefs and in a manner that is distinct from others. Concomitantly, there is a tremendous diversity of contents, approaches, methods, and even expression and reflection on the same set of ideas. Experiential learning appears to be a common key issue across the board with different interpretations. This goes along the line of thought of several eminent education theorists including Benjamin Bloom, David Kolb, Jean Piaget, John Dewey, and Paulo Freire, who voiced the opinion that experience should be an integral component of any teaching/learning process.

In design pedagogy, one should note the work of Tom Dutton, Necdet Teymur, and Henry Sanoff who introduced a spectrum of techniques that incorporate experiential learning components in studio pedagogy. Their work can be traced back to the famous dictum of Confucius around 450 BCE: “Tell me and I will forget. Show me and I may remember. Involve me and I will understand.” Experiential learning refers to learning in which the learner is directly in touch with the realities being studied. It is contrasted with learning in which the learner only reads about, hears about, talks about, writes about these realities but never comes in contact with as part of the learning process. On the other hand, there are a number of common concepts or key issues found in one or more arguments, which relate to experiential learning. These are learning from the environment; learning from practice; critical thinking; the hidden curriculum concept; play and design games; real-life situations; action research; multi-disciplinary research; and cultural diversity.

The deliberations presented in the papers of those committed scholars and educators emphasize that the mission of a school of architecture or a design program should foster an environment that nurtures exploration and critical thinking. Today, inquiry and investigation are viewed as activities central to design education. A considerable number of papers advocate the integration of research into teaching by arguing for the exposure of students to primary source materials that enable them to get as close as possible to the realities being studied. While some colleagues might say that the concerns generated in this edition of Archnet-IJAR are not new, we argue that the level of concern is intensive and the flood of emerging positions, issues, ideas, and outcomes is crested at an alarmingly high level, which in a way expresses dissatisfaction with mainstream teaching practices. Most important is not the quantity but the focus of this round of discourse; an emphasis on issues central to our own role as design educators that simply involves the development of design skills and critical thinking abilities through active engagement within the learning setting and off campus. These papers present new explorations, prospects, and opportunities for us as design educators to

strengthen design pedagogy, to enhance our role in shaping teaching and learning processes, and to improve the quality of the future built environment.

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Ashraf M. Salama and Michael J. Crosbie (editors)

TEACHING DESIGN AT THE LIMITS OF ARCHITECTURE

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Abstract

Pre-industrial architects inherently knew the effectual dimension of design through its materiality, detail, and form. Until now, the intellectual dichotomy of human thinking held that mind and body were separate entities, drawing a distinction between reasoned thought and feeling. The early Greek philosophers distinguished between these two realms. Theories on beauty, the human aesthetic impulse, and design were divided along the objective and subjective lines for centuries. In more current architectural terms, the objective dimension of industry gave structure and perceived virtue to the modernist paradigm, while at the same time clearing the way (tabula rasa) for the rampant subjectivity we now see in the idiosyncratic expressions of so many contemporary architects. By revealing the relationship between our physical and mental processes, neuroscience re-situates the debate on physical reality well outside the intellectual enterprise of aesthetically driven design. Clear measures can now be evidenced, documented, and applied to establish a new, more effective, and humanly engaging way to build. This new architecture draws upon those mechanisms of neuro-connectivity that help us to feel safe and secure.

From this knowledge we have developed a new model for building/rebuilding the world, called Intelligence-Based Design. Intelligence-Based Design is the purposeful manipulation of the built environment to engage humans in an essential manner through complex organized information. Intelligence-Based Theory evidences the direct neurological evaluations of surface, structure, pattern, texture, and form, etc., and maintains that our sense of well being is established through positive neuro-engagement with the physical world at the deepest level common to all people, i.e. "Innate Intelligence." This paper describes a senior architectural design studio taught using the precepts of Intelligence-Based Design. We describe our methodology, and the successful implementations of both theoretical concepts and practical ideas on pedagogy. We also relate in some detail the numerous conceptual obstacles we came up against; almost all of them attributable to the anti-architectural training students tend to receive inside contemporary architectural programs.

Keywords

Pedagogy, architectural education, architecture studio, intelligence-based design, Dubai.

Introduction

During the fall of 2008 we jointly taught a senior-level Architecture Design Studio. Our objective was to engage students with issues of scale and form as these pertain to an Intelligence-Based Architecture (IBA) (Salingaros & Masden,

2006; 2007a; 2007b; 2008). Students in the course were advanced design students educated in a contemporary architectural program, and thus representative of the vast majority of similar students in Architecture schools throughout the world. Wanting to develop a teaching model for Intelligence-Based Architecture, we chose to challenge our students, and our theories, by locating the project in one of the most difficult sites we could imagine: the newly developed main corridor of Dubai's business district. Given the extreme abstract nature of this site, we were interested in designs that could reconcile, or mediate, the tremendous disconnection between the double-loaded corridor of skyscrapers, and the severe lack of humanly adaptive architectural elements that the site presents.

Our goal was to have students establish an urban fabric that was effectively layered with vital architectural information so as to connect the local people with the built-environment in a healthy and engaging manner. The newly constructed strip of towers, by way of their scale, simplistic geometries, site placement, orientation, materials and articulations, is conceived as a sign or progress and power and not as a humanly adaptive settlement. We emphasized that the point of the studio was to connect human beings through informational structures such as scale, adaptive design, and detail to a region where we felt such connection was absent. One advantage of this location was presented in the newly inaugurated Dubai Metropolitan Transit System (Metro), a raised mass-transit that runs alongside the central highway. The system was scheduled to open soon after our studio took place, and it provided the necessary basis for the pedestrian network. In this way, we could work with both car and pedestrian networks to generate living urban fabric.

Another point of the studio was to encourage the understanding, utilization, and development of form languages, elements crucial to providing additional vital information with which to connect more deeply with the built-environment. This location was ideally suited for the application of a Traditional Islamic Form Language, thus several lectures were presented that described aspects of both form languages in general, and the various branches of Islamic Form Languages in particular. This studio presented a unique opportunity for American students to become familiar with the glories of Islamic Architecture, not in the usual detached historical context, but in immediate application. We wished to avoid an automatic, thoughtless application of the Western modernist form language as a matter of fact, and to open the students to the possibilities of either using a historical form language (one already adapted to the local social and building cultures), or to developing their own form language from the cultural imperatives of this unique place in the world.

A final aspect of this studio was its direct involvement with local professional architecture firms. This involved a two-part approach. First, we decided to free the students from the habitual dependence upon academic architects as critics. We therefore asked practicing architects who are members of three local architectural offices to serve as our critics for the studio projects. These were professional architects who understood firsthand the necessity and application of detail work in design. Second, we decided that a year-end jury is an ineffective means for teaching students whether their project

is actually moving in the right direction, since it is too late by then to make any adjustments. We therefore held a mid-term full jury, with all the students' projects exhibited and critiqued. It turns out that this intermediate critique from the professional architects provided a key inspiration and influenced how some students further developed their final projects.

Scaling: An Architectural System of Information

We began the semester with a series of visual exercises intended to make students look at complex scaling relationships in the local built environment because of the invaluable information that these structures provide when analyzed correctly. The exercises were derived to address a range of building typologies (residential, commercial, government, religious, educational) and siting conditions (urban, near urban, and suburban). Students were asked to take a progressive series of photographs, from close detailed images, backing out to the entire façade in proportional intervals in thirds, of different buildings that contained coherent scaling relationships in detail, structure, and form. They were also asked to identify and document buildings that lacked this information, for comparison.

One purpose of these exercises was to have students look carefully at buildings from a more immediate perspective. Once this type of complex information was revealed through the photo sequences, students could better understand both the effect and the importance of scaled information to humanly adaptive architecture. We then asked the students to apply similar strategies to their own design work. What this meant was that drawings and models had to depict multiple scales within their designs. Limited classroom space required that we construct the site model at a smaller scale than we would have wanted (1in = 20ft), so students were asked to supplement the site model with more detailed design drawings and models ranging in scale all the way up to a full scale, 1-to-1 ratio for architectural details. Prior research has shown that drawing and/or modeling at the largest scale is the most effective way to reveal the weakness in a design's scaling coherence, which is an important informational component of Intelligence-Based Design. Modeling or drawing at full scale is always best whenever it can be done. This type of large-scale detail work is very important for student architects since they have seldom experienced the built environment in an architecturally conscious manner.

During the scaling exercises students were also asked to consider the scale of programmatic requirements, i.e. function and program. Using a corresponding ecological model to demonstrate the effect of scale, students could understand the importance of multiple programs at varying interacting scales. The first and most obvious concern for Dubai was the large occupancy of the newly built towers. Such towers present a greater density of a singular program than traditional urban models. When thousands of people have the same front door on a city street, the process of urban scaling is severely impacted. To offset the extremes of the site students were asked to develop additional multi-scaled programs, i.e. schools (daycare, high school, university etc), retail (clothing, electronic, food etc.), service facilities (travel agents, attorney, restaurants etc.), religious

facilities, plus commercial and residential facilities on a human scale, to balance or break down the programmatic scale of the towers and the enormous empty urban spaces in-between.

The occupancy density of the towers puts a tremendous number of people on the street during the morning rush, afternoon lunch, and evening rush. Utilizing the scaling logic of thirds (Salingaros, 2005) the urban paths and spaces were pared down from the largest to the smallest in a manner that allowed paths and spaces to facilitate people rushing to and from work while establishing an informational logic that was comfortable and familiar to the intended user. Interlacing these new programs with the existing buildings and open spaces permitted the development of a more human oriented and organized urban space that is multiply connected. The new variant programs also gave reasons for pedestrians to stop along their way to and from work/home, which reduces the concentration of people moving along any one urban path, avoiding a pedestrian queuing effect.

Next we addressed the issue of vertical development within the site. The scale of the current towers is far removed from anything that would be considered human. It is also limited, for the most part, to only the largest vertical scale. When combined with the vast empty ground plane, the extreme scale of both offers little immediate information for humans to connect to and thus all but negates a human presence in this open abstracted terrain. Student designs needed to be planned and programmed in a manner that would develop tectonic, material, and architecturally detailed information at both the human scale and the city scale. Utilizing the scaling factor of thirds to develop the vertical scale of the new program, students were able to create a new multi-level urban fabric that established effective scaling coherence within the field of large towers. Combining this process with their evolved plans ultimately yielded designs that spoke to the appropriate apportionment of field and ground as well as the humanly satisfying aspects of sectionally structured urban spaces (utilizing the Transect promoted by the Congress for the New Urbanism, CNU) (Salingaros, 2006). All of these scaling dimensions contain appropriate levels of information to effectively engage human beings neurologically, as described by Intelligence-Based Design.

A Fixation upon Platonic Shapes Loses Information

During the process of laying out the urban paths and spaces we noticed a restrictive design behavior with our students, which drew concern. Most students could not see beyond their object-oriented, form-based training to be able to design an urban field of congruent structures. When shown effective field and ground studies and asked to design for pedestrian movement within the city, students consistently deferred to pure platonic-shaped spaces with an overabundance of urban paths cutting the program into unusable small areas.

Students simply could not understand the more immediate relationship of the city in terms of its paths, spaces, and program. Nor could they understand the concept of figurative space vs. figurative buildings. It wasn't until the structure of the city was explained in terms of human

movement (as in the pedestrian circulation within a building) and the relationship of function to program (office spaces versus hallways or corridors), that students began to let go of their object-oriented, form-based predilections. Even then, there were still students who were unsuccessful in letting go of their geometrical prejudices. Those students either refused, or for some reason could not design pedestrian paths, but instead continued to present pure geometric forms imposed on the plan.

The whole point of the scaling exercises was to break out of the confines of "pure" Platonic forms, to emphasize the informational complexity of living urban fabric that is due to its entire substructure on different scales. We explained that, in designing living urban fabric, priority must be given to the pedestrian paths and human spatial experience, which is antithetical to the abstract geometries of modernist built forms. "The pedestrian paths amalgamate into pedestrian streets, which are flanked by buildings, so those buildings must help reinforce and inform the paths." The only exception is a singular monumental project or event that assumes a formal appearance by necessity, which was clearly not the objective of our studio. Nevertheless, there seemed to be a deeply ingrained ideological bias, and a reductivist sensibility on the students' part, which kept making them respond with Platonic solids whatever the design problem. It should also be noted that there is a certain design economy in simplifying forms that provides an easy way out for students who might be underachievers. The ideological imperative for an objectively pure design provides the perfect cloak for this type of non-design.

Adaptive Design and Reuse Generate Architectural Information

The notion of adaptive design also proved foreign to our students. In a modernist architectural program where innovation and novelty are celebrated, students have a desperate need to invent anew. But the processes of adaptation are vital to Intelligence-Based Design because they extend or intensify the information field that humans effectively connect with. Our students treated their initial/original work as if it were somehow precious or divine. When faced with an unresolved problem in their original proposals, rather than search for an adaptive solution, students threw out their initial design to invent a new one. The notion of advancing their designs through adaptive strategies seemed to overwhelm them. This paradigm was difficult to overcome. Every time we suggested that their design should be MODIFIED, which is to say, ADAPTED, they refused to do it, and would re-invent a new form altogether. These new forms were invariably just as non-adapted as their previous attempts.

And yet, we were trying very hard to teach them the process of adaptation by making gradual changes. Without that concept, there is no adaptive design possible. It seems to us that our students' prior training did a very good job of erasing any possibility of adaptation by instilling some ideological fixation of a design's stand-alone, non-adaptive qualities. Towards this end, we desisted from criticizing their first attempt, even though there was a tremendous variation of quality among the students' first ideas. Some were simply silly or ridiculous, but we did not say so. We accepted whatever they came up with and tried to get the students to EVOLVE their

project recursively through adaptation towards a better design, as judged by eventual use. We urged them to improve their initial design though a sequence of small steps by imbedding layers of new architectural information.

Students had to be shown adaptive strategies and encouraged constantly. After several attempts on their part to find the perfect form all at once, we simply would not allow them to invent yet another geometrically rigid or fixed solution. At the appropriate time, we had them stop designing anew and start using their own first attempts as contextual entities to be altered and adapted, or to be addressed with adjacent structures they were to design so as to provide a more appropriately urban solution. Most (but not all) of our students successfully learned to adapt their designs through small steps, and their final efforts were quite successful.

Form Language as Cultural and Tectonic Information

As the designs began to congeal around this new way of thinking, and the paths, spaces, and massing had taken on a greater level of coherence, we introduced what was yet another unfamiliar notion to our students: that of an architectural form language. This too provoked a bit of hesitation from the students, who had come to believe that design within an architectural language was mere style or decoration. Many desperately held on to their object-based beliefs until the last possible moment. Many dismissed the idea of form language as an exclusive expression of historical architecture. They felt that if their design wasn't conceived in some inexplicable modernist form charged with hyper dynamics, it was of little or no value. What was worse is that when told they could draw from the rich form languages of other great urban architecture, and then adapt these to their context, many were unwilling (in fact, almost frightened) to do so. At this point it seemed that many would rather fail the class than imagine themselves copying the ideas of others (even though that was precisely what they were doing anyway). We tried hard to discern if this was a form of indoctrinated architectural design arrogance or ignorance, in that they simply could not see what we were saying.

More than one bright student would not accept the challenge of abandoning or adapting the modernist form language they had been taught throughout all their years in architecture school. They came up with all sorts of spurious explanations of how they were developing a new form language, whereas in fact they were stubbornly sticking with the modernist one. We did not push them but only encouraged them to open up, and if they insisted upon their chosen form language, then that was their choice. In this group, some students who were also working part-time in an architectural office had enough technical skills to create a decent project, albeit totally non-adaptive to the climate, culture, and site; but those with no practical experience remained stuck in a very poor and non-adapted dead-end design. There was clearly a psychological block preventing them from using the ideas we were offering, even when they could see that their usual method of working was not producing anything of either value or interest.

We suspect, but cannot prove, that students could not, based upon their previous training in

architecture school, accept the very idea of a plurality of form languages. Doing so classifies the modernist vocabulary as simply one of a multitude of viable form languages, which certainly contradicts what students have been taught in their previous courses (i.e. that the modernist vocabulary is somehow endowed with a sacrosanct, unique status as the ONLY permissible architectonic expression for our times). Our goal was thus sabotaged by the reigning architectural doctrine.

By taking students to local structures that possessed a human sense of scale and connectivity, and local structures that did not, we were able to better convey the effect of this dimension. Still, their first response was to try and invent a completely new form language of their own. Once students realized that developing a form language is complicated and best left to time, purpose, and context, rather than idiosyncratic inventions, they were more willing to draw from other sources and consider form languages that had evolved in other places over time. For those students who still wanted to invent their own language, they were given a series of design detailing exercises working through multiple scales of the assembly of materials, structure, and form. Only a few were able to develop their own language, which was superficial at best, yet was of interest to us given the nature of our study. Most were happy to just be able to successfully apply an already developed language to their designs. Some who did develop a new form language did so on the superficial or ornamental level rather than on the deeper tectonic level. Still, we encouraged these efforts as a new dimension of their originality, and their projects looked great during the critique.

We had uniformly good results from students who were either foreign students from Mexico, or Mexican-Americans from cities close to the US-Mexico border, where the Mexican architectural tradition is still strong. Those students immediately grasped at least part of what we were after, and drew upon their stored memory of traditional Mexican architecture. They discovered that they could import a traditional Mexican Colonial form language to their project. Nevertheless, after this first step, they evidently had a conceptual breakthrough, because they then began to innovate and develop their own form languages instead of just repeating traditional forms. Breaking out of the standard modernist form language was clearly enough to open up their mind to the infinite possibilities. The less-driven students of this group just took the easy way out and recycled a traditional Mexican form language for Dubai, even though we told them this was not entirely appropriate. At least,they could begin to see how such information worked through the processes of Intelligence-Based Design to foster a greater connectivity between human beings and the built-environment.

Design Process, Color, and Texture: Adding Layers of Information

Our research shows that an architecture that connects with humans in a neurologically satisfying manner typically contains rich visual information in color, texture, pattern, scale, and form. Students were asked to consider these aspects of the built environment when developing their own designs. One exercise required that they prepare large samples (1 meter square or larger) of the colors they were

intending to use. Another exercise asked that they resolve their structures on a detailed level at a full scale. Again there was resistance. Student could not imagine how anything could be gained from these exercises. However, once these samples of their work were presented, the strengths and weaknesses of each idea became evident to everyone. To simply imagine the color of a wall is quite different than standing next to a life-size sample of color. Your imagination when looking at a small color swatch can't compare with the real sensations that a larger information field elicits. Students were then required to fold this information into their work to advance their designs toward human connectivity.

After an entire lecture on the importance of color, our students were told to choose two main colors for their project, to which they could later add as many colors as they wished for use in lesser proportions. They were to prepare large panels of those two main colors so that we, and the rest of the class, could judge how it felt to experience the color standing right up next to it. Nobody followed our instructions! They all came to class and pinned up 1-inch-square swatches of color. The students did not believe us when we had told them of the tremendous emotional response to color, and that the effect has to be experienced on a human scale.

These new ideas were foreign to our students, and for most of them the process of design had to be relearned. Since it was important to give students time to assimilate this new information, their slow progress limited what we could accomplish in one semester. We spent so much time deprogramming the students there was less time for the actual design. To address a new educational model, the principles of Intelligence-Based Architecture would need to be taught earlier and more effectively throughout the undergraduate curriculum (Salingaros & Masden, 2008). When discussing these new provisions in design education with our peers, we found that most were unwilling or unable to debate the importance of such ideas. Most academic architects today teach from their own ideology and related design experience, and thus consider the type of educational model we were exploring as something intrinsically traditional and thus somehow not validated in a modern world.

Situational Issues/Cultural Component

Dubai represents a critique of the condition of modern values and the weakness of modernist design. Capitalizing on the iconic seduction of modern abstract building designs, Dubai has developed its new world at an unthinkable cultural distance from the people who will come to live there. Dubai's goal of global identity, seen here in a tour de force of scale, actually negates the very thing that gives cultural identity to a place. It has lost the human dimensions of design and the rich informational structures that indigenous work carries with it.

Over the last several decades the 20th century idea of an International Style has diminished cultures around the world, leaving in its wake a Western vision of international pretense. Our students and students around the world have been made to believe that unless their work looks like these Western models, their designs have no credibility. Other culturally rendered designs, those conceived outside this paradigm, are considered as somehow possessing less value. Even our students from Mexico look to the

famous Western designers for their inspiration, and not to the local materials, climates, practices, and traditions of their own culture. Dubai reveals the extent of this disconnect. It is the people of Dubai that carried with them the rich cultural traditions of their past and who will ultimately give identity to this unique place in the world. Just as it is the people around the world in their hometowns and villages that must be consulted before any formal vision is rendered on their behalf.

Western architecture forcefully presents its own generic and superficial culture. Its culture is a dominant ideology that places iconic forms above all else. It is a self-reinforcing logic that perpetuates itself through its abstract language. It is not a system of beliefs that can adapt to the specifics and the uniqueness of place. Rather, it seeks to disseminate its own beliefs and values across the global field of variant cultures. In a further degree of abstraction, these forms are simply imaged in the mind of some individual with limited, if any, concern about others. The fact that many contemporary designs could just as easily be placed anywhere on earth is very telling of their placelessness.

Admittedly, early expressions of architecture were often disseminated throughout the world as a means to signify the dominance of one culture over another. But before the time of modern industrial and advanced technology these forms still had to be adapted to local conditions, constructed of local materials, and made by local craftspeople who carried with them the traditions of their own culture. This adaptive process (forced by the restrictions of building technology in those times) helped to make such buildings more intrinsically contextual, whereas today's structures operate beyond any limits of place, and carry with them only the markings of an imposed ideology.

Given no clear test for what good architecture is, students these days quickly discover that if they can think of some clever explanation for their design, it will garner more positive attention from their peers and professors. This expedient draws students further away from their own lived experience, and conditions them towards an abstract way of thinking and a media-oriented justification for any type of design (by this we wish to relate architectural discourse to advertising that promotes a useless product through clever packaging). Abstract thinking too often necessitates the dissolution of information to strip an idea bare of these vital structures. While this may present some value in an academic exercise, students are never taught the limits of such exercises, and come to believe that this is what architectural design is all about. As is evidenced in modern cities around the world, this practice does not serve the human condition: it only negates the connective dimension of human life, instilling and eliciting anxious behaviors from those that must reside in the immediate proximity of these abstract forms.

Object-Oriented Design Thinking and Minimal Information

Unlike students of medicine or law, who are taught the principles of their field before they are encouraged to speculate, architecture students are asked to invent from day one of their formal education. Having no real criteria to guide their efforts, students must develop an unprecedented sense of self. This conditions

their personality and develops what would be considered negative characteristics in any other profession, i.e. an arrogance in their work that makes it unquestionable. Such conditioning establishes in students a sense that their opinion about design is somehow just as valid as that of a professional architect or an architectural professor. Remnants of the early Gestalt psychology and the co-option of the heuristic method of problem solving still permeate the educational models of modern architectural academic institutions. Without real criteria to guide design, endless subjective speculation is all you have.

Going back to the exercises such as the color panels (Section 6) that were consistently not performed as we had asked, the psychological conditioning of our students in previous architecture courses might help to explain what was really going on. One of us (NAS) has never witnessed such a total disregard for instructions from a professor: a specific project explained in great detail, following a rigorous theoretical explanation of what the exercise is supposed to accomplish, was re-interpreted according to the student's own prejudices. Ignoring our explicit instructions went far beyond the common phenomenon of homework not done; it represented instead an assertion of the student's opinion as being more valid than that of the instructor. And this uncooperative behavior was coming from students who were for the most part personable, friendly, and pleasant to work with. Refusal to do the work in the way we asked was not due to any hostility, but because it clashed with some prior conditioning.

Student Preparation, or Lack Thereof

One of us (NAS) was shocked by the lack of preparation of our senior students. It was to be expected that they might have some difficulty with the elementary mathematics of scaling, because architecture schools do not require much mathematical background of their students, but their architecture background was terribly deficient as well. Aside from those few students in the class that were already working in a practice, the others did not appear to know the simplest concepts of what makes a building stand up, nor about the user's experience of entrance, spaces, circulation realms, surfaces, natural light, etc. The students were focused almost exclusively upon formal design ideas, an approach that they were undoubtedly taught in their earlier classes. NAS talked with the past Chair of the architecture program, and tried to understand why this situation was occurring.

"I talked with my old friend who, as Chair of the College of Architecture for the previous couple of years, was responsible for a major re-organization of the curriculum to better prepare students for a design career. I was not personally involved in this effort because I am a member of another department, so there was no protocol in place to formally solicit my input. This effort by the previous Chair showed, however, that the Architecture School was concerned with improving students' readiness for their professional career. As this was a delicate topic — the possible criticism of the entire method of instruction — I trusted that our established friendship would overcome any reluctance he might have had in addressing my questions. I mentioned that I was trying to understand why my present students, who were seniors,

showed such little grasp of architectonics, even in the most basic concepts. After several conversations, my questions received no satisfactory answer, and I only succeeded in putting my friend on the defensive, which was never my objective!"

Another shock occurred with what was arguably the most design-deficient student in the class. This young lady kept to a simplistic design for a box and could not be induced to adapt her design in any way. All our conversations about climate, local needs, paths around her building had no effect whatsoever. Then one day, almost at the end of the semester, we were surprised to hear her repeat Le Corbusier's absurd dictum: "The plan is the generator, so the building is simply the simple rectangular plan pulled up, with glass façades added." That is why she had refused to learn from all the design methods we had been offering: she was stuck with this one (flawed) notion, to which she clung desperately. We could not figure out if she had been taught this in a previous class, or if she had picked it up from reading. In any case, this one slogan was sufficient to prevent her from learning anything about architecture. Because her efforts met the criteria of the College of Architecture, we had no choice but to pass her.

Conclusion

What we observed during this design studio validates our earlier findings, i.e. that formal abstraction in design only distances students from their physiological understanding and engagement with the real world. The alarming aspects of this conditioning cannot be ignored. Students trained in this "modern" architectural thinking lack the perceptual skills to see, experience, or understand the implications of architecture as a connective structure for human engagement. A more hands-on educational model is needed to encourage students to participate with the built environment in an immediate sense. The abstract nature of design and design drawings necessitates the constant and intentional engagement with real buildings. Students need to trust their instinct over their intellect. They need to be taught to recognize the sensory dimensions of the built environment that positively engage everyday humans, and which thus provides a greater sense of wellbeing. One problem that we face as educators is that few good examples of human architecture still exist within our cities. While iconic architecture may serve as a recognition of man's technical advancement for better or worse, Intelligence-Based Architecture serves the rest of us in the buildings in which we live, by connecting us with the built environment in a meaningful and nourishing manner.

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APPENDIX: Our end-of-semester exhibit that did not take place

Although our students lost a lot of time in picking up all the concepts we were introducing to them, most of them eventually did open up and indeed began to develop rather interesting and practical projects. Some of the projects contained parts that were really beautiful. We had, from the very beginning, engaged three local architecture firms to lend their staff as members of our jury, and had a full mid-semester review. The professional architects gave excellent practical advice, reinforcing our own teachings. Some of our students were finally convinced of what we were trying to teach them only after the professional architects told them exactly the same thing in the context of their own projects! If only for this reason, this was a tremendous teaching experience.

The architecture firms were happy to help us (pro bono) and were very pleased with several of our students' projects. Considering the quality of our students' work, we planned on using the end-of-semester show to structure a traveling exhibit of this work. We reserved the College's large exhibit hall to set up our main model of Dubai's existing double-loaded row of skyscrapers. Our students had prepared cardboard models of their projects to scale that fit congruently together into the large model to create an entire new urban field at the base of the towers along the Dubai corridor. Each student also had two large panels illustrating their project in great detail, to be pinned up on the walls. This was the presentation mode used for the mid-semester critique as well.

We had another, more practical purpose in mind, which was to bring our students into working contact with more practicing architects, so that our students would have an automatic introduction to a firm from which they could ask employment upon graduation. So often, an architecture student graduates only to find they have no idea of how to move towards a job. Having spent all their years inside the cloistered world of the architecture school, some students are totally unfamiliar with the world of real architecture and the way it is practiced. For us as teachers of architecture, the idea of involving professional architects as jurors in our studio served the double goal of connecting our students with possible future employers. Towards this end, we set a date for our show, and invited several local architecture firms to attend (beyond the three that had participated as jurors). We also made arrangements to videotape the model and students projects so that we could send a CD to other institutions and to the government authorities in Dubai itself.

Unfortunately, at the last moment, we were not allowed to utilize the exhibit hall, though no other exhibit ever took place in that room, and the space remained empty. Our show never took place. Two days before the photographer was scheduled to document this work for the traveling exhibition, the students were informed by the administration that they had 24 hours to get their work out of the studio or it would be discarded. Since we never understood the reason for these actions, we are not in a position to interpret them. The incident is described here only to explain why we have no illustrations for this paper.

Nikos A. Salingaros

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Theory of Architecture" (2006), "No Alle Archistar" (2009), "Twelve Lectures on Architecture" (2010), as well as numerous scientific papers. Both an artist and scientist, he is Professor of Mathematics at the University of Texas at San Antonio, and is also on the architecture faculties of universities in Holland, Italy, and Mexico. He designed the Commercial Center in Doha, Qatar in collaboration with Hadi Simaan and José Cornelio-da-Silva. Dr. Salingaros' theoretical work underpins and helps to link new movements in architecture and urbanism, such as New Urbanism, the Network City, Biophilic Design, Self-built Housing, and Sustainable Architecture. He is working with the Peer-to-Peer Foundation to promote self-built housing for the developing world. Dr. Salingaros collaborated with Christopher Alexander, helping to edit the four-volume "The Nature of Order" during its twenty-five-year gestation. In recognition of his efforts to understand architecture using scientific thinking, he was awarded the first grant ever for research on architecture by the Alfred P. Sloan Foundation, in 1997. Dr. Salingaros is a member of the INTBAU College of Traditional Practitioners, and is on the INTBAU Committee of Honor. Dr. Salingaros is one of the "50 Visionaries who are Changing Your World" selected by the UTNE Reader in 2008. In Planetizen's 2009 survey, he was ranked 11th among "The Top Urban Thinkers of All Time".

Kenneth G. Masden II

Kenneth G. Masden II is an NCARB certified & registered professional architect with licenses in New York, Kentucky, and Hawaii. He received his Post-Professional architectural degree from Yale University in 2001 and his first Professional degree from the University of Kentucky in 1982. While at Yale University he studied directly with Léon Krier, Fred Koetter, Andrés Duany, and Vincent Scully. Also during this time he worked for Peter Eisenman as the project architect on the Memorial to the Murdered Jews of Europe, in Berlin, as a project consultant with Laurie Olin on Eisenman's Cuidade Da Cultura De Galicia in Santiago, Spain, and performed the transect studies of both New Orleans and St. Augustine incorporated as part of the Smart Code by Duany-Plater-Zyberk. His work extends from the design-build of custom single family homes, to community design work including HUD (Housing and Urban Development Program) projects, historic restorations, and landscape design for the Enterprize Zone: a 7.7 Sq. mile area of Louisville, Kentucky (one of only two zones dedicated by President Reagan), to environmental restoration projects, archeological & natural resource programs, and large scale base relocation and land reclamation projects for the U.S. Government totaling nearly $4 billion in projects on which he has worked as project architect, environmental engineer, planner, and/or project/program manager, in Japan, Germany, Spain, Italy, and America. From 2001 to 2010 he was first an Assistant Professor, then an Associate Professor of Architecture at the University of Texas at San Antonio and has recently taken a position as Architect for the City and County of Honolulu, Hawaii. His research and practice are influenced by his international travels and his time spent living in Italy and Japan. His writings and professional work look specifically at human engagement with the built-environment and the adaptive and culturally driven urban systems that best serve everyday people in a multi-cultural world. His joint theories with Dr. Nikos A. Salingaros on "Architecture and Neuroscience" and "Intelligence-Based Design" underpin the recent sustainable movement in Biophilic Architecture and define human-centered sustainable strategies for emerging urban systems worldwide. His joint book with Nikos Salingaros "Intelligence-Based Architecture" is being prepared for publication by Umbau-Verlag.

Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

MISSION AS PEDAGOGICAL ROADMAP
ONE ARCHITECTURE PROGRAM'S USE OF "MISSION" TO HELP DIRECT AND FOCUS LEARNING

Michael J. Crosbie

Abstract
The mission of any architectural program needs to be well defined and articulated for several reasons. If the program is in the process of attaining accreditation from NAAB or another international agency, the mission can serve as a guide to the accreditation body as to the value system of the program and where resources and efforts are focused. The mission can also help integrate the architecture program into the goals of the larger institution. Additionally, the mission can serve as a roadmap for pedagogy within the program—at both the undergraduate and graduate levels. The mission can help direct and focus studio projects, the development of elective course offerings, the structure of foreign studies programs, and suggest ways of teaching architecture that are aligned with the program's values.

Keywords
Mission, pedagogy, accreditation, resources, identity, focus.

Introduction

One of the most overlooked, or perhaps under-appreciated elements of the architectural program accreditation process is the definition of a program's mission. This is particularly important for young architecture programs—those that have achieved permission to be considered for accreditation through the National Architectural Accrediting Board (NAAB), which is now in the process of expanding its program of accreditation to architecture programs outside of North America. Young firms seeking to establish accreditation certainly need to meet all of the student performance criteria and other elements of NAAB's conditions for accreditation, but the importance of defining an identity cannot be stressed enough. Identity can be articulated through mission, which can reverberate through all aspects of the program. This paper is written in the belief that young architecture programs need to take the articulation of mission seriously if they are to achieve accreditation—but that shouldn't be the only motivation for scoping out a program's identity. Such articulation helps to focus a program, to help decide how resources (often

meager or strained in small programs) are spent, what new full-time and adjunct faculty are hired, and lecture series are planned, and what course content will be.

History of a Mission

I write about this subject from personal experience. In 2007 I became Chair of the Department of Architecture at the University of Hartford, which was in the last leg of a multi-year attempt to gain accreditation of its two-year Master of Architecture program. A NAAB accreditation visit to the program in November 2005 had resulted in denial of accreditation, and the program was heading toward the end of its six-year window in which to achieve accreditation. Disruptions in the program's leadership hadn't helped forge its identity. Attempts to forge a mission statement special to Hartford had not resulted in anything tangible.

Within days of becoming Chair I visited NAAB headquarters in D.C. to try to determine how the program needed to sharpen its efforts for the next accreditation visit (a focused NAAB visit was scheduled in three months). I met with Sharon Matthews, then NAAB executive director. The gist of our afternoon meeting was that Hartford needed to clearly, forcefully, and believably define the mission of its architecture program. Additionally, the mission should be "nested" within that of the larger institution, that it be an extension of the college or university's mission, ensuring that the mission would not be counter to the larger goals of in institution. Matthews stressed that in defining the program and its focus, all of our other program efforts would be given a direction that made sense, and it would provide a roadmap for all our current a future endeavors.

A few weeks after my meeting with NAAB the Department of Architecture defined and adopted a mission that was part of the larger mission of the University of Hartford, which sees itself as a "private university with the public purpose," an institution with a larger mission to serve the greater Hartford community. The university's seal carries the motto: Ad Humanitatem, "For humanity." The Architecture Department's commitment to the professional education of architects grew from the initiative of several architects in the Greater Hartford region, with the support of the American Institute of Architects (AIA)/ Connecticut chapter, who in the mid-1990s met with the University's president to encourage the institution of a professional architectural degree program that would help serve the architectural community—both locally and in the New England region—and offer a choice in architectural education in Connecticut. The AIA/Connecticut chapter had championed the Department of Architecture over the years, as had practitioners throughout the Greater Hartford region. Building Community, Ernest Boyer and Lee Mitgang's landmark report on architectural education of 1996, underscored the need for greater connections between the architectural academia and the world beyond the campus.1 The mission unanimously adopted by the department in January 2007, describes it as "…a diverse community of practitioners, teachers, and students dedicated to educating future architectural professionals and growing the knowledge base of the profession. Our commitment is to engage architecture in its civic, social, and professional realms for the ultimate benefit of the built environment and

those who use it."[2]

Since adopting this department mission, it has helped the program define certain curriculum content, studio projects, opportunities for off-campus studios, and a new travel program. The rest of this paper is devoted to a series of case studies taken from different parts of the program that show how the mission has served as a roadmap for curriculum content and program direction.

Connecting with the City

One of the strongest themes in the department's mission is forging a strong connection to the state capital of Hartford and the Capitol Region. One simple way that this has been accomplished is by locating studio projects on local sites and engaging local stakeholders. In addition, the program makes a point to publicize the results of design projects to a regional and state audience through articles appearing in the Hartford Courant (Connecticut's premier newspaper). Faculty have written about studio projects and their resulting designs and the paper's columnists have served on review juries, taking the opportunity to assess student solutions in the context of Hartford's urban needs. In one instance, a project to redesign the northern edge of Hartford's central business district was described in a newspaper article written by graduate studio professor Daniel Davis. Within a day of the article's appearance, Davis received a call from the Hartford Mayor's Office, asking if the students could make a design presentation to the mayor. (Figure 1) The following week Davis and his students met with the mayor and the head of the city planning office, and walked them through the various schemes for redeveloping the neighborhood. Subsequently, one of the graduate students was offered and accepted a position at the planning office.

Figure 1: University of Hartford graduate architecture students Michael Varesio (left of center) and Gilbert Ramirez present a design for an area north of the downtown Hartford business district to Hartford Mayor Eddie Perez (far left), while Professor Daniel Davis (middle) and Roger O'Brien from the Hartford Planning Office look on. (Source: Author).

The connections between the city and the university have provided a focus for a graduate course on urban design, taught by adjunct professor Robert Orr, a nationally recognized New Urbanist architect and planner. Orr approaches the class as a review of the problems with exurban sprawl, urban decay, and the disappearance of open land in rural land—all problems that are national in nature, yet abundant in a state as small as Connecticut. The course focuses on codes, standards, regulations, and functionality as ways to remold our built environment so that it promotes neighborhoods, repairs the urban fabric, and halts unchecked development. The students become familiar with the concepts of

Smart Growth, and understood the use of the SmartCode, which helps guide planners and architects in appropriate development and the design details of six "transects" that range from rural to highly urbanized.

Orr's class has looked at the impact of New Urbanism as an alternative to the way we have typically developed neighborhoods around reliance on the automobile, cheap gas, and making what was previously unavailable available. In the U.S., these post-war changes led to standards and codes that we literally driven by the fossil-fuel consuming private transportation, developing communities around cars, which has not resulted in living environments that are best for building community. By going back and studying development before the dominance of cars, Orr helped the students to understand that much of what shaped earlier communities was actually convenience at a different scale—goods, services, and institutions in close reach that many could walk or bicycle to, making cars not only unnecessary, but also unattractive in comparison to a close-knit community.

In his course, Orr stresses that New Urbanism is not a nostalgia movement. In fact, the emphasis on "walkable communities" served by public transportation and regional transit systems is one of the more viable, forward-thinking alternatives to development and sprawl that is rapidly consuming natural resources, fossil fuels, water, and open space. In many ways, New Urbanism is one of the most sustainable approaches to environmentally responsible development and growth. It is really about sustainability. The added benefits are more humanly scaled, livable communities with a sense of place and less congestion.

Orr's critique of unchecked sprawl has been coupled with an understanding of the tools that New Urbanism uses to bring community development into balance. The class has visited several New Urbanist developments close by, such as Lowell, Massachusetts, as an example of how a small, industrial mill city has been reborn as a livable community. As Orr describes it, Lowell was so poor that urban renewal passed it by in the 1960s, "which essentially saved the place." Lowell even kept its cobblestone streets. The city has hired a progressive planner and has revamped zoning for Smart Growth. Mills have been reborn as mixed-use developments. Lowell is a case study of how an old city woke up and repositioned itself to attract Smart Growth investment, and Gen-Xers are now flocking to live there.

Orr and his class also visited Broadway in New Haven, right next to Yale University in New Haven, Connecticut, which has blossomed as an urban center catering to the university community with a vibrant mix of bookstores, cafes, and shops. Orr and his students studied how more colleges are developing urban areas adjacent to their campuses as a way not only to attract students, but also to help shape city neighborhoods that benefit the local government by adding to the tax rolls with commercial and residential development. Orr notes that this pattern of "town gown" development has been happening all across the country, and many prospective students are now making college choices based on the quality of the urban life around them.

The field trips prepared the students to design a New Urbanism community, right in their back yard. Westbrook Village is a run-down public

housing development just east of the University of Hartford campus on Albany Avenue. The site is ripe for new development, and Orr assigned his students to create a "university village" that would blend into the adjoining densities and provide a link to the Hartford campus and encourage interaction with the university community. Designs were based on an analysis by the students of the six transects of the SmartCode, which helps guide the appropriate level of development. The development schemes (Figure 2) had to provide mixed-income neighborhoods with mixed uses, a lyceum, a small school, a train station connecting to a rail line, a church, and urban farming areas. "It was a bit of a mixture of everything," Orr explains, and the challenge was fitting it on a 50-acre site while attracting students, faculty, and others to a development that would be occupied mostly by people without a university connection.

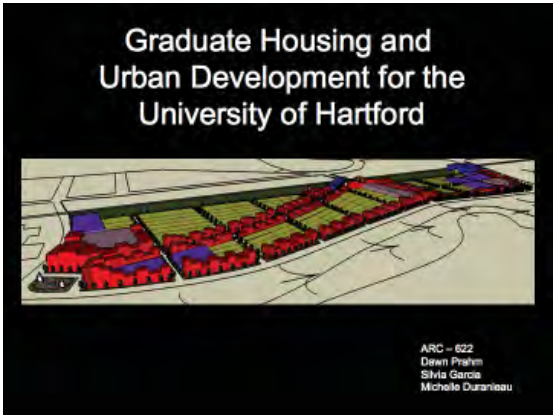

Figure 2: Scheme for redeveloping a 50-acre site just east of the University of Hartford campus into a mixed-used, mix-income academic town, including areas for urban farming. (Source: Author).

Orr's appraisal of the students' projects is that they managed to consider many factors in a short time (the entire design and presentation took place in about three weeks). Hartford Courant columnist Tom Condon was invited to the final review (Condon had previously written on several occasions on prospect of the University possibly become a partner in redeveloping Westbrook Village). In a later column, Condon wrote about the opportunities evident in the student design proposals.

Immersed, with Practitioners, in the City

The program at Hartford has a somewhat unique relationship with the state's practitioners, in that the program was started at the behest of architects, who approached the university in the late 1990s about starting a graduate program (there had been an undergraduate program at Hartford in architecture since 1994). The ties between the department and the profession remain close. The department hosts professional meetings, continuing education functions, and conferences geared for practitioners, in a close collaboration with the AIA/Connecticut chapter.

One manifestation of this close relationship with the profession is the structure of Master's Thesis studio in the last semester of the grad program. The studio meets three days a week. One of those days every week is devoted to critiques by the four principals of DuBose Associates, a firm that has operated in Harford for over 50 years. The four principals visit the studio and circulate among the thesis students, giving crits from a decidedly practice-oriented base. On other days consultants from other areas of the architecture/engineering/construction profession come in

and give thesis crits. While many schools take efforts to limit their students' exposure to input from the "real world" of practice, this program has looked for ways to maximize it—because it is part of the department's overall mission.

Professional ties, which are a part of the department's mission, have most recently been manifest in a collaborative program with a local Hartford architecture firm. During the fall of 2008, the department proposed to the firm JCJ Architecture that the architecture program establish a graduate urban studio at JCJ's downtown Hartford office. JCJ Architecture shares a mission similar to that of the architecture department, as we understand the firm. JCJ is a model for other architecture firms in its commitment to outreach, to engage and improve the urban context and the lives of the people who use it. The firm has in the past shown vigorous support for Hartford's architecture program by endowing its public lecture series and our annual student design exhibition.

The downtown urban design studio would allow University of Hartford graduate students to benefit from JCJ professionals in mentoring and first-hand experience with architectural practice. Studio projects might engage local institutions, neighborhood groups, civic organizations, or government agencies to probe needs and possible responses. Outreach through design would be the product of an educational collaboration between JCJ and the architecture program. Within a matter of weeks of our proposing the idea to the firm, JCJ President Peter Stevens and Chief Architectural Officer James LaPosta, AIA, LEED AP, announced the establishment of the JCJ Graduate Urban Studio.

This new studio commenced in the 2009 spring semester, headed by Hartford Assistant Professor Dariel Cobb. The students occupied a private studio space within the firm, and had access to the firm's architectural staff for occasional crits and reviews. (Figure 3) JCJ had shown amazing generosity in allowing our students to make use of the firm's office studios and other physical resources. According to Cobb, the downtown location, just behind the Wadsworth Atheneum (one of the oldest art museums in the country), has offered an unparalleled opportunity to explore Hartford, meet with the city's planning and development officials, and pursue projects that have a special Hartford focus. Cobb and her students spent time understanding the city's fabric, its strengths, and its weaknesses by conducting walking tours.

"You perceive interesting juxtapositions of buildings and spaces," says Cobb, who notes a different appreciation of the city in seeing it on foot, as opposed to just driving through it. "There are big gaps in the fabric, but also interesting historic structures next to modern buildings. We are trying to understand how the patterns fit together, and the continuity between new and old."

Or discontinuity. One weakness of downtown Hartford thrown into stark relief on the walking tours is how certain urban design decisions have countermanded pedestrian life and the vitality it can give to the city. Cobb notes that the location of on- and off-ramps has thwarted a sense of a pedestrian-safe zone. Elevated precincts such as Constitution Plaza, designed in the 1960s above the city's street grid, further remove pedestrians from the streets. The almost fanatical provision of unhindered access to

parking garages and surface lots also disrupts the easy flow of pedestrians, who must cautiously pass parking entrances and exits. Pedestrian tunnels and elevated walks result in what Cobb calls an "antiseptic" encounter with downtown, making Hartford "untouchable."

The best reason to study Hartford up close is that in many ways it is a textbook example of what not to do to a city. The shortcomings in transportation, infrastructure, retail, civic space, and downtown life are repeated in hundreds of small- to mid-sized cities across the U.S. Lessons learned by our graduate students here can be applied to ailing cities anywhere.

Cobb's approach to the studio is to make it comprehensive. "The city is simply a locus, a stage upon which the entire range of human experiences, emotions, and events take place," she explains. "Almost any issue in almost any discipline can be explored in an urban context." Because most of her students have not lived in a city, Cobb sees the JCJ Graduate Urban Design Studio as an opportunity to introduce them to it. "More often than not, architects

Figure 3: The graduate architecture program's downtown studio is housed in the office of JCJ Architecture, at the heart of the city, just east of the Wadsworth Atheneum and north of city hall. (Source: Author).

love the city. The intensity of its built fabric is intoxicating, the density and diversity of its cultural life is magnetic, and the layers of history written on its streets informs our understanding of the human-made world. Furthermore," says Cobb, "the city represents certain civic values that look kindly upon architecture: tolerance, respect for the past, interest in the future, social altruism, and the appreciation of the arts and free expression."

The first design project was a homeless shelter—more an exercise in nomadic city dwelling than simply a bed and a warm place to sleep. Along with providing shelter, the design had to be portable so that its homeless occupant could move it as he or she roved through the cityscape.

Students also worked on a project to "daylight" the Park River, which lies buried beneath Hartford. A research component required study of other river daylighting schemes, such as the one in Providence, Rhode Island, where Cobb and her students conducted a field trip. (Figure 4) Precedent analysis, explains Cobb, has uncovered the fact that different cities pursue river daylighting for different reasons. In Providence, the motivation was civic revitalization; in Berkeley, California, river conservation was the key; a project in Seoul, Korea, highlighted civic engagement and access. A key insight is that daylighting projects are championed by different groups for different reasons, and much of it has to do with who has the power to make such projects happen. So power, influence, and political leverage become factors in the design, notes Cobb.

At the end of the semester, the students documented their work in the JCJ Studio in a hardbound book that presented all of the projects.

Learning Beyond the Studio

The ultimate goal of education is to make students thirsty for knowledge, to engender within them a life-long journey of learning.

In 2007, Hartford-based architect Tai Soo Kim, FAIA, founded a traveling fellowship the supports the travel of a Hartford Master's degree graduate each year to further their independent study

Figure 4: University of Hartford graduate students do on-site research on a river daylighting project in Providence, Rhode Island, whose lessons they applied to a river daylighting studio project in downtown Hartford. (Source: Author).

of architecture. Students can travel anywhere they wish, but their program of independent study must include a service component (study of history, design, construction, techniques, or methods that result in service to the community or to the profession). After completing their fellowship, graduates are required to make a public presentation on campus to present the results of their travel and work.

Hartford architecture graduate Casey Nixon, selected for the first traveling fellowship, elected to extend her Master's thesis work. Nixon's thesis examined the use of modular design and construction at the Silver Lake Conference Center in Sharon, Connecticut. Nixon designed an activity center and a retreat lodge incorporating sustainable design and construction. The project's clusters of buildings cascading down the hillside site would to be constructed with a modular system that Nixon designed. This would allow people without sophisticated building skills to construct the project in and around the heavily wooded site.

The project raised Nixon's curiosity about "kit-of-parts" modular construction and the impact it could have on the quality of the lives of people in need of shelter. "When I finished my thesis, I wasn't finished," Nixon explains. She proposed to use the traveling fellowship to continue her education in hands-on construction, to further explore the design of modular components.

Nixon chose to vary her travel experiences. First she spent some time at the Yestermorrow Design/Build School in Vermont, getting valuable experience in hands-on construction and sustainability. She also studied the creation of outdoor spaces, which was an important aspect of her thesis project.

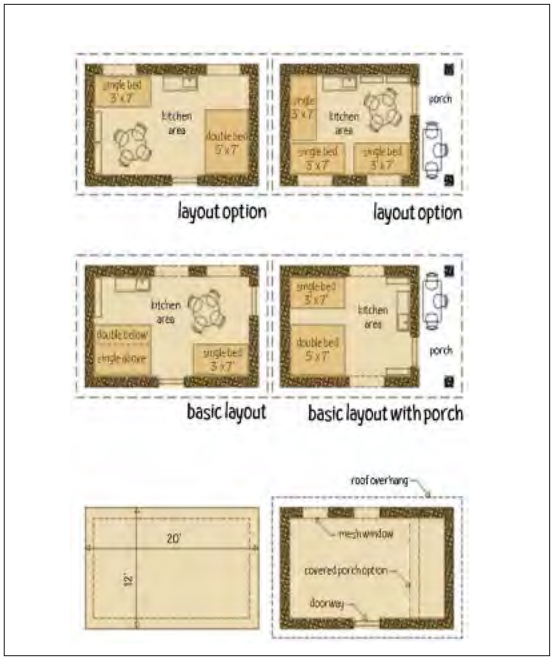

Figure 5: Master of Architecture graduate Casey Nixon's alternative designs for a series of houses for the poor in Mexico, based on research she completed for a thesis project. (Source: Author).

Nixon's next stop was Mexico. Here she worked with a non-profit group based in Connecticut to help house people in Mexico who were on the edge of homelessness. Nixon offered her design services to come up with a scheme for modest homes that would be built of modular materials that could easily be found locally. (Figure 5) Concrete masonry units and corrugated metal roofing were used because of they are easily available and their purchase helped support the local economy. She worked with a group

Figure 6: On a post-graduate traveling fellowship supported by Hartford architect Tai Soo Kim, FAIA, student Casey Nixon helps coordinate construction of houses she designed for the poor in Mexico. (Source: Author).

of untrained volunteers (a group of high school students from Wisconsin, actually) who provided the brawn for construction. (Figure 6).

The social context shaped Nixon's design. Parents find it hard to work without safe shelter for their kids. "Without basic housing, parents are forced to leave their kids at an orphanage," explains Nixon. "By providing shelter, this project allows the kids to continue living with their families." Nixon adapted her thesis designs for an affordable house where kids could sleep while their parents went to work.

"We came up with a one-room home with six different options," explains Nixon, who worked on the design with a Mexican architect, "with openings for natural ventilation." The 240-square-foot structures would fit on an affordable parcel of land. Approximately $3,000 covered the cost of a single house, which could be built in about a week after its concrete foundation is poured and cured. The houses offer thermal mass to keep

heat in during cold nights and to repel it during hot days. So far, about 12 houses have been constructed, with a goal of building 35 houses.

The third leg of Nixon's travel fellowship took her to Scandinavia to study the architecture and design of a culture that has taken modular construction to heart. For her thesis, Nixon conducted research on the precedents of prefabrication. In Scandinavia about 90 percent of construction is accomplished with prefab or modular components. "We tend to think of prefab in this country as trailer homes," says Nixon, which gives it a bad name. "In Scandinavia it is pre-customization. The options are endless with these components systems. It is very comprehensive. They whole culture has a belief system of helping people at the bottom," Nixon says, and the choice of modular design is a way of making that economically possible. Nixon immersed herself in this architectural culture in an attempt to learn the lessons of intelligent design and construction.

Nixon's experience, and the travels of subsequent grad students, seems to have reverberated through other parts of the program. Last year, 17 undergraduate and graduate students raised their own travel funds to travel to Panama through the Global Architecture Brigades to work with a rural farming community on a facility (a surf shack) that would help bring money into the town. Over the course of one week the students designed the project with the community, and they hope to return soon to help the community to construct the shack. (Figures 7 and 8).

Figure 7: University of Hartford undergraduate and graduate students traveled to a remote rural village in Panama to work with local residents to design a surf shack to promote local tourism. Photo: Brian Stancavage. (Source: Author).

Figure 8: Design for a surf shack for a small village in Panama, by 17 University of Hartford architecture students. The students plan on returning to Panama to help build the project with the local residents. (Source: Author).

Conclusion

The experiences at the University of Hartford program are special to the program given the department's history, its evolution, and its focus within the context of the larger institution.

The mission of the department has been an important element to explain to outsiders, such as accreditation officials, what the program is all about. It sets the context for why Hartford does what it does. But the mission can be an energizing force to help direct the program. It gives one a roadmap for curriculum development, for course content, for the lecture series, the hiring of faculty, and the attraction of students. More than anything else, mission can provide a roadmap for architectural pedagogy.

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Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

GREENING THE ARCHITECTURAL CURRICULUM IN ALL THE MALAYSIAN INSTITUTES OF HIGHER LEARNING- IT IS NOT AN OPTION

Abdul Malik Abdul Rahman

Abstract

Preparations toward sustainability and energy efficiency in buildings begun about a decade ago with many aspects of tangible and intangible results such as the existence of a The Ministry of Energy, Green Technology & Water (MEGTW - Low Energy Office), The Malaysian Energy Center (Green Energy Office) and the forthcoming office building for the Energy Commission known as the Green Office. Other initiatives are the high efficient motor, the increase of the electricity tariffs, the introduction of the Renewable Energy as the 5th Fuel Policy with a national campaign known as the Suria 1000 where the use of solar electricity for the building industry is encouraged. At the same time there needs a parallel development for the critical mass otherwise initial noble efforts would be jeopardized due to lack of knowledge and skill support infrastructure. Training has been going on but only for specific tasks initiated either by non-governmental organizations (NGOs) or government agencies. But as for the architecture profession, the efforts fully depended on individuals' interests and passion. This slows the process of assimilation and adaptation. There should be a thorough awareness throughout the practicing and academic architects as to the seriousness of having green buildings as the next future direction for Malaysian buildings. This paper does not attempt to set an agenda for education in architecture but rather to espouse the idea. It sets to show one way to accelerate the change in the mindsets of architects as a whole towards designing for architectural sustainability, is to revamp the architectural courses and curriculums in institutes of higher learning.

Keywords

Green architecture course, sustainability, green building index.

Introduction

It is common knowledge that to change the mindset from one viewpoint to the desired viewpoint is via education, training, and application. There is now the momentum in education to not only talk about sustainability in building designs among the professionals but also to act on it. Other countries have already applied for the so-called checklist to assess building compliance to given standards. Some examples already being applied and frequently referred to are the Leadership in Energy and Environmental Design (LEED) for the United States, the British Rating Energy Efficiency Assessment Method (BREEAM) for the United Kingdom, the GreenStar for Australia and New Zealand, the Green Mark for Singapore, the Comprehensive Assessment System for Building Energy Efficiency

(CASBEE) for Japan. India has been using LEED for their assessment and they refer to it as LEED-India. Rating levels are given as Certified, Silver, Gold, and Platinum. As a variation, the hotel industry in Thailand has their own ratings and those hotels that subscribe to this system would be rated and given the number of Green Leafs. Five Green Leafs is the uppermost, just as the refrigerators in Malaysia and some other countries have been given ratings of one, two, three, four, or five Stars to epitomize energy efficiency in energy consumption (Azusa, 2009).

For continuity and consistency, it is right that every discipline in the building industry should take initiatives towards improving and assessing this system of assessment. The Malaysian Institute of Architects is taking a proactive measure to this effort to begin by the education sector in inculcating and educating the budding architects from the relevant Institutes of Higher Learning. It is felt that to nurture is better than to enforce, although enforcement has to determine immediate effectiveness.

This pilot study is being carried out between the Academic Section of the Malaysian Institute of Architects (Pertubuhan Akitek Malaysia (PAM)) and the University of Science, Malaysia (Universiti Sains Malaysia (USM)). As a whole even Malaysian public universities are given ratings such as Research Universities and non-research universities. And among the four research universities there is a need for an APEX (Accelerated Program for Excellence) Research University. By conferring designations like this means there is a form of ranking. There are at least 20 Institutes of Higher Learning (IHL) in Malaysia and only seven provide architectural courses recognized and to be recognized by the Board of Architects, Malaysia (BAM) as shown in Table 1.

Public Universities	Status	BAM's Accreditation
1. Universiti Sains Malaysia (USM)	Research University APEX status	Part I & II
2. Universiti Putra Malaysia (UPM)	Research University	Part I & II
3. Universiti Teknologi Malaysia (UTM)	Non RU base	Part I & II
4. Universiti Malaya (UM)	Research University	Part I & II
5. Universiti Teknologi MARA (UiTM)	Non RU base	Part I & II
6. Universiti Islam Antarabangsa Malaysia (UIAM)	Non RU base	Part I & II
7. Universiti Kebangsaan Malaysia (UKM)	Research University	(In process for Part I)
Part III qualification which is the Professional qualification is the responsibility of BAM and do not fall within the auspices of the Universities		
PRIVATE INSTITUTIONS OF HIGHER LEARNING (in process for recognition for Part I)		
8. TAYLOR'S COLLEGE	Non RU base	
9. UNIVERSITY COLLEGE SEDAYA	Non RU base	

Table 1: The Seven Malaysian Universities Offering Professional Programs in Architecture. (Source: Author).

Among the Institutes of Higher Learning as shown in the table above, UTM is the oldest university to provide an architecture program. UM is the oldest university in Malaysia but the architecture program was introduce about ten years ago. There are several basic components that need to be wisely integrated to produce future architects, such as the need to interplay among the educators, students, physical spaces, the program itself, course content, and the resource center.

Conventional Course Structural Components

Lecturers, students, studio, and course content, physical spaces, and the time factors are the normal variables that are needed to carry out any typical course. The existence of students is most important, for without them there is no reason why the course should exist. Students normally look at the length of time period of a course structure provided by the institutions. To spend a longer time in one institution than the others to achieve the same recognition would not be attractive enough for most potential students due to additional tuition cost and the employment opportunity cost. Normally a minimum of five years of architectural education is required for recognition of the architecture program. Students go through courses and studio exercises determined by the lecturers of the institution, and upon assessment would then gain their degree as recognition and license to work in an architect's office before they embark on the Professional Practice Examination to qualify as a Professional Architect. Therefore, the variables such as lecturers, students, studio content, course content, and the time factor as mentioned above are important ingredients to make a successful architecture education. Of course the physical space was not mentioned because that is inherent when "studio" was referred to.

Figure 1 shows a diagram of a typical conventional architectural course structure where time and studio content are discussed in a sequence:

1. Year one to five shows the minimum time factor for an accredited architecture course.

2. A mini row column next to the year column represents a 2-week period i.e. the column to the right of the first column. Therefore each academic year has 28 working weeks with two 14-week semesters.

3. Throughout the year several design projects were given by the lecturers for the students' progress and to assess them on two basic categories of skills (i.e. their design philosophy and the ability to portray their ideas via the required methods of visualization). Design philosophy will present rational and intelligent way of providing space requirements, whether vertical or horizontal and as common to all schools of architecture all over the world, the need for plans, elevations, sections, and perspectives by mode of manual hand sketches or with the aid of computer-aided-design software.

4. Within the stretched arrows are the number and complexity of projects deemed fit by the architecture committee or the studio coordinator. Generally, the first year will have more short term projects to familiarize the architecture students with the basic skills needed for them to carry them through to the five-year program.

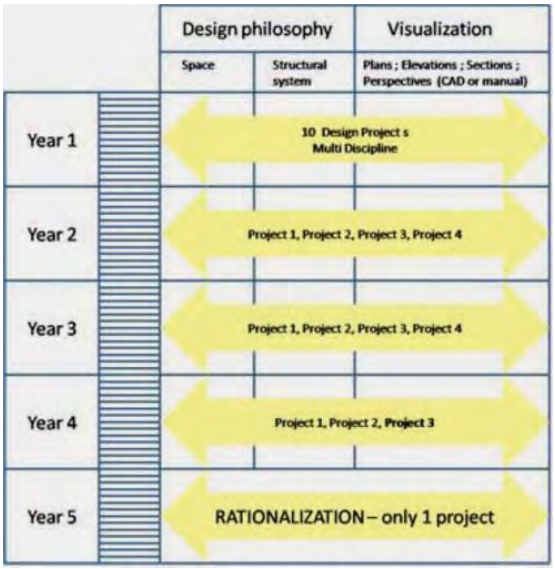


Figure 1: The present architectural studio format implemented in the institutes of higher learning. (Source: Author).

Evaluations from the point of view of sustainability were rarely done by most lecturers. Students develop design strategies from reading magazine articles such as Architects Journal, Architecture Today, Architecture Malaysia etc. (Hancock, 2008). Case studies should focus more on the successful designs that save the environment and a deeper understanding of the climatic elements in determining the shape of buildings would eventually be the norm. With the world approaching hot, flat and crowded, this has to change (Friedman, 2008).

Figure 2 shows that the trend is now towards improving the environmental performance of houses by design and material choice as a passive strategy and also from energy-efficient active systems. It shows the summary of the energy consumption for representative of domestic buildings from a simple shelter in a hammock under the shade of a tree up to the proposed bioclimatic house typology. The simplest shelter has no energy involved, so it has zero energy but it is not appropriate for living conditions. Therefore the Malay Traditional Village house was constructed responding well with the climatic conditions for the rural areas and the Colonial House epitomizes the urban prototype of a traditional house, both using less energy since at that time the population is small and development less hectic and furthermore electricity is cheap. But the modern house cut corners due to increased population and economic growth. Comfort at that time refers to material comfort and not environmental comfort, because air-conditioning was easily available. Thus energy consumption was high. With the advent of global warming, architects must develop an acceptable bioclimatic house, bearing in mind the thermal behavior as shown in Graph A below.

The arrow pointing downward shown in the circle shows that a paradigm shift is needed to examine the criteria in designing future buildings in Malaysia. To solve problems affected by global warming, one must be in a totally different frame of thinking and not in an existing frame of mind. In other words, one needs to be thinking “out of the box” with different set of design rules.

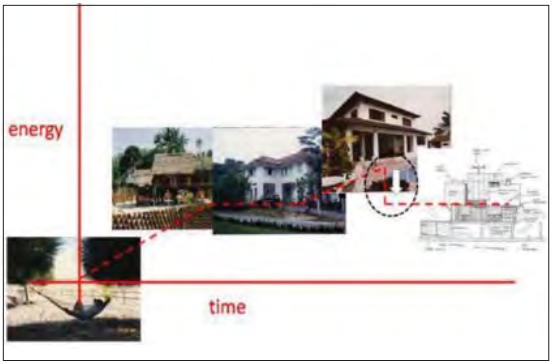
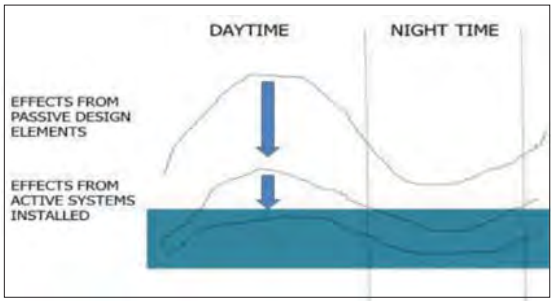


Figure 2: The sequence of domestic architecture and the amount of energy consumption that comes with it. (Source: Author).



Graph A: Graphic representation of strategies needed to reduce energy consumption in a building in Tropical Malaysia. (Source: Author).

Requirements for Changes in Studio Content

"In a speech to the 2007 AIA Convention in San Antonio, Nobel Prize recipient and former Vice President Al Gore dared architects to rise to the challenge presented at a unique moment in history, a moment when the gifts and training of the profession can play a leading role in healing our only home, the planet Earth. "Do no harm" has served the medical profession since Hippocrates first uttered those words. "Help heal the planet and serve its peoples" is a more assertive agenda, one uniquely within the grasp of the world's architects and one that can and should be vested in all schools and programs of architecture." (Andrejko, 2008).

The proposed strategy as shown in Figure 3 is being implemented in the architecture program of the School of Housing, Building & Planning, University of Science, Malaysia after the signing of a Memorandum of Understanding (MoU) (19 June 2009) between the University and the Malaysian Institute of Architects (MIA) to incorporate some form of a systematic infusion of sustainability content into the curriculum.

Sustainability related subjects normally involved the teaching of building physics or building sciences, but the way they were taught as a separate entity had little to do with the design process (Hagan, 2008). Many design tutors lack the technical know-how to connect these two elements (i.e. building physics and the building fabric design, because the physics element is intangible and not shown effectively in graphic presentation). How do you know show the comfort zone in graphic representation? Comfort and energy savings are abstract expressions and can only be expressed with the play of words but not in architectural drawings. Too often what was observed in many higher institutions was that environmental subjects were taught as a separate entity and not as an integral part of architectural design, and this had to be rectified (Al-Hassan and Dudek, 2008). Detachment would mean a missing link exists and comprehension by students would be skewed. Students would not

be well equipped for environmentally friendly buildings and not confident in giving advisory service on the requirements of Green Building Index (GBI) for achieving Certified, Silver, Gold, or Platinum (www.greenbuildingindex.org, 2009). In the realm of practice, rectification or retrofitting to the new building would be costly.

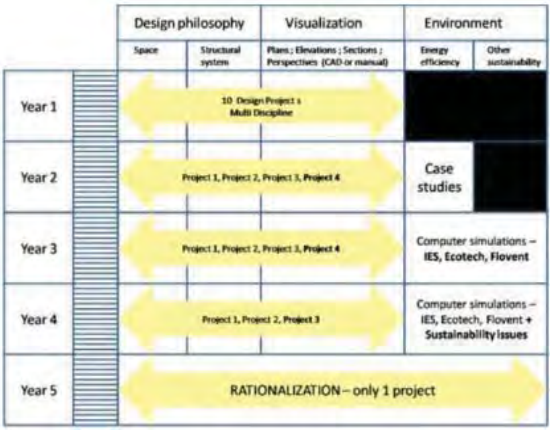


Figure 3: The proposed green studios for the Architecture Program. (Source: Author).

Where previously the studio format has only two components, i.e. the Design Philosophy and Visualization, this time there is the Environment as an added component:

1.There is no change in the curriculum set for the first year. The basics of design should be emphasized as students need to know the graphical language in order to convey their ideas. This skill will gradually improve as the students scaled up to advance years.

2. In the second year case studies of energy-efficient houses have been introduced to create awareness in the students of how energy-form relationship is possible. Students are to read about the philosophical context of the design of houses and be well-versed with the terminologies being used by the building referred to. Understanding the process is emphasized not the finished product.

3. In the third year computer-aided design software are introduced for designing three-dimensional renderings and also for animation. To add value to the design, it would be more realistic information added on the environmental performance data obtained from computer simulations, for example from Sketch-up, Ecotech, IES, etc. Simple programs like the Microsoft Excel can be utilized to calculate the Overall Thermal Transfer Value (OTTV) and for the Building Energy Intensity (BEI). These are required to obtain a GBI rating.

4. It is then expected that the students become familiar with this software and be able to do several permutations to find the best-suited design that meets the goal that they planned for, i.e. whether they are going for silver, gold, or platinum rating. This practice would hopefully give them a headstart in familiarization and the pertinent arguments regarding design for the bioclimate. In this fourth year they are then introduced to other sustainability issues apart from the specific design for energy efficiency, such as life-cycle analysis of construction materials, recycling programs, rainwater harvesting, industrialized building system, etc.

5. The fifth year comprises everything under the sun for designing a bioclimatic building project. It is a comprehensive project i.e. from understanding issues, design statement, brief requirements, application of statutory regulations, and design

proposals with inclination and emphasis on being green.

Some countries in Europe have experienced two alarming trends that resulted from this paradigm shift faced among building professionals. First, sustainability in architecture is reduced to quantitative measures such as energy efficiency by adhering to building regulations and standards (Wyckmans, 2008). In Malaysia there are several standards to be met, the most common being the Malaysian Green Building Index is the upgraded MS1525:2007. Some examples of criteria to be met are OTTV of less than 50, and Building Energy Indicator (BEI) at or below 200kWh/m2/yr. etc. Architects who feel that these are engineering problems for engineers to sort out thus feel less inclined to further delve into the nitty-gritty of the calculations involved. Architects would just rather bother with the passive design elements that engineers lack in visualizations.

Just like the GBI being introduced to rate buildings, it is proposed in this paper that in order to catalyze the teaching of the green curriculum in the field of architectural education nationwide, some form of compulsion is necessary. There are six criteria to be assessed: Energy Efficiency (EE), Indoor Environmental Quality (IEQ), Sustainable Site & Management (SSM), Materials & Resources (MR), Water Resources (WR) and Innovation (INN). The abbreviations form the codes as references and are followed by numbers to pinpoint specific requirements. Some of these codes would supplement the studio content depending on what the studio master wishes to introduce for that semester. A gradual approach of complexity would be encouraged and introduced from Third Year level onwards, with as many codes solved in any given project at the Fifth Year level. The staffs should be well-versed with the interpretation of the GBI requirements so that they are able to teach the students how to interpret the clauses into the designs that the students are to present. It is paramount that this is achieved because the need for GBI was because of the demand by the market and not enforced by the government. The market now determines the kind of service that it requires, and many foreign firms are competitive. By doing so, local architects will lose jobs to foreign companies.

Conclusion

The current climate change crisis triggers fundamental changes in building practice and our environmental inhabitation. It is no more a matter of providing equal efforts and opportunities for the three common sectors (economy, culture, and the environment) when discussing on the course content and emphasis for any discipline. At the Copenhagen 2009 conference on climate change, COP15, it was reported that the world climate temperature has risen to an average of 2o C--more than the usual average. A lot more effort by member countries needs to happen to bring down carbon emissions. This might result in overhauling economic sector priorities, resulting in indecisive and dismal conclusion of the summit.

One has to be aware that if the environment is down to its lowest ebb, the culture and economy will be fundamentally affected as well. The task now is to identify design methodologies that suit these new climatic scenarios by developing tools and techniques to mitigate local and global scale in human impacts. The Malaysian Green Building Index helps in re-conceptualizing the

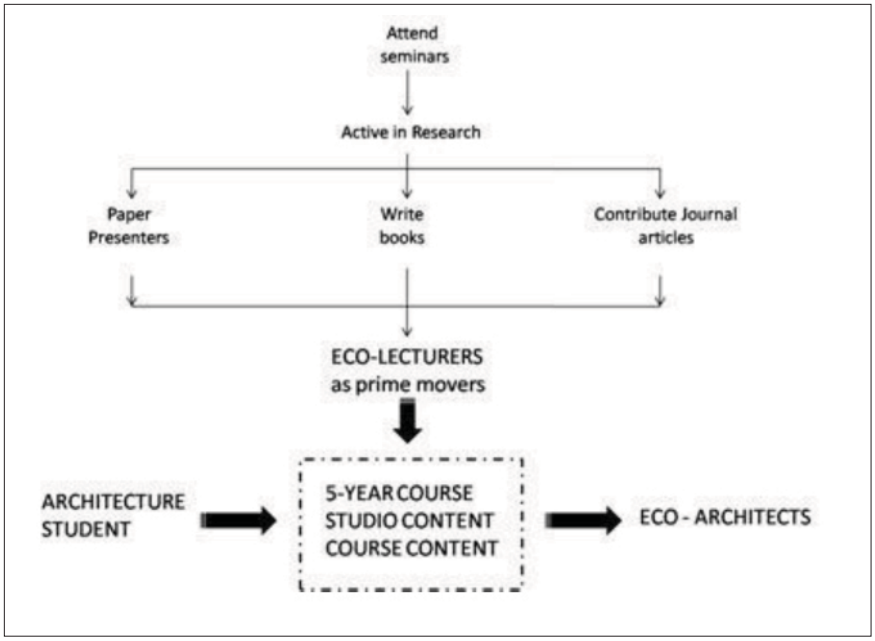


Figure 4: The path towards transformation into greening the curriculum. (Source: Author).

architectural curriculum. In it there are sustainable criteria and points to strive for which makes it easy to measure and assess. Anything that can be measured is easily managed. Therefore it is not specifically for USM to create a niche in its architectural program but should be taken up by other IHLs.

Advancements in technology will be a major breakthrough toward sustainable building practices "The question may be: why haven't we always been working with something that was compatible with Nature? Ironically, it often takes dramatic circumstances to become aware of the need to take responsibility of our own actions and to adopt all the possible solutions to wisely utilize our intellect and efficiently manage our resources so as to achieve well-being in our "habitats." However, if we succeed in using our knowledge to support and celebrate the Earth's intricate web of biological (and cultural) diversity, and we recognize nature as the very archetype of human creativity, the transition to an adaptive and carbon-free building design practice is achievable since we may already have all the know-how needed. The sustainability of our future depends on getting this right." (Altomonte, 2008).

Figure 4 shows the path towards transforming the conventional course content to be more environmentally friendly than it is at present. It is not an option but a dire need to save the world. We need buildings that are efficient,

comfortable, adaptable, and durable, but this can also mean beautiful, exciting buildings, contributing to places that make sustainable living easy, affordable, and attractive (King, 2008). The mindsets of lecturers have to change. They should attend relevant seminars, do research, and from research findings present papers, write books, and submit articles, all pertaining to sustainability. Existing lecture materials need to be upgraded or overhauled to meet climate change demands and examinations to be geared towards green building. For many of the staff in the IHLs this meant retooling, retuning or even reeducating oneself to suit new goals in not only the subjects they teach, but to incorporate them in the studio teaching.

Future lecturers must have backgrounds in sustainability, specifically those with knowledge of Green Building Index where the Architecture course at the Universiti Sains Malaysia is concerned. Existing staff are required to attend classes on GBI so that when they impart knowledge, appropriate vocabularies are used, which changes concepts and priorities in future buildings. This may reduce the influence of the iconic images of much publicized works by Frank Gehry, Zaha Hadid, Santiago Calatrava, etc. because the sustainability approach often puts more emphasis on context and locality and pragmatic solutions to produce energy-efficient designs (Abdul Samad et.al 2009) It can sometimes be contradictory to the iconic portrayal of architecture. It is a task for educators to shift the students' attention to emulate the work of sustainable architects who may not receive as much publicity or attention. The World Trade Centre of Bahrain is an exception. But once the momentum on sustainability in building designs catches on, buildings like the Bahrain WTC, though championing the green approach, would be slow to be emulated because good sustainable architecture can also mean deconstruction.

When the Malaysian Prime Minister pledged to the world that the country is going to reduce carbon dioxide by 40%, the academics must realize that it is not an option. Only in this way will there be conspicuous and tangible movement in influencing the minds of the students because the lecturers themselves are the prime movers. The architect cum lecturer can and must be at the heart of this process.

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RETHINKING HOUSING EDUCATION IN ARCHITECTURE SCHOOLS

Avi Friedman

Abstract
Architects are involved in only a small percentage of all built projects and are becoming marginalized in the huge home-building industry where other professions are moving in to profit from the need for affordable housing. The vast majority of homebuyers today view housing as a commodity and are unwilling to spend more on an architect-designed house. Architects must expand the market for their services to include a far greater percentage of new buildings.

It is my contention that the new place for architects is in the design of speculative housing as expert consultant to the developer. The practice of architecture must change emphasis to consider more social and economic concerns. The attitudes and skills currently being taught in architecture schools must change to reflect the new needs of the profession. Architects must be taught behavioral psychology, demographics, and building economics to enable them to apply their knowledge to the market, thereby rendering the architect's services indispensable to developers and the housing industry. Architectural education must play a key role in redefining the scope of the profession.

Keywords
Education, housing, speculative housing, teaching.

Introduction

A few years ago I had the pleasure of serving on the jury of the ACSA/American Wood Council Student Design Competition. The competition was entitled "HOME•EC, A Study in Affordable Housing," and was a project for designing affordable housing in a new neighbourhood in Mission Bay, San Francisco. While many of the submissions exemplified attractive and interesting design, none addressed the key problems involved in the design of affordable housing. None of the entrants had done an analysis of the likely age and family structure of potential residents; none had explored structural or detail design with cost minimization in mind; none had used principles of options-based or adaptable housing so critical to the sector; none had presented ideas for the marketing of the proposed housing; and not one of the submissions contained any cost estimation or breakdown thereof. I should note that although the program statement instructed the participants to consider most of the above design considerations, it did not require that they be included in the design solution. What I found hard to comprehend, having studied the

low-cost housing sector for many years, is how any solution to a program based on affordability could neglect such pivotal questions. The fact that students from across North America lack the knowledge and background to address themselves to the problems of a large portion of the building industry represents a significant failure of the educational system. In this article I intend to discuss the effects this failure to teach relevant knowledge has on the profession, and proposals for remedying the situation.

The Weight of History

As Joan Draper has noted, the first schools of architecture in North America were set up in order to professionalize the vocation: to differentiate "architects" from the draftspersons, builders, and contractors who freely used the title (Draper, 1986). The early pioneers of university architectural education saw "architecture" along the lines taught at the Ecole des Beaux-Arts: architecture as the designing of buildings which in themselves are works of art. The curriculum of the Ecole focused on programs of great public buildings, or private villas, as these were the building types for which one could expect the kind of patronage to make artistic design possible. Although not all methods of the Ecole were repeated in North America, this focus on grand programs was transplanted to the new university programs. These first roots of architectural education have had a profound impact on the development of the profession of architecture. Students today leave school believing that their purpose is to design museums, places of worship, and expensive custom houses. It is my belief that this orientation toward "prestigious," high-profile projects is the primary factor that makes architects dispensable for most building projects. In the United States only about 25% of buildings built involve the services of an architect (Saint, 1983) and only about 10% of all houses (Gutman, 1983). Magali Larson's examination of the architectural profession indicates that compared to such professions as medicine and law, architecture has failed to gain the same social status and high steady income. She attributes this characteristic to the failure of architects, compared to other professions, to create a dependence among their potential clientele, which she suggests is due to the existence of other occupations (civil engineers, interior designers, and speculative builders using established patterns) who compete for the same market in services (Larson, 1983).

Certainly we architects do face a widespread perception that our services are dispensable except in expensive commercial building. With respect to the services offered by most architects, this perception is not unjustified. Kenneth Frampton characterises Post-Modern architecture as large-scale packaging, where architects provide nothing more than an image with which to sell both a building and its product (Frampton, 1991). This tendency toward consumption permeates the housing industry as well. Today, buyers of new housing view their purchase in terms of a commodity, without the sentimental attachment to the "family property" of centuries past (1). Not unlike the attitudes common in the buying of automobiles, attractive packaging is only one of many factors influencing the decision to purchase a particular unit. If an architect-designed house costs 10% more than a house with comparable space and features, no amount of artistic design will endear it to the cost-conscious buyer.

Reconceptions in Architecture and Design

The current situation is very bleak indeed, a fact which has been recognized by the architectural community at large (2). It seems that to achieve a more broad and vital role, architects must expand the market for their services to include a far greater percentage of new buildings. This is not impossible; there are possibilities. There is indeed a place for architects in the design of speculative housing: that of expert consultant to the developer.

Successful developers generally have a wide knowledge of the business and practice of building. Yet at the same time the industry is notoriously slow to innovate, and virtually all developers are reluctant to be the first to try a new concept or method (3). It is my perception that developers are generally preoccupied with the economics and management of building, with product design being a secondary (though obviously still important) occupation. On the whole, developers tend to copy already successful designs believing that in this way they can minimize financial risk. However, they can be persuaded to experiment with something new if it is presented as a package that can give the product a competitive advantage. This is where the architects can make their place.

A few years ago, Witold Rybczinski and I designed a prototype affordable row-house, and solicited support from the private sector to build a demonstration model on the main campus of McGill University. Coined "The Grow Home," the house was 14 feet wide with 1,000 square feet of living space on two floors. The unpartitioned second floor remains as a loft to be finished according to the homeowner's priorities and resources. Market response was so enthusiastic that a total of 25 developers have, among them, built over 1,000 units in one year based on our prototype (4). I am certainly not being modest when I say that this "Grow Home" breaks no new ground in aesthetic theory or architectonic qualities. However, I do believe that its popularity is due to the fact that the design was developed based on a careful analysis of current demographic statistics and forecasts and socio-economic trends. Firstly, families today are generally smaller in size and need less space than conventional single-family dwellings provide. With the current decrease in household size and the increase of single-parent families, childless couples and empty-nesters, a whole new range of homebuyers, previously considered marginal, are interested in homeownership. Secondly, a 14-foot-wide townhouse is efficient in reducing construction and land costs, as well as energy costs in the operational phase while still maintaining comfort. With the gap between median incomes and median house prices steadily increasing, many young families are finding it impossible to consider homeownership. By being able to build these homes for between $65,000 - $95,000, the industry was able to provide a product that a large range of buyers can afford and that meets their everyday needs. This experience has taught me that architects can make themselves useful to the home-building industry - with the right approach to what "design" should be. We have the ability to acquire knowledge and to communicate with behavioural psychologists, demographers, and building economists, in addition to our design capabilities. If we integrate these skills to create a saleable package, the home-building industry will be able to use our services.

Which is not to say that the architect-expert would immediately be sought out by builders. It would take time to convince developers that any newfound interest in their sector of the market is not just a necessity of recessionary times. It would take time to build the confidence in architects personally, as we fought the widespread perceptions of flightiness that exist in the industry. And it would take a significantly different expectation among architects as to the structure of payment, and credit for their work.

This last point deserves some elaboration. Just as industrial designers are almost always anonymous, so too would be the architect practicing in speculative housing. Furthermore, the practice of collecting a percentage of the construction cost of built units would probably be replaced entirely by hourly or fixed fees for consultation. It remains to be seen whether professional ego could stomach such changes, but if these modifications were to enhance the economics of practicing architecture, they would be more palatable.

The Role of Education

As was noted before, architectural education has played the central role in defining the scope of the profession. If we are to reconceive what it means to design, and to be an architect, it follows that the system of educating architects must also change. At the heart of the reforms I propose is the assumption that as a training ground for a profession architecture schools must provide their students with the entire range of knowledge and skills necessary to practice. This assumption may seem radical to some who would argue that concentrating on such mundane issues as economics, marketing, and behavioural psychology inhibit the development of design creativity. This argument is, however, predicated on the assumption that the formal qualities of design are all that the architectural education is intended to teach, and that other skills should be learned in practice. Even if one does not accept the idea that the definition of design should be expanded to include a whole range of non-formal disciplines, the argument that other professional skills should not be taught in conjunction with design is patently ridiculous. Imagine if medicine or law schools were to operate on this principle of partial training.

We are all, of course, aware that nothing will change in architectural education if the changes are not rooted in the design studio. Here, then, are some suggestions for how the design studio might be modified to revive the profession.

• **Speculative Housing Projects.** Not surprisingly, non-custom housing programs are rarely assigned as design projects in schools. If we are to develop the skills of architects to function in this sector, then students should be introduced to the problems of demographic speculation, adaptability, economics, and marketing unique to such programs. What is more, by giving such assignments a place in education, we can lend them a level of prestige that might then encourage future architects to specialize in the housing field.

• **Research and Writing.** Part of the reason the formal aspects of architecture have become so dominant is that the bulk of a student's time is spent on computer drawing or modeling: manipulating shapes, materials, and geometries. This effect could be easily balanced if the

graded work of a given project was half a drawn/modeled physical design, and half an elaborate research paper on the social and economic design. I cannot support the view advanced by Philip Gartshore and Ian Mayfield (1990) that research can only be effectively integrated into design when it is made into a graphic exercise. If design is a social act, then it requires research in equal partnership with formal experimentation, and not subsidiary to it in any way. If we teach the meaning of design as such, we should have no problem impressing upon our students the importance of research and writing.

• **Details and Cost.** The time has come to break the taboo on bringing cost into the world of academic design. In an increasingly competitive world marketplace, design strategies for controlling cost will be an increasingly important part of all architects' practice. Not learning to do it systematically is an unfair and uneven handicap that schools currently impose. Furthermore, the best design with no price attached is rarely the best design when cost is a factor. In other words, compromising a design to meet a budget results in a compromised design, while using a systematic cost-controlling approach to design from the outset would not. Such strategies require the teaching of architecture at a much smaller scale than is currently done. Working drawings, far from being a chore best left for apprenticeship, could be a forum for exploring how small variations in detail can produce wide variations in cost.

• **Experts and Clients.** It is no secret that the vast majority of those who teach architectural design in North America are not familiar with the range of new design considerations I have suggested here. However, this lack of knowledge does not necessarily present a problem. Actual architectural design is an intensely social process, dealing with a whole range of people, from regulators to clients. Instead of the atelier-based system of a single design professor, one could employ a method more representative of the actual design process, whereby several specialists in different fields would contribute to the instruction of a design project, with the students having to balance their design with each teacher, and to deal with conflicting ideas and interests.

Principles in Practice

The Affordable Homes Master of Architecture curriculum at McGill University was developed based on the above-mentioned principles. The core activity of the program is personal research that culminates in a research report. The first two semesters consist of courses that are intended to equip the student with background material necessary to conduct his or her research and include an analysis of the economics of land and housing, cost reduction strategies, marketing strategies (i.e. working with developers) and living patterns and space requirements of different user groups. Representatives from the building and manufacturing industry as well as lenders, planners, and legislators are invited to participate in the program as speakers, critics, and seminar contributors. The second and third semesters are intended for the student to identify and elaborate a research topic selected from among the subjects that are currently under study in the department, but students are encouraged to propose new areas for investigation. In the first year, there is a design

studio which attempts to incorporate all these principles into design proposals for existing sites and to demonstrate the importance of dealing with the problem of affordability in the larger context of urban design. Publications based on the students' proposals are then produced and made available to the private sector and other interested parties. In one such publication, the students were assigned a site in St.-Bruno-de-Montarville on the South Shore of Montreal. The students analyzed various housing options and house prices in order to increase affordability and housing density, which could potentially result in a richer and more appealing townscape than is currently available in most suburban communities. The study exposed the team both to the concerns of municipal officials and to the needs of a property developer and the constraints of an actual site. They attempted to work in as realistic a manner as possible within the framework of existing codes and regulations, real land and construction costs, and marketing requirements. In the process of the study, in addition to examining various design options, the student design team worked with municipal officials, the Mayor of St-Bruno-de-Montarville, the City Planner and City Engineer, as well as the Vice-President of a local construction company who consulted with the project team and reviewed progress of the project at various stages. By integrating the design approach with the concerns of the "real" market, students partook in the process of designing affordable housing to achieve pleasant communities while at the same time gaining valuable insights into the concerns they would have to address to ensure the implementation of the project.

Conclusion

It is indeed ironic that the profession of architecture increasingly sees itself in skeptical terms at a time when the need for housing that deals with the rapid cultural, economic, and environmental shifts in society is so acute. Through a re-evaluation of the educational curriculum and the attitudes of the profession, a greater involvement in the housing market is attainable. Among the skills that architects must have to be indispensable to the housing industry are an understanding of marketing, behavioural psychology, and economic construction detailing, in addition to design. These subjects must be taught in the universities for them to become integrated into the overall scope of the profession. The participation of architects in speculative housing can only upgrade and improve the quality of housing available to the mass of consumers requiring affordable homes today.

Acknowledgement

The author sincerely acknowledges the contribution of David Gruber to the research and the editing of this paper.

Endnotes:

(1) Family households are moving in Canada on average every 5 years. Statistics Canada, 1981.

(2) To the point that one is constantly barraged with essays and symposia on "the end of architecture," as was titled the 1992 Vienna Architecture Conference.

(3) Marilyn A. Brown gave a particularly convincing presentation of this phenomenon at the May 1991 ARCC Symposium on "Building Partnerships for Technology Transfer."

(4) We have published two internal research reports: "The Grow Home," a design synthesis of this prototype, and a post-occupancy evaluation of several projects "Evaluation of Affordable Housing Projects Based on the Grow Home Concept," which are both available from the McGill University School of Architecture Affordable Homes Program.

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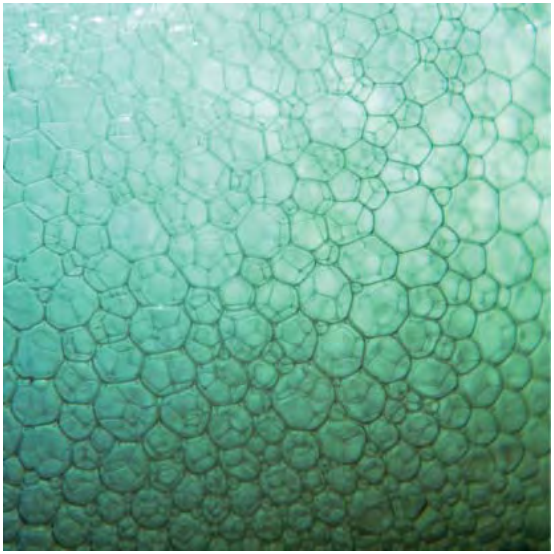
BUBBLE UP: ALTERNATIVE APPROACHES TO RESEARCH IN THE ACADEMIC ARCHITECTURE STUDIO

Gregory Marinic



What happens when architecture bubbles up instead of boils down?

Abstract
Increased connectivity among the design disciplines has radically transformed the nature of building today. Architectural education must accordingly adapt to the emerging needs of our changing built environment by providing vital, flexible, and open learning environments. Pedagogies in the academy have typically been rooted in practices that are both reluctant to change and slow to address transformative forces in an honest and open manner. Regrettably, the resilience of such top-down methods continues to bias the lens of learning toward natural performers and the notion of singular genius. Authentic attempts to react to new demands and to introduce change are all too often met with both strong resistance and profound contempt by conservative critics. Mainline architectural academia continues to project a deep ambivalence to new methodologies, alternative approaches to context, broadened conceptual practices, and advanced visualization techniques. Yet such means provide a responsive and resilient structure to re-frame content, expedite delivery, and update pedagogical objectives for the next generation.

Keywords
Architectural education, pedagogy, digital fabrication.

Introduction

Increased connectivity among the design disciplines has radically transformed the nature of building today. Accordingly, architectural education must adapt by providing vital, flexible, and open learning environments that address the emerging needs of our changing built environment. Classic architectural education has typically been rooted in practices that are both reluctant to change and slow to address transformative forces in an honest and open manner. Such top-down methodologies frequently bias the lens of learning toward natural performers and the notion of singular genius. Authentic attempts to react to new demands and to introduce change are all too often met with both strong resistance and profound contempt by conservative critics. Mainline architectural academia continues to project a deep ambivalence to new methodologies, alternative approaches to context, broadened conceptual practices, and advanced visualization techniques. Yet, such methods provide a responsive and resilient framework to re-frame content, expedite delivery, and update pedagogical objectives for the next generation.

If architecture is a living organism of historical reference, trans-disciplinary theory, social consequence, aesthetic preference, and changing technology then architectural education should flexibly interface with, adjust to, or address reigning paradigms. Today, the design process is an increasingly complex undertaking, offering vast procedural and methodological potential. Enlightened architectural pedagogies should strive to create an alternative world that is better than the one we currently inhabit.

The Beaux-Arts, The Bauhaus, and Emergence

Classic Beaux-Arts architectural education embedded a practice of justifying aesthetic bias through self-determined procedures and prescribed evaluation criteria. This philosophy promoted design output that was at once formulaic and invariable.

The inherent bias of Beaux-Arts methodologies, based on formalism and preconception, established a culturally biased framework that further justified conceptual moves in plan, section, and three dimensions. Echoes of this conventional academic legacy remain a discernable undercurrent within undergraduate architectural education in North America. And while this top-down approach imposes significant limitations, it offers the opportunity to identify and engage conventional but time-tested methods of urban analysis, building organization, and form generation. Thus, its effectiveness as a basic methodology is undeniable. The recent emergence of computational tools and approaches, however, has begun to significantly challenge the contemporary relevance of an architectural educational system based on this classic formulaic model.

As a reaction to conventional practices, the German Bauhaus movement proposed a 'Modernist' alternative. Representing a dramatic shift away from French methods toward those of the Modern Movement, the Bauhaus asserted that design was not simply a theoretical or material investigation, but rather the convergence of modern technology and mass production. While the Beaux-Arts School refused to accept this ideology, the Bauhaus embraced interdisciplinary approaches and

production efficiencies. So, perhaps, the recent interest in "complexity" in architecture is not new after all, but rather a re-acknowledgement of the multi-faceted experience of architecture. Shifting social, psychological, political, and economic forces operating against the built environment have become increasingly apparent in the age of globalization. More than any other human artifact, architecture embodies the most fundamental values and cultural preoccupations of a society. Ours has been significantly redefined by the internet, and thus its impact on the built environment must be considered in theoretical dialogue. This architectural age has been shaped by its desire to more critically connect with forces well beyond the act of building in a vacuum. As an alternative, architecture based on bottom-up, research-intensive inquiry offers the power to broadcast a powerful and lasting message that speaks to our age.

Emergence: The Rationale

In academic environments, frameworks that promote efficient, integrated, and open design environments promote the spirit of limitless exploration. Offering continual opportunities to develop a personal voice, defined by a rigorous conceptual process, is of particular significance in this realm. The studio critic should foster a methodology where alternatives are tested and critiqued, composed of a matrix of variables that address contextual, structural, programmatic, functional, technological, and metaphorical potentialities. Accordingly, the emergence of building form should not reflect the personal proclivities of the critic, or their prescribed goals and needs, but rather offer avenues for students to interpret the landscape, its user, flows, behaviors, and the inherent seen and unseen systems of the project's context. This way of working--an emergent approach--allows built form to reflect the care and complexity of a thoughtful design process. Design is then a product of inquiry and may be supported by charted and mapped linkages in the investigation.

From Top-Down to Bottom-Up

Our built environment is seldom the product of a singular artistic approach. Accordingly, it should be given the opportunity to emerge from a thoughtful process where programmatic goals address relevant physical, cultural, and technological conditions particular to the time. And while the design process is inherently guided by logic, it is profoundly dependent on conceptual creativity. Embracing research-intensive and emergent pedagogical approaches in design studio provides an atmosphere where logic and open-ended investigations lead to broader cross-disciplinary expertise, and thus increased project complexity. This bottom-up approach, if employed effectively, allows for a greater synthesis between formal proposals and conceptual underpinnings. The process tends to enable a higher level of design performance from students with less articulated skill sets. In consequence, the total output of a studio led by the bottom-up philosophy tends to result in a greater percentage of successful works than those forums guided by traditional top-down methodologies.

The rise of the Internet, and the resulting increase in access to massive amounts of data, has transformed the ability to undertake research-intensive studio work requiring technical and geographic data that is at once

accurate and time-sensitive. Additionally, the development of new digital visualization and fabrication techniques rationalizes the consideration of bottom-up emergence as an alternative paradigm to previous ideologies. Unlike conventional architectural processes, self-organizing opportunities rely less on the singular genius of an individual designer and more on the ability to collaboratively research, disseminate, transform, and deploy contextually coherent proposals. Methods that engage context in a broader sense can address sustainably grounded approaches that study change-over-time and nature-based drivers in an intelligent and provocative manner. A carefully considered bottom-up approach embeds the designer into an alternative understanding and broader definition of urban patterns, social concerns, behavioral flows, and material potentialities. Instead of subtracting the self-motivated rationale for concept, this methodology re-engages the designer into a previously uncontemplated investigative journey. Applying this approach to ecological cycles can provide a complex network of new potentialities for sustainable building beyond conventional means.

Balance and Choice

Today, foundation studios that introduce bottom-up, self-organizing processes alongside more traditional top-down methodologies allow a certain balance and choice to emerge early in the minds of young architects. For instance, the study of systems in nature can allow understanding of modulated environments, emergent morphologies, and material behaviors related to environmental performance to develop. These methods have traditionally been tied to culturally biased exemplars such as the Golden Section or Le Corbusier's Modular. Typically referred to as bionics or biomimicry, a morpho-ecological design approach, when combined with conventional theories in architectural studio, offers a high level of design competence and success for students due to its focus on identfying performance--performance that may be tested with various methods and means. By considering higher-order performance capacities based on multi-functional environmental systems, students are introduced to an endless cache of data for design inspiration and process intervention. Likewise, personal notions of order, scale, proportion, and form are influenced by intrinsic performative qualities within our world that offer exciting formal experiments and opportunities for transformation at various scales. In this case, the bottom-up approach offers a dazzling array of connectivity through its emphasis on research and experimentation. Yet this notion of evolution, adaptation, and open-endedness does not naively assume that a "projective" practice--one that reflects the world as it exists back unto itself, is simply a means to an end. Rather, the architectural process becomes a journey of discovery that pushes conceptual limits and self-given goals, while engaging pragmatic site, program, sustainable, and cultural influences as overlays that provide contextual appropriateness, site specificity, and delight. Emergent, or bottom-up, approaches embed the student in complimentary knowledge bases. As future architects, such forms of expertise may lead to greater sensitivity of forces beyond the normative emphasis on formal, structural, and basic contextual concerns.

Bubbling Up and Breaking Out

Parallel to this shift toward bottom-up methodologies, advanced computational techniques have enabled an organic design to reemerge through our ability to mathematically describe complex forms with complex geometries. Such computational techniques offer a level of academic experimentation that is certainly natural with the advent of new technologies. While formally exciting in the studio environment, full-scale digital fabrication of these experimental environments in practice has not kept pace with architecture in academia. In essence, bottom-up approaches have enabled the academic horse to pull the practice wagon—allowing academia to reassume its role as the driving force for innovative thought in the art and technology of building.

The current interest in radical form should not translate into antipathy toward the realities of building. Rather, their complexity should inspire greater commitment to problem-solving in both high-tech and low-tech ways. Naturally, the studio environment offers students a forum for testing the most interesting architectural techniques of today—a place to mediate between the ideal geometries of tomorrow and their potential in the real world. Meeting the challenge of practicality bases the conceptual academic environment within the context of problem solving. These efforts offer the potential to redirect the development and refinement of our material culture so that performance-based, truly sustainable architecture can ultimately be realized in the future. Formal computational exploration paired with bottom-up research methods offers a certain balance and control against the potential aesthetic frivolity.

Emergent Research and the 21st Century City

The cities and buildings that we inhabit represent temporal manifestations of mass, space, time, and memory. The development of 21st century urban space and architecture can be re-conceptualized through an emergent lens. How do such environments grow, transition, and transform? How does the integration of digital conceptualization tools with physical matter produce increasingly malleable architectural organisms, flexible spaces, and transformative assemblies?

With the advent of digital methodologies, cities, buildings, and interior space may be conceived more fluidly in terms of information. This shift from analog means to digital systems of conceptual design and material production enables a more profound interaction between designer and audience. A need to address such issues in design education framed our intent for a research-intensive undergraduate design-build studio examining the Bushwick neighborhood of North Brooklyn. The studio sought to postulate how built form can blur the boundary between mapping and making of cities, buildings, spaces, and places.

Emergent Exemplar: The Bushwick Project

The undergraduate architectural design studio environment offers untapped potential for advancing unconventional approaches to design research and teaching. Framed through the lens of an alternative pedagogy, our semester-long collaborative studio investigated urban emergence in the conceptualization of a design-build interior environment. This effort

attempted to architectonically synthesize notions of place and culture and indentified the neighborhood context of post-industrial Bushwick, Brooklyn as a laboratory of urban, social, and demographic data. The studio approached this endeavor from a bottom-up point of departure, casting its lens on the current relationship between information and production asking: How does an increasingly enhanced complicity between architect and audience inform the design of urban spaces, architecture, interiors, and objects? The studio philosophy attempted to re-propose how architectural space could be reconceived through alternative approaches to examining context. By working through allied disciplines to explore architectonic potentialities, the studio sought to expose how interior environments can transition, transform, and grow from contextual inputs. It worked toward fusing digital conceptualization tools with physical matter toward the production of a malleable architectural organism—a construct that could modulate interior space through its transformative assembly.

Blurring Boundaries

The studio attempted to blur the boundaries between the design process and the act of building itself. By identifying anthropomorphic relationships, morphologies, and change within a Brooklyn neighborhood undergoing significant gentrification, students sampled the context for site-specific data at various scales. These opportunities were considered through the study of various material conditions and connective operations particular to the neighborhood, then rapidly tested through mapping and digital fabrication processes. A series of focused charrettes keyed into emergence at various points of contact.

A pedagogical goal of reconnecting students of architecture with informal approaches to building within significant constraints was central to the studio. Students were introduced to the complexities and compromises inherent in contemporary architectural practice, whereby they designed, managed, procured, and ultimately deployed built form. Likewise, the project compelled students to cultivate a personal approach to imagining space, while simultaneously working toward a collaborative solution. Perhaps most importantly, the project allowed students to reconsider various traditional processes of making from generative-to-full-scale.

In practice, the design process is typically based on the formation of a project team, where various constituencies engage toward the ultimate delivery of a master plan, a building, or an interior space. In this project, this team was effectively the studio critics, the students, the hypothetical abstract "client"—an alternative gallery in Bushwick; and a series of visiting critics, advisory groups, and jury members that helped guide the design process. We attempted to express an openness to explaining the practical realities of the process of making in architecture and to generate a sense of collective ownership. This approach offered a relevant equivalent to the real world architectural decision-making process—a process that is at once collaborative and team-generated. Team-based aspects of this project allowed students to test their individual efforts against those of their peers. The atmosphere provided opportunities for valuable interaction, allowed information interchange,

fostered imagination, encouraged bottom-up learning, and inspired original hybrid creativity to emerge. Team experiences tended to mediate against promoting overly autonomous control over the design process—a valuable lesson with implications encountered later in professional practice.

Stretching Sustainability

This project attempted to further sustainable discourse by engaging with critical social and ecological imperatives. Design approaches were selected to reduce the waste stream, promote sustainable production, and enhance zero carbon/zero energy initiatives. The temporal, and in a sense, throw-away nature of interior environments was considered —resulting in the imposed constraint of local materials re-purposing. Ninety-five percent of the resulting ultra-light-weight built environment was created with pre-used stock provided by Materials for the Arts and collected through self-initiated reclamation efforts.

Revealing a contextual connection particular to North Brooklyn was central to this project. Environmental inputs were identified, documented, and then taken through a series of hand-generated and computational transformations. The resulting output was charted into a mapped sequence of moves rooted in this process. Ultimately, the interior environment's site-specific identity, spatial sensibility, graphic symbolism, and materiality connected with implied origins in the context--formalized as an experiential space.

Exposing students to the client experience was perhaps one of the more challenging aspects of the project. Our client, a small alternative gallery in Bushwick, Brooklyn, provided a 400-square-foot gallery space as installation space and design directives. Their intentions heightened the need to work within client-imposed constraints, an inflexible opening schedule, and the expectation of a zero-cost installation.

Manipulating Materials

By allowing the investigation of ideas through hands-on manipulation, the simple act of making offers a classic and timeless tool for testing spatial concepts. Studying contextual and figural conditions through making revealed unexpected opportunities not typically found within hand-drawn or digitally generated architectural methods. Exploiting the ambiguity and juxtaposition of local form, materiality, structure, color, and texture for the cause of architecture, as well as for art, engaged these processes toward an interdisciplinary relevance applicable to both worlds. Our processes attempted to unearth influences unique to Bushwick.

Engaging architecture students directly with notions of making in other artistic disciplines was an integral aspect of this project. Young designers benefit from that greater sensitivity that is derived from experiences beyond the building scale. This project employed exercises architectonically relating to the disciplines of fashion design, interior design, and photography as up generators of unexpected opportunities. Five sequenced charrettes were introduced during the semester that highlighted the inter-relationship between the practice of making in various realms of art and design

and its implication on problem-solving during the conceptual, design development, and construction phases of an architectural project. These exercises were carefully calibrated to gradually identify material, connective, and contextual consequences in ascending scale.

Each of the charrettes charged students with exploring the medium by researching materials and creating three-dimensional space. The process encouraged them to actively collaborate. Students were required to work in increasingly larger groups, which led to collective conceptual ideas to emerge. The phased sequence empowered far greater design freedom through its unconventional abstraction. The projects included the manipulation of an anthropomorphic object, an extensive materials investigation/exploitation, an exhaustive field photo shoot/analysis, and testing of component parts. Our first exercise identified the transformative potential of reconsidering the relationship of structure to skin.

Structuring and Sheathing

An introductory charrette focusing on human relationships between structure and skin was initially used to address the smallest scale of space-making. Vesalius' De fabrica, with its series of intricate and detailed drawings of human dissections referencing allegorical poses, Le Corbusier's Modular, and Leonardo's Vitruvian Man were employed as classic precedent equivalents. As an intimate exploration of a body in space, the effort acted as a springboard for a series of explorations that culminated at the scale of a room.

To launch this process, the studio revisited an approach previously undertaken by Diller + Scofidio. Their investigation, Bad Press: Dissident Ironing (1993-98), explored the architectonic capabilities of Oxford shirts re-imagined through the everyday domestic task of ironing. By performing operational techniques against the shirts, such as buttoning, folding, and pressing, Diller + Scofidio revealed unanticipated opportunities for both the material and resultant wearable objects. Our studio re-employed their approach by using it to investigate joinery connections at actual scale, material performance, and the relationship of a body in space.

The inherent capabilities and anthropomorphic characteristics of a white Oxford shirt were tested to reveal material characteristics toward determining topological and functional potentialities of skin (shirt) and moving structure (body). The charrette required students to test operational techniques against the shirt, photograph the process, generate an instructional guide describing the shirt's reconfiguration, and assembly of a graphic catalog of the transformed white oxford shirt. The process referenced linkages to building skins, whereby the fabric of the shirt assumed the role of a secondary, transformative, and performative layer for the body.

The power of language was engaged to approach architectural design from a reactive point of departure. Students identified qualitative terms that described spatial qualities, rather than subjective terms. These terms were used as generators of actions performed against the fabric and original assembly processes of the shirt. The end result was a wearable

Figure 1: A Transformed Oxford Shirt Manipulated and Modeled by Evelyna Averyanova.(Source: Author).

garment that better suited the owner due to its performative and constructive particularity.

Sorting and Story-telling

A parallel goal of the studio was to improve the visual communication skills of the students. The investigation of the previous exercise was deployed into the format of an illustrative catalog. Each student expressed the personal nature of their process by graphically representing it and showing their shirt with and without a body. Here, the process of making the catalog was linked to the processes of collecting, analyzing, editing, and framing. The subjective nature of photography and photographic processes was engaged.

Cataloging required students to clearly organize and disseminate their methodology into a series

of clear and sequenced parts. Using hand-drawn and digital techniques, catalogs resulted in sophisticated and provocative presentations, specifically tailored to the identity of the author and their original construct. This story-telling process highlighted the sequence of material transformation, deconstruction, and re-assembly.

Connecting and Conveying

The third charrette familiarized students with how connective conditions can be identified, investigated, tested, and ultimately exploited by examining the connective relationship between two bodies in space. Offered several material choices and operational opportunities, students were asked to explore potentialities revealed by a material, and a pair of selected operations operating against it. The selection of materials and operations established a dialogue of active and reactive forces, as well as the interconnectivity of three primary elements--axial tube, a planar surface, and connective tissue.

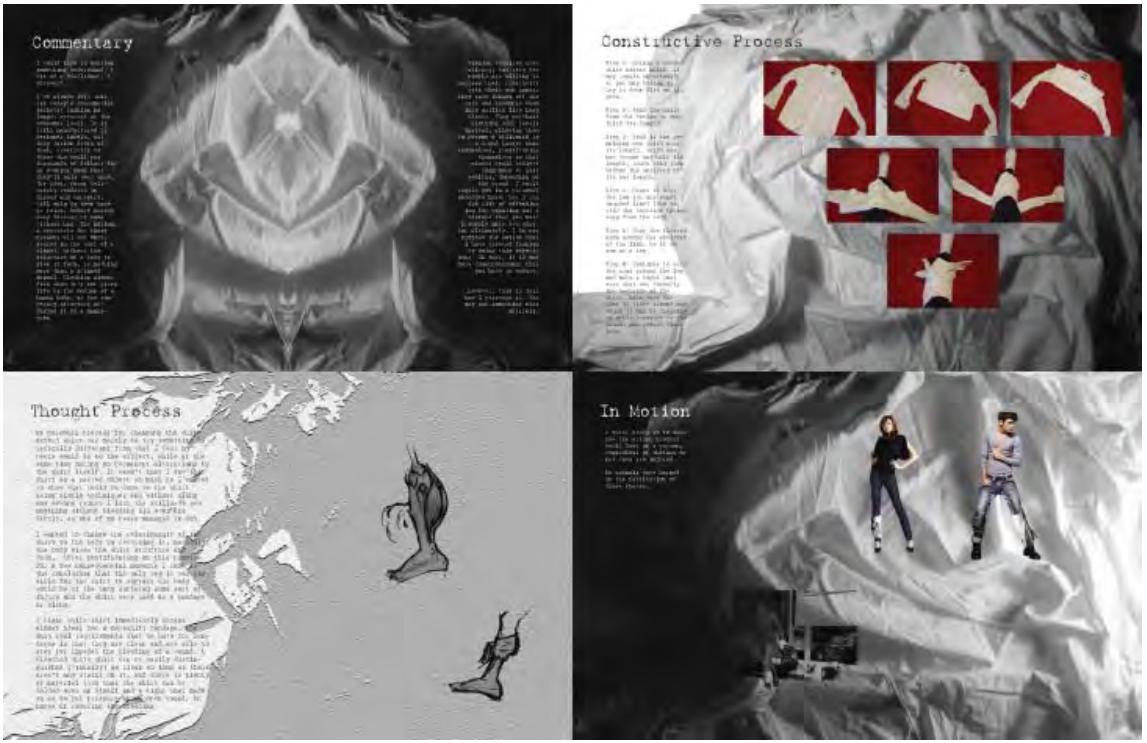


Figure 2: A Transformed Oxford Shirt Catalogued by Silvia Portilla.(Source: Author).

The exercise abstractly introduced the future conditions of the site--a gallery space in an artists' kunsthaus. Students were offered an exhaustive suggested list of materials to exploit, as well as a series of primary and secondary forces to explore through the mediums. A specified cubic volume of space was used to circumscribe the exercise. Within this space, students were created a series of spatial models that manipulated an axial wood element, a planar wood surface, and connective tissue.

Figure 3: Connective Operations: Planar Surface, Axial Element, Connective Tissue. Models by Bartosz Tarnawa, Piotr Szalega, Yaya Kobayashi, Phillip Morgan, & Yaya Kobayashi. (Source: Author).

Patterning & Postulating

This phase of the project required students to formulate an emergent site-based approach re-imagining the Bushwick district through a collaborative lens. The charrette familiarized students with how site-based data could be used as a ground-up generator of space and form by considering the potential relationship between interior-designed form and a larger

urban context. Bushwick offered a richly diverse platform for historical, industrial, and demographic research. Site-relevant formal and material inspiration was identified through found objects, captured patterns, and observed behaviors operating across the district. Students explored, examined, and employed site-based influences through careful investigation and time analysis of conditions specific to this unique neighborhood.

Hunting & Honing

Viewing, capturing, framing, staging—these were the tactics engaged by the students to develop an original interpretation of Bushwick. All that encompasses or surrounds a point in space defines that space. Therefore a place is defined by its contextual materials or surroundings. Using a digital camera, they embarked on a collaborative image-collecting field study of the neighborhood within a precisely one-mile radius of the gallery. The larger district offered an opportunity to key into material conditions, patterns, and forms as design generators. With the knowledge that a design-build endeavor can be derived from the immediate environment, students mined the Bushwick vicinity for data. Materials, colors, shapes and patterns were drawn from the surrounding urban geography.

Figure 4: The Field Photo Shoot. (Source: Author).

The task required collecting a large number of images that were then edited and selected. Multiple individuals or groups of individuals were involved in the image-capturing effort, based on various narratives of their own choice. Images keyed into patterns ranging in scale from broad-based to miniscule. These patterns were used as material generators, pattern references, and scaler generators for digitally-fabricated study models.

The End Game

A defined geographic area was defined for focused investigation and student teams were encouraged to collect found objects. Activities included the recording of visual and textural patterns at various scales, cataloging graffiti, and identifying material samples for testing and ultimate reuse. Materials were manipulated and connective operations tested, eventually revealing the potential for an environment constructed entirely of light elements such as repurposed masonite, metal wire, plastic, and colored paper. Testing was conducted hand-in-hand with pattern exploration applied to space-making. Student teams engaged a process of trial and error through postulating, hands-on building, and use of digital fabrication. The testing of constructs gave students a virtual library of potential building methods and material connections.

Figure 5: The Interior Space and its Digitally-Fabricated Ceiling-wall Installation. (Source: Author).

As student teams progressed through these stages, teams were combined when certain synergies in process and/or materials usage emerged. The narrowing field correlated with a greater ability to test environments at larger and larger scales without increasing time expended. Ultimately, two teams with compelling original proposals were considered. A logistical assessment was then conducted for each project defining the materials and time needed to fabricate and install each scheme. Once a clear strategy of time (low) and materials (free) had been established, students identified the most viable project and then converged as a single construction team for successful installation of the project.

Emergence Critiqued

Through this series of charrettes and resultant full-scale light construction, students gained valuable insight into place-making and space-making in a world where resource management, delivery distance, and adaptive reuse determine the real parameters impacting the environment. These circumstances should not be seen as limitations, but rather, as new opportunities of an architecture that speaks directly about place. Certain design decisions in this studio were made quickly due to time constraints. Thus, the investigation may have gained increased connectivity between place and space if, for example, production time was extended or materials were broadened--a greater importance could have been placed on more advanced structural capabilities. Likewise, the previous knowledge base and inexperience of this particular group of students added additional layers of limitation on the project. Future projects guided by this approach should more carefully consider the pre-existing student skill sets, available time, and materials available. A successful design process relies on both bottom-up and top-down methods of organization, and so, the process must remain open to the interplay of both forces throughout the process.

By engaging emergence, or a bottom-up approach, this studio attempted to reveal a broader and deeper approach to context in Bushwick. Here, we intended to apply a rigorous research investigation that translated circumstances into an event fixed in space. Yet, the project partially reflects the spirit of a place interpreted by designers with their own personal biases and/or preoccupations. This is the reality of emergence. For while it is indeed far more liberating than a conventional top-down approach, it would be naïve to assume that the human tendency to frame the world through one's own lens can be entirely erased. And frankly, should it ever be? Future exploration of such notions will provide on-going topical research opportunities for this team of educators and architects. Such investigations will continue to ponder our own roles and original voices in the interpretation of both place and space as architects of a certain age.

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THE DESIGN PROCESS – MAKING IT RELEVANT FOR STUDENTS

Keith McAllister

Abstract

Within the ever-changing arenas of architectural design and education, the core element of architectural education remains – that of the design process. The consideration of 'how' to design in addition to 'what' to design presents architectural educators with that most constant and demanding challenge of "how do we best teach the design process?"

This challenge is arguably most acute at a student's early stages of their architectural education. In their first years in architecture, students will commonly concentrate on the end product rather than the process. This is, in many ways, understandable. A great deal of time, money and effort go into their final presentations. They believe that it is "what is on the wall" that is going to be assessed. In an era of increasing speed, immediacy of information and powerful advertising, it is not surprising that students want to race quickly to presenting an end-product.

Recognizing that trend, new teaching methods and models were introduced into the Stage 02 undergraduate studio over the past two years at Queen's University Belfast, aimed at promoting student self-reflection and making the design process more relevant to the students. This paper will first generate a critical discussion on the difficulties associated with the design process before outlining some of the methods employed to help promote the following; an understanding of concept, adding realism and value to the design process and finally, getting the students to play to their strengths in illustrating their design process like an element of product and promoting personalization of the design process for each individual student. Frameworks, examples, outcomes and student feedback will all be presented to help illustrate the effectiveness of the new strategies employed in making the design process firstly, more relevant and therefore secondly, of greater value, to the architecture student.

Keywords

Architectural education, design process, design Studio, student experience.

Introduction

Currently it is an exciting time in both education and architectural design. Both disciplines face similar challenges, with constant change, uncertainty and increasing complexity set against a backdrop of continuing technological advance.

Yet within this ever-changing setting, the core element of architectural education remains

- that of the design process. It is intrinsic to the subject of architecture. To design, states Salama (2005: 18).

"... is to undertake a series of activities that lead to desired end results."

While this might seem initially straightforward, it highlights an important distinction – it is not only what to design, but how to design that is the crux of the matter.

So the challenge in architectural education is, if teaching design, "how do we best teach the design process?" Commonly students are taught in the system described by Wade (1977: 10) as the "studio method." With regard to Stage 02 Queen's architecture students this is indeed the case. The students are given a place to work. They are then given a series of design problems that increase in complexity over the year. They receive tutorials twice a week during a project, culminating in an end of project crit. Projects vary in length from one week to ten weeks in duration. A project brief is distributed among the students at the start of the project. This would outline the site, context and proposed building criteria alongside the intended Learning Outcomes for that project. At the end of the project, evaluation and assessment of the student's proposed design solution take place.

Understandable, yes. Straightforward, no. For therein lies the main problem in teaching architectural design. The assessment is one that concentrates and focuses on the product of the students' efforts, not necessarily the process. Therefore the very real danger in the studio is that students will concentrate their efforts on the product – the end of project design – and in so doing ignore the development of the essential skills that will aid them later in their careers. Lawson (2006: 7) summarised this by stating:

"one of the weaknesses of the traditional studio is that students, in paying so much attention to the end product of their labour fail to reflect sufficiently on their process."

Yet it is student self-reflection that we want to promote. So as tutors we have to ask ourselves some fundamental questions: "How should this imbalance be readdressed? What can be done to ensure concentration on product and neglect of process does not happen in our studios?"

Before seeking a solution to a problem it is often beneficial to first study the pathology of that problem. Why do students focus on the product?

At stage 02 there are many contributory factors. These include, understandably, the need to compose an end product for their final review and crit. A great deal of time, effort and money goes into the students' final presentations. They realise that it is what is on the wall and in model form at the end of the project that will be discussed and therefore assessed. Also, at stage 02, the students' communication skills are improving at impressive rates. It is during this year that students are taught how to use a number of Computer Aided Design (CAD) drawing packages. From the outset with their new skills, the students want to produce eye-catching graphic images and so we find ourselves subjected to a barrage of fractal geometric shards in techni-color brilliance, more dystopian than utopian, and simply a celebration of the CAD package itself. Also, in a time of increasing speed, the immediacy of the World Wide Web, mobile phones and powerful advertising, it is unsurprising that students want to

proceed quickly to presenting an end product.

To further complicate matters, the design process is itself a difficult and almost mythical beast. Lawson, (2006: 81) highlights this when stating:

"... we must not expect the design process to be as clear, logical and open a process as the scientific method. Design is a messy business that makes value judgements between alternatives that may each offer some advantages and disadvantages. There is unlikely to be a correct or even optimal answer in the design process."

So in dealing with the challenge that design itself is subjective, Lawson is asserting that for the design process, there may not even be an optimal solution. If this is the case – how can we as tutors first encourage the students to enter into this "messy business" and then secondly, critically assess this component of a project? As stated by Biggs (1999:149) "We assess to see what students know..." If we cannot accurately and fairly assess, it is unfair and unreasonable to expect students to immerse themselves in the design process. Moreover, if we cannot accurately assess, how can we as tutors best provide useful feedback to our students?

As if that were not enough of a problem, O'Cathain (1982) makes a persuasive argument that design is in fact - illogical.

Subjective, messy and illogical as descriptors of a subject are just about enough to dishearten the tutor, let alone the student. But when just about to throw in the towel, it is worth reminding ourselves of the value of the design process. It is the skill that students will take into their further studies and workplace. Mastery of the design process will allow a practitioner to take on any challenge.

Therefore, one can agree with Lawson (1994: 3) when he states:

"So what should we do to investigate design? Quite simply, we must do all we can."

So what can be done? The following pages outline two main strategies implemented over the past two years in the Stage 02 Architecture Course at Queen's University Belfast. These are:

1. Firstly investigating and searching to see what are the strengths and advantages that may be made clear to the students within the complexities and difficulties of the design process. If able to illustrate the importance and advantages of investing into the process, it might help encourage the students to concentrate on it more.

2. Adding value to the design process in the eyes of the student within the studio by making it an area of assessment that plays to the students' strengths – ironically, that of communicating product. Moreover, add further value to it, by inviting the students to take ownership of their work by personalising the design process as their own.

Student feedback was sought from the current stage 03 students a year after they had been first introduced to the implemented strategies in stage 02. This was in an attempt to evaluate and appraise both how successful these initial strategies were and how they might be made better. On the basis of the feedback received, a new framework was made for a major studio design project for the current stage 02 students. This is described with observations at the end of the paper.

Promote the Benefits of Investing in the Design Process

"If something is worth doing, it is worth doing well," the adage goes. But unfortunately, it does not expand to say what to do when that something is difficult. In fact, why do it at all? Therefore with the students, it is necessary to "sell" the design process. This can be difficult but it is worth doing. Yes it can be frightening because in effect the student is being asked to enter into the unknown. O'Cathain and Howrie (1994) ably describe this by contending,

"thus the design process is one of devising and experimenting, a process of rapid learning about something that doesn't yet exist by exploring interdependencies of problem and solution, the old and the new."

But therein lies the true excitement of the subject – the unknown. It is also arguably what tertiary level education should and must involve – intellectual uncertainty. As described by Barnett (2007:147),

"If there was no anxiety it is difficult to believe that we could be in the presence of a higher education."

Explaining this to and supporting the students in this might seem overly simple, but it is something that can be overlooked. The students always welcome constant encouragement. Highlighting that, "the most powerful learning occurs when the student is dealing with uncertainty." (Dewey 1938:32) can be a strong motivating factor for many of the stronger students.

Illustrate the Design Process

With students often being fixated with architectural product, it can be strategically worthwhile downplaying this element in seminars. Instead, the design process can be promoted. This can be done in many ways. In introductory lectures we were able to illustrate a range of architects' design sketches, concepts and diagrams. These would be accompanied by the minimum number of images of the completed building required to put the design process into context. Asking the students to reflect on how and why a building had been designed in the way it had, proved to be a powerful aid in getting the students to consider the processes undertaken. Schon (1995:79) describes the design process as a "reflective conversation." It is a conversation that students will enter into if invited.

Explain and Simplify the Design Process

It would be both conceited and false to believe that as tutors we could demystify all of the complexities of the design process in a two-semester studio period for the students. However that is not to say that we should not attempt to make it more accessible to the students.

This was first done last year in the Stage 02 studio by requesting that the students present a concept model for a project in the first semester. This had to encapsulate their "aspiration" for their building, in this case a Seedbank – a research and educational base for promoting meadowland fauna. Purposely it was restricted to twenty centimetres square in area to try and get the students to condense their ideas into one simple model. From this the students were asked to develop a praxis and parti for their design – a simplified diagram encapsulating the essence and organisational devices behind the student's design (Figure 1). Crucially the students were asked at the end of each week to revisit their concept model and update their parti. This was

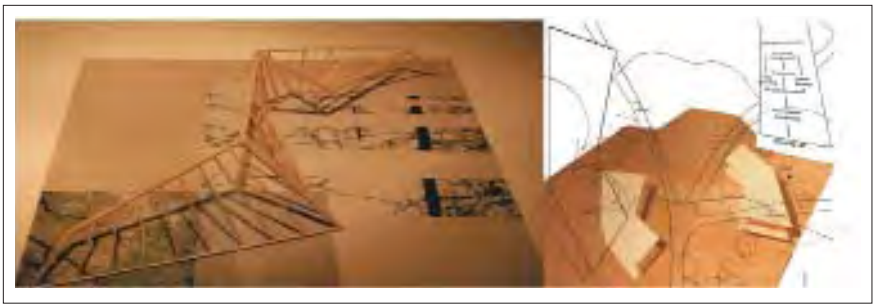

Figure 1: SEEDBANK—Concept Model, Praxis and Parti Model-Daniel Waterstone 2009. (Source: Author).

for two reasons, firstly, to encourage self-reflection and refinement and secondly, to avoid a purely linear design model.

The advantages of self-reflection for students in architecture are many, Appraising, prioritising, evaluating and consideration are all useful attributes in the workplace.

Avoidance of a purely linear design model is an important consideration. At first sight a linear model might appear both sensible and even desirable. It would certainly simplify the process and bring a logic and certainty to the process. However in doing so, it oversimplifies. This is both dangerous and limiting, as summarised by Lawson (2006:33) when explaining,

"Many writers have tried to chart a route through the process from beginning to end the common idea behind all these 'maps' of the design process is that it consists of a sequence of distinct and identifiable activities, which occur in some predicable and identifiably logical order. Unfortunately... these assumptions turn out to be rather rash."

Instead the design process is demanding and complex. However, giving the students an identifiable starting point has merit. While initially appearing prescriptive, the actual concept and its influence becomes the preserve of the student. What the concept is and how it is implemented and integrated into the design is up to the student. Also, developing an understandable parti too has merit. While Schon (1995:78) points out "For a student in the field – the multiplicity of voices is confusing," the benefits of simplification are well illustrated by the award-winning architect Michael Wilford, who stated that, "I like to see things encapsulated in one small image." (Lawson 1994:110) Being able to reduce the complex to a simple and coherent diagram shows order and understanding on the part of the student.

Make the Design Project Process Cantered

A simple yet effective method of concentrating the stage 02 students' minds on the design process was carried out for the first time in 2009 in the second semester. In an eight-week urban design project concentrating on the design of a literacy centre for east Belfast, no building brief was issued until the fourth week. Instead the students had to develop design site strategies for the site based purely on the site's potential.

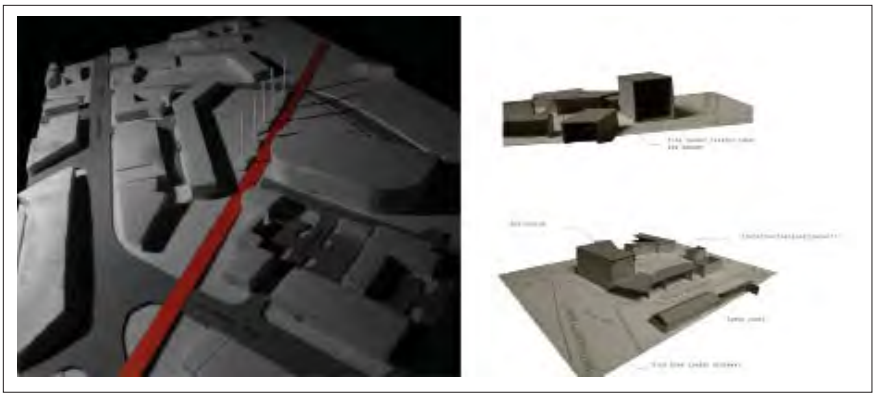

Figure 2: LIERA-C-(IT)-Y Site Strategy and Subsequent Massing Models—Chris Gaule, 2009. (Source: Author).

This initially caused great consternation among the students who repeatedly asked "when are we going to get the building brief?" However, by questioning the weaknesses of the site, the students were able to propose design solutions to the specific site problems (Figure 2).

Simply by putting the product temporarily to one side, the students were able to come up with design possibilities and strategies by asking questions relating to the site. The noted Czech architect Eva Jiricna illustrates the importance of this when she stated,

"The design process is finding the questions: there is always an answer to every question. You have to find the questions and not the answers; then it is only a matter of time to find the answers, but the question is the difficult part." (Lawson, 1994:48).

For many students, realising that there are always design answers and solutions and that the process is not something to be feared was a release. Getting the students to ask the correct questions was not overly difficult as that was in part, our responsibility as tutors.

Within this stage and then afterwards, the students were encouraged to use a sequential self-assessment model to help develop their design in terms of process. This was as shown below in (Figure 3). This was carried out at each stage by the students and checked on a weekly basis by the tutors. This led the students to self assess their work on a regular basis, an important benefit as described by Race (2001b: 6),

"Self assessment skills are invaluable in the context of life-long learning and are useful to students in their continuing professional development long after they have gained their university qualifications."

Adding Value to the Design Process

If considered important or worthwhile, students, like all of us, are much more likely to apply themselves to any challenge. Two different strategies have been employed in the design

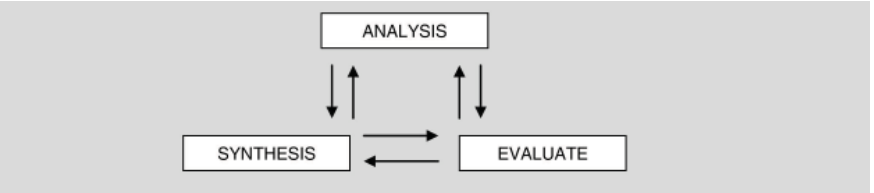

Figure 3: Students Self-Assessment Design Process (After Lawson 2006:40). (Source: Author).

studio over the past two years in an attempt to increase the awareness of the value and benefit to the students of investing in the design process. These are by promoting the design process as if "product" and by trying to individualise the design process for each student.

Treating the Design Process as a Product

"Assessment defines what students regard as important."(Brown 2001: 4).

A simple yet effective tool in promoting the design process as important was to make it an element that would be assessed. In the studio, Architectural Design and Architectural Communication are assessed – both are elements that are product based. If adding the design process into the mix as well, we effectively raise its profile in the studio. Also, importantly, if we do indeed "assess to see what students know…" (Biggs,1999:149), the design process does need to become an element monitored and marked to effectively check and appraise the students understanding of this element. But the question is, how should this be best done?

As the design process is not a clear-cut linear, sequential progression, how is it possible to check its progress? A checklist of benchmarks to be achieved or met would be simply impractical – how might an assessor know beforehand where a design might lead a student?

A potential solution might be to assess progress from one tutorial to the next. However once again this option is not without problems. Often design is reliant upon the "creative leap" – sometimes planned, sometimes not – an act that propels the designer's scheme forward to a different level of complexity, inventiveness or resolution. This can happen at any stage of the design – or, it might not happen at all. How can one assess fairly and evenly over a number of weeks when students will work at different rates, in different ways and often in different scales and media. This can be even further complicated by different levels of architectural ambition, with varying "sparks" and "flashes" of creativity? Also, if continuously assessed we run the real risk, with regards to the student that "their want to learn is damaged." (Race, 2001a: 35).

Instead an alternative method used in the main design projects in the stage 02 studio was to treat the design process as if a product. Students were informed from the outset that their design process would be assessed. It was explained to them that the fairest way of doing this was to ask the students to submit one or two A1 sheets illustrating their process and that these would accompany their main design drawings (Figure 4).

Figure 4: SEEDBANK—Site Location, Site Plan and Process Sheets—Chris Gaule 2009. (Source: Author).

The process sheets would then be assessed alongside the students other drawings and any submitted models at the final review crit. Students would then have the opportunity to describe their process and how that impacted and informed their subsequent design decisions and completed design solution – the final product. Students were specifically asked to include a concept image and parti so that they would have a definite starting point for their process sheets. This also served as a comparative aid for the students if peer reviewing when attending the review crits of their colleagues. Peer assessment skills can be valuable to one in the architectural profession who often has to work in a design team as noted by Race (2001a: 6) when he stated,

"Peer assessment skills are important when as professionals; one is expected to work often in a team scenario."

However there are further benefits in asking the students to present their process and design development at the end of the project. In order to do so, the student has to reflect, analyse, evaluate and then consider their process before presenting. This is of great benefit – it was especially pleasing to see the students recording their design sketches and photographing rough working models for that purpose. In doing so the students have to give careful consideration to their process by summarising and editing their design development. The hope is that a student summarising, as stated by Race (2001b: 109), is "a useful learning experience."

Moreover, treating process as an element of "product" simplifies assessment and feedback for the tutor. It puts the emphasis on the student to communicate this with the resultant added benefit of further development of their communication skills. It allows peer comparison. Importantly, it also facilitates tutors to see whether or not relevant Learning Outcomes are being met as advocated by Brown. (2001: 6).

The production of drawings and models and the opportunity to communicate them in their final

presentation excites many students. Treating the process as if an element of product often motivates the student to engage with the design process. In doing so, these students become involved in a deeper approach to learning than might otherwise be the case.

Individualize the Design Process for Each Student

Standardisation is an increasingly common trait in contemporary society. This trend also extends now to architecture with accepted styles and organisational rules championed to ensure accepted design propriety. Yet when dealing with individuals, this is potentially dangerous and damaging. Consider the popular backlash against modernism when architectural language became primarily a kit of parts to be borrowed and used as required, rather than a people-centered craft responding to individual need and regional identity. (Frampton, 1992: 314).

What can be forgotten all too easily in the architectural studio is that the students, too, are individuals, with their own personal experiences, hopes and dreams. In effect, the students are our clients, wanting to be excited and engaged. Making a subject of interest to a student can increase their enjoyment and engagement with that subject--so too with the design process.

Specifically, the design process is an area where a student's own values and personal interests can become design generators. A designer's own "preferences and prejudices" can personalise a design, thereby helping both "gain the interest of the student" and making the project appear more relevant to them. (O'Cathain & Howrie,A, 1994) Promotion of the personalisation of a design project and encouraging the student to "leave their mark" can be an effective method of encouraging the students to embrace the process.

But how can this be done?

To gauge potential strategies for promoting student design personalisation, the current stage 03 students were first asked in a questionnaire:

1. How they felt they were able to personalise their design process, and

2. Where in the design process they felt they were able to best implement this. In particular, the students were asked if they felt if they were able to personalise their work at early stages, especially when using the previously advocated concept, praxis and parti design aids.

With regard to how the students felt they were able to personalise the design process, the majority of the students' responses stated that they felt that they were able to personalise their design work by the following;

i personally picking the aim and aspiration for their project;
ii having some flexibility to individualise the parameters of the project;
iii being able to draw upon their own past experiences;
iv individualising the methods of making their models and choice of graphics;
v choosing the initial design generator for their project.

Overwhelmingly, the students described their desire for personal choice, welcoming the opportunity to personalise the design process.

By doing so, they were making it specific to themselves. In particular, choosing the aim and aspiration for the project was stressed as being very important to the students and a vital starting point. This assertion was made very clear when the students described how they actually used and engaged the aids of concept with praxis and parti in their design work. Most noticeably, the majority of the students thought it was important to have a concept, often drawn from personal experience that could be repeatedly referenced during their design work. This then helped inform their later work.

In doing so, the students therefore recognized an important interim stage between concept and the use of praxis and parti – one that would allow their aim, ambition and aspiration for their project to creatively and positively influence their design. This is an important distinction – especially if a concept is going to be something that can inform and aid in later design decisions. An abstract idea unable to be transferred into actual form is of no real use in this regard.

Rather, as depicted in (Figure 5), the students' responses described what they felt was a necessary linkage of concept into their design work, thereby using the concept to help clarify later design decisions.

What is also noticeable is that the students believe it is the concept stage where they feel that they can most definitely personalize design. It is here that they see their personal choice being most important in helping formulate and individualize their design work. In many ways this makes sense – if able to make their mark at the outset of a project, a student is more likely to follow it through engaged to the end.

This relationship was perhaps most eloquently described by one student (Figure 6) as entering into a dialogue between concept and later design decisions, stating that the shout of the site can be heard by all, but the poetic murmur of the site will be heard and interpreted differently by individuals due to their different backgrounds, experiences and interests. It is this that will then most clearly individualize different students' work.

It was acknowledging this key factor that was used as a generator for a project with the current stage 02 students earlier this year. With the aid of award-winning architect Dominic Stevens, a schedule was developed to help introduce the project. This was developed to allow immediate

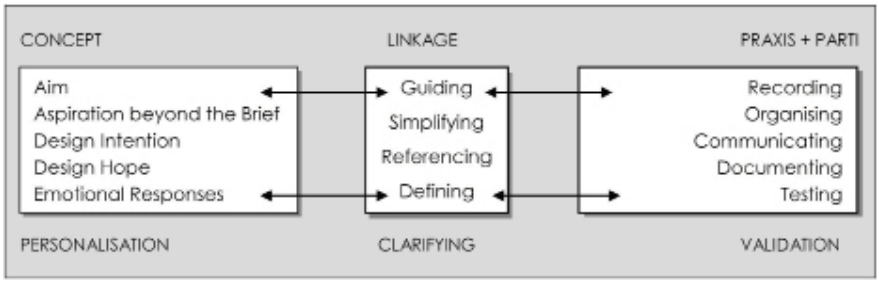

Figure 5: Stage 03 Student Description of their Use of Concept, Praxis and Parti. (Source: Author).

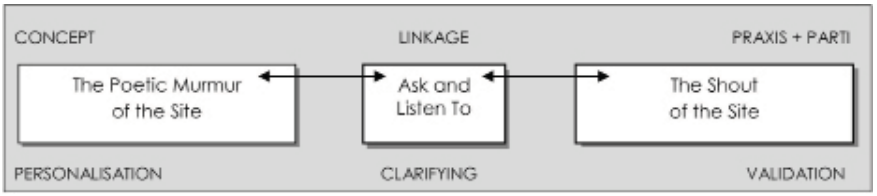

Figure 6: Stage 03 Student Description of their Linkage of Concept, Praxis, and Parti. (Source: Author).

personalization of the project and thus ensure that each of the students had a useful and clear starting point.

To reinforce this, at the start of this year, before the project began, the stage 02 students were all asked to convey their "architectural manifesto." This was to help see what was important to each of the students and something that could be referred to throughout the year. This was not only a reference point but also the opportunity to stress to the students the importance and validity of having a voice in design. It also allowed the students to express their interests and provide a useful reservoir of ideas for the subsequent projects throughout the year.

At the start of the Seedbank project in 2010, once again for the design of a research and educational base for promoting meadowland fauna flora in a woodland setting, the students were asked to come up with one single idea or aspiration or feel for their building. It was thought appropriate to promote the use of only one idea, in the belief that a single idea if taken seriously can lead to complexity.

For the one idea, the students were encouraged to develop an aspiration for the building formed from their personal experiences or thoughts. This could be from childhood memories, an immediate instinct to the brief or site, wood land or previous personal experience. Right away students were encouraged to draw. If unable to draw something immediately, the students were asked to list words describing their aspiration and then make diagrams from the words. Alternatively the students were asked to draw quick sketches of the site, helping to identify what exactly was important to the student. (Figure 7) Drawing as a way of finding out what was important to the student was advocated, bringing immediacy and personal feel into the process for without the "distancing and flattening" effects of computers. (Pallasmaa, 1996:12) Just as important in this regard is the practical and realistic observation made by Robbin (1994) that "drawings are the most common currency of the student-teacher exchange."

At all times it was felt important to stress to the students the need to draw and for the students to bring their personal aspiration into the project. In this way it helped make the project more relevant to all abilities in the year group. All viewpoints and thoughts were tabled between the students and Dominic Stevens in group sittings. If initially unable to pinpoint a single aim, the previously completed students' manifesto was used to help identify an important ambition or aspiration that could be used as a starting point in the project. This helped fire the imagination of students of all abilities across the year group. This also helped overcome a problem noted in

Figure 7: SEEDBANK—Site Sketch and Development Models—PC Wan 2010. (Source: Author).

the previous year that sometimes it was only the stronger students who found the use of concept models useful and were able to link them to their design work. However, for other students it was an element divorced from helping later design development. But, as stated by the noted architect and educator Peter Wilson (2006: p44), "an explanatory diagram is worth a thousand words in keeping a confused student on the straight and narrow." Therefore the initial drawing can be both start and beginning of a dialogue between student and tutor for the student in their design. It can also inform their later design work. An example is shown below (Figure 8), where the student very much wanted to make the building a continuation of a woodland path on the site.

Crucially, as the project developed the students began to realize that their aspiration was not only there to incorporate their signature into their project but also allowed further design analysis and clarification – the important link between

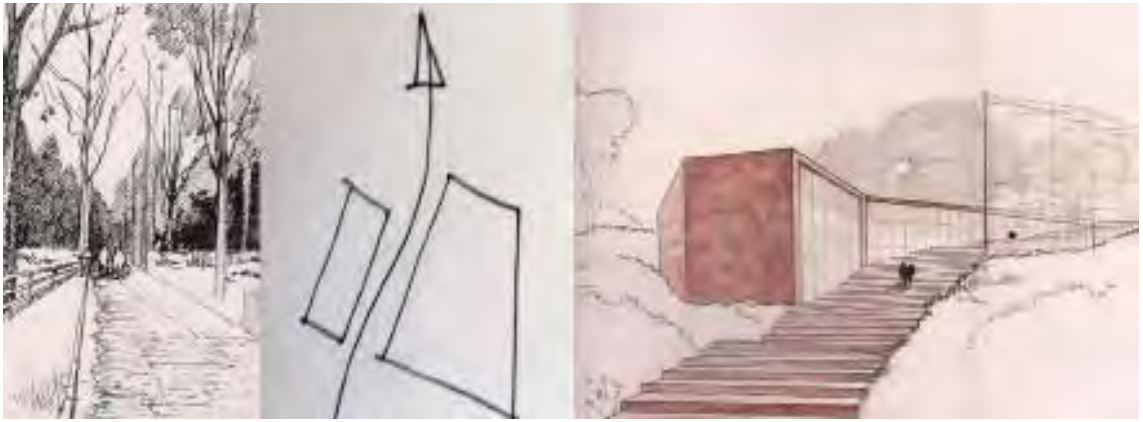

Figure 8: SEEDBANK—Site Sketch, Praxis, and Final Perspective—Julian Maney 2010. (Source: Author).

the design aids of concept and praxis and parti. If a concept is going to be referenced and a useful design generator, it makes sense that it is both personal and individual to the designer. If it is of genuine interest to the student and not a total abstract notion, it is much more likely to be meaningful and have a positive influence on the end design.

Conclusion

In many ways the effectiveness of this approach – treating the design process like an element of "product" will only become apparent at the end of the year when the current stage 03 students are graduating and we can see if their final grades are improving. Certainly to date the average mark in the stage 02 studio has increased markedly compared to previous years. Since mastery of the design process should result in better quality design projects and higher studio marks, these are pleasing statistics. However, more immediately pleasing are the responses from the students suggesting that implementation of this strategy has given them a better understanding of the design process.

It would of course be wrong to assume that concentration on process alone is recommended. The act of design is to produce and there does need to be a final product at the end of the process. Often, the ideas and decisions made in the process will remain the sole preserve of the designer. They will not be available to the public who come afterwards to view and experience the completed work. The acclaimed architect David Chipperfield (2009:35) makes this important point, stating,

"Architecture is an unforgiving reality. It is experienced and judged in isolation without any guide to explain or justify the decisions of the architect; it is what it is."

In effect, what there is to see, is – what there is to see. The process itself is rarely celebrated. However, with students in the early stages of their education, it is vital to help them come to grips with the "messy" business of design. An understanding of the design process is essential. Being able to break it up and simplify it is necessary. Later on in their careers, with greater experience, they will be able to cope more quickly with the many challenges inherent in design. However, if we as tutors and educators add value to the design process in the eyes of the students, we are much more likely to encourage them to come to grips with its difficulties.

It is therefore only a start for the student in what one hopes is a long and successful career. As someone still grappling with the vagaries of the design process I can personally testify to Lawson's (1994: 137) statement that,

"Designers bring their own intellectual programme with them in each project. In some cases this programme is a lifetime of study and development and has been laid out in books, articles and lectures."

But at least it is a productive start.

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PROCESS-BASED LEARNING: TOWARDS THEORETICAL AND LECTURE-BASED COURSEWORK IN STUDIO STYLE

Hatem Ezzat Nabih

Abstract

This article presents a process-based learning approach to design education where theoretical coursework is taught in studio-style. Lecture-based coursework is sometimes regarded as lacking in challenge and broadening the gap between theory and practice. Furthermore, lecture-based curricula tend to be detached from the studio and deny students from applying their theoretically gained knowledge. Following the belief that student motivation is increased by establishing a higher level of autonomy in the learning process, I argue for a design education that links theory with applied design work within the studio setting. By synthesizing principles of Constructivist Learning and Problem-Based Learning, PBL students are given greater autonomy by being actively involved in their education. Accordingly, I argue for a studio setting that incorporates learning in studio style by presenting three design applications involving students in investigation and experimentation in order to self-experience the design process.

Keywords

Design studio, design process, constructivist learning, problem-based learning PBL.

Introduction

A major curriculum change was adopted by myself and applied as an alternative to a theoretical course in architecture. The prior course was a lecture-based course that described form, circulation, components, function and design programs of buildings. The buildings were examined as finalized end-products and students perceived the buildings as typical and "ideal" design solutions. Being detached from the design studio this approach left little room for exploring design alternatives. This course followed a teaching ritual that disseminated theoretical reasoning to existing buildings and overlooked the benefits of examining the factors that impinge on the design processes. Since lecture-based courses are not linked with an applied educational setting, the knowledge gained was usually overlooked by the students.

Lecture-based education is a prevalent model in higher education. In architectural education, lecture-based curricula tend to be detached from the studio and deny students from applying their theoretically gained knowledge. Studies on past and present academic training have

indicated that practicing architects have diverged away from understanding the opinions and evaluations of the public. (Edwards, M., 1974; Groat, L., 1982; Devlin, K. 1990 and Gifford, R. et al., 2002). Meanwhile in undergraduate architecture education efforts to bridge this divide by integrating theoretical coursework with the design studio have hardly been documented.

With extra emphasis on conceptual design-thinking in studios and on theory in coursework, design education is veering away from overcoming practical concerns and solving problems. At the global scale and within the past 30 years, schools of architecture have witnessed extended attention to more abstract architectural theories dominating the schools' scientific method such as geometrical formalism and deconstructivism that have veered away from practice (Brown, G. & Gelernter, M., 1989). Architectural education is therefore diverging from the pragmatic issues of the discipline.

Furthermore, design studios are characterized by the ritual of producing designs involving "appropriately" performed procedures and actions (Maya, J. A., 1988). These vague procedures are formed by tutors' explicit or implicit view of design being creative and intuitive and therefore cannot be taught (Purcell, A.T., 1985). Studio instructors may also believe that the design studio is already the practicing ground for design training, an active mode of learning or "learning by doing" (Schön, D. A., 1987). While this may be true, the assumption is based on isolating drawings with no room for investigating the consequences of their designs or involving post occupancy evaluations of existing buildings. This suggests that the drawing board alone cannot involve students in investigating the outcomes of their designs.

Moreover the design studio barely incorporates theoretically gained knowledge from coursework. Students are often troubled as a result of courses being removed from practical contexts with an overall process lacking in clarity (Nelson, W. A., 2003). For the student, design is opaque in essence because the structure and logic of the design situation and process is seldom explained. On the other hand, the learning process inbuilt within the design studio acquires an abstract form of reality representation on the drawing board inheriting a limited view of the outcomes. The design studio is therefore mistaken for an applied approach, which in reality involves decisions to be made and designs to be created and remain on paper.

Both instructors and students struggle to identify the succinct success of the design at hand. Meanwhile, the more diverse and specialized theoretical coursework becomes more effort to integrate theory into the design studio is required. Furthermore, the disjointed arrangement between faculty being separately appointed to teach theoretical courses and others appointed within the design studio further impedes the integration of theory into the studio. While students are always required to incorporate their gained theoretical knowledge within conceptual design frameworks, methods integrating architectural disciplines and theory with design have hardly been delineated. We are inevitably in need for students to apply and critique lecture coursework using self-acquired knowledge. This can only take place when students are left to experience design using more applied teaching methods.

Experiencing Education

Without involving students' own experiences in their education it seems hard to assume that students would be able to think critically and understand how theory is constructed. Schön (1987) highlights how design inherits a dimension of experimentation that allows one to test her or his understanding of the design at hand and explore new phenomena. Schön's writing suggests that experimentation takes place in learning by reflecting upon past experiences. Similarly, Dewey (1963) also presents a philosophy of education emphasizing experience, experiment, and purposeful learning involving the acquisition of cumulative knowledge. He further states that the role of the educator should not repel but engage students in enjoyable activities for promoting desirable experiences. Accordingly, education needs to be explorative, exciting, stimulating, and enrich the experience of education.

Student motivation is increased by establishing a higher level of autonomy in the learning process. On the other hand, instructors' involvement and bias is reduced when their role changes from being informants to becoming directors of education. Simultaneously, by developing students' research and analytical skills, students acquire the tools to gain self-learned experiences. Furthermore, by incorporating theoretical issues within design projects, students are able to critically examine and self-construct theory and further integrate theory within their design assignments. In this light I propose an approach involving two simultaneous objectives to design education to bridge the divide between theoretical coursework and practice:

1. Coursework in studio-style. This involves restructuring coursework for implementation in studio style. As an alternative to the design studio ritual solely taking place on the drawing board, theoretical issues are incorporated within the design studio by engaging students in experimental design applications. Concurrently, theoretical curricula are developed with the purpose of involving students in the design studio using models and simulations or realistic design situations. It is therefore necessary to create a more autonomous yet controlled educational environment for design training.

2. Process-based learning. This objective aims to develop a process-based learning context involving students in a guided exploration of the process of design. Consequently, the design applications mentioned above should allow students to actively investigate and assess each stage of the design process. This requires instructors to create design applications that allow for relevant learning issues (LI's) to emerge. I therefore present the value of a process-based design education as a method for students to examine design using self-gained experiences.

To demonstrate, three design applications have been structured and presented below. The applications are part of a course in design methods and taught to junior students of architecture. The methods and results of three consecutive years of my observation of students in model making to experience the design process are presented below. First, I argue for a process-based design education that involves theoretical disciplines within design projects. For this purpose I suggest employing both principles of constructivist learning environments and Problem Based Learning PBL methods.

Lessons from Problem-Based Learning PBL and Constructivist Learning

Problem-Based Learning (PBL) was first introduced at the McMaster University Medical School in Canada in the late 1960's as its major teaching approach in response to what were perceived as the limitations of traditional teaching methods. The underlying idea behind PBL starts from a learner wishing to solve a problem, question or puzzle. Its widespread application has been in the first two years of medical science curricula. It aims to counter for students' memorizing of information and their lack of knowledge integration by motivating them to actively gather and analyze information.

PBL is not a mere problem-solving task that requires students to apply information by the teacher to solve a given problem. Conversely, PBL guides the design of the curriculum (Boud, D. & Feletti, G., 1997). Problem solving requires students to apply information provided by the teacher to solve a given problem. Meanwhile, with a PBL framework the problem comes first and students identify the information required to solve the problem. In medicine students in a PBL group generate learning issues LI's that may later become a course topic (Koschman, T.,Phillip, G. & Conlee. M., 2000).

Of the main characteristics of PBL, teachers act as facilitators to guide students to acquire self-directed learning skills, giving them the opportunity to learn and think on their own (Miflin, B. & Price, D.,2001). The role of the instructor remains actively responsible and might, however, yield some of their authority in the classroom setting (Allen, D. E., Duch, B. J. & Groh, S. E., 1996). Most PBL is well fitted to medical education, however much of it is incorporated in other disciplines such as social work, engineering, business, law, economics, management, mathematics, education, introductory university science, agriculture, as well as architecture (Boud, D. & Feletti, G., 1997). Subsequently, most PBL models have followed the example of the medical school, but have been differently adapted to the distinctive requirements of other disciplines.

The architecture department at the University of Newcastle, Australia is the first architecture school to adopt PBL principles (Drake, J., 2003). At Newcastle PBL is successively applied in stages of increasing complexity throughout a four-year course by specifically integrating technical and design areas (Maitland, B. (1995). However, Rambow & Bromme (1995) illustrate the substantial difference between medicine and architecture, particularly concerning specialist knowledge where architects' knowledge is derived from diverse areas of science and differing aesthetic and stylistic viewpoints. Hence the main difference between architecture and other sciences remains in the range of theories offered by the diverse discipline areas of architecture.

Architectural education is challenged to incorporate architecture's diverse and sometimes disjointed, discipline areas within a unified framework. Nonetheless, PBL indicates that coursework should allow students to identify design constraints in particular contexts thus addressing individual theoretical concerns. Consequently, the challenge in architectural education is to be able to create design assignments that can independently and collectively incorporate architecture disciplines areas.

Constructivist learning principles involve creating applicable environments suitable for learning.

Accordingly, constructivist learning environments incorporate curricula by involving students in self-assessing their design proposals. One of the many definitions of constructivist learning environments fitting to architectural design training is explained by Wilson as "…a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities" (Wilson, B. G. 1996. p.5.). Collectively involving students in exploring diverse solutions promotes knowledge construction and counteracts inexplicit instructor "guidance" that is seldom if ever explained.

Furthermore, constructivist models for learning elaborate on how one comes to understand. Savery & Duffy (1996) highlighted the primary propositions based on constructivist philosophical literature on learning and include the following conceptions: [1] "Understanding is in our interactions with the environment" where learning takes place as a result of our interactions with a given context for learning; [2] "Cognitive conflict or puzzlement is the stimulus for learning and determines the organization and nature of what is learned." Here a problematic situation creates incentives for students to determine and acquire knowledge; [3] "Knowledge evolves through social negotiation and through the evaluation of the viability of individual understandings." This assumes that learners are central to the education process by accounting for the relevance of what they learn as they construct their own understanding. Constructivist learning environments can therefore adopt different course objectives providing that students are collectively stimulated to participate in problem solving activities.

Constructivist principles create stimulating conditions for learning environments to promote self learning. Similarly, PBL engages students in self learning, however it bases learning on students' experiences of more realistic educational concerns. Both promote a higher level of student engagement within a given context and share in creating an educational context for experimentation and learning. In brief, constructivist philosophy and PBL facilitate a self-directed learning process by engaging them in collaborative decision making to given problems. (Due to space limitations, an extensive discussion on the philosophy and range of application of these approaches and I recommend the reader to the work of Brent G. Wilson (1996) and Dorothy H. Evenson and Cindy E. Hmelo, 2000).

The above educational methods have appeared due to the institutionalized isolation between theoretical lecture-based courses and application. Their goals are to primarily integrate between diverse discipline areas and bring theory closer to practice. They are responses to the diverse specializations within different discipline areas and aim to merge them within applied learning environments. In architectural education the same divide is witnessed between theoretical curricula and the design studio. Architecture curricula should allow students to bring about the LI's within each discipline area. This implies that we need to reconsider the manner in which we instruct students of architecture to bring theoretical issues closer to design studio training.

Coursework in Studio-Style

The conditions for creating constructivist learning environments require the creation of applied

learning environments. It is usually the case for the architect that the studio presents the environment for experimentation, however it cannot become the sole basis for an "applied" education. In design training it may seem difficult to find alternative educational environments to examine design processes progressing only on the drawing board.

Further obstacles are created within the academic environment granting greater autonomy and freedom for faculty members to develop their own individual discipline areas. This in turn furthers the divide between studio and theoretical teaching where the instructors' own theoretical experiences and bias is inevitably passed on to students. This is reinforced by the instructor's choice of problems relating to her/his own specializations and their own view of the daily concerns within architecture. How can we then leave it up to students to choose the relevant theoretical issues within their design proposals?

The answer remains in the way we educate students of architecture. Nelson (2003) suggests that for solving problems, classrooms should be used as studios. This requires that design activities depart from the drawing board and leave space for students for investigation and evaluation. Simultaneously, curricula must involve problems that give students the chance to learn how to incorporate theory for solving problems. In conflict to the master-apprentice model, constructivist principles create a solid base to guide more applied educational methods. Theoretical coursework can be structured to integrate courses with studio projects covering various topics within architecture.

If design programs are constructed to include theoretical concerns, students would be stimulated to incorporate theoretically gained knowledge into their design assignments. Anderson and Puckett indicate that in-class problem-solving activities engages students in a variety of solutions to a single problem (Anderson, R. S. & Puckett, J. B. 2003). This suggests that by integrating theoretical conceptions within design projects, diverse design solutions are produced. Design projects inheriting problem-solving tasks also afford the possibility for students to collaborate and learn to negotiate and make collective decisions.

This can be achieved by allowing students to experiment within the studio using models that materialize the various stages of design, allowing them to evaluate unexpected outcomes and judgmental errors in design procedures. In turn, such a process limits the involvement of instructors in the overall process and the instructor is left to instigate discussions around the outcomes of the process. Moreover, design training should address design processes and aim to produce new LI's within the studio. In this case the classroom, traditionally used for disseminating ideas from the literature, becomes a platform to develop and discuss outcomes of the design at hand in studio fashion. When classrooms are ritually shaped as design studios only then can students be directed to function as designers.

Process-based Learning

Imagery is often perceived as a central concern in architectural design, drawing the overwhelming attention of architecture critics as well as students. In the footsteps of schools of art, architectural media predominantly exposes new architectural form based on the contemporary aesthetic.

Within the design studio, the processes that shape buildings are overlooked at the expense of the final form, which has hijacked the focus of architecture. Furthermore, the proliferation of architectural styles limit the production of diverse architectural design solutions.

Akin (1986) suggests that architectural presentation simplifies design to create an abstraction of the whole design process. He further indicates that "...most contemporary stylistic 'theories' aim to develop systems of constraints which can be imposed on the design problem and reduce the uncomfortably large number of degrees of freedom which have been created by technological advances and breakthroughs." (Akin, 1986, p.94.). Style reduces all the demanding problems and the many possible design solutions to a single choice. This dismissal threatens architectural diversification, leading students towards a more formal type of design driven by inspiring "new" architectural forms. Style therefore undervalues the design processes that respond to diverse discipline areas of architecture. Architectural education is therefore must subject students to the intrinsic processes of design, shaping the final form of the architectural product.

Scholars have grappled to explicitly identify the design process, and Schön (1987) explains that the design process responds to the unexpected outcomes taking place by "reflecting on action" by thinking back on what we have done (p. 77). Maya (1988) states that the design process is systematically taught with the first step of the process being data collection; consecutively design tutors instruct their students to follow what is a basis of "good" design.

Their observations and writings are produced from a design ritual involving a two-way process between instructor and student in the studio. Such a ritualistic context restricts students' freedoms to explore alternative possibilities, as they are limited by the design program and dictated by instructor guidance. On the other hand, design education emphasizing the design process presents a response to everyday experiences and the socio-economic and political fluctuations in theoretical reasoning.

The Royal Institute for British Architects RIBA Handbook suggests that the design process is separated into stages: assimilation; general study; development; and communication, and are not necessarily in sequential order. Lawson's (1999) book How Designers Think describes these stages as a sequence of distinctly identifiable activities, which occur, in some predictable and identifiable logical order. Similarly, Akin (1986) explains that the product does not result from a random process and is based on conscious cognitive thought. However, Lawson explains that because the design process takes place in our minds, it is not a clearly explicit process. Nevertheless, the definitions highlighted here indicate a process that takes place during the design activity and requires an informed response to the relevant information gathered. By capturing these different stages, students need to be aware of the individual design phases and address them with a holistic design reaction.

In light of Lawson's explanation of the design process, I carry on this conception as an antithesis to studio instruction emphasizing on the final form/design product. Following this conception, design is therefore guided by a set of "design constraints" (Lawson, B., 1999, p.174). Design

constraints have been categorized by Lawson (1999) as: radical; formal; internal; external; and practical constraints (e.g. materials and the construction system are practical constraints). This avoids extra attention to more subjective aesthetic values, which are significant within the design process and shape the finalized design product. It suggests that the design product results from a complex relationship between various design constraints that are sometimes also used to guide the design process (Lawson, 1999). Design training is inevitably exposed to diverse problematic constraints and require problems to be solved to develop students' own analytical skills. Consequently, students should be trained to identify design constraints and develop their own design principles in response to simplified problems.

The criteria for simplified problems are clearly outlined by Weiss (2003) as stimulating activity and engagement to promote higher order thinking among students. Weiss (2003) suggests that such problems should be: appropriate for students; ill structured; collaborative; authentic; and promote lifelong and self-directed learning. Design training therefore requires a degree of puzzlement to generate an entertaining learning environment that involves students in competitive interactions. Weiss's view for simplified, ill-structured models is of value predominantly for junior students of architecture at the early stages of design training.

I shall present below three applications for junior design students. They are presented in a studio-style format based on a process-based learning approach allowing students to examine individual design stages by incorporating ill-structured problems. However, it is my view that more developed problems reflecting demanding concerns of professional practice should be involved at the senior stages of design education. Nevertheless, all stages of education require process-based design training as a medium for design education. Following both constructivist principles and PBL methods, I suggest the following guidelines as a structure for process-based design applications. The applications aim to engage students in exploring the design process and make clear the design decisions made throughout the process. I therefore propose the following objectives for a process-based design education for implementation in studio style:

1. Design applications should be unique and include puzzlement to unfamiliar design problems. Design applications need to be challenging and stimulate investigation. This requires that applications avoid predictability by incorporating unfamiliar design tasks.

2. Limit the number of design constraints and encourage the production of design alternatives. Design is subject to numerous design constraints that are often hard to determine. As mentioned above, many design constraints encourage designers to give attention to certain issues at the expense of others. This results in the filtering of valuable data, usually leading to subjective judgment throughout the decision-making process. On the other hand, junior students should be trained to respond to a limited number of clearly identifiable design constraints and have the opportunity to develop different design alternatives to the same challenge.

3. Students should work in collaborative groups and participate in collective decision making.

Students are encouraged to work in groups, investigating and sharing information to take decisions collectively. This encourages students to participate in debate and advocate their proposals as in professional practice.

4. Students should take control over their design applications and raise learning issues LI's for generating in-class discussions. By liberating students from authoritative instruction, learners conduct research and produce learning issues derived from the task at hand. In turn, instructors should not dictate to students throughout the design process but must only assume the role of the coach. In this case, students take full responsibility over their design solutions and are responsible for conducting their own research to bring about the demanding learning concerns from within their assignments.

5. Utilize the LI's raised as an outcome of previous design applications to develop future coursework. The learning issues being raised after evaluation should be used by instructors for developing future course objectives and refine course requirements. Here course objectives are developed with new information addressing up to date concerns.

For the purpose of creating a studio style setting, Figure 1 presents a general model indicating three main stages shaping the relationship between instructor, student, and the studio. The diagram presents a sequence of related procedures that give structure to a studio style learning environment. The instructors' role is in this case detached from the studio setting; however, instructors are involved in identifying the general course requirements and make use of learning issues raised from students' involvement with earlier applications. Accordingly, the input from the course objectives facilitates the creation of new applications that are implemented in a studio style setting. Consequently, students' explorations of process-based applications generate LI's that are relevant to the course objectives. The LI's produced are the main educational criteria to be learned, debated, and utilized for developing future course concerns. This cycle allows more updated issues to be involved in coursework by developing and utilizing the research and analytical skills of students under the guidance of the instructor. Process-based design applications should therefore allow students to examine the design process in stages and make easy for them to assess up-to-date course concerns.

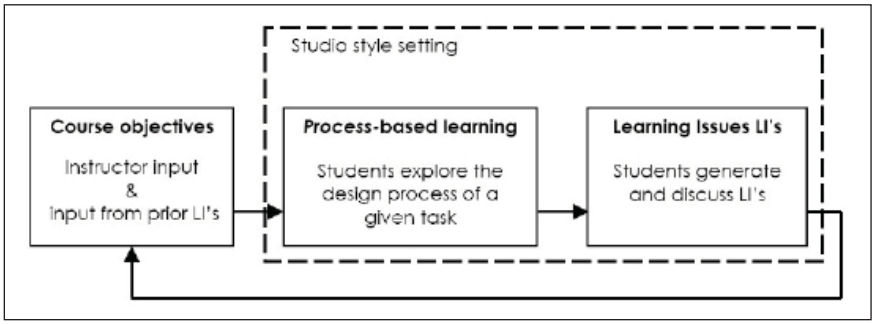

Figure 1: Framework for studio-style coursework. (Source: Author).

Process-based Design Applications

Based on the above framework, the following includes a description of three design tasks applied through three consecutive years. The objective of this course is to enhance students' ability to critique and evaluate different design methodologies used in design practice. Accordingly, and as discussed above, the design applications aim to subject students to study specific course objectives by being more aware of the process leading to the finalized design product. Therefore, the design applications are given to students to follow a design method or to create their own design approach and overcome the design constraints. Models are therefore used and act as simulations of the design process.

In order to facilitate for students to differentiate between the constraints, the students were given a limited number of constraints. As discussed above, the applications were kept simple and somewhat ill-structured to create atypical design challenges. However, for students at later stages of design education, the level of difficulty can be increased by raising the number of constraints and the complexity of the objectives.

Each of the three applications described below involve students in determining individual design factors influencing the overall design process. Consequently, students are required to work collaboratively in groups to identify the specific design constraints. They are then required to formulate a sequential map representing the progression of the various stages of decision-making and the overall design process. The students are given four weeks before revealing their designs and maps. This is followed by in-class debate and assessment of the final designs. Simultaneously and throughout these weeks I present lectures including visuals on different design and conceptual approaches applied in design practice.

Design Application I

The first design application was derived from Lawson as a basis for investigation (Lawson, B. 1999). The objective involves separating a total of nine marbles into three containers. The three containers had to contain two marbles, three marbles, and four marbles respectively, which created an initial sense of puzzlement regarding the strategy used for separating the marbles. After the four weeks had past, each group brought their model for testing in-class in the presence of students and instructors. Students were free to explore the use of any materials, which in turn influenced the efficiency of their models. The differences between the models varied in the way they were separated into the containers (figure 2). The following observations are highlighted:

Students' collective evaluation of this application depended on the efficiency and ease of separating the marbles. The students found little reason to base their evaluations according to visual appeal as the task did not involve form-making as an objective. Therefore, their final models were in sole response to the design constraints and to the given puzzlement. Some of the models failed in working efficiently and were clearly devaluated by the students during their in-class evaluation.

Learning Issues: Students realized that the efficiency of the materials used in the models

Figure 2: Model Sample for Design Application I. (Source: Author).

was the basis for the more successful designs. The more successful models were more stable and involved smoother surfaces, which in turn became the basis of the evaluation. This led them to conduct research and experiment with the stability and surfaces of different materials. The diverse solutions produced from the same objectives highlighted that different design products can be achieved by the various ways their designs responded to the design constraints.

Design Application II

The second design application was applied in the following year. This task "constrained" students to using paper for bridging a given span while carrying a load at the middle. In this case the design constraints were in the restriction to using paper as the sole modeling material. Paper was therefore required to span 40 cm (16 inches) while carrying an external load of 1kg (35 lb) midway along the span. The use of adhesives in their models was forbidden and therefore raised the level of difficulty. This task limited students to experiment with the paper, however the design solutions where diverse as they differed by way of connecting the various parts of their paper structures.

All groups rolled, folded, and pierced paper to create holes and grooves in order to connect between the structural components of different sizes. One other group used paper strips to weave and tie the parts of paper using knots. Each paper bridge was tested in class and evaluated by all students (figure 3).

Collective evaluations relied on the models' capability to carry the required load. However, the students discriminated between all the successful models by the innovative methods used to connect the paper components. In summary, their evaluations focused on structural methods used, components and their ability to create strong connections using paper.Learning

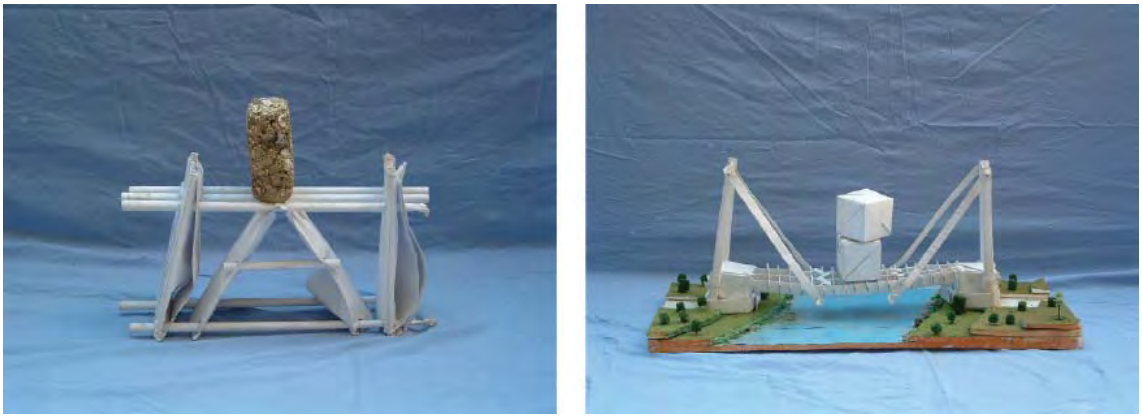

Figure 3: Model Sample for Design Application II. (Source: Author).

Issues. Preconceived structural solutions were produced in the form of frame structures and beam-like reinforcements. This suggests that their final models could have been influenced by the formal composition of frame structures, which the students had previously studied in lectures on structures. This gave reason to their research on various structural systems and allowed them to explore the possibility of molding paper into these systems. Furthermore, being limited to using paper and prohibiting the use of adhesives encouraged them to explore and produce diverse methods to connect between the structural components.

Design Application III

In the third design application I increased the level of complexity by including multiple design constraints that seemed to conflict with each other. This application involved the design of a surface with a ratio of 1:3 between length and breadth with the objective of overcoming four main design constraints. The first is to shade not less than half of its own surface area with light perpendicularly projected upon it. Secondly, it should endure an air current being directed towards it from one direction. Third, the surface should shelter from falling water. The fourth constraint involved raising the surface above the ground level to a height not less than its own breadth. This constraint was given to restrain students from attaching their models to a stable surface as an easy solution to overcome the wind constraint.

The constraints were initially perceived by the students as being at conflict with each other. For example, in order to withstand the air current, the surface had to be tilted to avoid collecting air currents that might cause instability to the model. Simultaneously, the surface had to shade an area not less than half its own surface area, so the surface could not be completely tilted. In this case both design constraints where in conflict. Likewise, in order to protect the surface from

falling water, it had to be positioned to slope at an angle. If the surface area sloped too much, then it would conflict with the required area to be shaded.

Compared to the previous assignments, I requested from the students to produce not less than three design alternatives followed by choosing the most appropriate alternative of the three after in-class examination. Furthermore, this assignment involved more design constraints at a higher level of complexity to compensate for the freedom given in choice of materials. The evaluation of this assignment differs from the earlier ones as it involves the evaluation of not less than three design proposals from each group and accordingly took more time to evaluate. Furthermore, the evaluation process was relatively more interesting for the students as each model was examined for four constraints simultaneously: water shelter requiring the examination of form fluidity and the surface materials to protect from falling water; wind endurance requiring structural endurance to the air current inflicted upon the model; the ability to shade from light perpendicularly projected upon it; and measuring the appropriate height to which the surface is raised (see figure 4).

In order to test for wind endurance, students positioned their models in the most appropriate direction to withstand the air current created by a fan. Likewise, an overhead lamp was also used to measure the surface area of shade from light. Finally, sand was sprinkled on top of the models to test for water shelter and fluidity of form and surface materials. The use of sand as an alternative to water was a dry and quick in-class method to examine the sheltered area required.

For the students this application represented a structure that had to simultaneously overcome environmental constraints: rain, sun, and wind. Although this was not the main reason behind this assignment, however, being closer to a realistic situation facilitated the formulation of well-defined evaluative criteria. In this case the evaluation was based on overcoming these constraints collectively and efficiently. The majority of students agreed that the final form of the models was intriguing and the most dynamic and distinctive forms of the models where evaluated highly.

This application received more interest from the students as they produced more solutions to the same puzzle. In this case most of the student research was experimental and students created more than the required models, which were all tested in class. The student groups that created more testing models produced diverse design solutions than their counterparts.

Furthermore, this application made clear to the students that diverse solutions are produced from several seemingly conflicting design constraints. The additional models they created stimulated more in-class discussions relating to durability and fluidity of materials, structural systems and components in addition to the models' visual appeal. This further raised environmental concerns specifically relating to the movement of sun and airflow. In this case, the learning issues produced were based in theory and methods of investigation, which where valuable to junior architectural students.

During the first year I had requested the work groups to produce only one final design to tempt students to take final decisions. However, by

Figure 4: Model Sample for Design Application III. (Source: Author).

the third year I had encouraged each group to submit not less than three design proposals and to choose their most successful model in an in-class debate. This created a platform for discussing the individual attributes leading to the success/ failure of their models in addition to giving justification to the evaluation. This established transparency in the evaluation and involved students in choosing the relevant criteria for evaluation. The final grading took place in class according to student and faculty votes following the application's guidelines and objectives.

Conclusion

In contrast to teaching predetermined design approaches to different building types in a lecture-based format, this course subjects students to the design process in studio style. It is an attempt to overcome the "schizophrenic duality" between the creative thought provoking studio and the tedious nature of the lecturer (Maitland & Cowdroy 2001). Here, junior students are involved with the various stages of the design process providing them with greater autonomy to their education. The models allowed students to experiment with the process of design and raise learning issues derived from their own experimentation and research. The assignments facilitated for the students to link theoretical course concerns with design applications--one of the main objectives of a studio-style environment. Within this educational context students acquired a higher awareness to the individual design stages and gave clear descriptions of the design constraints and the methods used to overcome them.

One of the main points that students highlighted was that the design process did not occur in sequence, rather it gradually filtered unnecessary information by rethinking earlier design stages. As the assignments were experimental, students confirmed that the design process was not at

all linear requiring frequent reassessment of the gathered information. This makes clear that design training is better experienced as a process than being informed of in stages.

The complexity of the design constraints varied throughout the three design applications. Within application III, I intentionally included more design constraints and raised the level of difficulty. In response, students agreed that it simulated realistic design concerns and was more motivating than the earlier assignments. Accordingly, more positive results can be achieved by simulating more complex concerns by using a process-based design application. This suggests that a studio style course may include more elaborate theoretical discipline areas within design assignments.

Overall, the students' responses were more positive in contrast to the previous course and as a result students cooperated, increased social interaction, depended highly on intuition and gained negotiation skills for final in-class decisions. Each group produced multiple solutions to a single problem and derived potential knowledge from a number of other discipline areas. This teaching approach aims to encourage students to examine theory to reach their own theoretical stance and to further be able to critique theory. As a result of the learning issues raised from their models, this teaching approach limited my involvement to developing new process-based assignments. In turn, theoretical course concerns became more open ended, absorbing new learning issues that may have been previously neglected.

This article suggests that a process-based learning approach should be motivating, intellectually challenging, and include puzzling design assignments. This can be achieved by substituting well structured problems with ill structured ones that are not faced in everyday life. Simultaneously, the problems should also be authentic and well grounded within students' abilities. A process-based education aims to reduce instructor bias by leaving students to investigate for themselves the immediate learning issues within the course. Rather than being taught theory, students become more able to critique theory through their own investigations. This in turn brings up relevant learning issues that are often neglected in design studios that follow the master-apprentice model. The process-based assignments and studio-style approach provided students with an experimental space for design.

We are therefore in urgent need for studio training that instantly allows students to test the successes and failures of their designs. This requires involving more sophisticated technologies in a studio-style setting. Moreover, it is a fundamental requirement for undergraduate students to be trained on how to use more complex research and investigative skills. Accordingly, future students are required to gain knowledge using experimental methods and become self-directed investigators, a skill that cannot be acquired from master-apprentice models or be derived from lecture-based courses. Although teaching coursework in studio style requires further exploration, the design process is presented in this article as the tool to synthesize advanced theoretical issues into the design studio. Architectural design schools are therefore required to create a basis for an applied design studio that is integrative of the diverse areas of architecture. The stimulating and enjoyable nature of this course fostered many teaching goals that were previously

non-existent in lecture-based coursework. As a result I have become more of an advocate for integrating theory into studio teaching and further encourage employing design process-based assignments as a tool for teaching studio-style coursework.

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Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

DESIGN PEDAGOGY--A TESTED PATH

Ujwala Chakradeo

Abstract
Knowledge, skill and design are three basic components of architecture education. Knowledge, i.e. theoretical part of the education can be taught by taking assistance from education technology. Skill has to be taught by demonstration. However teaching "design" is still being discussed and debated. The paper is about establishing the fact that process is important in teaching design and in continuous development of tender minds of students. The paper also demonstrates briefly the process adopted and established at our college, with a careful conscience of not leading the stakeholders into the rut, so that it is never forgotten that creativity is the essential component of design. An example of third-year design studio is chosen to demonstrate the progression in learning process of a student and to demonstrate the applicability of local context.

Keywords
Process, progression, knowledge, skill, curriculum.

Introduction: Knowledge

Analysis of knowledge is possible along two dimensions, general knowledge versus local knowledge. This is also called vertical and horizontal knowledge. Architecture education has to be a judicious combination of vertical and horizontal knowledge. The methods of transmission of these two types of knowledge are different. Different models of appropriate teaching can be chosen for this transmission. There are different roles of central as well as local knowledge institutions. General knowledge is knowledge that is true for all countries, cultures, and times; it can also be called as "universal knowledge," which remains unchanged under all circumstances. Local knowledge takes account of the specifics of the place, people, and time. It is necessary that general knowledge be made locally applicable and that the adaptation is made by the local doers of development. (Not given as a gift or imposed as conditionality from outside.) Considerable efforts are required to adapt general knowledge to local conditions and culture. The role of architecture institutions is to be sensitive and careful towards this issue.

One has to know the surrounding thoroughly, only then it is possible for him to understand the rest of the world. This is an important issue as far as education philosophy is concerned and Mahatma Gandhi propagated the same. He always said that, "Doors and windows of my house are always open for fresh winds from outside but first I should know who I am, otherwise the wind of change would sway my feet away."

Skill

Skill in architecture education can also be categorized into two types. Skills related to reproduction of drawings and building, and professional skills. Skills related to reproduction of drawings and building have "craft" component within them. Since architecture is the combination of art and technology, art in architecture and craft in architecture are closely related. Art has traditionally been taught mostly by demonstration. Teachers of music must actually sing to students and painters have to demonstrate their masterstrokes with a brush in the hand. So should the skills in architecture to be demonstrated to students.

The proportion of professional skills should be less as compared to reproduction skills at lower level. Thus, the early years of architectural education should be comparable to the vocations related to architectural profession. With the increased input of knowledge the vocation gradually gets converted into a profession. Skills of reproduction of buildings should be taught more on site with live examples. Workshops for developing skills need to be attached to the schools at appropriate levels.

Design

"Design" in architecture education should extend an opportunity to apply the knowledge and the skills learned. "Seeds of thinking sowed in other subject should flourish and develop in design studio." "Thinking logically" and "thinking creatively" taught to students in some theory

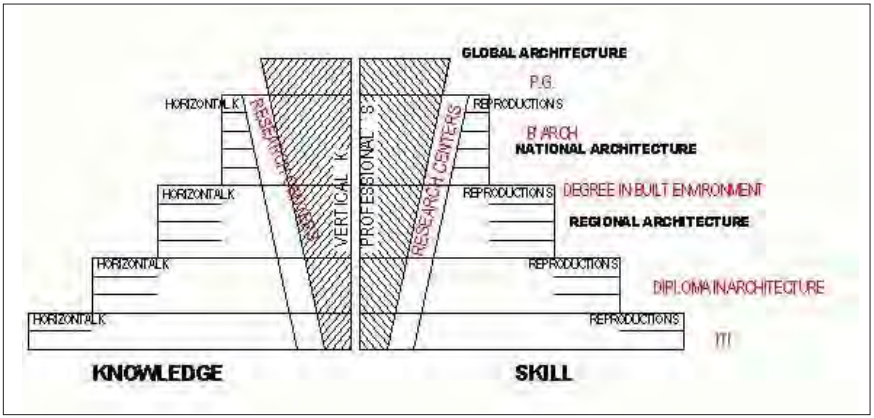

Figure 1: Levels of Horizontal and Vertical Knowledge in Architectural Education . (Source: Author).

subjects or through some of the visual art skills have to be applied to the design projects taken up in the studio. The teacher in the studio has to be a co-learner, but with a clear vision regarding required output from students at the end of the project and having a know-how about the process that is required to be adopted to achieve the envisioned end product. The teacher also has to have the ability to modify the vertical knowledge to suit the local conditions and requirements. The teacher in the design studio has to ensure that the skills required during the process are known or taught to students.

The "process" is built into the meaning of the word "design" as a verb: to, conceive, to create, to plan, to form etc. are some of the meanings of the word design given in the dictionary. The process is the system of operations in the production of something and the method is a means or manner of procedure, especially a regular and systematic way of accomplishing anything. The final outcome of designing has to be assumed before the means of achieving it can be explored. The designers have to work backward in time from the assumed effect of chain of events leading to starting point. This critical path is design process. The teacher in the design studio has to be aware of various processes available and should be trained to choose an appropriate process for the chosen design project in the studio.

Teaching design occupies more than 40% of the teaching-learning load in architectural institutions all over the world. "Can design be really taught?" If the answer to the question is yes, then should it be really taught or it is only to be learnt? Methods adopted for teaching design have always been discussed and debated. Every individual is very sensitive about his or her method of teaching design. But teaching the subject with different methods every year as per the individual teacher's liking would create confusion in the tender minds of students. This major chunk of teaching and learning design needs to be attended more carefully, sensitively, and scientifically. Students are likely to learn without confusion if continuity is maintained in their learning and they are taken gradually from the world known to them to the world that is not so familar. Loss of continuity would result in undesirable effects.

"Each individual has unique creative talent and thus the teacher is required to only assist them to explore that hidden uniqueness within." In spite of all these discussions, the need for a process for teaching design is now an established fact. Thus the teachers at S.M. M. College of Architecture, Nagpur, India, have tried to adopt a policy which clearly defines the state of mind of students, inputs required from staff with special emphasis on creative exercises.

"Molding a teaching method for teaching design is a challenge. The problem generally with any method or system is that it stems the very creativity that it was expected to develop. Soon it becomes a rut. We try to get out of it and make more ruts. If the purpose of design education is to liberate the mind from set patterns (clichés) then we need methods that allow adventure and exploration of paths not treaded. The method should eliminate drudgery, repetition, and "donkey work." These must be stimulating, offbeat, enjoyable, and simple. Above all, it must give the designer an insight into the problem, a sense of adventure and finally, the experience of beauty. It must stimulate the

mind to an extent that the designer is surprised by his own creativity. It was with this end in view that a process was developed by using "lateral thinking." The experience of over two decades is both interesting and possible for emulation.

Objectives for Adopting the Process

As per the process, there is vertical progression in design projects with respect to the architectural challenges and the complexity of activities. So the main objectives are to:

- take every student gradually from known to unknown areas of knowledge
- ensure continuity in learning process of a student
- ensure application of local knowledge at appropriate level
- ensure teaching of appropriate skills.

To achieve these main objectives there are several sub objectives of the school, which are discussed in the review meetings held at the beginning and end of the session.

Though both art and technology have influence on each other, art takes more time to change as compared to technology because the sense of aesthetics is deep rooted in culture and tradition of the people of that region. Changing technology shall be utilized to produce a desired art form. The policy is unchangeable part but the methods adopted to achieve the main goal change with the changing technology. Here every objective for a design project is set keeping in view the main objectives of the process, "progression" and "continuity."

Progression

The sequential progression is clearly seen from first year's project of "My House" to the final year's project of urban renewal related to urban and environmental issues. After "My House" in first year, it is "Composite House" in second year and "Multiple Dwelling" in third year. Here year-by-year the complexity of residential activity is increased. With the vertical progression, horizontal progression in design is also equally taken care of. Every year a new dimension is given to "My House," "Composite House," and "Multiple Dwelling," and students handle new architectural challenges successfully. Fourth year the maturity of the student is considerable and therefore intangible aspects of architecture and urban-social issues are introduced to students.

Figure 2: Relation of a Space with the Activity to be Conducted Within. (Source: Author).

Complex issues of housing are introduced in fourth year. The fifth year in this pattern is focused more on giving freedom to the student to apply the knowledge gained in all the previous four years.

The objectives of design studio at first year level are: Introduction of architectural language and making students aware of architecture around them. Analyzing their own house (an architecture well known to them) and proposing the new house for the family is taken up.

Figure 3: My House Project. (Source: Author).

The objectives of design studio at second year level are: Increasing the complexity and combining two diverse activities. Modular co-ordination is also introduced at this level. While dealing with a composite house in second year, the student is already aware of designing a house. She has to focus on the issues related to joining the house to the additional activity area.

The objectives of design studio at third year Third year Design revolves around the integration of tangible aspects such as services, structures, climatic responses, and the intangible ones, the philosophy, formal, and informality of function etc. building level projects are expected to be completely understood by the end of third year.

Figure 4: Composite House Project (Source: Author).

The objectives of design studio at fourth year level are: 1. Architecture is not always what is physical and visible, but it also has some invisible components, which contribute to the "total experience" for its users. 2. Interaction between spaces and users; architecture and its surroundings are important aspects, which make architecture appropriate for its place, time and people (users).

Detailed Example

Multiple dwelling with courtyard concept of housing--a third year design project (2008)

Stage I: Introduction

General introduction of the present scenario of housing sectors to students. Students were asked to study literature to understand the traditional housing in India with special emphasis on

courtyard concept in the form of internal court, shared court, and common green.
Objective – To bring the student's attention towards courtyard as a design element

Stage II: Unit Plans and study models

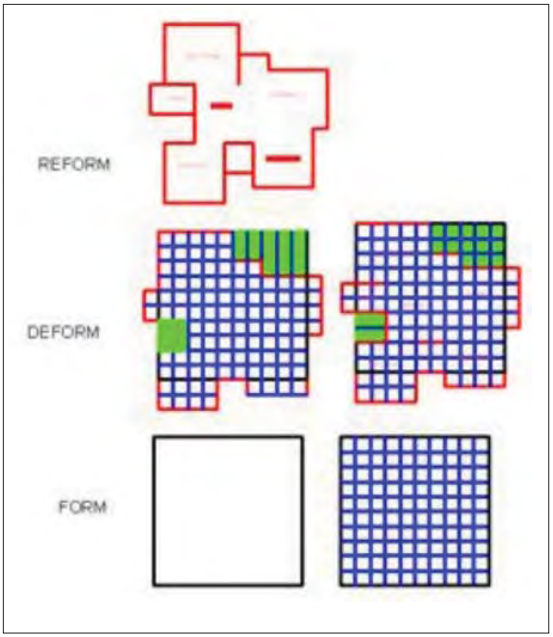

Figure 5: Form-Reform-Deform Study. (Source: Author).

Shadow study: Once all the unit plans with the study models are ready, the students are given the sun dial to find out the percentage of shading, the percentage of shaded area of courtyard, and surrounding walls to decide the orientation of individual units in terms of L/B ratio, shades and shadows. The information is also used for finalizing fenestration design. This experimental exercise gives the students an insight into the play of volumes so as to create the shadow pattern as desired. Students change the L/B ratio of courtyard to achieve maximum shade; they try different orientations to come up with a desirable one. Tabulation for the all unit plans with different L/B ratio is prepared to compare the percentages of shaded parts of building and the analysis was done to come up with orientation wise L/B ratio chart as ready reference for other students.

Figure 6: Shadow Study. (Source: Author).

Stage III: Heterogeneous and homogeneous combinations in 2-D and 3-D

Using the staircase as connector, heterogeneous and homogeneous combinations of units are worked out to understand the way of augmentation of density in housing layout and also to explain how to take the advantage of mutual shading and upper-level open spaces as terraces. Again, using the sundial students come up with the logical placement of upper level so as to create shaded terraces.

Objective – To explain them the term density and its importance in housing layout and also to explain them how to plan the activity areas by taking the advantage of mutual shading and the concept of upper level open spaces as terraces.

Stage IV : Cluster design

From this stage, emphasis is now changed from built design to unbuilt design. To make a cluster, the importance is given to the position of courtyard. The rear-to-rear and front-to-front combinations of courtyards are adopted so as to create the private and semiprivate open spaces. The entire cluster is then checked on the sundial to study the shadow pattern and changes are made to get maximum shaded open spaces especially in the critical months of the year. The location of trees is identified to contribute to shading.

Figure 7: Cluster Design. (Source: Author).

At this stage, to develop the logical thinking among the students to take design decision regarding the placement of number of units, a wind study is introduced.

Wind study: A wind stimulator is an instrument in our environmental lab used to conduct experiments related to wind. It has a fan with speedometer at one end and adjustable louvers to change the plane at other. It has some limitation as far as the size of the fan and the speed is concerned, but it gives the students an overview of the use of such instruments in taking the design decisions.

The wind study is performed on the study model of cluster with the help of the sawdust to mark the flow of wind. Direction of local wind flow is taken into consideration. It is very clear from the experiment where to add wind breakers, how to open the enclosed space to avoid the turbulence, while at the same time how to take advantage of turbulence, how to avoid wind shadow areas, and the relationship of height and the spacing of built form.

Stage V: Super cluster design

Super cluster is the stage wherein the students performed the experiment by combining the sundial and wind stimulator. While working out the super cluster, the focus is on the design of unbuilt spaces again, so as to get the hierarchy of open spaces. The inputs were given regarding incorporation of pathways, common parking areas, individual parking, and access roads. Street shading and mutual shading was studied with the sundial.

Stage VI: Layout

The identified site was facing the highway. Discussions were held regarding the entry to housing layout, hierarchy of roads, provision of road side parking areas, the community facilities like, health centre, shops, primary schools and their locations. The layout is prepared using the super clusters, clusters, and with the provision of all other facilities needed at area level.

Figure 8: Wind Study. (Source: Author).

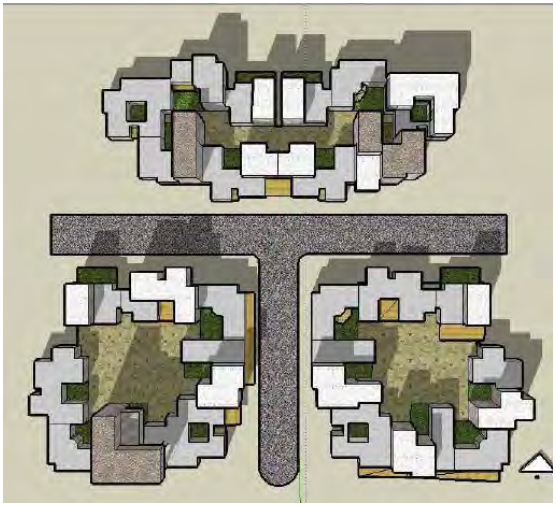

Figure 9: Super Cluster Study. (Source: Author).

Figure 10: Layout. (Source: Author).

Stage VII: Street Elevations

Students worked out street elevations to design skyline

Objective It is expected that the students work more on the street elevations, individual unit elevations are not asked for. Final drawings of these students are absolutely different from the batch of previous year because of change in the focus area.

Following are some of the thrust areas of some of the past years.

Vertical clustering in fourth year

Keep in mind the progression of understanding of students in designing dwelling units projects like vertical clustering in the urban village, with an objective of creating a high-rise urban housing with

emphasis on optimum use of spaces, changing urban lifestyle, and vertical clustering to create a collective generative form of urban village.

Teamwork is the key for the success of an architectural firm, so it is true for architectural education. Brain-storming sessions at the beginning and end of the session are necessary for retrospection, future planning, and to ensure continuity in the learning process of student.

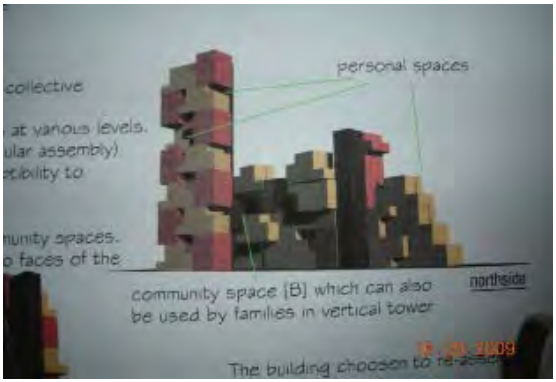

Figure 11: Vertical Cluster. (Source: Author).

Figure 12: Brainstorming Meeting (Source: Author).

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A BIO-EXPERIENTIAL MODEL FOR LEARNING CREATIVE DESIGN PRACTICES THAT SUPPORTS TRANSFORMATIVE DEVELOPMENT IN BEGINNING DESIGN STUDENTS

Steven Temple

Abstract

This paper asks what beginning design learning experiences best support the remainder of design education. It is a conjecture of brain-based learning theory that a student's direct, concrete primary experiences are responsible for the construction of fundamental structures of neural processing as "hard wired" pathways. These structures then form the ground of and set into play patterns of later more abstracted learning experiences. Pedagogy of basic design courses that seeks introduction of creative processes as a foundation for design education must recognize these experiential, biologically developmental relationships as basic to developmentally appropriate beginning design curriculum.

This paper models a beginning design pedagogy on developmental relationships between concrete and abstract processes of learning as a basis for transformative creative thinking that enables student self-development that progresses up the curriculum. Aligning with developmental learning theories (Piaget and others), a basic tenant of this approach is that learning at the primary level of direct experience self-initiates brain changes where students form their own structure of learning. Thus, initial learning experiences will be those that best enable decision-making consistent with the biological interactivity between body and mind, between, respectively, the concrete and the abstract. This is important because the designed environment in which we all live is grounded in the development of abstract content experientially based in concrete material physicality. Experiential learning theories (Kolb and others, following Piaget) identify concrete and abstract learning as fundamental poles for acquiring and acting on knowledge: Concrete learning involves direct experiential engagement through heuristic discovery and reflection and abstract learning involves indirect representational cues in acts of conceptualization, synthesis, and experimentation. The pedagogical model of this paper proposes a cycling of concrete material experiences and abstract learning experiences into an interactive transformational interdependence as a model of creative design processes that engages student self-development toward maturation. In addition to explication of this theoretical background, an introductory design course sequence following this model will be demonstrated:

Initial course - Students typically enter introductory design studios as visual learners, where the saturation of media has for them abstracted the world and overwhelmed concrete experience. A central pedagogical concern of the initial course is to redevelop awareness of the balance of concrete and abstract experiences in everyday human engagement by "reinitializing" students to the primacy of their relationship to the physical world through activities of making. A sequence of projects immerses students in

Paradigms and Positions

working through direct experience, within the material, sensorial realm, enabling discovery and manipulation of a material's "workability" in uncovering design ideation. Learning about materials is learning about design. Making necessitates heuristic investigations and discoveries brought to light through cyclical reflective observation and comparative critique. Modes of conceptualization and experimentation are implicit in working with materials to complete projects.

Following course - Following neural development by direct experience, abstract conceptual mechanisms are introduced to develop a context of representation against which concrete investigations become balanced, thus building lessons of abstraction upon lessons of concrete experience. Abstraction includes such issues as diagramming, analysis, visual thinking, representational devices such as drawing, modeling, simulation, scale, context, use of narrative and metaphor, and the nature of ideation. Projects focus on theorizing conceptual approaches and developing experimental proposals in which concrete experience and reflective observation are implicitly engaged as the raw material of creative, abstract thinking. By engaging in design processes as structured concrete and abstract creative discoveries, students build an experiential dynamic of making-thinking-doing-reflecting to actively make sense of creativity in design. Learning to abstract, when grounded in concrete experience, is learning to design.

Keywords
Beginning architectural education; design pedagogy; making; experiential learning; student development.

Biological Imperatives for Learning

An issue to be addressed in developing design curricula is to construct beginning design learning experiences that support the remainder of design education. As an apt analogy, consider a baby in the world of objects for the first time. It will roll and frolic in the grass, reveling in its presence against its skin, in its hand. The baby's fingers will fondle and finesse the blades, press into the mass of roots, break and tear. Learning takes place at the fingertips. As new connections are made to the concrete physicality of the world, representations of that experience are constructed. Each new contact becomes a test of those representations against each successive contact. Concrete experiences are thus impressed upon the abstraction of mind, literally constructing new synapses and restructuring nervous circuitry. Our nervous systems, as characterized by philosopher William James, are "grown to the way in which they have been exercised, just as a sheet of paper or a coat, once creased or folded, tends to fall forever afterward into the same identical folds."1 Primary experiences in which college students first engage similarly form basic structures of neural processing, and these in turn, inevitably and profoundly form mechanisms of learning for successive educational experiences. What is more broadly called into question is raised by the very fundamental nature of first-year education itself: how can beginning design learning experiences be constructed so as to form patterns of learning that are most beneficial to subsequent architectural design and studio education learning experiences?

Robert Leamnson, in Thinking about Teaching and Learning - Developing Habits of Learning with First Year College and University Students, parallels theories of brain-based learning in defining learning as involving changes to brain neuro-structure that are self-initiated primarily through the ability to detect patterns of experience and make self-correcting approximations through self-reflection. Thus, first experiences are paradigmatic, as they establish a biological patterning of learning

for future learning experiences. First learning experiences set in place conditions for the reception of learning. The brain, as the hub of the nervous system, is experienced as the seat of consciousness in the abstraction of mind but because our nervous systems have their origin in our bodies as our bodies establish a relationship to the physical world. It is the body in concrete relation to the world that provides the basis of nervous transformations.2

The biologically formative nature of concrete experience casts initial learning experiences as those that enable self-initiated decision-making consistent with the biological interactivity between body and mind, between, respectively, the concrete and the abstract. Education psychology identifies concrete learning and abstract learning as two opposing yet complimentary and fundamental means for acquiring and acting on knowledge.3 Concrete learning methods are facilitated by immediate experiential contact in which there is direct engagement through heuristic manipulation and discovery, followed by reflective observation and judgment. Abstract learning involves mental mechanisms and cognitive comprehension utilizing indirect representational cues and symbols in acts of conceptualization, synthesis, and experimentation. Interactive cycling of concrete and abstract modes form the basic staging of learning and pedagogy.

The relationship of concrete and abstract learning at the basic level of a baby's world is primarily a reciprocal one of sense perception and action. In experiencing the grass, the baby is set to understand something about its place on the grass and the grass itself. Shown only a picture of the grass the baby will not gain understanding. A picture is a representation of grass and is therefore an abstraction from the grass itself. Placing the baby in the grass provides direct experience of its physical qualities and gives the baby an opportunity to self-correct and learn from concrete experience by making approximations as an adjustment of its own representations of grass. The baby's relationship to the grass is one of learning by doing - a heuristic process of trial and reflection in a feeding on the concrete in a complex interactivity with the abstract in which each mode mutually modifies the other as knowledge and experience develop. "Hard wiring" develops according to one's association to the world in concrete experience.

Cartesian mind/body dualism is an opposition between abstraction and concreteness that is not reconcilable. However, dualism as a complimentary relationship is descriptive of other basic human relationships such as thinking and doing, thought and action, mind and hand, and, for design, materials and intentions. The successful practice of architecture is itself grounded in the development and expression of abstract content experientially bound into concrete material physicality. For example, architect Steven Holl's design process develops architectural experience as a perceptual recombination of heightened sensory experience and ideational encounter.4

Recognizing these basic relationships can help cultivate their interactions into foundational learning experiences. This paper will discuss the significance of constructing biological imperatives for learning and model first year design pedagogy on relationships between concrete and abstract processes of learning as a basis for the continued development of design

process and maturation beyond first year. In modeling these processes, the intent is to identify and actualize essential and enduring aspects of concrete and abstract learning processes that are both specific and universal in foundational education in architectural design and that result in a structural approach that holistically defines transformational interdependence between these elements without reliance on forces outside the model.

Pedagogy as the Forming of Relationships to the World

Fundamental to this pedagogical model is a basic premise of psychological theorist Jean Piaget - that learners actively and purposefully create their own structure for knowledge as they seek to make sense of the world from their own experiences. Piaget described four stages in the development of schemata, patterns of operational concepts that come about as the child structures its own representations of the world. In the initial "sensorimotor" stage, schemata are formed in actions taken while making direct, concrete connection with the world. The infant develops symbols within the schemata as a way of mediating between its perceptions and the actual objects or events in the environment. In the second "preoperational" stage, roughly from age 2 to 7, children will develop the ability and intentionality to let one thing stand for something else ("symbolism"), even though they depend on contact with the concrete world. Additionally, children also develop the use of reflection to help them test and think operations through logically in the preoperational stage. During the "concrete operational" stage, from age 7 to 11, children become able to engage with concepts but depend on relation of the concepts to tangible or concrete situations. In the "formal operational" stage, Piaget's fourth and final stage of development, children age 11 to 15 are capable of reasoning abstractly about the same concepts through the use of propositional thought using symbolic representations (e.g., words; thoughts; mental images) without requiring constant reference to concrete objects or events. Another way to describe this stage is when they are able to think about thinking.5

What is meant by abstraction? All abstractions are an abstraction of something. The act of abstracting is movement away from the concrete. There must exist a causal referent of any abstraction. "The only way we can become familiar with symbol systems, abstractions of reality, is to move from known realities to the symbols of them."6 Childhood development, according to Piaget, demonstrates that the development of the ability to learn is an interdependent relationship between concrete experience and abilities for abstraction. Abstraction does not replace the concrete, it is its complement. Piaget's ideas are also significant because they stress the idea of developmental relationships, that one act of learning is built upon another as structure, as an evolving representation of mind/body/environment interactions analogous to a kind of mapping of our nervous network onto our activities and onto the world itself.

Expanding on the developmental theories of Piaget, David Kolb re-developed experience as a basis of learning into continuous and phased learning cycles. Kolb's process of learning cycles is typically portrayed as revealing one's "learning style" and has been construed into

many applications for education theory. Analysis of "learning styles" for architectural education is not the subject of this inquiry. Rather, it is the structure of Kolb's learning cycle diagram that is significant. Basic to Kolb's experiential learning model is that learning is thought of as a process whereby concepts are derived from and continuously modified by experience. Kolb believes that, "Learning is the process whereby knowledge is created through the transformation of experience."7 The process of experiential learning can be characterized as a four-stage cycle involving four adaptive learning modes - concrete experience, reflective observation, abstract conceptualization, and active experimentation. Movement from stage to stage is a transformation of the other stages.

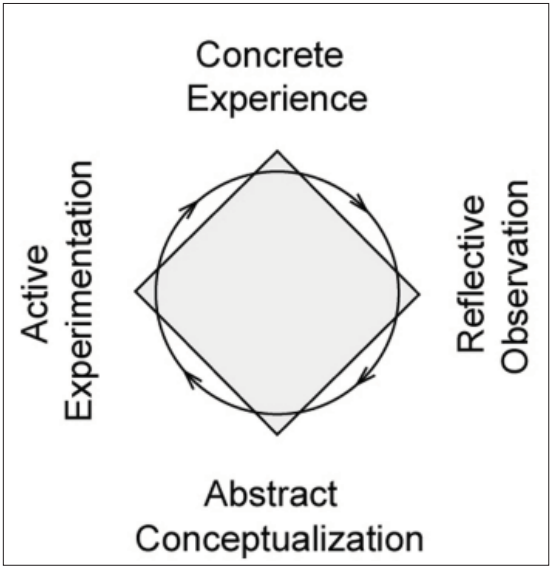


Figure 1: The Experiential Learning Model of David Kolb (Source: Author)--after Kolb.

Two distinct basic learning activities are identified as opposing poles in Kolb's model of experiential learning: perception and processing. At one end of the perception pole is concrete experience (apprehension, real, human, sensual, intuitive). Experiencing is immersing oneself in the "doing" of a task, not reflecting on the task, but carrying it out with intention. Opposing concrete experience is abstract conceptualization (comprehension, representations of experience, mental imagery). Conceptualization involves interpreting the events that have been noticed and understanding the relationships among them. It is at this stage that theory may be particularly helpful for framing events. In processing, the two poles are reflective observation (intention, reflecting upon past experiences and many views) and active experimentation (extension, testing and utilizing ideas raised by an experience). Reflection involves stepping back from task involvement and critically reviewing what has been done and experienced. Skills involved include attending, noticing differences, and communicating analytic judgments. Experimentation involves the new understanding and its translation into predictions about what is likely to happen next or what actions might refine the way the task is handled.

Learning experiences that cycle through Kolb's "dimensions" achieve a more holistic learning experience. That is, students first experience, then reflect on it, then analyze it, then act on it. In this approach the learner will recognize that some modes in the cycle are more productive and will identify types of learning that may be more beneficial. This cycling fosters a meta-cognitive awareness of the learner's own learning processes and helps the student to

engage in self-initiated learning.

Biological Consistency for Beginning Design Learning Experiences

Comparing Kolb's experiential learning cycle to the pedagogy of typical design studio experiences yields some striking similarities to activities that already and routinely take place in studio education. Design students readily engage in concrete learning experiences in the form of making things and engagement in first-hand material explorations. It could be said that concrete experience is in large part the actual content of design, in that actual buildings are the surroundings and circumstances of an occupant's everyday life and comprise the ordinary state of consciousness of the things around them. Design is also a highly reflective activity, with formal and informal design critique at the center of studio efforts. Reflective activity in the form of design inquiry also takes form as search for sound measures of design. Abstract conceptualization in design occurs within the development of meaningful ideational structure for a design project and typically occurs in the form of discursive thought and conceptual development, and visualization. Representational structures, such as diagrams, drawings, verbal descriptions and discourse, material models, and virtual models seek connection of abstract concepts to the realities of human sentient experience and physical materiality. Active experimentation occurs as concepts take form as the raw materials of architecture (i.e., configurations of walls, floors, openings, spaces, forms, materials, structure, and construction). This process repeats in a cycle of evaluation and refinement.

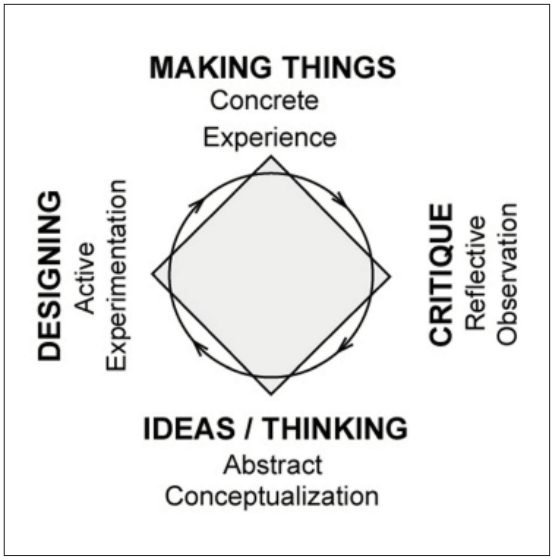


Figure 2: Proposal for Pedagogical Structure. (Source: Author).

A pedagogical model for studio education based on Kolb's learning cycle pairs making and thinking as dialectically complimentary operations. Key to actualizing this structure of activities in the design studio is Piaget's notion that each student self-initiates their own operational conditions within new mental structures. Some will conceptualize and be informed by making; others experiment with making and discover/develop conceptualized thought; still others "receive" conceptualizations primarily through reflective activity (such as critique). Designing always occurs with respect to a varied set of conditions that necessitate varied modes of learning activity. In respect of these distinctions, a supportive and integrative pedagogy will allow, fertilize, and propagate methodological

interacting in the context of design studio to facilitate a "community of design."

Initial Course - Making and Reflecting

Beginning design pedagogies confront students with abstract learning experiences within tasks such as diagramming, conceptual thinking, visual thinking, representational drawing, and reductive exercises that intend understanding of basic design "elements and principles." However, beginning design students have little experiential basis for these specific abstractions of architectural inquiry. Additionally, it is a common goal of beginning design pedagogy to overcome student misconceptions about design and visual learning acquired principally through the saturation of media. However, developing new nervous pathways in students requires developing sensitivities for the processes and qualities of concrete experience and the physical world in balance with abstract experience. Making is an important first step in rewiring students' nervous pathways, as it fosters material and construction sensitivities through concrete experience.

The first learning encounter can structure relationships between abstract and concrete processes through engagement in the concrete experiences of making things, followed in turn by engagement in reflective critique of the things made. Making is an immersion in concrete experience through direct experiential manipulation and discovery of a material's workable properties in relation to design intentions. Engagement in acts of making has its premise in the notion that making decisions about materials is making decisions about design. Projects that require acts of making necessitate that students employ heuristic investigations and discoveries that are brought to light through on-going reflective observation and comparative critique. Modes of conceptualization and experimentation are implicit in working with materials to complete the projects. Workmanship is a constant measure of intentions and is brought into awareness as a fundamental category of design and material qualities.

In the initial undergraduate design studio course of the College of Architecture at the University of Texas San Antonio, students engage creative design decision-making directly through hands-on transformational projects as a precursor to the near-exclusive use of abstract, representational, scale drawings in the following studio design course. Thus, all design projects are completed in one-to-one scale and involve drawings only as transformative devices. Projects are structured in a developmental sequence where each project transforms into the next, forming continuity from the scale of the hand to a final, habitable built project. The learning environment consists of efforts in design and making bound with critical review of these efforts - a cycle of thinking and making that necessitates reflection on the previous project(s) as knowledge grows through direct experience. In this way, students develop as individuals as well as designers.

Project 1 - Place for a rock

In the first class students are introduced to design by designing something. Presented with a 3' length of bendable wire and a rock, students and are asked to design an "orderly support for a rock" over 15 minutes. Following their work is a discussion about aspects they considered in making design decisions, their conceptions and

Figure 3: First project - Place for a Rock. (Source: Author).

preconceptions, and the processes of design as invented and discovered. They are then asked to refine their design and reconceive it, making a second refined version for continued discussion. The follow-up project is to design and make a place for a rock substituting paper for wire while retaining the "design concept" of the first orderly place. A review and discussion follows about the nature of material and the effect of workmanship on design decision-making.

Project 2 - Index card tower

The consideration of structure is primary to building design. Central to the efficacy of structure are the physical properties of the material comprising it. In an in-class project, teams of four students construct a tower of 3 x 5 folded index cards, making it as tall as they can. Teams typically confront preconceptions of ideas about structure and in working as a group. Trial and error processes are discovered as primary in learning that falling down has as much to teach them as building up. Critical review of all projects enables not only celebration but comparative judgment and fosters self analysis of design processes as well as one's own decisions.

Figure 4: Project 2- Index Card Tower. (Source: Author).

Project 3 - Printing project

Developing a design project necessitates many iterations until a creative or conceptual focus begins to guide design decision-making. Often these iterations are heuristic, trial-and-error explorations. The print projects sets up this kind of learning experience. Working individually, students transform a pictorial drawing of their own place for a rock into a geometric structure within a rectangular plane. Through readings and demonstrations they learn about and apply a regulating geometrical armature (e.g., golden proportion, Fibonacci, etc.) derived from the rectangle itself to establish the basis for building an ink block print. Emergent visual cues such as depth, layering, and space are key to raising questions about what to do next. Central to this project is the introduction to the necessity of workmanship as a part of design - a link between ideas and their realization in material. Typically, good workmanship is achieved by first making a mess, then realizing that won't do. One well-accomplished final print is the expectation of project criteria, created as a result of a "path" of design iterations. A composite presentation of all developmental steps is produced at the end of the project as a reflective synopsis about process and their own decision-making and as an aid in explaining conceptual decisions to the class. It is at this point easy to express to them that good speaking means good thinking. The print project establishes design as a series of developmental decisions, rather than a moment of grand inspiration or stylized mimicry.

Figure 5: Printing Project Utilizing Geometric Regulation. (Source: Author).

Project 4 – Relief: plaster

The suggestion of layers and depth in each student's block print is the basis for transformation into a raised relief. Learning objectives include trial and error processes to successfully transform print into relief, developing geometries and learning how plaster and mold materials work. Students realize that a plaster relief contains compelling material qualities for design and that material qualities are necessary considerations for design. Architectural design is not merely a good idea or a clever pattern.

Figure 6: Project 4 Relief Study in Plaster. (Source: Author).

Project 5 - Frame, panel, volume

The suggestion of volume in the plaster raised relief is creatively extruded into layers of three-dimensional blocks of solid and void constructed of chipboard. Issues such as pattern, depth, volume, movement, layers, thickness, and surface are developed within or between ordering planes. It is realized that geometry is critical to order. Linear pieces of basswood are then used to transform the chipboard construction as a modulated system. Wood as a material must be addressed - its strengths and weaknesses, its joinery, and the fact that wood creates planes only at the edges, resulting in transparency and the emergence of space as a primary aspect of design as distinct from material presences.

Figure 7: Project 5 Frame, Panel, Volume. (Source: Author).

Project 6 - Frame, panel, space, mass

The suggestion of volume, plane, and frame in Project 5 must now be transformed through the addition of mass and the amplification of

space. It is realized that Interior is a vessel that reveals architecture. Interior relates to exterior. Panel, mass, and frame enclose and thus develop architectonic relationships with space through the ordering of geometry. In the making of the project it is realized that detail and architectonics are merged - how materials are joined gives significance to architectural design decisions. Ideas and building are simultaneous. In project review it is realized how materials speak within the language of designing and how limitless creativity can be.

Figure 8: Project 6 Frame, Panel, Space, Mass. (Source: Author).

Project 7 – System of light

Light has no scale, so light at the scale of the desktop will perform as in full scale. Students design/construct an architectonic system of panel, frame, mass, space) that reveals four places for light: place(s) for a source of light; for illumination; for the presence of light; for shadow using materials studied in Projects 1- 6. Project review leads to discoveries, especially when different projects are compared when illuminated. Realized in review is that interior is a container of light that reveals architecture and that perceptual aspects of illuminated surfaces and spaces evoke emotional qualities in relation to architectonic systems. Also realized is that the room in which the project is displayed becomes part of the project. Illumination is architecture. Illumination is also a product of workmanship and workmanship is revealed by illumination.

Figure 9: Project 7 System of Light. (Source: Author).

Project 8 – The space of the body

The presence of the self in the space of the room that was realized in the illumination of the room in Project 7 was not acted upon because the

Figure 10: Project 8 Body, Movement, Space. (Source: Author).

project was "over there on the table." In project 8, two students develop a dialog between themselves and the space of their bodies using only constructions built upon their bodies. Implicit in body is the act of movement and the space surrounding the body, which are both specific to a particular body. This is key to the development of the project. Body anthropometrics (i.e., limits, motion, dexterity, size, etc.) become design constraints - the project must "fit" the two specific bodies. Project construction necessitates the measure of the body and the measure of kinesthetic movement between two bodies. Only three different materials may be used. The project must be performed, so the project becomes designed as a choreography of body movements that define and celebrate an event of communication.

Project review puts students in the unfamiliar place of being "on stage" with two results - the project breaks social barriers and builds a culture of design discourse. The project creates commitment to design because the designer IS the project, not an object apart from the designer. More significantly it is discovered that transforming the body mediates and structures time and space and celebrates and makes elegant the relationship of body to the built things of the world.

Final project – The body in space: full-scale project

The final project is specifically structured to link acts of making and thinking in the context of an experiential learning model of pedagogy. Student teams design and construct an "incident of human occupancy" assigned from basic activities common to public streets. Constructed projects are assembled into the form of street at final review. Direct experience initiates the project as students are sent to experience, discover, and identify basic forms of human occupancy. Common bodily experiences, reduced to a single word (i.e., anxiety, anticipation, etc.) are assigned to student teams as the basis of the project. Materials are limited to wood lattice strips, a binding material for joinery, and sheer fabric. Glue and external mechanical connections are forbidden. A 6' x 6' site for each group along two parallel rows of sites that formed a "street" in a plaza of the campus. The project is a comprehensive culmination of the sequence of previous projects. The group project fosters

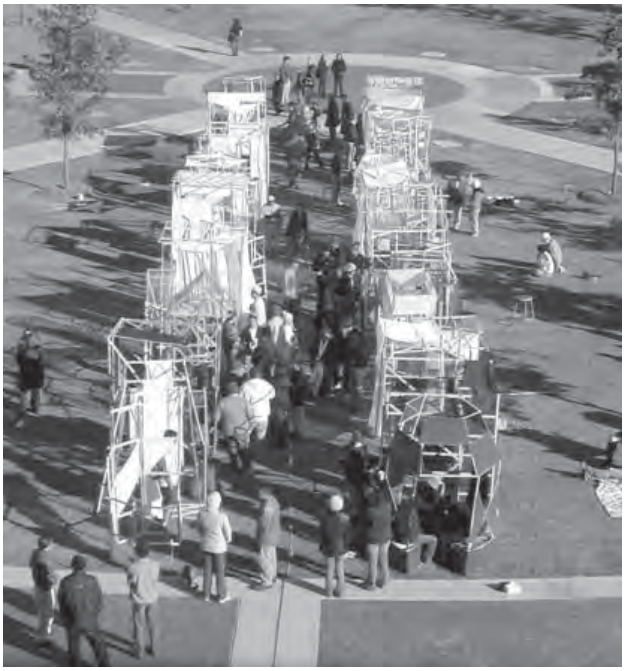


Figure 11: Final Project - All Projects Oriented into a Place - view from above. (Source: Author).

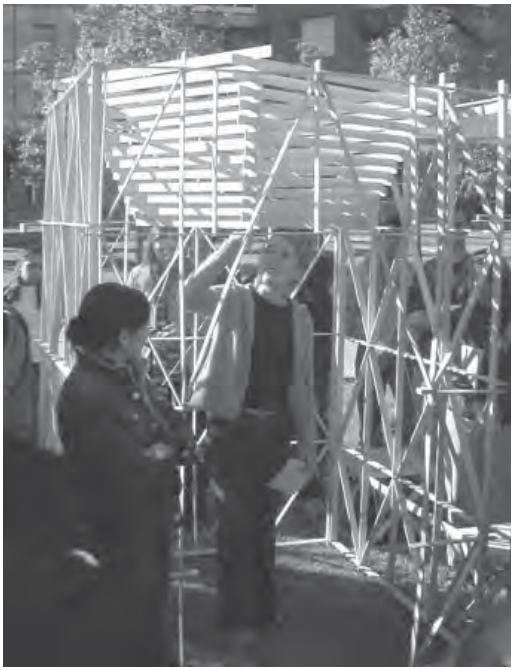


Figure 12: Final Project - AFinal Project - A Single Full Scale Project. (Source: Author).

dialog within the task of designing and making a project beyond the scope of an individual student. Each group was then challenged to find common ground as they conceptualized, experimented, strategize, and built a model of a design proposal. The actual refinement of the design occurs in its full-scale construction. This gives rise to detail. This is the key lesson of the course experience - there is as much design in the concreteness of detailing and fabrication as there is in abstract conceptual thinking.

Following Course - Abstraction / Experimentation

After experiences in making and reflecting in the initial studio course, the following studio introduces design process utilizing abstract conceptual mechanisms to elucidate and develop a context of representation against which concrete investigations may be balanced. Abstract design activities include issues such as diagramming, analysis, drawing conventions, modeling, simulation, scale, context, as well as the use of narrative, metaphor, and the nature of ideation. Although engagement in abstract

conceptual modes of design follows the notion that learning to abstract is necessary to design, abstraction is always built upon concrete experience. Projects are developed to introduce theorizing a conceptual approach and developing an experimental proposal in which concrete experience and reflective observation are implicitly engaged as the raw material of abstract thinking. Having fulfilled experiential learning objectives by manipulating materials in the initial design course, the subsequent design course first introduces students to the abstraction of representation and scale inherent to drawings and models. The project sequence builds on the use of these abstractions in projects that introduce design as an ordered and intentional creative process in dealing with issues such as site planning, site analysis, human interaction with space, structure, materials, color and light, and accessibility. All design projects provide creative design opportunities and as such also that enable personal development consistent with a beginning level of student development.

Project 1 - Transition into Abstraction

The initial project transitions students from full-scale material and making-based design projects to the abstract use of representational drawings and models. This project alternates concrete and abstract processes (building and making, un-building and un-making, respectively) as actions necessary to integrate the making with more abstract thinking. The project sequence builds on the use of these abstractions in projects that introduce design as an ordered and intentional creative process in dealing with issues such as site planning, site analysis, human interaction with space, structure, materials, color and light, and accessibility. As the concrete world is the intentional goal of design processes, representation is necessarily linked with physical substance. Without representation, developing intentionality in physical substance is limited. Work progresses in transformational stages.

1] Disassembly - Each student systematically disassembles a toaster and then uses all components to construct new spatial compositions with the parts, which are them drawn and photographed. Objectives of the phase are 1] to discover the nature of assembly and the manner in which the components were designed to support this assembly, and 2] to reveal new possibilities based on material qualities and relationship of parts. Making drawings of the toaster parts compositions develops explicit awareness of the physical actuality of the object and its subtleties.

2] A Dialog of Spaces - The next stage asks students to create “spaces in dialog” that explore spatial organizations as introduced in their reading of Francis Ching’s Architecture - Form Space Order. Students design and build based on their understanding of the physical interrelatedness and nuance of the toaster parts when used to develop spatial relationships. Diagrams are drawn to augment discussion and students make design decisions that identify, clarify, and refine design intentions.

3] Model of an Environment - Scale figures are introduced to transform the spatial model into an environment that can be viewed as habitable and scaled. Perspective drawings view the model at human-scaled eye level (as well as continued practice of perspective). While it is recognized that the environment is abstract, it nevertheless offers creative opportunities for

interrelationships of spaces and the possibilities of architectural components, both analogous and literal. Objectives of this phase are to: 1] critically transform the design based on material qualities related to occupancy issues as found in a scale model, and 2] explore differences between degree of enclosure as a function of the differentiation and articulation of spatial dialog, type of occupancy, and the nuance of material.

4] Scale Drawings - Since this is the first experience students have with scale
drawing following their Visual Communications courses, the final assignment of the project is to construct representational drawings in half-scale that explicitly utilize drawing projection methodology between plan views, elevations, and sections. In addition, students develop perspective views that can be modeled on views gained by visual exploration of their toaster construction by holding it up to the eye at a scaled eye-level.

Figure 14: Model Simulation Photography at Eye Level .(Source: Author).

Figure 13: Project 1 Project Supporting Transition into Abstraction. (Source: Author).

Figure 15: Scaled Drawings of the Object Reconfigured. (Source: Author).

Project 2 - Information Kiosk

The kiosk project is a transformation of the toaster project, the first step of which is to draw a diagram of the spatial organization of the final configuration of the toaster project. This diagram is a beginning of the kiosk design (an entry and two areas that support a small open-air public display of architecture student projects). Spaces must manipulate natural light for display of objects and flat art. The hypothetical campus site is an outdoor, flat level area with full sun exposure and pedestrian access. Students study solar orientation as a modifier of form to control day lighting within the project from a selected palette of three materials as a transformation of those suggested in the thicknesses and differences of materials in the toaster project. A final model and composite drawing develops skills in communicating building concepts, materials, and views with orthographic and perspective representations.

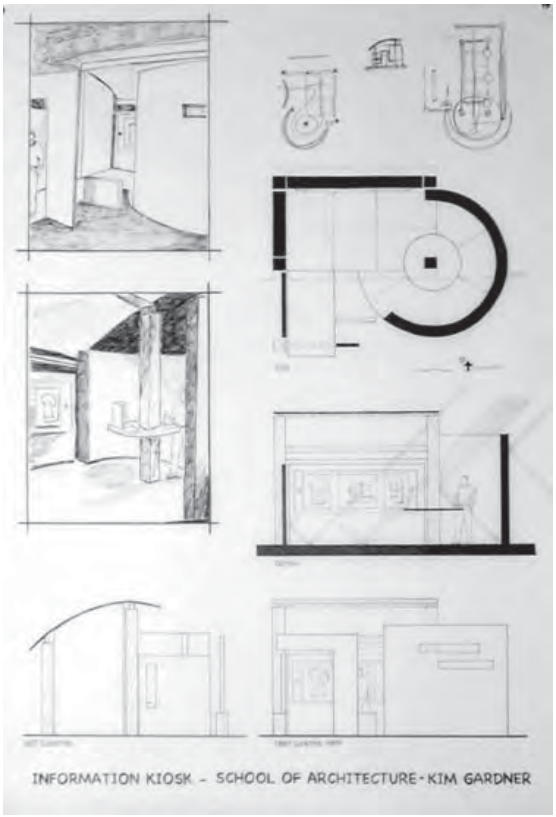


Figure 16: Project 2 Information Kiosk - Final Drawings. (Source: Author).

Project 3 - Campus Student Center Project

The student center project offers educational objectives that extend student abilities for complexity and development, while introducing basic analytical tools used in the disciplines of building design. It is the first project in the design curriculum in which each student is asked to develop his or her own conceptual direction, so it is controlled in scope as a logical “next step.” A project where the student is both the client and the user group challenges preconceptions and causes students to extend themselves outside their own worldview.

The students themselves are the primary occupancy group of the program - a student center with a small cafe, study areas, and spaces for multiple purposes, including large outdoor gathering areas for performance or lecture. Thus, the project studies varieties of public and private experience of both individuals and groups. Sited in an open space on campus between a circular plaza walk and the rectangle of building facades, analysis of site leads to a realization of great potential

for interaction with geometries of the campus plan as conceptual generators. Students are also introduced to analysis of patterns of human occupancy in a group project that sends them to local cafes to observe, sketch, and photograph the way people interact in the space of a café, its plan, scale, lighting, and materials, both as public visitors and cafe workers. The flexible building program enables each student to make choices about program components they believe are fitting for the campus. Control of day lighting and prevailing breezes is also a factor because the structure is not heated or cooled mechanically. A primary factor for design is that this building will become iconic for campus identity at many scales. The project timeline allows development of many iterations as cycles of model and drawing, as a cycling from concrete and experiential to abstract and conceptual.

Figure 17: Project 3 Campus Student Center - Final Model. (Source: Author).

Figure 18: Project 3 Campus Student Center - Interior Simulation Photograph. (Source: Author).

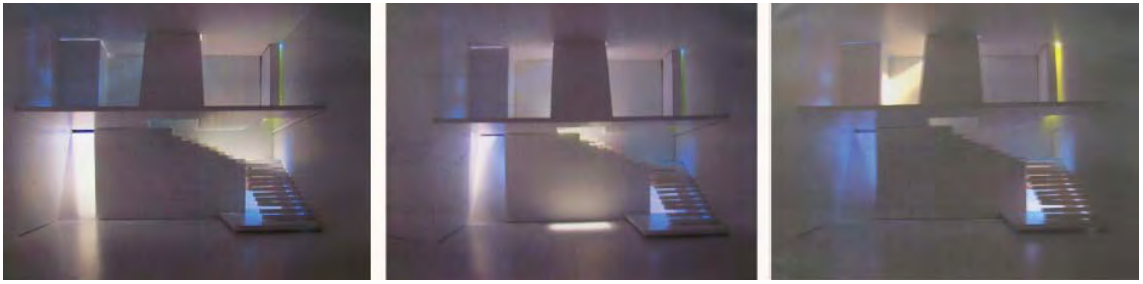
Project 4 - Introduction to Color and Light

The purpose of this project is to introduce color and light as implicit design factors in architectural design situations. The project begins with experiential mixing of paint pigments to address color variations, thus building understanding of the basic concepts and vocabulary of color systems Simultaneously, students are engaged with photographing a place between buildings hour by hour during the course of a single day and laying out the photographs in sequence for continued color analysis. Specific hues in each successive photograph are matched with paint mixes revealing changes in hues due to reflective light. Students observe that color is not an absolute and is related to the adjacent environmental color, and issues such as light color, light direction, and time of day.

This experience is then applied to a design project with each student constructing a large-scale model that enables them to directly observe, and then refine, daylighting effects applied to a small program for a student lounge. This model

Figure 19: Projects Exploring Color and Light Experiences. (Source: Author).

simulation works precisely because light has no scale – daylighting effects in a model are equal to that of full-scale environments. Students photograph the models in different solar orientations to understand lighting effects and color variations. This exercise also instructs about the value of model-making to assist in design decision-making. Three rendered perspective drawings communicate interior daylighting conditions in morning, mid-day, and late afternoon. Students come to understand that drawing light well also means drawing shadow and that effective representation of lighting conditions must involve an observer's imagination as much as depict what actual illumination. Underlying this project experience is, of course, an understanding of the movement of the sun during the course of a day (i.e., altitude and azimuth related to latitudinal location).



Room at 9.45 AM | Room ar 12.17 PM | Room at 3.28 PM

Figure 20: Project 4 Study of Light and Color Interaction in Architectural Space. (Source: Author).

Project 5 - Residence for Artistic Production

While the final design project of the semester serves as a comprehensive project, it also addresses specific design issues such as structure, context, programming, exploration of other art forms, interior experience, as well as daylighting, color, materials, model-building and composite drawing methodologies. The project is located in a cavity of space between two contiguous, fire-resistant party walls. Each student develops a program for both an artist's living space and for the architectural support for the work involved in production and display of their selection of one of four art forms - ceramics; photography, found art, woodworking.

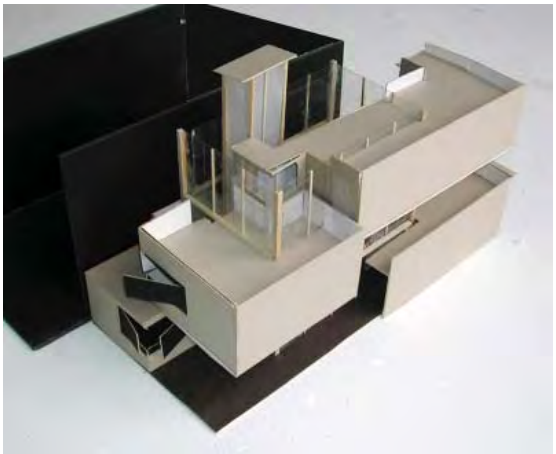


Figure 21: Project 5 Residence for Artistic Production - Progress Model. (Source: Author).

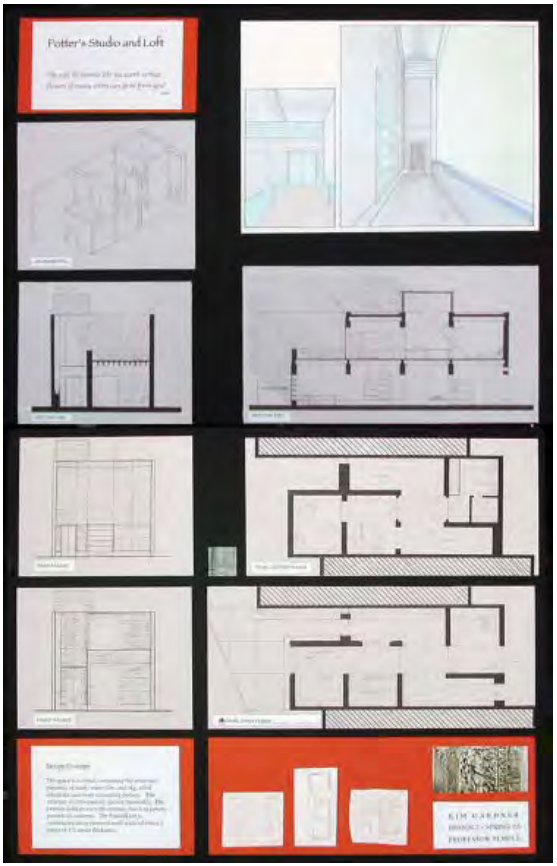


Figure 22: Project 5 Residence for Artistic Production - Presentation Drawings. (Source: Author).

Project design development involves determination of structural systems and a daylighting strategy conceptually unified by a program for the living and working artist. Students build a study model to explore a three-dimensional strategy for spatial organizations while simultaneously developing structural systems. Section drawings are utilized to study the vertical aspects of their proposal and the penetration of daylight by placing their model

in sunlight. Daylight penetration demands complex interaction with spatial and structural organization. While requirements for a model are to develop and express day lighting, structure, and space through concrete exploration in a model. Drawings complement a model by representing material finishes and, to some extent, an experiential character of the spaces (i.e., spatial qualities, materials, lighting effects, and colors). Although there are many specific submissions due in the cycling of model and drawing exercises through design processes, the final drawing takes form as a single composite drawing, a format that causes thinking of a design project as storytelling.

Conclusion: Doing (concretely) and Thinking (abstractly)

"Thinking is too easy. The mind in its flight rarely meets with resistance. Hence the vital importance for the intellectual of touching concrete objects and of learning discipline in his intercourse with them. Without the check of visible and palpable things, the spirit in its high-flown arrogance would be sheer madness. The body is the tutor and the policeman of the spirit."6 - Ortega y Gasset

It is impossible to be convinced that teaching by beginning with traditional, abstract, standardized, non-heuristic learning will "produce" the kind of students who will thrive as designers of our physical surroundings. They will instead, I believe, prioritize abstraction in their design work and will not value the realization of these abstractions. Instead, they will create an environment that necessitates "abstract reading and interpretation" that negates issues of substance and individual valuation of direct experience (i.e., materiality, light/shadow, proportion, materiality, connectedness, etc.) and, most importantly, the affective and physiognomic effects of the material world on the reception of any abstract content. It is healthy skepticism that questions that abstract learning should or can prefigure experiences of making. Students that learn design "backwards" in this way inevitably seek to provide only "what the instructor is looking for" as a solution to their design projects because their use of abstraction has no ground in their own experience of the world as their own bodies become shut out of the learning experience. Teaching design by making things must comprise students' first learning experiences

It is not the author's objective to apply Piaget's developmental stages or Kolb's learning cycle as an exercise of applied science. To the contrary, I am advocating mind-body unity in the classroom that, simply stated, places the direct experience of our physicality in the world as the ground for abstract, cognitive development of design intelligence. For architectural designers, abstract learning must always account for the physicality at the heart of their work. Buildings convey ideas. But architectural ideas are conveyed to an experiencing occupant only when linked, by necessity, with the perception of a building's material and spatial presences. These physical ties form the ground of abstract ideas and give body to conceptual representations that are otherwise formless. The mere idea of "giving body" to representation describes precisely a more unified relationship of mind and body. Images and representations (ideas) "of mind" originate in sensations of the physical world. This origin does not vanish or drop from significance

once the mind forms a representation. In fact, the continual renewal and reconstruction of neural networks is testament to the continual contact of the nervous system with the physical world. Educational systems that recognize this structure do so by providing direct experience as ground for cognitive development. Groundless abstract conceptualizing situates design problems as mental structures with at best a weak connectedness to the physicality that must, ultimately, find resolution in materials and space. As a foundational experience for architectural design education, learning exercises that are principally abstract in nature disassociate designing from human perceptual experience and lead the student to believe that the value of their work (and the built environment) lies principally in representational content. Experiential content is devalued and marginalized or forgotten.

Heuristic methodologies that underlie the utilization of experience as a basis for learning locate abstract content by way of the student's own selection, experience, and discovery. More importantly, this puts the student in charge of his or her own learning through dialog with self through decision-making, trial-making, self-critique, material exploration, and process selection. The teacher's role becomes responsive rather than formulaic - partners in design rather than omnipotent masters. This alleviates the teacher from having to deflect students from looking for "what the teacher wants" toward looking for what they can discover, critique, think about, and take action upon. If first educational experiences establish conditions for the reception of learning, then helping students to make their own inquiries sets a pattern that can only reinforce studio education.

Learning structures analogous to those in Kolb's experiential learning model are always already embedded in design studio methods. However, to be optimally effective studio pedagogy must elaborate a structure of learning that allows experiential learning as a basis for abstract learning. Pedagogies of beginning design courses that seek to introduce design processes as foundational for success in architectural education must recognize that synthesizing physical reality with abstract content necessitates the integration of concrete and abstract learning experiences. Specifically structuring design activities as cycles of making and thinking constructs design experiences that are dynamically interactive. Explicit engagement in concrete experience as self-initiated learning experiences grounds the complex situation of learning in which students act, observe, challenge, and reflect, allowing them to construct for themselves a dynamic process of learning and doing in which the holistic human experience of buildings can emerge.

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Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
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WHEN GROWTH IS NO LONGER THE NORM: TEACHING URBAN DESIGN IN A TIME OF TRANSFORMATION

Sujata Shetty and Andreas Luescher

Abstract

Over the past few years, there has been increasing interest in cities that are rapidly losing population, so-called shrinking cities. This is becoming a global phenomenon, with shrinking cities found on every continent. The decline has been attributed variously to changing demographics, suburbanization, post-socialist transformation and deindustrialization.

We are just beginning to develop approaches to dealing with shrinkage and its consequences – vacancy, abandonment, and limited public and private resources. However, there is currently little faith in the ability of design-related disciplines to deal with shrinking cities. Some authors argue that disciplines such as architecture, urban design and urban planning have always planned for growth and have reached their limits when dealing with shrinking cities (Oswalt, 2006). Still others suggest that restructuring should be seen as an opportunity (Vey, 2007).

This paper challenges the first view and responds to the second by suggesting that design education can and must respond to these new realities. It critically examines a collaborative urban design studio that was part of an attempt to transform a part of a shrinking city in the American 'rustbelt.' The city, once a flourishing manufacturing center, is now facing steep economic decline along with the decline of the auto industry. It is also home to a university that is beginning efforts to revitalize neighborhoods adjacent to the campus. The studio, which brought together architecture and urban planning students from two different universities to work on a section of the city including the campus area, suggests possibilities for preparing students to work in an environment where economic growth is no longer the norm. The following lessons emerged: 1) In a shrinking city, urban designers may need to focus less on designing the solids and more on meeting the challenges of the voids. 2) In spite of urban design's historical bias towards design, students need to be strongly grounded in the planning context, which inter-disciplinary collaboration can help achieve. 3) Now more than ever, even a small urban design project has to be viewed in a larger scale - in the context of the entire city and region. 4) In an era of shrinking resources, the urban design studio can be an important source of ideas for cities facing the physical consequences of shrinkage.

Keywords

Shrinking cities, deindustrialization urban design pedagogy, collaborative studio, Toledo.

Introduction

"The Beaux-Arts approach to architectural education is dead.... We need a complete overhaul and right now we are tinkering at

the edges. What we need is integration, collaboration...less about singular intelligence and more about collective intelligence."

-James Timberlake, founding partner of the architectural design firm KieranTimberlake, in a keynote address at the Association of Collegiate School of Architecture Conference, March 2009

Despite the global trend towards increasing urbanization, cities in some parts of the world are experiencing the declining population characteristic of the "shrinking city phenomenon" (Oswald and Reinerts, 2006). Globally, one in four large cities declined in population between 1990 and 2000 (Lindsey, 2007). While much of the discussion of shrinking cities has focused on Europe, the challenge is especially acute in the industrial midwest of the U.S. due the decline of the manufacturing industry (Vey, 2007; Pallagst, 2007, 2008). High unemployment and the housing foreclosure crisis have also had severe impacts on these old industrial cities.

However, architecture, urban, and urban planning have historically been framed by a narrative of growth (Swope, 2006) and a reluctance to speak about shrinkage or decline. Thus the traditional planning response to shrinkage has combined efforts to reduce sprawl and attempts to revitalize inner-city neighborhoods or downtowns (Pallagst, 2008). It has not taken an approach framed by shrinkage itself.

Architectural and planning education have also been framed by a narrative of economic growth and prosperity. For example, the U.S. Bureau of Labor Statistics (2010) forecasts a higher-than-average need for urban planners "to address an array of problems associated with population growth, especially in affluent, rapidly expanding communities." There is little discussion of how education and practice might change to address an alternate reality, one in which growth is not the norm.

By analyzing an urban design studio that brought together students of architecture and urban planning to address urban design issues in a typical U.S. "rust-belt city," we seek to contribute to the nascent discussion of how urban design pedagogy might change to reflect current urban transformations. The studio had two main goals. The first was to allow students to work collaboratively and across disciplines, since urban design is no longer a singular pursuit. The second was to think about how to teach urban design in the context of economic and population decline. Specifically, we sought to answer two research questions: Do cities facing economic and population decline merit a different approach to urban design? And what might such an approach look like? Would it be different from current pedagogy, and would the outcomes be any different?

As increasing numbers of cities face a long and protracted economic contraction, questioning the future role of urban designers has implications for both practice and pedagogy. Urban contexts in shrinking cities are undergoing profound change (Pallagst, 2008), but our paradigms for teaching remain rooted in an earlier era of growth.

To answer these questions, we draw on the work developed in the studio, regular group reflection sessions, course evaluations, and interviews with individual students.

We found that as students changed their focus from growth to shrinkage, their proposals shifted

from focusing on buildings to emphasizing issues of sustainable land use and the environment, specifically issues of infrastructure, density, and urban ecology; broadening the scale of urban design to include planning and the socio-economic context; and community engagement.

Our conclusions are based on a single case study and should therefore be considered exploratory. However, we believe they provide a starting point for further empirical research.

The paper is divided into four sections. The first section begins by briefly outlining the scope of the shrinking city phenomenon worldwide, then reviews the literature on the planning and design issues confronting these cities. The second introduces the studio and the city of Toledo, a shrinking city in the U.S. midwest, currently undergoing economic transformation. The third describes and analyzes one project emerging from an interdisciplinary studio and highlights findings on urban design concepts and strategies specific to this context. The final section offers conclusions and recommendations.

Planning and Design Issues Confronting Shrinking Cities

In a global survey, Oswalt and Reinerts (2006) estimated that worldwide, one in four cities with a population of at least 100,000 was shrinking. In the last half century or so, over 450 cities across the world with populations of over 100,000 have lost over 10% of their population, including 59 cities in the United States. Many of these are concentrated in the industrial northeast and midwest (Fishman, 2005; Vey, 2007); within this belt, Ohio has been particularly hard-hit. Except for the capital, Columbus, all of Ohio's major cities are declining in population, and the economic decline of cities often affects the entire metropolitan region (Brookings, 2007). This is not a uniquely Western European and U.S. phenomenon – it appears across the globe, including in South Korea and West Asia (Oswalt and Reinets, 2006).

Changing the Focus from Growth to Shrinkage

Europeans have been discussing their shrinking cities for years (the first large publication was the 2006 German government-sponsored Shrinking Cities project). In Europe, shrinkage has largely been correlated with the post-socialist era. In East German cities, which have attracted much of the research on shrinking cities in Europe, the decline has been attributed to various factors including changing demographics, suburbanization, post-socialist transformation, and deindustrialization (Oswalt, 2006). In the U.S., Beauregard (2006, 2009) suggests that shrinkage in the last century has two distinctive periods, the first immediately following World War II, between 1950 and 1980, when industrial cities in the Northeast and Midwest lost residents, while cities in Southwest grew. During the second period, between 1980 and 2000, fewer large cities lost residents, but those that did had lost population in previous decades as well. Hence, the persistence of shrinkage is the issue. A population loss limited to a single decade might be considered a setback, but losing population in consecutive decades indicates structural rather than circumstantial barriers to growth (Beauregard, 2009).

Despite the persistent population loss of many U.S. cities, the idea of shrinking populations is not compatible with the ideals of local policy makers

(Beauregard, 2003: 673). In U.S. urban and regional planning, current discourse still shows a "high affinity toward growth" (Pallagst, 2008: 10). U.S. planners tend to concentrate on managing urban growth or revitalizing downtowns, with little discussion of the accompanying shrinkage of cities (Pallagst, 2009). The U.S. equivalent of sustainable development is smart growth—a concept that is still very much centered on growth (Pallagst, 2009)

The Implications for Design Education

Design and planning pedagogy have also been slow to react. Referring to Kelbaugh's (2001) model of three competing urbanisms - New Urbanism, Post-Urbanism, and Everyday Urbanism, Kaliski (2008: 116) suggests that "New Urbanism was the champion in 2001 and six years later is the near-hegemonic approach to urban design in the United States. It is demanded by publics, adopted by developers and accepted by decision-makers. Its preeminence among planners is simple. It provides straightforward place-making principles that are imageable, reassuring and communicable." The International Network for Traditional Building, Architecture and Urbanism lists several universities in the US., including some very prestigious ones, as having courses or faculty members dedicated to New Urbanism. This approach remains focused on building, raising questions about whether such a prescriptive approach to urban design makes sense in a city facing shrinkage.

Designing the Void: Sustainable Land Uses

Physical consequences of shrinking cities include abandoned buildings and vacant lots. After years of depopulation, job loss and disinvestment, such cities' land use patterns and physical footprints do not reflect their current economy or population levels (Brookings, 2010). The availability of open space both poses new challenges and opens up new "spheres of action" to urban design, presenting opportunities to think about sustainable land use in terms of urban ecology, infrastructure and density. These are obviously intertwined, but for reasons of clarity, we will address each separately.

Urban Ecology

Proponents of Landscape Urbanism suggest that abandonment and vacancy reveal lost natural features (Spirn, 1995) that can now be restored (Waldheim, 2006), or that the area can be returned to a more natural state. In many shrinking cities, nature has already begun reclaiming once built-up lots, but not by design. Unmaintained landscapes can reduce property values (Wachter and Gillen, 2006) and erode faith in a neighborhood's future (Schwarz, 2008). In Philadelphia, for example, Wachter and Gillen (2006) found that in blocks with high concentrations of unmanaged vacant lots, residential values decline by about 18%.

Vacant land can, however, be a valuable asset in improving a city's environmental infrastructure. Most simply, vacant land helps to "green" a city, either through a managed return to a natural habitat, or through planting. Philadelphia has used greening as a policy specifically to tackle shrinkage and vacant properties (Bonham and Smith, 2008). Working with residents, businesses and local organizations, Philadelphia Green, a program run by the Philadelphia Horticultural Society, reclaims vacant urban land. Individual lots are cleared of litter, graded, and planted with grass and a few saplings to create pocket-park-type settings. Long-term maintenance is

part of the program. In one of the few studies to calculate the economic impact of such greening policies, Wachter and Gillen (2006) found that proximity to a neglected vacant lot reduced the value of a home by 20% from the base value of an adjacent home. Location adjacent to an improved lot increased the home's base value by approximately 15%.

Describing efforts in Buffalo, a U.S. city facing population loss, Schilling (2008) suggests that vacant and abandoned properties be replaced with green infrastructure. At its most basic, this consists of "cleaning and greening" – clearing vacant lots and adding some simple plantings. If the lots are maintained, neighborhoods not only benefit from the visual impact of well-maintained open space, but also benefit economically, as the prices of adjoining lots increases (Wachter, 2005).

Density

As the open space in shrinking cities increases, figure ground diagrams highlight their changing density. As populations decline and buildings are demolished, a patchwork of built form emerges – loosely connected, if at all. Two approaches have emerged to address this – the consolidation and dispersion models (Schwarz, 2008). One example of the former is architect Oswald Mathais Unger's early proposal for Berlin, called the Urban Green Archipelago. It described areas of dense development in the most viable areas of the city, creating archipelagos around which all future development would be clustered. In other parts of the city, buildings would be demolished, the land allowed to return to nature, and the residents relocated to the urban archipelagos (Cepl, 2006). Youngstown, Ohio is attempting a gentle version of this approach (Swope, 2006), and the mayor of Detroit recently urged citizens to think seriously about this option (MacDonald, 2010).

In contrast, dispersion occurs when, for example, residents have taken over adjacent vacant lots, creating areas of suburban-like low-density development (Armborst et al., 2008). Planners and urban designers tend to oppose de-densification, fearing that it will lead to suburbanization of the city. Using Cleveland as an example, Schwarz (2008) argues that "while suburban-style development patterns can in some cases undermine the character of the city, the statistical reality of Cleveland's on-going population decline obligates us to be more flexible and open-minded about what good urban form means for our city in this period of transition" (Schwarz, 2008:81).

Infrastructure

A shrinking city's vacant land can also be used to accommodate infrastructure. As populations decline, impervious surfaces for uses like parking can be converted, for example, to rain gardens or bioswales to help manage storm water run off. In a pilot project in Philadelphia, vacant lots have also been used for storm water management (Bonham and Smith, 2008).

Open spaces are increasingly being used to develop a sustainable local food infrastructure, from individual lots to community gardens (Rugare and Schwarz, 2008). Such uses help to develop a sustainable, local food system in areas where access to fresh food has long been an issue. Although the availability of land and low land costs benefit such uses, contamination could present challenges in cities where the

land has had widespread industrial uses.

The Implications for Design Education

Discussions of land use, infrastructure, urban ecology or density often fall into the category of sustainability. Given their importance in the urban context, one might assume that these ideas are central to design education. However, analyses of architecture programs in Africa and the Middle East found that the concepts of sustainability do not form a big part of the curriculum (Salama, 2002, 2007). A similar study of architecture, landscape architecture, planning and surveying schools in the United Kingdom had similar results (Iball, 2003). There are, however, suggestions on how to integrate sustainability into architectural education in the U.S. (Wright, 2003), as well as specific examples of how sustainability can be incorporated into design education (Salama, 2008; Hayles and Holdsworth, 2008). Urban design must begin to incorporate ideas of sustainability into the curriculum.

A Broader Scope for Urban Design: Crossing Disciplines and Scales

Urban design education and practice continues to focus on how to build on the steady supply of open space in many U.S. cities. For example, Fishman (2008: xviii) says that "fortunately for urban design, deindustrialization has created in almost every city a large inventory of... sites where lost space can be found," and he suggests that these lost spaces are potentially available for redevelopment.

But what might the redevelopment look like? Urban design as practiced now has been described as architecture at a large scale in an urban context (Inam 2002; McCullough 2008), as an "extension of architecture, not something inherently different" (Marshall 2009: 53). Architects lead some of the largest urban design projects around the country (see Ouroussoff 2009), a trend that has international parallels (Ockman 2008).

Kelbaugh and Krankel McCullough (2008) suggest that the focus on the individual building and the underdeveloped urban design sensibility in schools and practice has too often led to buildings that do not engage their urban settings. "The hegemony, even fetishization of the individual building in both the design studio and professional practice continues to plague architectural culture. The singular building - whether signature or vernacular – remains the digit of design in the built environment. The building is still seen as the morphological, legal, financial and operational unit of urban development" (p. xxi).

Designing in cities that are experiencing population loss raises a number of practical issues as described above – for example, what, if anything, should we do with the vacant land in the city, or how best can we provide services in a city with very uneven density? There are social issues, such as, who will decide where in the city new investments will be made? There are issues of image – what should a city that has lost, let's say, a third of its population, look like?

These questions cross the conventional boundaries of disciplines like architecture, urban planning, and landscape architecture. In response to these issues, a discipline like urban design must push beyond its focus on building and engage the urban setting. Urban designers must collaborate beyond professional boundaries (Krankel McCullough 2008; Krieger 2009).

The Implications for Design Education
Design education then, has to encourage students to stretch far beyond the individual building or site and work across different scales and help students collaborate across disciplines. Making a case for collaboration, Krankel McCullough (2008:3-4) argues that "urban design, more than other design disciplines, is inter-disciplinary, crossing the boundaries of architecture, planning, landscape architecture, and engineering. Like planning, it is a creature of policy, political decision-making and power structures. Yet it is distinct from urban planning, because it is predicated on three-dimensional form. The process of urban design is to resolve the political, economic and social vectors with the goal of arriving at urban form that works."

Even when urban designers were exposed to planning, Scott Brown (2009) argues that their exposure was not well-integrated. She suggests that the problem got worse "as planning departments lost their social thinkers and activists, and architects lost interest in social problems. So eventually, most urban designers had training that was primarily in architecture…." (Scott Brown 2009: 82).

Embracing a multiplicity of scales, and reaching across disciplines, urban design must be anchored in research and analysis of conditions on the ground, then propose specific interventions at different scales, (such as a single lot, street, neighborhood, etc.,), while mindful of the regional context and beyond.

Community Engagement

The literature is not yet explicit about the social dimensions of shrinkage. Who will determine what approach a city should take to address shrinkage? What process can ensure that marginalized residents of the community have a role in decision-making?

Equity has long been important in the field of planning, where inclusive design and social inclusion are key principles (Krumholz and Forrester, 1990; Peel and Posas, 2009). Urban designers should recognize the multiple interests and decision-makers at work in cities and engage community members much more broadly (Scott Brown 2009; Krieger 2009; Kaliski 2008; Sanoff 2007). Proponents of 'Everyday Urbanism' have articulated the principle of community engagement most clearly. One of the primary spokespersons for this approach, Kaliski (2008) suggests that rather than relying on good planning processes or generalized knowledge of urban design, "planners, architects and landscape architects, acting as urban designers must associate themselves and their specialized activities with everyday people to do everyday planning" (Kaliski, 2009: 250). Kaliski (2009:251) argues that the details citizens cannot draw and planners tend to abstract make urban designers the professionals "that best integrate citizen-based planning concerns and practices into the actual bricks and mortar of qualitative place-making."

The Implications for Design Education
Although community participation in design has been established now for about four decades (Sanoff, 2000), there is still resistance to this approach among those who believe that architecture is a creative art, that the social aspects that frame architecture are not issues for architectural education, but for practice (Salama and Wilkinson, 2007). However, the design issues facing cities cannot be seen as

artistic endeavors divorced from a social context. Engaging members of a community in the process of urban design and being responsive to community needs can lead to many significant positive outcomes in the design and planning process, which Toker and Toker (2006) suggest is the pragmatic turn that community design has taken. At the same time, the complexity of problems that practitioners of urban design will face suggests the need to provide students the opportunity to engage socio-economic, political and other community-related issues in the course of their design education.

The Studio

This paper explores the issues raised for urban design in a shrinking city through the lens of a studio based in one such city. The city of Toledo, once a thriving industrial town with a rich architectural heritage, has for several decades experienced declining population. It has poverty, unemployment, and crime rates that exceed national averages (U.S. Census, 2000). The city's population is now a little under 300,000.

Dorr Street, a major artery in Toledo, runs west from downtown towards Toledo's suburbs (see Figure 1). A mix of uses is visible along its length – single-family homes, apartment buildings, a few stores, the University of Toledo, a private golf course, a city park, a post office, some industry. Also visible are largely vacant strip malls and parking lots, fast-moving traffic, and few pedestrians. But this was not always the case. Sections of Dorr Street were once the bustling center of Toledo's African-American community and hosted bars, restaurants, theaters and live entertainment venues. Famous musicians always made Toledo a stop on their tours. Other sections of Dorr had destination stores and professional offices, many of which were black-owned businesses. Dorr Street was one of the city's thriving arteries.

The 1960s and '70s were a time of urban unrest in the U.S., and Toledo had its share of problems, including, in 1970, the high-profile shooting of a patrolman and a shootout at the Black Panther offices on Dorr Street. By the mid-1970s, urban renewal was in full force across the country, and Dorr Street was slated to receive federal funds for blight removal. Between 1976 and 1979, $25 million was spent to acquire and relocate 300 businesses and homes so that Dorr Street could be widened. Some were relocated to other parts of Toledo, but many businesses closed for good.

The city has also suffered from a lack of political leadership in planning and design - Dorr Street is only one example. However, in the past five years the university has shown renewed interest in engaging the community, in redeveloping areas adjacent to the campus (notably Dorr Street), and in being a better neighbor to the residents of surrounding areas. Included in the planning was the West Central Alliance, a federation of four local community development corporations (CDCs) serving sections of the Dorr Street study area. The University of Toledo Foundation was the fiduciary agent for the project.

Clearly, there is renewed interest in Dorr Street, including the university's interest in being a better neighbor. This is reflected in the Dorr Street Neighborhoods Visioning & Implementation Plan, whose purpose was to provide a conceptual context for development decisions

Figure 1: Figure-Ground of Dorr Street and surroundings from downtown Toledo (to the right) to the edge of the city (to the left). The main east-west axis is Dorr Street.(Source:Authors).

on issues related to land use, transportation, and community facilities. The plan focuses on "big picture" issues.

With the Visioning and Implementation Plan as the starting point, students of architecture from Bowling Green State University and students of geography and planning from the University of Toledo were charged with developing visionary and sustainable urban design concepts for the length of Dorr Street. Teams of students drawn from both universities were assigned to different stretches of the corridor. They were instructed to concentrate on their site while always keeping the larger city context in mind, paying particular attention to the role of the street. Could it anchor a shrinking city? Did the street work for students as well as community members? What part could it play in the life of the city? How was this reflected in the team's design?

The students came to the project having prepared in multiple ways. Some studied other cities that have used a street or a linear form as a linking element, such as Duesberg in Germany and the High Line in New York. Others looked at city-university plans for redevelopment, including those of the city of Columbus with the Ohio State University, and those of Philadelphia with Drexel University and the University of Pennsylvania. Still other students studied the history of Dorr Street to provide a context for the current work.

Before collaborating on proposals, groups of students were also assigned to short stretches of the street. They studied each section closely to understand not just the architecture and planning issues confronting the area, but also its historical and social contexts. Students walked along different stretches of Dorr, took photographs or sketched, and talked informally to members of the community. After each assignment, they reported back to the larger group. Students received briefings from members of the Toledo Design Center and were encouraged to look at the Toledo 20/20 plan. At the end of the semester, students shared their work at a public presentation.

Findings

From Growth to Shrinkage: Building versus Not Building

The students were familiar with vacancy and abandonment in Toledo, but in their experience, public policy addressing these voids had focused on project-based building – a government center, festival marketplace, convention center, baseball field, and multi-

purpose arena. Rethinking whom these projects are for and what purpose they serve in a city facing population loss and economic decline led many students to question what urban design means in such a city. Vacancy and abandonment are pervasive – only one downtown intersection still has buildings on all four corners. Figure ground drawings give most streets a gap-toothed profile. There is plenty of land on which to build, but the first question for the budding urban designers was, "Should we build?"

Figure 2: Figure-ground of the University of Toledo Main Campus (top half of the figure) and the denser residential neighborhood (bottom half of the figure), with Dorr Street acting as the divider, Toledo, USA (Source: Authors).

A figure ground analysis of the site that included the main campus of the university and an adjacent neighborhood (see Figure 2) shows that while the university, north of Dorr Street, follows a typical low-density buildings-in-a-park pattern, the neighborhood to the south, which once used to be dense residential fabric with retail uses along stretches of Dorr, now shows lots of vacant land. The concepts of economic decline and shrinking populations framed the proposed interventions of the students who worked on this site. The challenge, the students said, was in "connecting campus and community after decades of division in a city that is experiencing obvious decline" (Kallio et al 2009:2). One of the goals of this proposal was to "focus intervention and limit development to a scale that both appreciates the status of Toledo as a 'shrinking city' and acknowledges the opportunities and demands uniquely present in a site serving a major university and its neighbors" (Kallio et al, 2009:8).

This proposal portrays Dorr Street as "a necklace – a landscaped boulevard linking nodes of activity, with several modifications to calm traffic and provide a safer, more inviting environment for non-automobile users, and make the area more aesthetically pleasing" (Kallio et al, 2009:8). Proposed changes are distinguished by their small scale and their strategic distribution across the site to strengthen existing nodes of activity (see Figure 3). Among the proposed new uses are a concentration of small-scale retail, such as cafes, food establishments, and a small convenience or drug store to meet the everyday needs of long-term residents and students; moving the university's visual arts studios to Dorr Street; and using a vacant strip mall as the site for a community center that will

house public meeting rooms, offer one-stop shopping for public services such as housing, legal or employment assistance, and host after-school activities for neighborhood children.

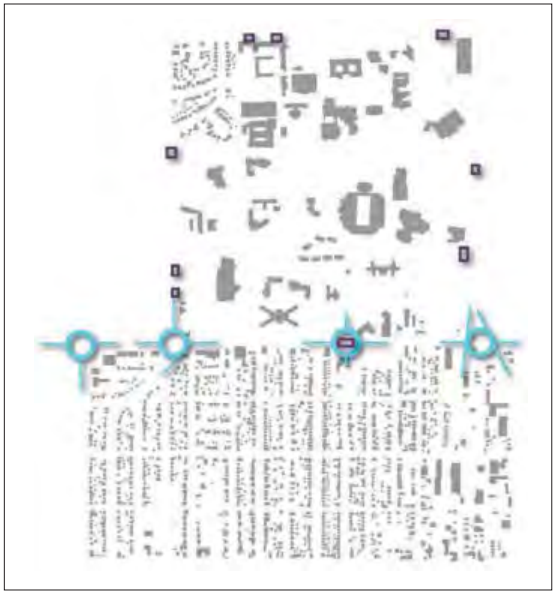

Figure 3: Analysis of nodes at the University of Toledo Campus. (Source: Authors).

Many of the proposed interventions were small and detailed. A church parking lot would be transformed to green space; parishioners could use the lot next door, which they would share with the proposed community center. Two blocks along Dorr Street with vacant lots and poorly maintained rental and commercial buildings would be home to fast food restaurants and businesses now lacking in the area. One larger intervention was to use a nearly vacant parking lot at a major intersection for a small mixed use development that would include a much-needed grocery store, small offices, banks, restaurants, stores catering to residents, and upper-story living space. What tied these various interventions together was the idea of a legible street – Dorr Street as a necklace.

Designing the Void: Sustainable Land Uses

Infrastructure

Students began their analysis of the site by looking first at the natural, physical context. They found a relatively flat site outside of flood zones and floodways. However, the soil was compacted and thus less permeable. This, combined with the inadequate storm water drainage system, the seasonal floods along the Ottawa River (which runs through campus just north of Dorr), and flooding problems in the city suggested the importance of reducing impervious surfaces and managing storm water runoff. The proposal addresses these issues with several suggestions, including converting a long strip of green into a rain garden with signs to educate passers-by. The proposal suggests that any new paving utilize porous technology. It also identifies unused and under-used parking lots and vacant lots to be converted to rain and community gardens.

Urban Ecology

Open space is now firmly a part of the city's fabric, and contrary to the city's attempts to fill up these spaces with big buildings, students featured the open spaces in their proposals.

An analysis of the existing green spaces on the site suggests an extremely uneven distribution, with large swaths on campus to the north, and very few within the neighborhood to the south (see Figure 4). They are inaccessible to residents

due to their location (deep inside the campus and difficult to reach from south of Dorr) and their nature (often undulating landscape elements rather than easily usable green space). The proposal does several things to address this. For example, seven parcels along Dorr Street, close to campus - four vacant and three with a long-vacant service garage – could be turned into a pocket park so that community residents, students and visitors have access to a usable green space. Farther east, an under-utilized parking lot belonging to the engineering school is the proposed site for "Cricket Corner," which would serve the needs of students who currently play cricket there in good weather.

Figure 4: Analysis of green space at the University of Toledo Campus and the surrounding neighborhood. (Source: Authors).

Vacant lots within the neighborhood and on its edge close to campus have also been designated for community gardens as part of the city's active and growing local food movement. In addition, this proposal, inspired by an example in Toronto, proposes a community brick oven to allow for communal cooking.

Density

Students addressed the issue of density through consolidation, though the abandonment here is not so serious as to create urban archipelagos. Using publicly available data, students identified the ownership and tax status of every lot on their stretch of Dorr Street. They also identified the use and condition of each structure. Students were very aware of the history of demolition during urban renewal and residents' subsequent distrust. As a result, very few structures, and only those in poor condition, were ear-marked for demolition. Where possible, parking was moved to the back of buildings, with suggestions for streetscape enhancements including better lighting, wider sidewalks, and the redesign of some open spaces into plazas with outdoor seating.

The few small new buildings and the proposed new uses for old buildings incorporated mixed uses or were placed close to each other so that people could meet many of their needs within a reasonably small area, possibly without using an automobile (see Figure 5). Students promoted connectivity between nodes of activity with proposals for bike paths, cooperation between the university and city bus services and a regular shuttle along Dorr Street. Using the suggested pedestrian overlay zone as a planning tool, strengthening public transportation along Dorr, and using pedestrian and bike paths across

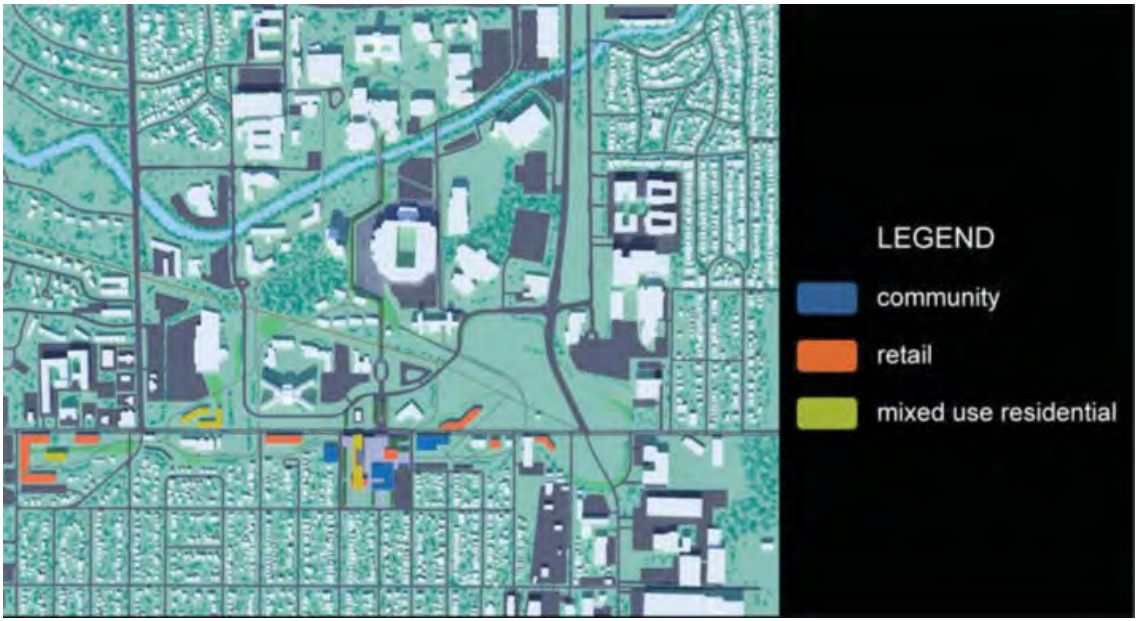

Figure 5: Proposed land uses along Dorr Street.(Source:Authors).

Dorr to connect campus and community were attempts to strengthen infrastructure to promote walkability.

A Broader Scope for Urban Design: Crossing Disciplines and Scales

In response to calls for urban design to become more "urban" and less "design," this studio was structured to foster collaboration between architects and urban planners, and it drew from those two disciplines as well as from urban design.

These disciplines have different sensibilities – planners lean towards data and analysis, and architects lean towards physical design. Their collaboration, combined with our insistence that they justify the relevance of their proposals to a shrinking city, had the effect of grounding of the proposals firmly in the current reality of the city. It forced students to look at their site at many scales, ranging from its location in a shrinking city in economic decline, to census data on the population in their area, to the property value of buildings (see Figure 6), all the way down to the condition of individual buildings. At the same time, they had to think about how to make the city more legible, define the edge of a street, or create attractive open spaces.

For example, a planning analysis of the residential neighborhood covered in this site

revealed several challenges. Compared to county averages, census data showed that it had a higher rate of owner occupancy, a higher percentage of vacant housing units, a higher rate of adult disability, and a higher rate of poverty. Moreover, its average per-capital income and monthly mortgage costs were lower than the county average. Since households in this neighborhood are relatively poor and have low housing costs, it is critical to preserve housing, and, where possible, expand housing choices. These were goals of the proposal, even though the housing stock is old (about 39% built before 1939, and about 80% built before 1960), and many of the houses need maintenance. At another time, these conditions would have made the neighborhood ripe for razing and redevelopment.

This example highlights another aspect of this broad view of urban design. Meetings with members of the local design and planning communities prodded students to think about the relevance and economics of their proposals for Toledo. Thus, even when students suggested a new building, for example, to house a much-needed local grocery store, they also proposed alternatives, such as a community garden, that could put the site to good use relatively inexpensively until a grocery store became feasible. Students adopted an incremental approach, suggesting both long-term land uses and short-term alternatives that could be implemented before a more ambitious proposal was realized. Furthermore, their proposed land uses could either stay the same or change to reflect changed circumstances.

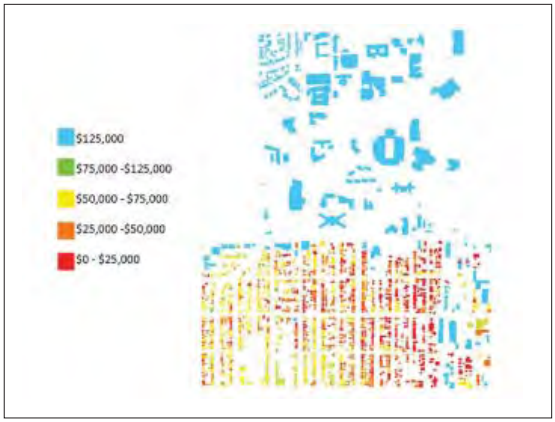

Figure 6: Analysis of property values surrounding neighborhood of the University of Toledo Campus.(Source: Authors).

Community Engagement

Following a series of analysis drawings and conversations with those who live in or frequent the area, students felt that Dorr Street acted as a physical barrier between the university and community (see Figure 7). In addition, residents in the neighborhoods to the south of Dorr Street, mindful of history, expressed mistrust of institutions north of this border, such as the city and university. They feared that students renters would negatively impact their property values and quality of life.

In crafting their proposals, students were guided by their conversations with residents and students, their experiences, resident input gathered by recent planning initiatives, and the everyday needs identified by those living in or frequenting the site. Many of the uses suggested – a grocery store, a convenience store, parks, a neighborhood medical clinic,

fast food restaurants and cafes – came from an appreciation of these needs. Many of these would be spaces that would bring togther residents from both sides of Dorr Street.

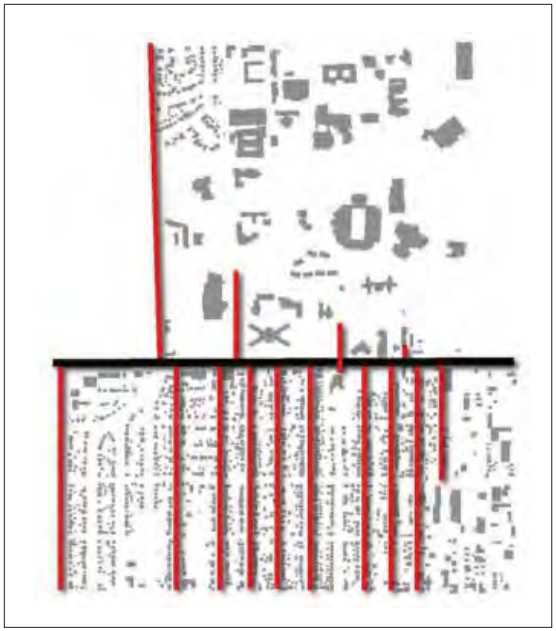

Figure 7: Analysis of stagnant circulation between University of Toledo Campus and the surrounding neighborhood. (Source: Authors).

Some uses were not as palatable to the students – for example, an existing "plasma center" where students and poor residents sell blood for money. Similarly, some urban forms were not as desirable, for example, the vacant strip malls lining Dorr Street. But students were following a path similar to what Kaliski (2008) describes as the work of the North American everyday urban designer, who is "simultaneously accepting and critical of automobility, suburbia, single-family houses, shopping malls, sprawl, and all the other accretions of contemporary urbanisms, believing that each addresses a human need and that all remain a subject for betterment as opposed to obliteration" (p. 117).

Some Lessons

In reflecting critically on this studio, we sought to answer two questions: first, do cities facing economic and population decline, so-called "shrinking cities," merit a different approach to urban design? And, second, what might such as approach look like? We structured our research to highlight the planning and design issues in shrinking cities based on the literature as well as our experience on the ground, and designed the studio to respond to these.

Our work showed that in a shrinking city, the focus for urban designers may not be in designing the solids. The challenge could lie in the voids, meeting the needs of cities whose populations and economies cannot support more buildings, and questions of sustainable land use have to be addressed directly. Among the specific features, we saw attention to urban ecology, infrastructure and density. Additionally, we saw a leaning towards working in multiple scales. There were smaller and staged interventions, (for example, using a vacant lot for an urban garden until the time is right for a much-needed grocery store). These interventions, though individual, were seen as part of a larger plan for the area to increase the coherence and legibility of the urban fabric.

Despite urban design's historical bias towards

design and the singular building, students need to be strongly grounded in a broader context, which inter-disciplinary collaboration can help achieve. The push towards inter-disciplinary collaboration in universities has come from the natural sciences. Forsyth (2007), while suggesting reasons why it might be difficult for architecture faculty to respond, argues that it has the potential for positive effects on architecture programs, especially those engaged in traditionally support areas such as social factors. We suggest providing opportunities for students to interact early and frequently in the course of their education from people in other disciplines, with the aim of having students perceive an intellectual comfort in a broad area of knowledge allowing them to interact confidently with people from a variety of backgrounds. (Ferreira, et al, 2009: 47)

In an era of diminishing resources, the community-based urban design studio can be an important source of ideas for cities - not just for city leaders, but for residents - facing the physical consequences of shrinkage. Communities with limited resources can benefit from the design work done by students (Sanoff, 2000). For the student, community-based learning provides students an opportunity to integrate techniques with theory (Kotval, 2000). For the profession, as Boyer and Mitgang (1996:144) suggest, "the scholarly activities of both faculty and students should relate to...matters of consequence for the profession and beyond that, to society as a whole."

The Beaux-Arts master-apprentice model of teaching design thus has limited applicability in the context of shrinking cities. The pedagogy and practice of urban design have to evolve in response to new circumstances – shifting focus from buildings alone to working at multiple scales, reaching out across disciplines, engaging the complexity of communities.

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HOW SPIKE AND THE SLUMDWELLER FIND REALITY IN DESIGN STUDIO HANDOUTS: AN EXPLORATION OF REALITY IN THE DESIGN STUDIO

Beatriz C. Maturana

Abstract

This paper is part of my research exploring the architectural design studio (ADS) and its engagement with the real world. This engagement is partly investigated by identifying instances where the architectural design brief (reflecting the reality of practice) manifests in the ADS handouts. Specifically, I will examine here the occurrence of three of the nine criteria identified in the design brief within the ADS handouts: consultation, need, and client. Spike and the slumdwellers are two "clients" that reveal some of the complexities of the connection between ADS handouts and the real world. The data for the study consists of 145 handouts from three architectural faculties in Australia. It covers five years of architectural studies between 2003 and 2007.

Keywords

Architectural education, reality, experience, maturity, engagement.

Introduction

Assessing ADS against the reality of practice is not without contention. Some would argue against emulating the reality of practice in ADS, believing that practice diminishes the opportunity of creative freedom (1). Others consider that the aims of practice contradict the aims of education—practice focusing on financial gains and education on learning (2). Conversely, others posit that by not drawing from the real world, "contextual variables are neglected. (3)" In this paper, I argue that creative freedom requires experience, knowledge, reason, judgment, and maturity, and that in ADS these qualities can be attained by engaging with the real world (4). Without these, freedom becomes a shallow and misplaced delusion (5). I suggest that the criteria used in a design brief and permanently used in architectural practice (6) offer some readily available "tools" that can assist students (even if in a limited degree) in increasing the opportunities for interaction with the world outside the university environment (7). This is not to say that there are no other ways to go about improving ADS' engagement with the real world, but for now, this is perhaps one of the most measurable and attainable.

Aspects that replicate the reality of architectural practice, or more specifically the criteria used in a typical design brief, can be and to a degree are perceived as built-in to speculative ADS exercises. Indeed, most ADS handouts contain at least some of these criteria—for example,

client, site, cost, or budget. Inquiring into the research data from the perspective of the processes typically undertaken by an "average" architectural practice provides an agreed-upon process of gathering information that assists to define a design brief. This information is generated by and within the "culture" of architectural practitioners. Thus, by exploring and evaluating how ADS handouts engage or dismiss aspects of the brief, this study highlights the benefits that this specific form of engagement with the real world of practice could offer to students.

Data, Methods, and Nomenclature

The study is based on 145 ADS documents contributed by three Australian architectural faculties from the University of New South Wales (UNSW), University of Tasmania (UTas) and The University of Melbourne (UoM), from the states of New South Wales, Tasmania and Victoria, respectively. The three faculties are representative of what I have called traditional universities, meaning that these are public and are some of the oldest universities in their respective region (8). It is not the aim of this research to focus on evaluating the differences between these three universities. I have called "theme" the sum of most of the content included in the document or case, which encompasses the problem(s) selected and explored by the studio, and expectations and recommendations of the subject coordinator, tutor, or studio leader—all of whom will be referred to in this research as "tutor." Other important elements, such as ADS pedagogy and ADS physical learning environments, are not explored here.

Some key terms have emerged from the bibliographic material and from the data analysed, particularly from those cases offering thick descriptions (9). One of these key terms involves attitudes, broadly grouped around the idea of "maturity."

Experience, judgment, and "maturity": I use these first two terms to refer to important aspects that assist us to understand reality and consequently facilitate the process of maturity (personal and societal)(10). For instance, awareness of reality through the development of objectivity, "the faculty to see the world, nature, other persons and oneself as they are, and not distorted by desires and fears, (11)" was essential to Erich Fromm in the achievement of maturity—or sanity, as he would define it. Others, using terms such as experience, the practical side of life, "field of care," engagement and judgement, have gone further to discuss notions of maturity in architectural education (12).

The main data used for this research comprise subject outlines and design studio handouts or SD (used to describe the specific design studio offered by the studio coordinator and/or tutor). Handouts offer a significant opportunity to succinctly explain ADS projects to students—including intentions and recommended approaches. In a manner that selects what is considered essential by each ADS, these documents offer a snap-shot of an important phase in ADS, one that establishes what is to be done for the rest of the semester. It is understood that while studio handouts and descriptions are essential documents in ADS, these do not constitute all the written information offered to the students throughout the semester. Nevertheless, these are chosen because they set the scope for the semester's work, which in many cases form the basis for the students' selection of a particular ADS (13). While the length of

each case varies substantially, within and across faculties, most cases manage to present the ADS project (from the perspective of what matter in this research) in one or two pages. The remaining pages comprise information that has not been weighed up by this study, such as bibliographic lists, images, maps, timetables, university regulations and students' services.

The data are framed within the period between 2003 and 2007, inclusive, and it is chosen because there has been continuity in the general program or curricula of each faculty of architecture during this time.

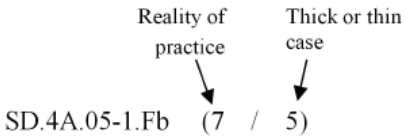
The following table shows the information and meaning provided by each case name. The use of a nomenclature to identify case type, year level, semester level (when known) and faculty code, provides a short form of immediate access to basic information about each case, while keeping the source (architectural faculty) anonymous.

Case names are accompanied by data specific to each case offering information regarding two

Studio Handouts:	***Year Level***	***Semester (if known)***	***Year***	***Project No. when more than one case***	***Faculties of architecture (code used to identify each faculty is known only to the researcher)***
OL. (subject outline x 44) SD. (studio description x 87) EX. (exercise x 1) WS. (workshop x 4) RF. (reference x 3)	1 2 3 4 5	A. (first) B. (second) C. (third)	03. 04. 05. 06. 07.	-1. -2. -3. -4. -...	Fa, Fb, Fc
Examples: OL.3.B.06-2.Fb EX.1.B.03-5.Fa	* Note: because of the type of information contained in "RF" documents, these have not been used in all analyses. ** To maintain the anonymity of the participating faculties, names of places and/or organisations in selected quotes have been replaced with a "XXX".				

Table 1: Cases are identified by using the following nomenclature. (Source: Author).

forms of engagement with reality. For example SD.4A.05-1.Fb (7/5), where 7 (max. score is 10), refers to the "reality of architectural practice," which favors a more clearly defined and larger social engagement. The number 5 refers to "content thickness" (max. score is 10), which is achieved by a quantitative calculation of nodes expressing pieces of information included in each case. Example of the scoring system used:



The Design Brief as a Criteria

In order to establish ADS' engagement with the real world of practice, cases were evaluated to ascertain their content in relation to nine points, reflecting important design brief criteria. The AIA defines the design brief as:

...a written statement which details the client's expectations and the functions of a proposed building. It should describe the facilities to be provided and the activities to be performed and also clearly identify the broad policies within which these are to be achieved in respect of time, cost and quality of the facility (14).

The criteria used in this research comprise simplified versions of the headings included in standard architectural design briefs in Australia and includes the following performance criteria: consultation, site, needs, societal reach, client, spatial details, construction, budget, and planning control or regulations (15). Social reach conveys the recommendation described by the AACA and the AIA as the "Human, social, environmental, and contextual issues are researched and addressed. (16)" The answers are recorded simply as "not mentioned" or "mentioned."

While some parallels can be drawn between the reality of architectural practice and ADS, it is also necessary to appreciate that in an educational environment some flexibility is required in the manner and depth with which none, some or all of the nine criteria are noted. Most ADS handouts provided evidence of at least one criteria of the design brief. The parameters for the evaluation of the presence and weighting of this criteria in the ADS handouts is based on the extreme case samples—those that addressed most of these questions and those that address virtually none. A moderate approach that mediates between those two extremes was taken.

By and large, early results unambiguously suggested that cases addressing the criteria were far fewer than those not addressing it. These results prompted me to verify the evidence using different methods, including the consideration of a more flexible approach that included a wider range of terms that could indirectly convey the notions sought. The steps taken confirmed and increased the confidence in the findings. Nonetheless, each category has also presented its own particularities, which when significant will be discussed separately.

The figure below shows a comparative distribution representing the nine-point design brief criteria. It aims to illustrate the level of relative importance that these criteria have within ADS.

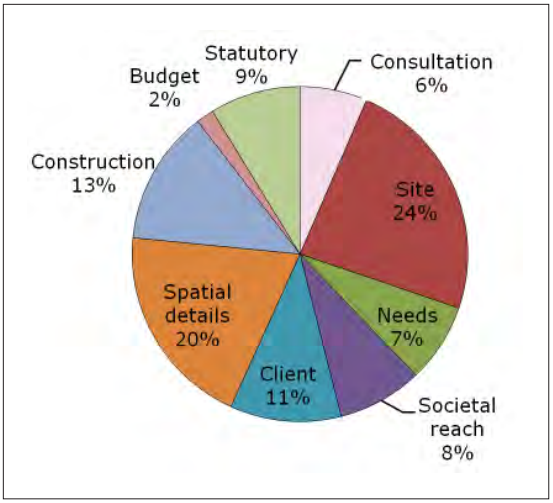


Figure 1: Average distribution of the criteria representing the "reality of architectural practice" within the yes answers. (Source: Author).

ADS Handouts: What Do They Say?

This exploration looks at three of nine criteria identified in the design brief used in architectural practice—consultation, need, and client—and their presence in the ADS handouts.

Consultation

With whom is the architect going to consult, for example, engineers, planners, neighbors?

In the real world of practice, even the simplest project requires some form of consultation. The most fundamental and more regular consultation takes place with the client. Meetings with specific council departments—for example, building and planning permits (or at least recommendations)--are often sought for most housing projects. Experts from other disciplines fill the gaps in architectural knowledge or in areas in which architects are not authorised to sign-off, for example structural engineering. Dealing with consultants is also deemed an important part of the learning process in practice.

The following chart shows the overall reference to any type of consultation taking place in ADS by each of the three faculties. Of the total sample, 77% do not mention consultation and 23% cite some form of consultation.

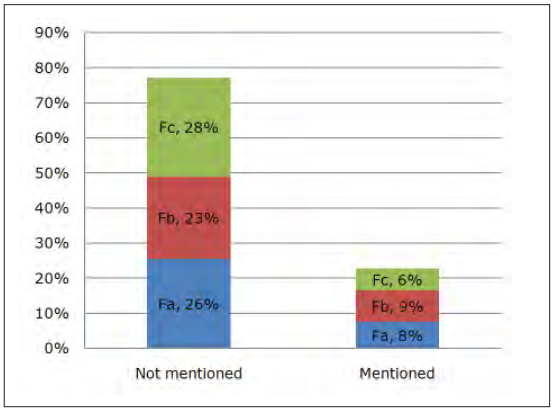


Figure 2: Mention of consultation or similar notion. (Source: Author).

While consultation in the real world of practice is a necessity, the above results (see Figure 2) would suggest that ADS does not rate consultation as an intrinsic part of the design process.

Although this research takes into account any mention or inference of consultation, including fictitious consultation, a "yes" result does not mean that "actual" consultation is being requested or will take place. However, a mention

Not mentioned	Mentioned						
	Mentioned (generic)	Self or Fictitious	Not encouraged	Professionals outside the university	Community	Client	Government departments
77%	2%	3%	1%	9%	3%	2%	3%

Table 2: ADS consultation details. (Source: Author).

would indicate a degree of acknowledgment. For example, the following two cases have been coded as self-referential consultation and placed under the "self or fictitious" category. These cases express an indirect allusion to self-consulting, both of which are based on the assumption of past experience. These documents do not cite any other forms of external source of knowledge, checks, or balances. Low engagement with practice and "weak" content is articulated in their scores both (2/3).

I assume that students will use their personal experience of studying architecture and their knowledge of its current state as a discipline to inform their design work, and I also assume that students.... Case: SD.5B.06.Fc (2/3).
Critically review his/her own past work in order to articulate a personal agenda for a design project; Case: SD.4.07-1.Fb (2/3).

An opposite situation is presented in the following examples, in which, according to the document, consultation covers a wide and well-defined range of opportunities. These cases not only prompt consultation, but note how the second example also reinforces its value by highlighting the benefits that consultation brings to the studio as a whole (a studio community) and not only to individual students:

Pencil and sketching, walking, seating, observing, asking questions, and expressing the findings graphically. Case: SD.4B.06-1.Fc (3/5).
We also welcome design tutors, colleagues from other disciplines, professional architects, consultants and guests from practice, statutory authorities, government and the wider community who will be sharing their expertise with our Studio community. Case: OL.2B.05.Fb (4/4).

"Devaluing" of the connection between ADS and practice is evident in some ADS cases. In the following example, note how design and practice (professional services) are conceived as two disconnected or "different" activities and consequently "direct comparisons" are actively discouraged.

...learning about design is a quite different activity from undertaking design as a professional service. While the design studio superficially resembles the work of an architectural office, students are by no means encouraged to play-act half-baked architects, and you are discouraged from making direct comparison to 'the way things are done in an office'. Case OL.3A.05.Fb (3/3).

While consultation will take place in practice, it may be regarded as a "necessary evil" rather than an opportunity for further learning through collaborative engagement with other professionals and the community. This situation might indeed have further implications for

interdisciplinary, multidisciplinary, and cross-disciplinary working models that, while stated as aims in educational curricula and by professional bodies, are at best difficult to achieve (17).

...you will be asked to engage with the real debates, conflicts of value and forces for change without dumbing down your urban and architectural responses. Case SD.4B.05-7.Fc (3/7).

As with each of the three criteria, I have taken a flexible approach to include a wide range of terms that could indirectly convey the notion, in this case, of consultation. In the above example, consultation is not explicit but I have taken engagement with real debate as a form of consultation. It is not clear why the engagement with "real debates, conflicts and values" would automatically result in the "dumbing down" of the urban or architectural response.

Ironically, some studios that engage with real situations that are close, both in proximity and social context, limit the experience of the real world by capitulating to the practical constraints of establishing relationships with "clients." In the following example the tutor's attempt to shield the would-be clients from unsolicited consultation is supplemented by the promise to provide "all" information required by the students. By default, this real-life studio reduces the experience to one that could be anywhere and is nowhere at the same time.

Please do not make individual contact with or request information from officers of XXX City Council or occupiers of the existing building or surrounding buildings. All information that you may require will be provided in the studio context. As this is a hypothetical project, it is in the best interests of all concerned that false expectations or concerns are not aroused. Case: SD.3.05-2.Fb (7/6).

That there are such few cases where consultation is mentioned in the ADS handouts indicates that consultation is either not valued or cannot be accommodated within ADS. This suggests that the concept of consultation as a source of knowledge to inform the architectural response is not relevant or a priority within architectural education. Without an appreciation and skill in consultation it might be difficult for students to locate the needs of the client.

Need

This refers to the needs that any project will have as an objective to satisfy. The mention of the notion of need is occasionally found expressed in the documents or asserted through and as part of the exercise. Below are examples of how the notion of need is explicitly expressed in the ADS handout:

What are their needs? What facilities exist? What are their functions? Case: SD.1B.03.Fa (5/2).
... by acknowledging that they bring prior knowledge, experience and capabilities to a real world design project that seeks design solutions for needs identified by a community group. Case: SD.4B.07-6.Fb (7/4).
Housing needs, objectives and strategies will be explored through readings and design exercises. Case: OL.5A.07-2.Fb (1/3).

The following chart shows the overall reference to any type of need by each of the three faculties. Of the total sample, 73% do not mention need and 27% cite some type of need.

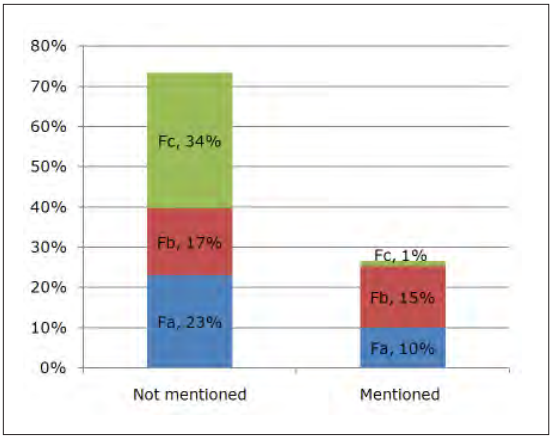


Figure 3: mention of need, purpose or similar such notion. (Source: Author).

Not mentioned	***Mentioned***		
	Mentioned	Needs of a fictional user	Inferred needs
73%	***11%***	***4%***	***12%***

Table 3: ADS details of "need category." (Source: Author).

Clearly defined clients or real clients bring with them clearly defined needs. This is also true in ADS, in which narrative, clients, and needs tend to merge. For this reason, some of the examples cited here are mentioned under the "client" heading, although with a different emphasis.

Sometimes need—as distinct from what we tend to translate as some type of social urgency— is an abstract necessity that we create or accept. For instance, the need to comply with some project deadlines or "immediate attention" as expressed in the following cases.

Plan for occupancy between 2004 and 2008. Case: SD.3B.03.Fa (9/8).
The need for consolidation and improvement of ferry terminal facilities in the region has been requiring immediate attention since the introduction of the two new XXX vessels in September. Case: SD.3B.03.Fa (9/8).

The above cases offer some of the few examples in which time is part of the proposal—not only as deadline for students' submissions, but as an intrinsic factor in most of what we do in the real world. Deadlines are charged with all sorts of pressures that could assist to ground any project. Often needs are inferred in the narrative as in the following example that tells of an almost palpable sense of need and urgency:

The slumdwellers are furious that part of their community is to be evicted for a land use that they will not even be able to afford to use. Case: SD.4B.06.Fa (10/10).

Also, observe how the following case offers some background information that not only informs about the history of the place, but also actively implies the need to adapt and create new conditions. Notice the use of terms such as change, inevitable, conflicts, and competing interests, all bringing about a sense of immediacy, reality, and specific need:

The major industries that gave rise to the town, fishing, forestry, and agriculture are all in decline. New industries and new people are changing the region and the town. With change are the almost inevitable community conflicts between the new and the old and the competing interest[s] of the multitude of individuals and private and public organizations. Case: SD.4A.07-9.Fb (5/5).

Similarly, the following case speaks of needs that are intrinsically connected to a design response and which are not to be imaginary, but embedded in the experience of actual users.

The needs to which your design responds must be established by research, because they cannot be drawn from your own limited experience. (...) Before all other considerations, dwellings must 'work', and they must do so for some identifiable range of users other than yourself. Case SD.3.05-2. Fb. (7/6).

In similar proportion to the criteria of consultation, the overwhelming majority of cases do not mention "need." This suggest that the need, often responsible for defining the architectural problem, is either not a priority or is actively devalued through its absence in ADS. However, as some of these cases here exemplify, there is much to be learned from those cases that have mentioned need. The manner in which they express need and the rich connection that they manage to establish between ADS and the real world are worth further study.

Client

The AACA (Architects Accreditation Council of Australia) defines the client as the building owner, proprietor, architect's employer, or the principal. The client may be "an individual, a corporation, a partnership, an incorporated association, a statutory corporation or a government department. (18)"

The client is a crucial factor in a study that explores engagement with the real world. The client is the reason for much of the formal procedures as they ground the project in a locality and financial and spatial terms. A client has a legal voice and often it has a human voice that expresses needs, affections, preferences, and dislikes. I will therefore expand the definition of the client to provide a glimpse of its many possibilities.

Often the client is the person, business, or corporate entity who requests the project (19). From a single client to a government department or land developer, the typology of the client can vary extensively (20). It is still a matter of contention whether "the wider public," users or passersby, will be regarded as clients, but they certainly are stakeholders. Although the wider public may have vested interests, their relation to the project is indirect as compared to that of the "client." Nevertheless, the following case provides an example of how a local government is presented as facilitating engagement with other government agencies and the stakeholders, through a defined document containing a set of goals:

XXX Terminal Proposal: The ferry terminal will be owned by the Port of XXX Corporation, and the State Government, with the opportunity for some private sector investment. Discussions with stakeholders and research into similar facilities indicate a new ferry terminal facility is likely to contain the following basic activity areas:
Client: XXX City Council, and the Port of XXX Authority.
Client Goals and Objectives, XXX CITY COUNCIL. Case: SD.3B.03.Fa (9/8).

The client is the generator, the assessor, and often the source of essential information regarding the project. From this point of view, we could consider the client as a source of knowledge, whether formal or informal. The client defines the basic functions that the project is required to satisfy and is normally the person(s) to whom the architect is answerable. With some exceptions, clients or

their agents are often financially responsible for the project (21). Given this, it is important to note that because architects are only associated with a small percentage of all buildings produced in Australia (somewhere between 8 to 15%) we can assume that architectural practices deal with some types of clients but not all of them. For example, clients in the form of community groups and not-for-profit organizations requiring building services rarely can afford the cost of engaging architectural services. Another type of client, seldom accessible to a "typical" practice, is the pro bono client (22).

The typology of the client also defines the closeness or separation between the architect and the ultimate user. For example, a developer as a client tries to interpret the needs of the potential user from his or her own perspective and interests. Similarly, a government lead development could also exhibit some distance from the user.

Different degrees of speculation within ADS projects also affect the "realism" of the client, its influence and actual presence. The existence of a client in ADS is not always designated as such. Yet, some can still assert their presence by other means, even when speculations may not generate the degree of definition needed in formal agreements typically used in architectural firms. Their presence, as in the following case, can be as informal as is the client's housing situation. These clients have no names but they are present through their needs, which are most apparent and provide a powerful impression of determination and urgency. Notice how their presence is introduced with active realism—they are going to be evicted, they are furious.

The slumdwellers are furious that part of their community is to be evicted for a land use that they will not even be able to afford to use. Case: SD.4B.06.Fa (10/10).

Among cases acknowledging clients or users, the following quote exemplifies how the existence of a client allows other aspects to take on a more substantial form. Note how liaison with the users prompts the students, in advance, to become receptive to the users' aspirations and needs:

Working in association with LLL. There our LLX studio enterprise will liaison with the rural community service group XXX Enterprises based in XXX to meet their aspirations for a residential and community based facility in the township of XXX. Case SD.4B.07-6.Fb (7/4).

The following chart shows the overall reference to client or user by each of the three faculties. Of the total sample, 62% do not mention clients and 38% cite (explicitly or implicitly) a user or client.

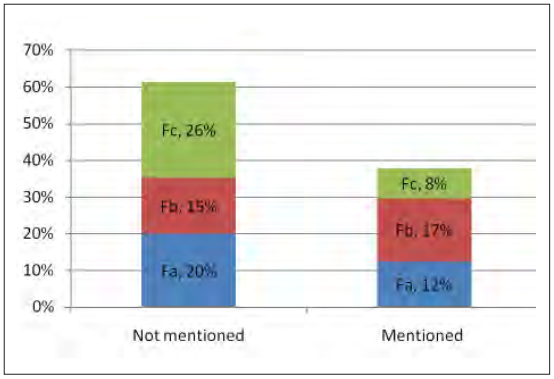


Figure 4: Mention of client, user or similar notion. (Source: Author).

Not mentioned	Mentioned						
	Mentioned (generic)	Fictitious	Self	Community, government or not-for-profit	Interest group	Educational institution	Private consortium or institution
62%	16%	9%	1%	6%	4%	1%	1%

Table 4: ADS's client typologies. (Source: Author).

While in the real world of practice the existence of a client is almost mandatory, the above information suggests that most ADS do not rate the client as an intrinsic part of the creative process.

Although this research takes into account any mention of client, user, or similar notion, including inferred references, this does not mean that actual engagement with a client is being requested. However, a mention of any type would indicate some acknowledgment of the role of the client. Likewise, the absence of such a notion denotes failure to recognise such a key aspect in the instigation of most projects—a trigger in the creative process of establishing the "problem" to be solved.

Note in the following example how the presence of the client enriches the context of the proposed project by bringing to the discussion issues affecting a large number of people who are not traditionally architectural clients.

Relocated Slumdwellers: It is proposed that a total of 15.48 ha of the reclaimed land be used for relocation and rehabilitation of those people living in slums along the river who are affected by the project. The land is allocated in three pieces at separate locations. This ensures that none of the project affected persons will have to move too far from their present location. Case SD.4B.07.Fa (7/9)

The presence of clients brings with them their own preoccupations with which students can develop some empathy. In the real world of practice, design decisions carry consequences. In the world of ADS, students' decisions also carry consequences, even if for now only for the students. Although the result of these decisions will not be worn by the clients (slumdwellers in this case), students can be reminded and made aware of the possible consequences that their design options could have in the real world. Design decisions can be richer by considering the issue at hand in all its complexity—creativity springs from a problem with tight constraints. The text offers enough visual clues to prompt questions that can confidently be asked by the students—because we all know what a river is and can imagine how living close to a river can present some challenging conditions. Students may also have heard that people prefer to remain close to their community—in fact, this is what many students do.

The text invites questions and the responses can further enrich and ground the learning and project response: what is the line that determines beyond which the users will not need to move "too far"? What are the climate and topographic

conditions along such a river?

As indicated by the score for this case (7/9), this ADS handout has engaged with the reality of practice and it is thick in content, therefore, we can assume that many of these questions are addressed in other sections of the document. Nevertheless, the point I am making is that a client, with defined needs and social conditions, enriches the case and may assist students to make sense of the wider realities that they may have never experienced.

Nonetheless, in ADS it is not always possible to have "real" clients with such strong presences. In such cases, this is how two cases deal with hypothetical projects:

This project is hypothetical, but you are encouraged to consider current use patterns and the needs of the local community when designing your proposals for the site. Case WS.2A.07-1.Fb (4/4).

Whilst the project is a fictitious, speculative one, the problem stems from an actual need to improve facilities at the XXX School in XXX. The site is home to a support school, providing educational facilities for intellectually handicapped children, and also general learning support for other primary schools in XXX, as well as adult literacy classes. Case: SD.5A.07.Fa (6/4).

The above two cases demonstrate how the key role of the client is not diminished by the admission that the project is hypothetical. On the contrary, even in these hypothetical cases, the needs of the clients (the community and the school) are to find their way into the proposal. This statement opens the doors for students to work out how they are to investigate these needs. Hypothetical, speculative or not, these cases draw from strongly definable clients and needs. The opportunity to extend the "field of care" into areas such as that of intellectually handicapped children is made available to students (23). The acknowledgment that "the problem stems from an actual need" speaks of a tutor that values real experiences and brings them into the ADS.

Nevertheless, not all clients are based on real situations. Consider, for example, the following description of a client, in which the direction of the investigation is inward looking and in which exposure to new experiences is explicitly reduced. Furthermore, note how these clients are shaped from the student's imagination in order to serve the student's "own design":

The clients are an imaginary pair. It is up to you to give them attributes that are relevant to the questions you are exploring in your design. The only requirement is that the pair must somehow challenge conservative norms regarding the idea of a couple. Case: SD.2B.03-1.Fa (2/4).

In addition, as real clients "vanish," fictitious characters come to replace them. Take for instance the following description,

"Is there a place for Spike?" is a sub text and question that would be explored in the studio. Spike is a character in "Buffy the Vampire Slayer" and subject of many media and cultural studies. Spike epitomises a character that lies between fantasy and reality (and many shades of grey in between), a subterranean dweller that exists in the underbelly of any city. Is there a place for Spike in a genuinely diverse city? Case SD.4A.07-1.Fc (2/6).

This is an interesting case and not exceptional in regards to the use of fictional characters. Yet, most other fictional clients are somehow based on human beings, while this one transcends those boundaries. In spite of the fictitious nature of the client, the document expresses concern for social, political, and global issues affecting humanity and our cities. The document attests to it by centring the theme on questions and discussions posed by Richard Sennett and Leonie Sandercock —both authors grounded in social theory, politics, and social processes. Nevertheless, the document does not once mention terms such as clients, users, or consultation, although client is inferred in its mention of Spike (24). Thus, the "medium density housing" brief presented to the students is not supported with government reports, housing needs of the area in question, or any other form of empirical data, nor is there advice for students to search or support their investigations on quantifiable data. However, students are encouraged to consider certain urban conditions from the point of view of the suggested theoretical works. While these readings may encourage some students to further immerse themselves in theory, taken in isolation and without grounding them with experience, they may not do well in connecting these ideas to lived social and environmental conditions:

Richard Sennett identified one of the key principles of urban design as the creation of "live urban space," space that acknowledges principles of diversity and focuses on the tensions in a society instead of isolating them from one another. Case SD.4A.07-1.Fc (2/6).

The score of (2/6) indicates that this case has a very low engagement with the reality of practice, however relatively thick in content. This is because much of its content is made of references to various theoretical works, and relevant history, with little grounding or emphasis on quantifiable, perceivable, or material conditions. Perhaps "Spike" as a client epitomises recurring cases revealing a ghostly void between good intentions and reality.

Conclusion

The three criteria studied above suggest that the reality of architectural practice does not play a significant role in ADS. What remains unanswered is how reality or which reality is represented in ADS.

As much as a mention of consultation, need, or client recognizes the value of their respective roles, the absence of these notions devalues their role. Their absence not only distances the inquirer from learning opportunities and from the opportunity to widen the understanding of an issue by approaching it from different perspectives, it also distances the student from a direct opportunity of engagement with its social context—from experiencing—considered by some intrinsic to the work of architecture (25).

This study begins to suggest that the notion that practice will take place after university education is already the dominant approach of the ADS. If a connection with the criteria of the design brief is not a tool used to engage with the real world of practice or reality in general, then it is unclear at this stage what other approach is providing such a connection. This poses a challenge to ADS in relation to delivering the stated intent of the universities to engage with the outside world.

Spike and the slumdwellers are two case studies that demonstrate the complexity of the connection between ADS handouts and the real world explored in my research. Here we have two cases that are both rich in content. The former, representing the overwhelming majority of case studies, meets little of the criteria I have used to ascertain the connection with the real world of architectural practice. On the other hand, a design brief for slumdwellers may appear to be an extreme example to explore the criteria of a design brief located within the world as we know it. Yet, it would be a mistake to assume that the real world is always somewhere else. There are ample case studies within this study that evidence high levels of engagement through mundane as well as extreme situations. Both the obtuse and overt case studies that demonstrate a connection with the outside world are assessed through the lens of the nine criteria of the design brief within the reality of architectural practice. Another question emerges in regard to why a disconnection takes place between the purported ambition of the universities to connect with the outside world and the intention outlined in the ADS handouts compared with actions, purposes, or measurable results of this intention.

Notes

1 A recent study on architectural education in Australia discusses how a focus on design has come at the expense of other areas of knowledge while misleading students in regards to wider societal concerns and the real world of practice. (Ostwald & Williams, 2008, p. 18). Moreover, according to Prof Louis Sauer, some practitioners see teaching in ADS as an opportunity to free themselves from the actual demands of the architectural practice while opting for play while avoiding references to real constrains. (Sauer, 25 February 2009).

2 (Teymur, 1992, p. 15).

3 (Salama, 2008, p. 104).

4 This paper is not concerned with the discussion of reality or the 'real world' from a philosophical perspective. It takes the stance that reality is not a relative notion, while its perception might be. The term 'reality' in this sense is referred to as the day-to-day, the quotidian, common place, ordinary, the real world, or simply reality.

5 See (Habraken, 2007, p. 17).

6 The Australian Institute of Architecture (AIA, former RAIA) calls these 'performance criteria', see (RAIA and AACA, January 2006, p. 10).

7 A commitment to external engagement in education is articulated by The University of Melbourne by:
...its intention to make research, student learning and external engagement serve public ends. This includes taking up pressing societal problems in research, producing graduates prepared for responsibility, and promoting inquiry and open debate based on evidence and reason. (The University of Melbourne, 2005).

8 According to 2008 SHJT Academic Ranking of World universities, within Australia, The University of Melbourne ranks 2nd (note that the university ranking first does not offer architectural studies), the University of New South Wales ranks 6th (second in the State of New South Wales) and the University of Tasmania ranks 13th (first in its own State and the 4th oldest university in Australia).

9 Adopted from Gilbert Ryle, Geertz refers to thick description as those rich and contextualized narratives, the opposite he calls thin description (Geertz, 1973).

10 According to Fromm, "Mental health is achieved if man develops into full maturity according to the characteristics and laws of human nature. Mental illness consists in the failure of such development."

(Fromm, 1955, p. 14).

11 (Fromm, 1955, p. 64).

12 See (Sennett, 2008), Mies Van der Rohe's "1938: Inaugural address as Director of Architecture at Armour Institute of Technology" in (Johnson, 1979), (Tuan, 1974), (Teymur, 1992, p. 15) and (Habraken, 2007, p. 11).

13 Dr Greg Missingham raised the point that occasionally, a student's preference for a particular ADS may be based on the studio leader's reputation (it can work either to pursue or to avoid), in which case, any written material may have little effect in determining a student's preference.

14 (Royal Australian Institute of Architects, 1998, p. 1).

15 (RAIA and AACA, January 2006, p. 10).

16 (RAIA and AACA, January 2006, p. 10).

17 See (Morin, 1990); (Salama, 2005); (Boyer & Mitgang, 1996).

18 (AACA, September 2003).

19 A statutory definition of 'client' is also provided by government departments such as the Building Commission, the Architects Registration Board of Victoria (ARBV) and by professional bodies such as the RAIA. To the ARBV 'client' "means a person or body with whom an architect enters into an agreement to provide architectural services;" (Architects Registration Board of Victoria, 2004).

20 In the last decade, there has been some recognition that architects, unlike doctors or lawyers, do not extend their services to the wider community. Some large construction firms such as Arup and Grocon in Australia are trying to redress this situation by setting up a dedicated pro bono service within their practice. Also in Australia, Architects for Peace has established the first formal pro bono service for poorer communities and non-for-profit organizations. A similar social program, although not technically pro bono, was established earlier by Architects without Borders (Australia).

21 Exceptions such as charitable organisations or those receiving funding from other agencies, for example kindergartens or hospitals financially supported by government. With thanks to Dr Greg Missingham for pointing this out.

22 Other traditional professions such as medicine and legal services have formalized pro bono services and through this service, they engage with a wider spectrum of the community. In Victoria, Australia for example, The Public Interest Law Clearing House (PILCH) offers professional services to that sector of the community that could not afford it otherwise.
23 (Tuan, 1974, pp. 56-57).

24 (Sandercock, 1998), no information is provided in this document about the source of Sennett's ideas.

25 Garry Stevens comments on architects not supporting their decisions on hard-data, he claims that the 'Anglo-American' approach is not to test theories but, more like in a manner of a religious cult, "Architectural Truth is never obtained by achieving correspondence between the mundane and the theoretical, but by creating a great edifice. The architectural eye has ever been elevated to the transcendental." (Stevens, 1998, p. 118).

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STUDENT PERCEPTIONS OF THE ARCHITECTURAL DESIGN JURY

Ashraf M. Salama and M. Sherif T. El-Attar

Abstract

The jury system is a traditional architectural learning assessment tool. Since the early years of the 20th century, it has been imported to schools of architecture throughout the Arab world by foreign expatriates and native scholars educated in the United States and Europe. The system has been well documented through the study of its evolution, the analysis of its processes, and also was criticized heavily in the literature of the Western world. However, there appears to be a severe lack of research and documentation in this area in the Arab world. The purpose of this paper is to fill this informational gap and attempts to answer the questions of how jury practices are performed in the context of the Arab world and how students perceive the jury system and its underlying practices in such a context? In an attempt to answer these questions, a multilayered methodology is deployed. First, to induct generalities between the two contexts (Western and Arab) an extensive literature review is conducted on the educational value of the jury system and the embedded communication processes. Second, to deduct particularities concerning specific contexts of the Arab world, two empirical studies are carried out with the intention of investigating jury practices and student perceptions within the context of selected cases from Egypt and Saudi Arabia. The understanding and portrayal of the Jury system and its associated problems contribute to the development of a set of recommendations to improve the performance of the Jury and its acceptability to architecture students.

Keywords

Architectural education, design studio, architectural design jury, assessment, learning.

Introduction

The architectural design jury system was -and still continues to be-a subject of debate over the past twenty years. Since the emergence of the classical study of Kathryn Anthony, published in Private Reactions to Public Criticism in 1987 and Design Juries on Trial: The Renaissance of the Studio in 1991, the topic has attracted a considerable number of educators to study, investigate, and debate its underlying processes and outcomes. Analytical descriptions of the jury system however can be traced back to earlier writings that emerged in the late 1970s and early 1980s (Carlhian, 1979 & 1980; Chafee, 1977; Egbert, 1980; Kostof, 1977; and Middleton, 1982). These writings point out that the jury system as a model for evaluating architecture students was first developed as part of arts education and training, and later was adopted in 1795. This was part of the rituals that were developed by the French system in the Ecole Des Beaux-Arts in Paris (School of Fine Arts). The jury practice started

as evaluating students' projects behind closed doors, where students were not allowed to be part of the evaluation process. This took place until the beginning of the 19th century when the Ecole Des Beaus-Arts decided to open up the system and allow students to be part of the evaluation process.

During 1800s, the jury tradition was imported to North American Architectural Education since Europe was the model for the Americans (Kostof, 1977). Most schools of architecture in the US continued to have one or two "Paris-Trained Professors" to make sure that the system is in place (Esherick, 1977). It basically encouraged competition between students that was intense, and the end results were beautifully drawn projects in traditional and classical styles which were often defensible only on the grounds of "Good Taste and Intuition."(Anthony, 1991). Evaluation criteria were based on the quality of presentation and drawings, ignoring many of the variables that influence architectural design (Kostof, 1977; Salama, 1995).

The word jury appears to have negative connotation as it refers in linguistic terms to "a group of persons sworn to render a verdict or true answer on a question or questions officially submitted to them" (AHD, 1994). This goes on contrary to the true purpose of the assessment of design projects presented by the students, which is simply learning, reflecting, discoursing ideas, and ultimately improving students' performance. Juries, reviews, critiques are three terms used interchangeably in the schools of architecture. Remarkably, the system is the same, which is basically the old Beaux-Arts mechanism but in a modern version. Students present their completed design work one by one in front of a group of faculty, visiting professionals, their classmates, and interested passersby. Many scholars (Anthony, 1987; Dutton, 1987; Salama, 1995; Sara, 2004) agree with the view that faculty critique each project spontaneously without criteria made clear to the students who are asked to defend their work. Although the German and Swiss models have emerged between 1910s and 1930s in Europe to replace the French model, many of the habits, mechanisms and rituals of the Ecole Des Beaux-Arts continued to exist in the US (Esherick, 1977), while influencing architectural education around the globe.

The jury system has been analyzed and also criticized heavily in the literature, specifically within the English speaking world. This is evident in the amount of publications that have dedicated entirely or partly to discussing and debating the jury practices, getting feedback from those involved in the jury process, and with the general aim conceived as improving design learning and the mechanism by which students work is assessed. While the evolution, analysis, criticism of the jury system is well documented within the Western context, a simple investigation on current 'English' publications reveals a severe lack of how such an evolutionary process took place in other parts of the world, namely the Arab world. Therefore, this paper is developed in response to this need. In essence, while the development of Arab architectural education admits that there has been continuous influence of worldwide trends on the educational process (Salama and Wilkinson, 2007), nothing or very little is documented on the jury system.

The assumption is that the overall educational system of architecture in the Arab world was borrowed from, or dramatically influenced

by, that which prevails in the West, but may have witnessed modifications throughout the years which changed its characteristics and its underlying practices. On the basis of this assumption, this paper attempts to answer the questions of how jury practices are performed in the context of the Arab world and how students perceive the jury system and its underlying practices in such a context?

In an attempt to answer these questions, a multilayered methodology is devised. It encompasses the following three mechanisms:

• Carrying out an intensive literature review of the published literature with the objectives of comprehending different approaches to investigate and discuss jury practices while shedding light on the educational value of the jury system.

• Investigating students' reactions to the jury system and its underlying practices within the context of the Arab world. This is based on two studies undertaken by the authors in 1999 and in 2005 respectively.

- The first was part of a research methods class offered at Misr International University-Cairo, Egypt, where a series of topics were presented to student teams and one team selected the topic of investigating student perceptions of the jury system in four major universities in Egypt. The team devised a questionnaire based on identifying a number of key issues, and was able to receive responses that ranged from 45 to 60 from each of the four universities.

- The second was three sessions conducted in 2005 at the department of architecture at KFUPM (king Fahd University of Petroleum and Minerals) with three student groups representing different year levels (sophomore, junior, senior). The sessions were envisioned in response to several student complaints on the way in which juries were undertaken by the faculty. Sessions involved brief discussions on the value of the juries in architectural education, followed by a questionnaire distributed to the attendees of each session. The questionnaire addressed issues that pertain to students' view of their previous learning experiences during the juries, jury mechanism, jury composition, jury scheduling, jury dynamics, and their feelings and behaviors.

While the discourse in this paper is qualitative in nature, it outlines the results of implementing the preceding two mechanisms. The significance of this work lies in the fact that it contributes to the international debate while adding to the already developed body of knowledge on this topic, uncovers student perceptions of the jury system in the Arab world, and proposes different scenarios amenable to a more effective learning process.

On Architectural Design Juries: A Literature Account

It is widely acknowledged that there is a lack of research on architectural education, design studio teaching practices, and architectural design juries. However, a considerable number of valuable writings on the architectural jury system and design review processes have emerged since the mid eighties. They were introduced to the academic community in architecture and its allied fields to discuss merits and demerits of the jury system while exploring its underlying communication mechanisms and suggesting possible ways of ameliorating current jury

practices. The three classical writings of Kathryn Anthony in 1987 and 1991, and Thomas Dutton in 1987 appear to be the most cited and influential with a strong impact on the publications of others. In essence, all publications offer insights toward a better understanding of the learning process and of assessing students' performance thereby deserving some form of investigation.

A total of twenty six publications on the jury system and design review processes were identified by the authors. The publications identified include those that are published in English only. It is noted that a number of authors who are non-English native have published on the subject both in English and in their native languages. In this respect, the authors note the work of Necdet Teymur of Turkey, Doris Kowaltowski of Brazil, Ashraf Salama of Egypt, and Ahmad Bakarman and Abdul Aziz Al Mogren of Saudi Arabia which relate in different ways to studio practices, communication in studio settings, and evaluating students performance. Their writings are not included except those that are published in English and on the jury or assessing students' performance. Moreover, the publications that address the jury system in virtual or digital studios are not included in the selection. While such publications attempt to relate virtual or online juries to some aspects found in real life juries, the typical characteristics of the communication process in real-life juries are very different. Therefore, the scope of virtual practices goes beyond the scope of issues and concerns this paper is raising.

Examining the twenty six publications (see Appendix 1) reveals three categories of studies; a) Students and Faculty Surveys, Questionnaires, and Observations; b) Experience Based Case Studies; and c) Experience Based Analysis and Positional Recommendations. While there are no clear boundaries between the approaches involved in the three categories, they are proposed for the purpose of classification and identification. In this context, it should be noted that such categorization is based on the approaches adopted to investigate and develop arguments on the jury and is not based on the results or the findings of these approaches.

Students and Faculty Surveys, Questionnaires, and Observations

This category involves different forms of rigorous research on the jury system in a specific context. Its major interest lies in getting feedback from those who are involved in the jury process; either faculty or students, or both. A total of nine publications can be considered under this category including the works of Anthony 1987, 1991; Frederickson 1993; Salama 1995; Groat and Ahrentzen 1996; Wilkin 2000; Al-Mogren 2004; and Gurel and Potthoff, 2006. The example of studies under this category can be seen in the work of Anthony 1987 and 1991. Anthony, in her article Private Reactions to Public Criticism (1987) followed by Design Juries on Trial: the Renaissance of the Studio, reports the results of intensive investigation on the effectiveness of design juries. She examines the educational value of juries, both interim and final, how design students cope with public criticism, and a comparison of the architecture student "subculture" with that of other university students. Anthony's approach relies on systematic behavioral observations, interviews, questionnaires, and diaries. Students, faculty, and alumni in architecture and its allied fields were integral components of this approach.

Another example of the publications underlying this category can be seen in the work of Mark Paul Frederickson (1993) in his article Gender and Racial Bias in Design Juries. Frederickson study encompasses features like assessment of the participation and interaction of various participants in the design jury process that is, male and female jurors, male and female students, and racial minority students. As well, it identifies and statistically examines several consistently biased practices and procedures in design juries. Its findings are developed in order to improve the inner workings and educational efficacy of design juries in architectural education.

Experience Based Case Studies

This category encompasses articles developed by an educator whose concern is to relate the literature and his/her experience to a specific case in a specific context. Five publications can be considered under this category including the works of Dutton 1987; Jones 1996; Parnell 2000; Salama 2005; and Llozor 2006. The investigation of these articles reveals that the case adopted and linked to the literature can be articulated through one or two modes: a) some conceptual understanding of pedagogical or communication concepts and this is evident in the work of Dutton (1987), or b) through a type of experimentation as evident in the work of Parnell (2000). The other three articles have overlaps where the cases presented rely on pedagogical or communication theories as well as experimentation in a studio or a jury process.

Analyzing the work of Dutton (1987) demystifies how the case is adopted through conceptual understanding of pedagogical concepts. In his article Design and Studio Pedagogy, Dutton (1987) utilizes the hidden curriculum concept to analyze the nature and practices of the studio while arguing that there is a rough correspondence between schooling and larger societal practices, where the selection of knowledge and the ways in which school social relations are structured to distribute such knowledge and are influenced by forms and practices of power in society. On the other hand, the investigation of the work of Parnell (2000) reveals how the case is adopted and presented through some form of experimentation. In her article The Student-Led 'Crit' as a Learning Device, Parnell (2000) develops a student-led review (in the form of sessions) as an experimental methodology that involves two reviews run by the students. She attempts to get feedback from both students and staff after conducting such experimentation.

Experience Based Analysis and Positional Recommendations

This category includes articles that represent the position of their authors. While those articles do not involve any form of research (neither students/faculty surveys nor case studies), they offer critical analyses and positional recommendations based on experiencing jury practices either as a student or an educator. A total of nine articles can be considered under this category including the works of Frederickson 1993; Willenbrock 1991; Ahrentzen and Anthony 1993; Vowles 2000; Farivarshadri 2001; Koch et al 2002; Anthony 2002; Cameron 2003; and Sara 2004.

An example of articles under this category is the work of Willenbrock (1991) in An Undergraduate Voice in Architectural Education. Willenbrock describes the jury review system as a tool of oppression and outlines her experiences as an

undergraduate student, how she got enrolled in architecture, and the practices she experienced in learning design in the studio. Her approach is to offer reflection and critique on studio teaching practices through experiencing them. Another example of the publications underlying this category can be seen in the work of Rachel Sara (2004) in her article The Review Process. In positive terms Sara's work appears to be optimistic and offers a guide that is aimed at design studio faculty and visiting critics involved in review/jury processes. While highlighting inherent opportunities and potential problems of the established jury model, she offers a variety of tips and concrete examples in an attempt to offer alternative approaches to the typical jury process.

In sum, based on the preceding analysis four aspects in the literature developed on design juries can be inferred as outlined below:

• Three publications were not classified under one of the preceding categories as they cross the boundaries between them; those are of Doidge, Sara, and Parnell (2000), Salama and Wilkinson (2007), and Webster (2007). The work presented in these publications overlaps between the categories of experience based case studies and experience based analysis and positional recommendations (see Appendix 1).

• Despite the variety of approaches to investigate, address, or develop recommendations, the aim of all publications is to offer panacea to the current ills of the jury system, and ultimately improving the teaching/learning processes of design.

• While the approach to investigate the overall jury practice based on rigorous research and getting faculty and students feedback appears to be more convincing as it relies on figures and some statistics, the other two approaches are important in providing critical discussions and valuable recommendations for improving the jury system either based on case study and experimentation, or just previous experience.

• Strikingly, out of the twenty six publications only three publications are written by Arab authors (Salama, 1995; Al-Mogren 2004; and Salama, 2005). While they are based on the literature developed by Western authors, they attempt to contextualize some aspects of evaluating students' performance and jury practices in the Arab world. Still, this in essence, supports the initial assumption of this paper—the lack of studies on this topic within the Arab world.

The Educational Value of Architectural Design Juries

In discussing the jury system the important beginning would be to address its purposes, objectives, and educational values. Several studies attempted to answer these questions (Anthony, 1987 and 1991; Graham, 2003; Llozor, 2006; Sara, 2004). In general terms, they all agree on certain characteristics that should represent a paradigm of educational values for any jury process.

The main educational value of the jury system lies in enabling students to acquire effective knowledge of solving architectural or urban problems while offering them sufficient framework of guidance, either to complete their projects and that is the case of interim juries, or to consider such a knowledge in future projects and that is the case of the final juries.

Anthony (1987) argues, and rightly so, that the jury system should be seen as a tool that fosters the refinement of the learning process as well as in measuring the acquisition and application of knowledge (Anthony, 1987). The educational value of the jury system has a central position in the learning process (Salama, 1995). However, it has been heavily criticized on many grounds. Many students feel that they have not learned much from any juror comments, they state that they cannot remember anything about their colleagues' projects that are presented before or after their own due to exhaustion, nervousness, and worrying about their performance and grades (Anthony, 1991; Graham, 2003).

In 1993 at Harvard University, a round table discussion was organized to debate the purpose of the jury and to whom it should be directed towards (Dilnot et. al. 1993). In these debates, participating faculty members agreed that the purpose of the jury should not be to pass judgment on the students or to evaluate their design work. In essence, they perceived the jury system as an opportunity for developing theoretical discourses for ideas to thrive utilizing the work of students as a catalyst for discussion (Dilnot et. al. 1993). While this may seem to be the ideal situation, the roundtable discussion resulted in recognizing the different viewpoints of students and faculty as to how the jury mechanism works. Some jurors find the discourse fascinating and the discussion is between jurors and "the students didn't know what the hell was going on, it was entirely uninteresting to them (Dilnot et al. 1993:2-15). Conversely, juries that appear interesting to the students seem to be boring to jurors. In fact, one can infer from literature and from Harvard's roundtable discussions two important points, the first is that there exists a misunderstanding in terms of how educators and students see the educational value of the jury system, and second, such a misunderstanding inhibits an effective communication during the jury process.

Arguably and in optimistic terms, the aim of the jury system as an educational tool can be exemplified by the following four purposes:

• Introduce constructive criticism of the students' designs, drawing the student's attention to the pros and cons of his/her design.

• Provide general instruction on critical design issues that pertain to the students projects under evaluation.

• Initiate scholarly dialogue, seminar-like exchange between faculty members, faculty members and students, and among the students themselves.

• Measuring the degree to which a student was able to acquire and apply knowledge in the form of a design solution in response to a hypothetical or real-life architectural or urban problem.

Notably, these purposes intend to further the student's intellectual growth. However, the literature points out to the fact that typical jury practices in many schools of architecture worldwide were not able to address these purposes efficiently and effectively (See Appendix 1). In this context, two aspects appear behind the shortcomings of jury practices which impact its intended educational value, the first relates to the jury set-up itself while the second concerns itself with the juror attitudes. Anthony, 1991; Boyer and Mitgang, 1996; Sara, 2004; and Wilkins, 2000 all argue that the physical seating arrangements of the jury indicates that the students work is

on trial as they often present before rows of jurors. Such a setting as indicated by Boyer and Mitgang (1996) encourages the view of jurors as attackers and students as defenders, and this in itself can bring out the worst in both jurors and students where, as Sara (2004) states, a defensive attitude tends to lead to further attacks. These two aspects are coupled with the subjectivity inherited in any judgmental process and in the absence of clear measurements for evaluating students' performance. Therefore, it is not surprising that the current established jury practice is not as valuable as educators would like to think.

Surveying Architecture Students by Architecture Students: Key Jury Related Concerns Investigated in Four Egyptian Universities

As part of an undergraduate research methods class offered in 1999 at Misr International University-Egypt, after delivering the necessary lectures, students implement the knowledge they have gained in a research assignment. A series of topics were presented to student teams and one team selected the topic of investigating student perceptions of the jury system in four major universities in Egypt. The team devised and developed a questionnaire based on identifying a number of key issues and with the facilitation of the instructors; the authors of this paper. The team received responses that ranged from 45 to 60 from each of the four universities; theirs was not one of them in order to reach reliable results and also due the sensitivity of the issues involved as felt by the students.

Notably, students were free in identifying the key issues but with some direction of the instructors. Strikingly, the issues they have identified express their deep concerns. Although students' own school was not included as part of the survey, what they were interested to investigate may reflect to a great degree the jury practices undertaken in their school. Issues identified by the students can be outlined as listed below:

- Jury composition and who should be part of the jury process: instructors/tutors and studio leader or a mix of jurors that include external examiners.

- Discussion preferences during the jury and whether students prefer a dialogue and feedback on their projects or just prefer to receive a final grade. It should be noted that the practice of conducting the juries behind closed doors still prevails in many schools of architecture in Egypt for a number of reasons, most important is the students numbers and the time constraints.

- Adherence to programmatic requirements and its impact on jury discussions and students grades.

- How students approach their design toward the final jury, whom they want to satisfy, the studio leader or their own thinking.

- Preferences on final grading policy: a holistic grading on the overall project or an announced itemized grading based on different project elements (precedent studies; program analysis; mass and contextual plan; floor plans; facades and imaging; perspective or axonometric drawings; and the overall presentation).

- The impact of personal impressions and appreciation on students' grades.

• The impact of utilizing impressive presentation techniques on the final grades, irrespective of the design concepts and the ideas involved.

The student team surveyed their colleagues and responses received were from Ain Shams University, Al Azhar University, Cairo University, and Helwan University. All are located in Cairo, Egypt and have well established architectural programs with large student population that exceeded 1150 in total at the time of conducting this survey. The number of respondents was 209 from the four universities. The student team stated in the final report that their colleagues were interested in the study and wanted to voice their opinions and express their views diligently on the jury practices at their respective programs. Table (1) illustrates summary of percentages of students responses to the key issues involved in the study based on simple frequency procedure.

Discussion of Major of Findings

The overall results indicate similarities between the four universities. As well, they indicate correspondence of the students' perception of jury practices in those universities with that which is found in previous studies in Western contexts. Nonetheless, new patterns of average responses emerged based on the key issues explored.

In general terms, students prefer the involvement of external examiners and jurors (88.62%). Many of them commented that they want the jury process to be more objective and that the presence of external jurors will help achieve this. This result corresponds with another alarming figure where over 90% of the students believe that personal appreciation and impressions has a strong impact on the final grades. Therefore, it can be argued that the fact that subjectivity and personal interest are considerable parts of the jury handicaps the overall learning process. While personal appreciation may benefit some students, it has severe negative impacts on the majority of the students. It appears that this case is more dramatic at the level of two individual universities. Every single student responded from Ain Shams and Helwan Universities believe that personal appeal influences the final grade of the project.

The majority of students (92%) prefer having an opportunity to receive feedback and defend their projects over only receiving a final grade. In essence, this indicates a need to engage in discussion about their projects. It also indicates that the students admit the validity of the jury system as part of their learning. The authors note in this context that the practice of conducting the juries behind closed doors still prevails in many universities in Egypt except in the final or senior design thesis. The typical claim by faculty or department chairs is that it is a time consuming process—discussing students' projects individually due to the large student population. But, such a case becomes completely unfair, when only a sample of students is allowed to discuss and defend their projects but others are not.

While only 11.6% of the students responded believe that emulating the style of studio leader and tutors and reflecting their interest is the driver for developing their design ideas in order to guarantee good final grades, the majority does not believe so. 74.42% of students responded believe that they attempt to address the style and interest of the instructors while at the same time integrating it into their own understanding and interpretation of the design problem, the nature of the project, and the overall

Issues / Students Concerns		Universities				Average
		Ain Shams	Al-Azhar	Cairo	Helwan	
Jury composition	Students prefer involving studio instructors and leaders only	14%	7.5%	9.4%	10.5%	10.35%
	Student prefer involving external examiners as part of the jury process	86%	91%	89%	88.5%	88.62%
Discussion Preferences	Students prefer dialogue, feedback, and defend their project	93%	88.5%	92.8%	93.7%	92.00%
	Students prefer just to receive the final project grade without discussion	7%	7.5%	6.2%	5.3%	6.50%
Impact of adherence to programmatic requirements	Adherence to the programmatic requirements has a high impact on jurors and the grade	51.7%	35%	50%	36.8%	43.37%
	Adherence to the programmatic requirements has an average impact on jurors and the grade	33.3%	35%	37.5%	52.7%	39.57%
	Adherence to the programmatic requirements has a low impact on jurors and the grade	10.3%	21.5%	9.4%	5.25%	11.61%
	Adherence to the programmatic requirements does not have any impact on jurors and the grade	3.7%	7.5%	2.1%	5.25%	4.63%
Approaching design toward the final jury	Students approach the design from the perspective of the instructors and the studio leader	20.6%	12.5%	3%	10.3%	11.6%
	Students approach the design based on their understanding and thinking of the nature of the project	10.4%	12.5%	25%	-----	11.9%
	Students approach the design based on the perspective of the jury leader and their own understanding	69%	74%	71%	83.7%	74.42%
Grading policy preferences	Students prefer holistic grading on the overall project	41.5%	50%	34.4%	36.8%	40.67%
	Students prefer an announced grading on different project elements	58.5%	50%	65.6%	63.2%	59.32%
Impact of personal impression/	Personal impression and appreciation has a strong impact on the final students grades	100%	83%	92.8%	100%	93.95%
	Personal impression and appreciation does not have any impact on the final students grades	-----	16%	6.2%	-----	5.55%
Impact of impressive presentation techniques	Students believe that utilizing impressive presentation techniques has a strong impact on the final grades, irrespective of the design concepts and the ideas involved.	75%	65%	72.9%	73.6%	71.72%
	Students believe that utilizing impressive presentation techniques has no impact on the final grades	24%	30%	24.1%	26.4%	26.12%

Table 1: Summary of students' responses to key issues on jury practices in four Egyptian universities. (Source: Authors).

requirements. On the other hand, approximately 60% of the students prefer having an announced grading policy on different project elements including the presentation itself. In this regard, one would argue that this will minimize the level of subjectivity involved in making judgments about students' projects.

The majority of students believe that the adherence to programmatic requirements either that which is delivered to them as part of the project outline requirements, or that which is developed during the studio process has some type of impact on jurors and the grades, 43.37% high impact, 39.57% average impact, and 11.61 low impact. On the other hand, 71.72% of the students believe that utilizing impressive presentation techniques has a strong impact on the final grades irrespective of the design concepts and ideas. These two results may seem contradicting since the adherence to programmatic requirements as a statement contradicts with the statement that utilizing impressive presentation techniques has a strong impact on the final grades irrespective of the design concepts and ideas. It is expected that if the average responses of one of the two statements is high then the responses to the other would be low, which is not the case.

Analysis and Discussion of Student Perceptions of Jury Practices at KFUPM in 2005

Three sessions were conducted in 2005 at KFUPM-Dhahran, KSA, with the three groups representing different year levels. These sessions were envisioned in response to several students complaints on the way in which juries were undertaken by the faculty. Sessions involved brief discussions on the value of the juries in architectural education, followed by a questionnaire distributed to students attendees of each session; (16 sophomore students, 12 junior students, and 10 senior students). The questionnaire addressed issues that pertain to students' view of their previous experiences during the juries, jury mechanism, jury composition, jury scheduling, and jury dynamics.

Jury Learning Experience

Students were given a list of skill and knowledge related statements and were asked to select all that apply to them based on their experience in both final and interim juries. Moreover, they were asked to add any additional skills they feel they have gained out of their learning experience within the juries.

The total responses of students illustrate that "development and improvement of verbal presentation skills" appear to be the most important part of their experience in the final juries as it was selected by the majority, while "criticism and assessment of architectural projects seems to be the most important part of their learning in the interim juries." Looking at each group of students the same skills apply where consistency among students responses exist. However, three types of skills appear to be competing for sophomore students in the interim juries, these include in addition to the preceding two skills "satisfying the jury members by balancing the issues they introduce in their project presentations." (Table 2).

While "development and improvement of conversational skills" appears to be the second important part of student learning experience in the final juries, it does seem so in the interim juries. "Note-taking skills" appears to be the least

Skills students feel they were part of their jury learning experience	Final Juries					Interim Juries				
	SO	JU	SE	TO	RA	SO	JU	SE	TO	RA
Criticism and assessment of architectural projects	8	6	7	21	3	6	9	8	23	1
Development and improvement of your note-taking skills	3	2	0	5	6	4	5	4	13	5
Development and improvement of your verbal presentation skills	11	11	9	31	1	6	7	6	19	2
Development and improvement of your conversational skills	10	7	6	23	2	5	5	6	16	4
Satisfying your studio faculty by focusing on issues of interest to him/her/them	7	7	4	18	4	4	6	7	17	3
Satisfying the jury members by balancing your emphasis on the issues you introduce	6	4	6	16	5	6	5	5	16	4
Others: presentational layout, overcome frustration, playing w/words, and organize thoughts	3	3	0	6	7	1	2	0	3	6

Note: SO = Sophomore, JU = Junior, SE = Senior, TO = Total, and RA = Ranking

Table 2: Students' perceptions of their learning experience in final and interim juries. (Source: Authors).

important part of students' learning as it is seen in the rank order performed on the total responses for both final and interim juries (Table 2). As well, this is clearly evident in the senior students' responses. On the other hand, "satisfying studio faculty by focusing on issues of interest to them" seems to occupy an average position across the responses.

The preceding results indicate that students recognize that there is a high value of the juries and that their learning experience was satisfactory in general terms. It is the position of the authors that the skills selected by the majority of the students seem logical and was expected. However, as part of students reactions on their learning experience negative aspects emerge where some students stated that focusing on the presentation layout is more important to them than any other skills to attract the attention of the jurors while others mentioned that as part of their experience they learned to play with words to impress the jurors. Overcoming frustration was mentioned by three senior students as they stated sometimes in the interim juries that continuous misunderstanding exists between them, studio faculty, and when there are visiting jurors attending.

Jury Composition, Mechanism, and Scheduling

When students were asked about the composition of the jury, about 50% seem to prefer that it involves their studio faculty, other design faculty, and visiting professional

Jury Composition	SO	JU	SE	TO
Only studio faculty	6	0	0	6
Studio faculty and other design faculty in the college/department	0	1	2	3
Studio faculty and visiting practicing architects	1	4	2	7
All (studio faculty, other design faculty, and visiting practicing architects)	7	5	6	18
Other (Please state)	2	1	0	3
Jury Mechanism	**SO**	**JU**	**SE**	**TO**
Jury members critiquing students projects publicly	2	7	8	17
Jury members critiquing students projects individually (behind closed doors)	9	2	1	13
Jury members critiquing students projects without students presence at all (behind closed doors)	4	3	1	8
Others (please state)	1	0	0	1
Jury Scheduling	**SO**	**JU**	**SE**	**TO**
The jury is conducted on the same day of project submission	0	0	0	0
The jury is conducted in the studio session that follows that day of the project of submission	14	9	9	32
The jury is conducted a week after the project submission	2	3	1	6

Note: SO = Sophomore, JU = Junior, SE = Senior, TO = Total

Table 3: Students' perceptions of jury composition, mechanism, and scheduling. (Source: Authors).

architects. Reasons for this preference were expressed in statements like these "having a more vibrant dialogue," and "having multiple view points and inputs." Some students stated that external critics bring different perspectives and approaches on how they look at a project and this will help in understanding what aspects should be considered in future projects. In fact, these responses reflect a general awareness of what the jury composition can add to their learning experience. This corresponds with the results of investigating jury practices in the four schools in Egypt.

Notably, those who prefer the involvement of "only studio faculty" are mainly sophomore students who feel that outsiders do not know much about what the project is about, the nature of the assignment—they come unprepared and thus address issues that go beyond the scope of the their projects under assessment.

A considerable number of students (17) prefer to have jury members critiquing their work publicly. The reason they stated is that it offers a good opportunity in terms of speaking in public and learning how to communicate effectively. However, a smaller number of students (13) prefer to have the jury members critiquing their projects individually behind closed doors stating that it causes public stress and that the ambient noise may disturb the student (Table 3). Students who do not prefer to be present at all in assessing their work stated that their concern

is that it represents a situation of embarrassment if their projects are not up to the standards expected that they do not know clearly.

One of the striking results is that none of the students prefer to have their juries on the same day of project submission as they stated there is always a need to refresh after hard work and not sleeping for several nights preceding the submission. On the other hand, there appears to be a reasonable consensus on the need to conduct the jury two or three days after the day of submission stating that if such a period from the day of submission got longer the degree of enthusiasm in presenting their projects decreases dramatically (Table 3).

Jury Dynamics—Selected Paradoxical Aspects

A number of important issues related to the jury process were selected to understand students' perceptions including the format of receiving criticism, the time given to them to present their projects, the design issues emphasized during the jury versus the ones emphasized during the semester, and the general mode of communication among the jury members.

Regarding the format of receiving criticism they have experienced, the majority of the students (30 out of 38) stated that the common type of receiving criticism on their projects is oral and that they have rarely received it in writing. Students stated their concern regarding the form of criticism they receive during and after the jury, emphasizing the fact that feedback on their projects should be offered in writing in order to maximize learning opportunities the jury process may offer whether to advance the project through interim juries, or to capitalize on their learning for future projects through final juries.

Over 50% of the students (20 out of 38) feel they are given enough time to present their work and that this time is typically around 10 minutes. However, more than 70% of the students stated that they are either interrupted by jurors' questions while they are in the middle of their presentations, and in some cases they are not given sufficient opportunity to complete their presentations, or go into a conversational mode beyond the scope of their projects. Some students commented that this creates a chaotic tense situation. This corresponds to the work of Frederickson (1990), when he argues that a typical statement is often heard immediately after the juries "I wish the jury had enough time to sit and listen to me, I have prepared things to say, it is really frustrating… I needed extra time to have things explained differently and clearly."

The majority of the students (75%) agreed that design and projects priorities are changed during the jury process from what was intended and emphasized during studio instruction, commenting that this contributes to a continuous misunderstanding of what the project intentions were, and what aspects they should have placed emphasis upon, or whether there were true learning outcomes expected. Some students commented that this sometimes create a lack trust between them and the studio faculty who they expect to run the jury based on aspects kept emphasized throughout the project process. In essence, this result leads to the argument that the change of design priorities may lead to an anxious, defensive, and potentially hostile attitude toward the jurors.

While students have not explicitly stated all their concerns, in discussing some jury dynamics during the sessions, a common scene in jury

settings can be derived, that is—jurors show inattentiveness during the presentations expressing boredom and monotony and naturally students feel embarrassed and humiliated while showing the need for a better attention. While such a feeling of boredom hinders the communication process between jurors, it has a negative impact on students. In this process, repetition and discussion of irrelevant issues become dominant and thereby depleting the vigor of the jurors and the students presenting.

Asking the students about what they have sensed as a general mode among the jury members, more negative issues are emerged where 33% mentioned that there is always a contradiction among all members of the jury, while 55% mentioned that a competitive scene is what characterize the discussion and intervention of jurors in the delivery of their criticism and viewpoints. Only few students 16 % stated that there is harmony and understanding among jurors. This finding corresponds with the literature Anthony (1987), Frederickson (1990), and Sara (2004) when they agree that jurors come to the juries with hidden agendas and that by some jurors, the jury is seen as a forum in which to set forth a certain ideological or philosophical approach to design or to respond to previous statements made by other fellow jurors at other juries

In essence, findings suggest that there is as a misuse or abuse of the jury system itself. It is argued that flattery and showing-off to attending high administration figures or prominent visiting architects is an important factor that often sets educational goals aside, In fact, this diverts the jury from one of its primary purposes, to educate and enlighten students based on their articulation of responses to design problems. Another important aspect is that there is always a tendency to undervalue those with different view points from their own. In making judgments about students' projects this may lead to distorted views about students' performance and in terms of their actual and potential aptitudes. As the result, many students are unfavorably affected by the existence of personal matters among the jurors. Students might be the victims of such old and unresolved conflict where a juror can address several criticisms to another juror through the student and his/her work.

While the preceding discussion of some aspects of jury dynamics may appear negative or pessimistic as it presents worst-case scenarios, it provides a base for openly discussing some of the rituals as educators keep repeating them unconsciously. As well, the discussion suggests that there are many feelings and attitudes involved in the communication process including defensiveness; hostility; anxiety; fear of failure; conflicts of ideas; emotional tension; frustration; boredom; embarrassment; and humiliation, to name a few. While some may argue that the resolution to these negative aspects involves very basic concepts such as respect, reciprocity, sensitivity to others, etc. implementing such concepts in jury settings that are amenable to responsive learning process, remains a challenge.

Conclusions

The architectural jury system as a traditional educational ritual started in the French "Ecole Des Beaux-Arts" as a part of an evaluation process that continued to evolve as both an

assessment and learning tool. During the 19th century, this educational tradition was imported to North American schools of architecture and later to the Arab world starting in Egypt. Eventually, by mid 20th century the same jury practices were adopted by faculty and teaching staff in all schools of architecture in the region through their European architectural education. Over the past thirty years, architectural schools throughout Saudi Arabia and Gulf States, took on the practice through Arab and foreign expatriates in addition to native scholars who were typically educated in the United States or other European countries.

It is generally agreed that the jury is supposed to further and enhance the student's intellectual growth through constructive criticism that clarifies the pros and cons of the students design and expand on the critical design issues that pertain to the project in question, in addition to the evaluation of how much knowledge has been acquired and how successful it was applied in the proposed design scheme. All such activities should be undertaken in an environment that facilitates communicating and exchanging scholarly thoughts and knowledge between faculty members and students.

Based on an extensive literature review on the educational value of the jury system and the embedded communication processes and two empirical studies presented on student perceptions of jury practices, similar problems have been identified across all the domains of investigation. Most of the problems that have been reported by the students stem from the communication aspects that bring the students and the jurors in conflict that mainly arise from the rules that organize and control the relationships between the students and jurors. Other problems stem from the educational program that does not cover aspects such as presentation skills and verbal expression, while the majority is juror related problems such as harmony between the jury members, subjectivity, and motivation.

Classifying the problems, they can be seen within three categories that relate to environmental setting, the juror, and the student.

• ***The setting*** of the architectural design jury suggests an offensive inquiry ending with judgment and grades on behalf of the jurors, and a case (i.e., project) presentation and defensive responses on behalf of the students.

• ***Jurors*** are the main source of the jury system problems primarily because of their subjectivity and professional ethics. This can be further outlined as follows:

o Subjectivity of the jurors can be attributed to personal preferences due to understanding and experience in certain domains and weakness in other. This contributes to problems such as a) lack of transparency in grading; b) changing priorities during presentation; c) fixation on certain design issues while oversimplifying or ignoring major design issues, thus leading to boring and repeated discussions; and d) weakness towards strong presentation versus commitment to design standards and program requirements.

o Professional ethics related problems can be attributed to the inability to separate judgment from emotions. This contributes to problems such as: a) personal appeal influences; b) hidden agendas between jurors; c) cruelty and harsh comments; and d) showing off to impress certain

audience whether students or other jurors.

• ***Students*** are mainly over concerned with fair treatment since they call for scheduling their presentation after they have rested, to know in advance the criteria of their evaluation, to have sufficient time for their presentation, to be given sufficient opportunities to articulate and defend their viewpoints, and to have a clear and concise feedback that is recorded while being amenable to implementation.

Most of the preceding problems can be eliminated through scenarios that may include:

• To educate the educators about the true reasons behind the jury evaluation system which should be concerned with educating the student and fairly assessing their performance.
• To write down the criteria of evaluation and the set of ground rules that the jurors and the students should abide by.
• To weaken or even remove the grading power of external jurors, such that the educational values of the jury may increase.

The authors believe that the jury system should continue to evolve and that these brief scenarios should be taken seriously and be further developed into frameworks for jury practices amenable to experimentation, testing, improvement. In essence, architectural education should not adopt educational tools developed in the past and not equipped to face the practical realities of contemporary learning, assessment, communication, and design discourse. While addressing the unique peculiarities of each project and year level, such frameworks need to emerge from the specifics of a school of architecture, its students body, its faculty profile, and its overall context.

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Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

1987	**Kathryn Anthony**	**Private Reactions to Public Criticism** Journal of Architectural Education, vol. 40, issue 3. pp. 2-11.
Major Approaches - Features		
• Reports the results of research about the effectiveness of design juries in architectural education, • This research examines the educational value of juries, both interim and final, how design students cope with public criticism, and a comparison of the architecture student "subculture" with that of other students. • Two phases are involved: The first: relied on systematic behavioral observations, interviews, questionnaires, and diaries. Students, faculty, and alumni in architecture, urban planning, landscape architecture, and outside environmental design participated in the research. Phase II is a follow-up study of other schools, based on questionnaires of architecture faculty at the Cranbrook Teachers' Seminar. • Implications of these findings are discussed, and suggestions for improving design juries are offered. • Could be considered under the category of students and faculty based surveys.		
1987	**Thomas A. Dutton**	**Design and Studio Pedagogy** Journal of Architectural Education, Vol. 41, issue 1. pp. 16-25.
Major Approaches - Features		
• Utilizes the hidden curriculum concept to analyze the nature and practices of the studio • Offers an argument that there is a rough correspondence between schooling and larger societal practices, where the selection of knowledge and the ways in which school social relations are structured to distribute such knowledge, are influenced by forms and practices of power in society. • The author attempts in experimenting with a transformative pedagogy for the design studio, endeavoring to set up the conditions to investigate not only the many issues of design, but the nature of design education itself. • Could be considered under the category of experience based case studies.		
1990	**Mark Paul Frederickson**	**Design Juries: A Study in Lines of Communication** Journal of Architectural Education, vol. 43 - issue 2. pp.22-26.
Major Approaches - Features		
• Assesses impediments in communication between different parties involved in the jury system. • Anatomy of the communication problems during the juries and the attitudes, feelings, and behaviors involved. • Methodology is not clear, but appears to be based on some form of observation. • Could be considered under the category of experience based analysis and positional recommendations.		
1991	Kathryn Anthony	**Design Juries on Trial: The Renaissance of the Studio** Van Nostrand Reinhold, NY, New York USA.
Major Approaches - Features		
• Developed based on the earlier intensive investigation (1987) • Introduces guidelines and checklists that are based on extensive research with systematic observations and videotape recordings of juries, diaries of design students, and interviews and surveys of students, educators and practitioners conducted during a seven year period. • Interviews feature leading architectural, landscape, and interior designers including name architects. • Introduces recommendations that aim at empowering students to take better control of their performance at juries and in studios through an array of self management skills, including: time management, public speaking, negotiating, preparing effective graphics, and handling studio stress. • Could be considered under the category of students and faculty based surveys.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

1991	**Laura L. Willenbrock**	**An Undergraduate Voice in Architectural Education.** In T. A. Dutton, ed., Voices in Architectural Education: Cultural Politics and Pedagogy, Bergen and Garvey, New York, USA, pp. 97-117.
Major Approaches - Features		
• Outlines the experiences of an undergraduate student, how she got enrolled in architecture, and the practices she experienced in learning design in the studio. • Offers reflection and critique on studio teaching practices. • Describes the jury review system as a tool of oppression. • Could be considered under the category of experience based analysis and positional recommendations.		
1993	**Mark Paul Frederickson**	**Gender and Racial Bias in Design Juries** Journal of Architectural Education, vol.47 – issue 1, pp. 38-48.
Major Approaches - Features		
• Assesses the participation and interaction of various participants in the design jury process, that is, male and female jurors, male and female students, and racial minority students. • Identifies and statistically examines several consistently biased practices and procedures in design juries. • The findings are distilled from one portion of an ongoing comprehensive investigation of the inner workings and educational efficacy of design juries in architectural education. • Could be considered under the category of students and faculty based surveys.		
1993	**Sherry Ahrentzen and Kathryn Anthony**	**Sex, Stars, and Studios: A Look at Gendered Educational Practices in Architecture** Journal of Architectural Education, vol.47 – issue 1, pp. 11-29.
Major Approaches - Features		
• Based on educational research and theory, it assumes that male and female university students are treated differently and that this needs to be investigated in architectural education • Argues that architectural educators must examine whether their teaching practices and pedagogy are similarly gendered. • Identifies situations in which gendered practices occur in design studios and juries. • Suggests ways in which we can restructure our educational practices to provide enhanced opportunities for both women and men. • Could be considered under the category of experience based analysis and positional recommendations.		
1995	Ashraf M. Salama	**New Trends in Architectural Education: Designing the Design Studio** Tailored Text and Unlimited Potential, Raleigh, North Carolina, USA.
Major Approaches - Features		
• Part of an intensive study on studio teaching practices. • Outlines a criticism against traditional approaches to studio teaching and jury practices. • Presents a wide range of innovative concepts and practical ideas for teaching architectural design. • Based on surveys of over 75 design instructors from 28 schools of architecture, it explores different aspects of studio teaching and what impact they have on the attitudes, skills, methods, and tools of architects. • Offers a comparative analysis of contemporary trends that are committed to shaping and identifying studio objectives and processes. • Could be considered under the category of students and faculty based surveys.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

1996	Sue Hall Jones	**Crits—An Examination** International Journal of Art & Design Education, vol. 15 – issue 2, pp. 133–141.
Major Approaches - Features		
• Describes the history of instituting the crit and the ways in which its use has changed in the last 150 years • Utilizes the context of a British school of architecture and both contemporary and earlier research examples to support the hypothesis that these changes have contributed to the current atmosphere of doubt in which the crit is held. • Supports the call for a review of architectural education methods, whilst stressing that the nature and flaws of the existing process must first be recognized. • Could be considered under the category of experience based case studies.		
1996	**Linda N. Groat and Sherry Ahrentzen**	**Re-conceptualizing Architectural Education for a More Diverse Future: Perceptions and Visions of Architectural Students** Journal of Architectural Education, Vol. 49 – issue 3, pp. 166-183.
Major Approaches - Features		
• Argues that the field of architecture must engage diversity in two senses of the word simultaneously: both in terms of its demographic composition and in terms of the substantive domain of architecture. • Surveys 650 students at six different architecture schools. • Investigates the ways in which both the content and the form of architectural education might impede or support the progress of women and minority students, with emphasis places upon three aspects of the "hidden curriculum": studio pedagogy; social dynamics; and ideals and expectations. • Could be considered under the category of students and faculty based surveys.		
2000	**Charles Doidge, Rachel Sara, and Rosie Parnell**	**The Crit: An Architectural Student's Handbook** Architectural Press, Elsevier, Oxford and London, United Kingdom.
Major Approaches - Features		
• Argues that the crit, review or jury is a cornerstone of architectural education around the world. • Offers critical statements that pertain to jury practice and how in most cases many students view it as hostile confrontation – an ego trip for staff and humiliation for them. • Offers guides to students through this academic minefield. • Offers advices and suggestions for tutors on how to model a crit around a broad range of learning styles to ensure that the process is constructive and beneficial for all architecture and design scholars. • Prepares students to build more creative relationships with clients and users across the industry. • Could be considered under the categories of experience based case studies and experience based analysis and positional recommendations.		
2000	**Rosie Parnell**	**The Student-Led 'Crit' as a Learning Device.** In D. Nicol and S. Pilling, eds., Changing Architectural Education, Spon Press, London, United Kingdom, pp. 211-219.
Major Approaches - Features		
• Argues that the traditional crit of review is underexplored resource for the development of a considerable number of skills including team work and communication skills. • Develops a student-led review (in the form of sessions) as an experimental methodology that involves two reviews run by the students. • Encompasses feedback and evaluation activities. • Could be considered under the category of experience based case studies.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

2000	**Margaret Wilkin**	**Reviewing the Review: An Account of a Research Investigation of the 'Crit'** In D. Nicol and S. Pilling, eds., Changing Architectural Education, Spon Press, London, United Kingdom, pp. 100 -107.
Major Approaches - Features		
• Argues that the crit or project review is a from of teaching and that its continuity suggests that it has been a successful mode of knowledge and skills transmission. • Based on feedback received from both faculty and students involving a questionnaire, they were asked to state their views. • Adopts a group discussion as an additional mechanism to get faculty feedback • Reports on the result of the investigation and develops arguments under the headings of the review process as a learning opportunity, the organization and setting of the review, client and user related issues, and students' participation in the review process. • Could be considered under the category of students and faculty based surveys.		
2000	**Hannah Vowles**	**The 'Crit' as a Ritualized Legitimization Procedure in Architectural Education.** In D. Nicol and S. Pilling, eds., Changing Architectural Education, Spon Press, London, United Kingdom, pp. 259-264.
Major Approaches - Features		
• Maps out the peculiar and contradictory tradition of the crit. • Argues that the review process is inherently social and can function as a vehicle for socially produced meanings. • Introduces the author's position as an architect and educator. • Could be considered under the category of experience based analysis and positional recommendations.		
2001	**Guita Farivarsadri**	**A Critical View on Pedagogical Dimensions of Introductory Design in Architectural Education** Proceedings of Architectural Education Exchange: Architectural Educators Responding to Change, Cardiff, United Kingdom http://www.cebe.heacademy.ac.uk/aee/pdfs/farivarsadrig1.pdf (last accessed in April 21, 2004).
Major Approaches - Features		
• Introduces critical pedagogy as mechanism under which students are capable of taking their responsibilities as future professionals. • Critically analyzes the pedagogical dimension of introductory design education • While emphasis is not placed on the juries, some aspects of ways in which students work is evaluated are involved. • Introduces a framework for a student-centered introductory design education. • Could be considered under the category of experience based analysis and positional recommendations.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

2002	Aaron Koch, et al.	**The Redesign of Studio Culture** AIAS Studio Culture Task Force, American Institute of Architecture Students, Washington, DC, USA.
Major Approaches - Features		
• Part of a larger study on analyzing the studio culture • Studio teaching practices are critically analyzed, critiqued • A number of visions and values the form the backbone of architectural education are conceptualized. • Argues that critiques are learning experiences not target practice while introducing a cultural shift in terms of viewing the jury where its role should be to celebrate student work as well as benchmarks for growth. • Could be considered under the category of experience based analysis and positional recommendations.		
2002	**Kathryn Anthony**	**Designing for Diversity: Implications for Architectural Education in the Twenty-first Century** Journal of Architectural Education, vol. 55 – issue 4 , pp. 257–267.
Major Approaches - Features		
• Reviews literature about the need for diversity in schools of architecture and provides statistics documenting the relative lack of diversity, especially among architectural educators. • Stresses the need to go beyond affirmative action requirements in order to promote a climate that values differences and manages diversity. • Proposes strategies such as writing a diversity plan, restructuring the design evaluation process, and revising the architectural curriculum. • Suggests mentoring and cross-training programs, more-flexible work environments, exit interviews, and public outreach as ways to promote diversity in architectural schools. • Could be considered under the category of experience based analysis and positional recommendations.		
2003	**Mitlon Cameron**	**The Jury's Out: A Critique of the Design Review in Architectural Education,** Proceedings of the Annual Conference of the Australian Council of University Art and Design Schools, University of Tasmania, Australia. www.acuads.com.au/conf2003/papers_refereed/cameron.pdf (last accessed in Dec. 11, 2007).
Major Approaches - Features		
• Discusses the review process as a forum for presenting and assessing student design projects. • Relies heavily on reviewing the literature while at the same time relate the literature to personal experiences at the university of Canberra. • Relate architectural design juries to the experiences of design and fine arts disciplines which often employ practices similar to that of the jury. • Could be considered under the category of experience based analysis and positional recommendations.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

2003	**Elizabeth Mary Graham**	**Studio Design Critique: Students and Faculty Expectations and Reality.** Master Thesis, School of Landscape Architecture, Louisiana State University, Baton Rouge, Louisiana, USA.
Major Approaches - Features		
• Argues for the need to reevaluate and better understand criticism in educational settings in landscape architecture. • Explores if theories of criticism are employed in landscape architecture studios. • Reviews remarkable writings on the jury. • Surveys faculty and students perception of criticism in the design studio including jury practices. • Could be considered under the category of students and faculty based surveys.		
2004	**Abdel Aziz Al-Mogren**	**Architectural Learning: Evaluating the Work Environment and the Style of Teaching and Management in Design Studios** Paper posted as part of the scientific document portal of the College of Architecture and Planning, King Saud University, Riyadh, Saudi Arabia, http://faculty.ksu.edu.sa/almogren/Publications/Architectural%20Learning%20(Egypt)4.pdf (last accessed in December 10, 2007).
Major Approaches - Features		
• Part of a larger study on studio teaching at the College of Architecture and Planning, King Saud \] University. • While the focus on is on the studio environment as a whole, a survey study is conducted and involves jury related aspects (communication and assessment). • Adopts a questionnaire mechanism to get the students and faculty feedback from the same college. • Identifies different factors involved in assessing and grading students' design projects. • Could be considered under the category of students and faculty based surveys.		
2004	**Rachel Sara**	**The Review Process** CEBE Transactions, Center for Education in the Built Environment, University of Cardiff, vol. 1 – issue 2, pp. 56-69
Major Approaches - Features		
• A guide aimed at design studio faculty and visiting critics involved in review/jury process. • Provides a description of the established model, highlights inherent opportunities and potential problems. • Offers a variety of tips and concrete examples in attempt to offer faculty alternative approaches to the typical jury process. • Could be considered under the category of experience based analysis and positional recommendations.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

2005	**Ashraf M. Salama**	**A Process Oriented Design Pedagogy: The KFUPM Sophomore Studio** CEBE Transactions, Center for Education in the Built Environment, University of Cardiff, vol. 2 – issue 2, pp. 16-31.
Major Approaches - Features		
• Argues for a process oriented design pedagogy, and that the process and product are equally important components in design teaching practices. • Outlines an assessment of traditional studio teaching practices. • Introduces and implements a model that advocates dialectic relationships between the process and the product, and that recognizes students' individual differences. • Issues that relate the studio process to evaluating the outcomes of students' work are outlines. • Could be considered under the category of experience based case studies.		
2006	**B.D. Llozor**	**Balancing Jury Critique in Design Reviews** CEBE Transactions, Center for Education in the Built Environment, University of Cardiff, vol. 3 – issue 2, pp. 52-79.
Major Approaches - Features		
• Offers a review of the jury system • Explores and evaluates alternative mechanisms introduced and implemented to foster a fairer system of critical reviews. • Argues that a jury critique that is students-centered enhances students' learning experience while avoiding the typical over-emphasis on their inadequacies. • Could be considered under the category of experience based case studies.		
2006	**Meltem Ö.Gürel and Joy K.Potthoff**	**Interior Design in Architectural Education** International Journal of Art & Design Education, vol. 25 – issue 2, pp. 217–230.
Major Approaches - Features		
• Explores interior design related coursework taught in accredited architectural programs in the United States. Two methods of collecting data are used: self report from architectural program chairs and content analysis of web-site posted program catalogues describing course content. The findings show that many interior design concepts are not well addressed in the architectural curricula. • While emphasis is not placed on the juries, some aspects of jury related practices are involved. • Could be considered under the category of students and faculty based surveys.		

Appendix 1: Major Features Addressed in the Literature on Architectural Design Juries as Part of Design Studio Teaching Practices

2007	**Ashraf M. Salama & Nicholas Wilkinson** (editors)	**Design Studio Pedagogy: Horizons for the Future** The Urban International Press, Gateshead, United Kingdom.
Major Approaches - Features		
• Probes future universal visions within which the needs of future shapers of the built environment can be conceptualized and the design pedagogy that satisfies those needs can be debated. • Introduces theoretical perspectives on design pedagogy and outlines a number of thematic issues that pertain to critical thinking and decision making; cognitive and teaching/learning styles; community, place, and service learning; and the application of digital technologies in studio teaching practices, all articulated in a conscious endeavor toward the betterment of the built environment. • While the general focus is not on the jury, specific demerits of studio teaching and assessment are addressed. • Notable contributions that address students performance related issues are that of Anu Yanar, Nisha Fernando, Malika Bose, Michael Jenson, Ryan Smith, Hulya Turgut, Ashraf Salama, and Stephen Kendall. • Could be considered under the categories of experience based case studies and experience based analysis and positional recommendations.		
2007	**Helena Webster**	**The Analytics of Power: Re-Presenting the Design Jury** Journal of Architectural Education, vol. 60 – issue 3. pp. 21-27.
Major Approaches - Features		
• Argues that while the centrality of the design jury as a site for learning disciplinary skills, beliefs, and values is now widely acknowledged, there continues to be considerable disagreement about what is learnt and how. • Inspired by Michel Foucault's studies of relationship between power and the formation of the modern self, reports on the findings of a year-long ethnographic study carried out in one British school of architecture. • Attempts to unravel the complexities of the design jury as a site of dichotomous power relations • Proposes a new set of pedagogic events that are carefully constructed to support student learning. • Could be considered under the categories of experience based case studies and experience based analysis and positional recommendations.		

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INTEGRATING MULTI-GRADE COLLABORATIVE LEARNING PEDAGOGY INTO DESIGN STUDIOS

Ayman Mohamed Ismail and Mona Hassan Soliman

Abstract

Undergraduate design instruc¬tion in the Arab world has traditionally focused on the design studio as the primary tool for developing creative design capacities. Interaction continues to be based on student-to-content, student-to-interface, and/or student-to-instructor. Student-to-student (peer) interaction however has usually not been formally considered as a source of skill-development, or limited to groups formed in the research and data collection phase of the design process.

This paper describes and evaluates a type of collaborative learning which was applied in the context of transforming the traditional single-level design studio into an all-level combined design studio. The impressions, skills acquired, and the efficiency of the produced project is compared with those produced in a traditional design, competitive class setting using a student-based survey. The items of this survey were derived from theories on collaborative learning that stress the importance of interaction to promote deep learning.

The literature review addresses: definition of collaborative learning, assumed benefits, conditions for success, as well as the vertical studio approach and relevant experiences in the Arab world.

Keywords

Collaborative learning, Cooperative learning; design studio pedagogy; architectural education.

Introduction

DCollaboration is defined as a process by which disciplines work closely together. This view of learning cannot be made operational in traditional didactic teaching set¬tings that are more often than not both individ¬ual and competitive in nature. The generic skills, attitudes, and competencies required for the implementation of a different approach to learning requires a setting with a number of qualities that are traditionally missing in the Arab world, namely: open-mindedness; readiness to accept others' opinions; shared needs and goals; room for multiple perspectives on the prob¬lems and their solutions; and shared responsibilities both for the process of achieving a final product and for the product itself. Mutual trust between the participants is needed such that their contributions and their initiative are valued. In other words, this can only be achieved in a collaborative or cooperative learning setting that is probably grounded since kindergarten

(Wagenknecht, 1989; Kirschner, 2004).

The collaborative learning movement was originally derived from literature and practice at the elementary and secondary level, then extended to higher education. According to (Slavin, 1991), Chickering and Gamson (1987) included the use of collaboration among college students in their influential work "The Seven Principles for Good Practice in Undergraduate Education," demonstrating how collaboration among college students relates to positive student outcomes, including, for example, a positive effect on educational gains and on student retention.

On the other hand, it was also reported that faculties' use of teaching strategies that promoted students' active learning, possibly in the form of group projects, had a negative effect on college students' retention (Johnson, Johnson, and Smith, 1991). The paper goes on to review the literature's possible explanation, suggesting that poorly designed group learning can produce worse results than competitive approaches. The current literature on collaborative learning methods is, therefore, very specific about the techniques and procedures necessary for teachers to follow to have positive learning outcomes in their studios.

Advantages of Collaborative Learning

The validity of team-work as a process for developing and maturing skills has been long recognized. The advantages to this type of teamwork are numerous and include:

1. Collaborative teamwork can lead to better clarification of the task at hand (Walton, 1991).

2. Collaborative teamwork leads to more variety and creativity in design solutions. When students from diverse disciplines are working together, each individual brings new insights to solving the problem at hand. Students also gain different perspectives from other team members (Soliman, M., Okba, E., 2006).

3. Collaborative teamwork leads to more intensive analysis or critique of the final design solutions. Team members who bring ideas to the table must often clarify their solutions, leading to increased critical thinking and analysis of ideas (Dillenbourg, et al, 1996).

4. Collaborative teamwork can expedite the design process, and teams often generate more work in a shorter period of time than an individual (Soliman, M., Okba, E., 2006).

5. Collaborative teamwork also can improve project quality and improve performance. With teamwork, there is no individual ownership; rather, all members on the team have some aspect of ownership. Because everyone contributes to the design, team members may feel more motivated and take more pride in their work (Soliman, M., Okba, E., 2006).

6. Collaborative learning leads to gain and exchange more knowledge about the subject and about thinking in general (Summers, J., et al. (2005).

7. Collaborative teamwork helps adopt and develop new design and work strategies.

8. Collaborative learning generates managerial skills, building consensus, and shared responsibility for success and failure (Summers, J., et al. 2005).

Approaches of Collaborative Learning

Collaborative learning has been influenced by two major theoretical frameworks: constructivism and socio-cultural approaches. Piaget's constructivism theory indicated that individuals learn and develop knowledge through social interaction rather than individual exploration (Piaget, 1969). The second theoretical framework is the socio-cul¬tural approach, which comes from Vygotsky (1978). He proposed the concept of zone of proximal development, which means that chil¬dren can develop skills with adult guidance or peer collaboration, which cannot be attained alone. By drawing on a larger collective mem¬ory and the multiple ways in which knowledge can be structured among individuals working together, groups can attain more success than individuals working alone (Bruer, 1993; Palincsar, 1998)

In the best collaborative learning situations, the members of a group should benefit in several ways. For example, according to Slavin (1995a, 1995b), in the process of working together, students should acquire new strategies and knowledge, both about the subject and about thinking in general. When a class is divided into groups, a new social context is created in which students have the opportunity to share individual cognitions with their peers and come to a conclusion based on the sum of those cognitions. One can think of the benefits of collaborative group learning arising in several ways. Among these are benefits derived from the method itself and benefits derived from the social context of learning that is part of group learning.

Benefits from characteristics of the method itself: The collaborative learning process requires that all members of the group agree on the team goals and each member must attribute his or her own successes to the success of the group to maximize the learning potential of the whole group (Cooper, et al, 1994). This is where individual accountability becomes key: When students themselves are motivated and are invested in the success of the group, they will be more likely to encourage success and motivation among other members of the group. (Colbeck, C., Campbell, S., & Bjorklund, S., 2000) reported in their study that prior experience in group work had been most beneficial in helping them collaborate effectively on a current project.

Benefits derived from learning in a social context: According to (Ickes, 1990), coordinated cognitive activity depends on intersubjectivity, that is, a shared understanding among group members of the work to be accomplished. In the case of collaborative learning, the instructor is responsible for setting up a problem so that inter-subjectivity can be reached even before the process of problem solving begins. Once initial understanding of the problem has been reached, one outcome that can come out of the problem-solving process is socially shared cognitions (Levine, et al, 1993).

Collaborative Learning for Designers: Conditions for Success

Planning, architecture, and landscape architecture are among several unique multi-disciplinary fields in which various actors interact to form consensus over policy or deliver a single product that meets several criteria. This unique feature of design disciplines requires solid background in teamwork and successful collaboration. However, such collaboration has

its problems, even in western countries (Gaffikin and Brand, 2007). In the Arab countries, team-working skills are at best moderate. In the architects' and planners' real world, the need for better team-players and collaboration in plan making is increasingly evident. McCann (2001) argues for the planning process to be consensus-based, collaborative, and inclusionary, rather than elite-centered and expert-driven. This focus on team-working skills seems to be lacking in many of our universities graduates. This is where the design studio fits in.

Design studio students are usually introduced to their first teamwork experience in the early years of their university education, usually as part of a research assignment required to prepare them for their design or planning project. In most cases, their teamwork is with colleagues of the same level, with little or no guidance or coaching from the instructor. Many authors have enumerated conditions for success (Astin 1991). Among the most salient are:
1) Prior experience in group work
2) Proper design of the project by the faculty (poorly designed group learning can produce worse results than competitive approaches)
3) Inter-subjectivity (a shared understanding among group members of the work to be accomplished. The instructor is responsible for setting up the problem.)

Types of Collaborative Learning Methods

Hard and Soft Collaborative Learning Techniques

Peer-learning techniques provide opportunities that are both social and academic in nature. Collaborative activities in the studio vary according to the level of instructor intervention within student activity and structure.

According to Cooper (1999), in a traditional collaborative group activity the instructor: sets up the problem; assigns a task with an outcome goal to each small group; gives the groups a set amount of time to complete the task; and then asks the group to share its results with other groups, the whole class, and the instructor. The students: form their own groups; select their leaders; organize and manage themselves. This is a "soft" collaboration approach. This requires less staff intervention, more self-dependence by the student, and promotes creativity in problem-solving. However, its successful implementation probably is better suited to a more sophisticated student with sufficient managerial skills and maturity.

In contrast, Johnson and Johnson (1998) describe a more structured learning approach in which students are monitored much more closely by the instructor and require the instructor's role in the design, implementation, and monitoring of the project. The instructor is required to introduce the project; assign students to groups of two to five members; give students the materials they need to complete the assignment; assign students roles; explain the task to the students and teach them any concepts or procedures; structure the cooperation among students; intervene when students do not understand the academic task or when there are problems in working together; evaluate the academic success of each student. This approach is "cooperative learning," while the authors of the paper call it the "hard" collaboration approach. It is a process-oriented, methodical, and more formal form of collaborative learning. Student characteristics by this approach are believed to include positive interdependence, cognitive

development, and social development.

Vertical Studio Cooperation System

The vertical studio is an element of peer-teaching collaborative learning that has been developed for application throughout the college. Barnes, (2008) describes the how Rhode Island School of Design has used the "Vertical Studio" system to challenge traditional, sequenced design studio organization by allowing students of various developmental and skill levels to interact and compete with one another in a topical, thesis-based studio. According to Barnes (2008), several key components underpin the success of the vertical studio system. First is the belief that design education is not a linear process, but rather is experiential in nature. Second, a foundation level of training that clearly provides students with a mutually comprehensive core of values, skills, and techniques and nurtures motivation and independent thinking must be part of the system. Third, faculty must be willing to deal with students of varying levels of technical confidence in a single studio. And last, a sufficient number of meaningful studio choices that are both broad in topic and flexible in structure must be made available.

In vertical studios the instructor:
• Introduces a studio theme and a multi-level project;
• Defines the sub-project component that each level is responsible for;
• Puts in place a grading mechanism that rewards vertical cooperation;
• Closely monitors cross-level progress to verify deliverables are handed over from seniors to juniors on time to begin their project.
• Evaluates the academic success of each student.

As for the students in vertical studios:
• Students of various developmental and skill levels interact and compete with one another
• Form vertical groups with clear peer assignments.
• Each senior student has a junior apprentice
• Each junior assists a senior.

Barnes (2008) concludes that any system that allows free choice does so at the expense of rigorous control. The vertical studio provides considerable freedom of choice, but with this freedom come some distinct limitations and new responsibilities for both faculty and student.

Methodology for Measuring the Impact of Collaborative Learning: Four Factor Model

The evaluation of a particular teamwork experiment needs to consider both content and context of the experiment. Many outside factors are thought to influence the ability of the design student to participate effectively in a group project. Among these factors is prior experience in group work (Colbeck, et al 2000); proper design of the project by the faculty; inter-subjectivity (a shared understanding among group members of the work to be accomplished); the instructor's involvement in setting up the problem (Garcia, and Stinson, 1990).

Also with the content of the experiment is student group interaction. A homogeneous and cooperative group is expected to perform better in a group assignment. The group's internal factors have four main attributes including: participation; interdepen¬dence; synthesis of information; and independence

(Thompson and Ku 2006).

1. Par¬ticipation is the most basic requirement of a collaborative group because it is impossible to collaborate without individual contributions to problem solving.
2. Inter¬dependence requires interaction between group members to bring about active responses to one another.
3. Synthesis of information requires the product of collabo¬ration to reflect input from every group mem¬ber.
4. Independent from the instructor means that whenever a question occurs, group members should attempt to collaborate with each other rather than turning to the instructor for answers.

The group's performance on the projects is measured by the graded work by the instructors based on grading rubrics. The student's attitude towards the experiment is calculated and ranked across participants as well as groups to determine their impression towards collaboration. Lastly, student reflections about the skills acquired were aggregated into categories and then collapsed into meaningful patterns to serve as the framework for discussion.

Based on the factors identified above and the literature review, the paper identified four main groups of effective variables and factors that dominate and affect the teamwork in university level education. These factors are:

Factor 1: Student Background

We measured students' readiness for university level collaborative work. These factors could be tested individually or aggregated into a scale including such items as:

- family size
- age
- location and type of primary and secondary education
- pre-university experience in any type of collaborative work.

Factor 2: First Group-Effect on individual

Some authors put emphasis of the first experience of group work and find it detrimental on future experiences. These factors include (Walker, C., & Angelo, T., 1998):

- impressions about the first university level experience,
- student role as a leader or member (once a leader, always a leader)
- group size
- subject
- personal impression of its value.

These factors could be tested individually or aggregated into a scale.

Factor 3: Last Group-Evaluation & Group Processing-Effect on individual.

Summers et al (2005) developed a Group Processing Scale based on elements of successful group work. The measurement contained items designed to assess students' perception of the effectiveness of group work on completion of a studio course that used group work. This scale included such items as:

- evaluation fairness
- group members' contribution
- improved problem-solving skills.

Factor 4: Evaluation of Multi-Grade Collaboration

At this point, the evaluation covers:

- student's attitude about the vertical studio
- skills acquired
- grade importance and evaluation
- impressions about ways to improve the system (difference between group-building

skills and problem-solving skills).

The Case of the Faculty of Environmental Design – KAU

The vertical studio as an element of peer-teaching collaborative learning has been developed for application throughout the college since 2003/4. Two departments, Architecture and Urban Planning, have applied it but adopted various interpretations of the concept. The common theme that has transcended in both is the spatial co-existence of all four academic levels in the same open space.

The Department of City and Regional Planning has formed four studios. Each studio has 2-3 faculty members tutoring 40-50 students gathered around a single theme. Each student has his or her own private workspace within an open-plan office space, shared with all three levels (in addition to the graduating class). Students live and work within the studio, so the studio is equipped with a kitchenette, outlets, wireless, sofas audio-visual equipment. Instructors meet officially during the 12 contact hours with their students in two weekly six-hour sessions. Each studio has a somewhat different interpretation of the vertical cooperation concept. These are best summarized in figure (1).

As the figure shows, the tendency is definitely in favour of collaborative teamwork. However, some prefer to have a multi-level student arrangement of the team while others use single-level teams. These variations help explain the findings. The study samples consist of 85 students from the department of Urban and Regional Planning. Their basic data are summarized in the graphs below. Their ages cover the whole four-year program while the bulk is on the last three years where they have higher exposure to teamwork. Their mean GPA is 3.5 and their mean last studio grade is 86.3.

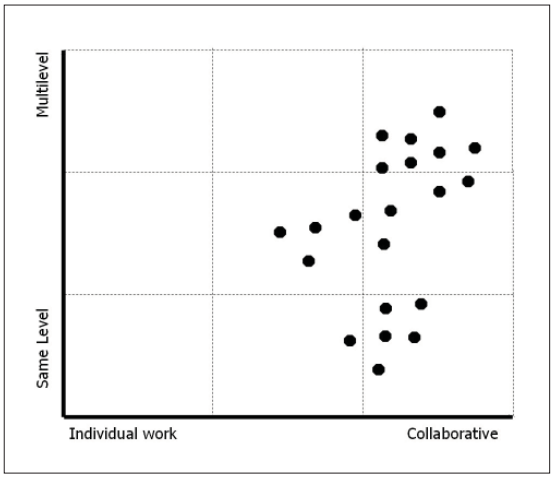


Figure 1: Studio arrangement distribution. (Source: Authors).

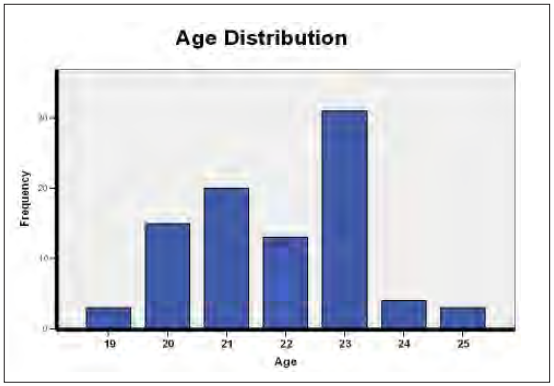


Figure 2: Age frequency distribution of the sample. (Source: Authors).

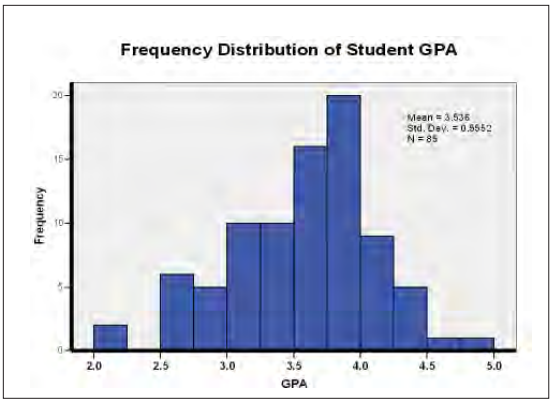


Figure 3: GPA frequency distribution of the sample. (Source: Authors).

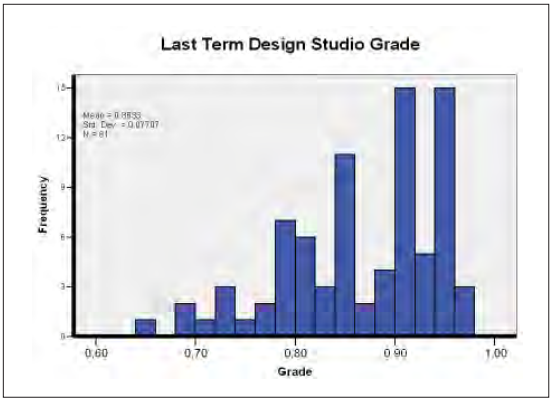
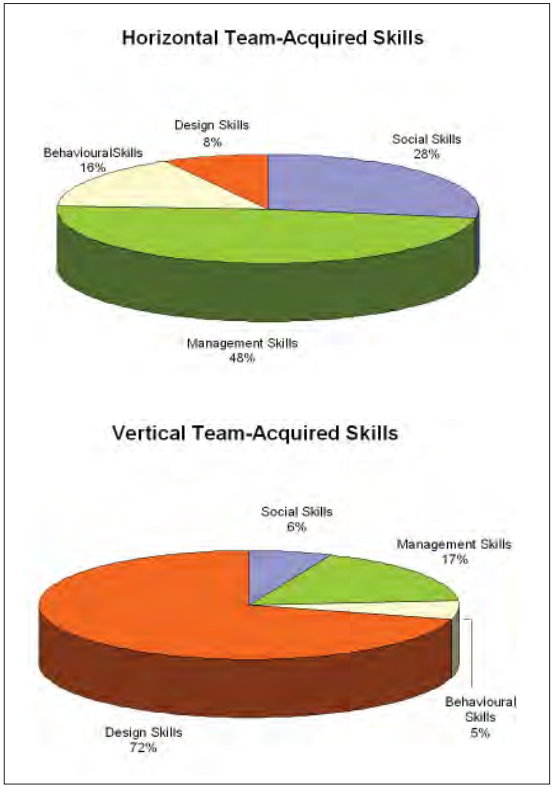


Figure 4: Design studio grade frequency distribution. (Source: Authors).

Research Findings

Skills Acquired

Students listed a large number of positive and negative skills that they acquire during both horizontal and vertical studios. These skills were grouped under four major categories: management, behavioral, social, and design skills. The main differences are shown in figures 5 and 6.



Figures (5,6) Comparison of team-acquired skills between the horizontal and vertical design studio. (Source: Authors).

It would seem that the most significant contribution of the vertical team arrangement--in the opinion of the students--is design skills.

Students find that having senior students in the team helps more junior students deal more efficiently with design problems, software, and fieldwork. This helps develop a positive peer-learning attitude and probably less time is used socializing. The horizontal team arrangement however has students invest a significant amount of time on social and managerial aspects, helps them interact with students of their same age, and make friends. However, it may also be easier to develop dependency (laziness) especially with large groups and ineffective management.

Correlation among Variables

From both parametric and non-parametric correlation results, it is clear that the student's GPA and design studio grade is positively associated with their total number of leadership in teams. The more elders and young cooperate with their team-members, the more skills they acquire and the fewer disputes that erupt. Team-players (in the opinion of their partners) perform better in terms of GPA and Design Grade. They perform better even if they have more previous experience in leadership. However, what is not clear is the impact of high school experience in teamwork on either their university performance or success of the team (number of disputes). This goes on to imply that even if the upbringing of design students had no team-building and working skills, it is not to late to build them in college. Strong association between studio grade and team player is an encouraging and healthy indicator that some form of group-thinking could be tested with less fear of its affect on the student's performance.

Final Preference

Overall, the final preference is in favor of the vertical studio. Unfortunately, within URP students, the students own interpretation of the experience is yet inconclusive. They are evenly split between favoring the vertical and horizontal team arrangement, with the majority still undecided. The arrangement in URP is more towards the formal multi-level integration of teams (figure above). An instrumental factor is the impression of the instructor's capacity to deal with the student. Respondents feel it's more, by about 15% in the vertical arrangement.

Figure 7: Responses to impression about the instructors' capacity to deal with vertical studio students. (Source: Authors).

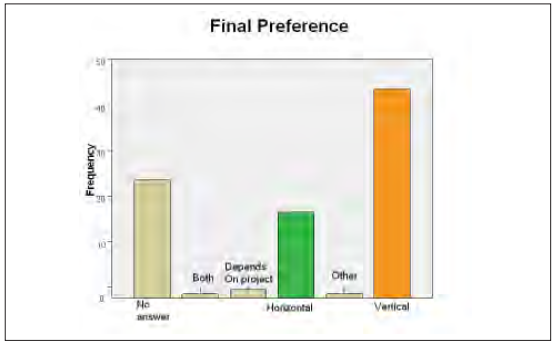


Figure 8: Studio type final preference of all students. (Source: Authors).

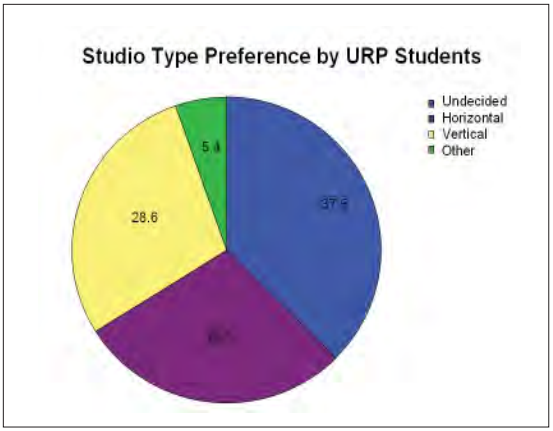


Figure 9: Studio type final preference of URP students. (Source: Authors).

Conclusions

This paper described and evaluated student-to-student (peer) learning through the innovative transformation of traditional single-level design studio into an all-level combined design studio. The impressions, skills acquired, and the efficiency of the produced project in comparison with those produced in a traditional design competitive class reveal a significant variation in the skills learnt by each. Whereas the vertical arrangement helps develop more design skills, horizontal teams excel in managerial skills. Previous high school and primary education type did not show a significant impact on the performance of students in teams. Vertical studios appear to be more adapted to the types of projects in architecture design whereas in URP the results are inconclusive. The findings are limited to the context of single-sex education of KSA, and it is advisable to test the findings in other multi-sex education in other parts of the Arab world.

Currently, the incorporation of teamwork into the design process became a very important approach in enhancing the design studios in the schools of architecture, planning, and environmental design, as this approach formulates a very beneficial means of interaction with the global challenges in the profession practice. This type of collaborative learning incorporated in the vertical design studio pedagogy helps the students with better learning and by positively developing their potentials and skills that are needed for confronting the present and future challenges of the design profession.

The evaluation of a particular teamwork experiment needs to consider both content and context of the experiment. Many outside factors and variables are thought to influence the ability of the student to design and to participate effectively in a team project. The paper identified four main groups of effective variables and factors that dominate and affect the teamwork in university level education. Also it determined its impacts and importance levels.

In conclusion, this paper provides a validation of measurement factors and variables to a type of collaborative learning that was applied in the context of transforming the traditional single-level design studio into an multi-level combined studio (vertical studio). It shows the impacts of social and cultural factors affecting the teamwork process, performance, and evaluation. These factors, when considered in planning the design studio, could enhance the

design pedagogy and products in schools of design and planning.

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APPENDIX

	Effective factors	Associated variables	Impact level
Student Background	Age	Last teamwork level at university	Strong
		Elders cooperation with the student	Moderate
	GPA	Design studio grade	Strong
		Total number of teamwork assignment	Strong
		Total number of leadership	Strong
		Elderly cooperation with the student	Moderate
	1st teamwork experience in high school	Elderly cooperation with the student	Strong
Team processing effects	Teamwork at university level	Total number of team	Moderate
		Elderly cooperation with the student	Moderate
		Total number of team breaks	Weak
	Teamwork evaluation at university level	Last teamwork experience importance	Moderate
		Grade importance	Weak
	Last teamwork level at university	Younger's' cooperation with the student	Moderate
		Elderly cooperation with the student	Weak
	Total number of teamwork assignment	Skills developed for job requirements	Moderate
	Total disputes	Younger's' cooperation with the student	Moderate
		Vertical groups developed skills	Moderate
		Total numbers of breaks	Weak
	Total number of breaks	Younger's' cooperation with the student	Moderate
		Elderly cooperation with the student	Weak
		Grade importance	Weak
Team evaluation	Grade Importance	Younger's' cooperation with the student	Moderate
		Evaluation preferences (evaluation on individual bases/team bases in teamwork)	Weak
Multi-grade collaboration evaluation	Elderly cooperation with the student	Vertical groups developed the student skills	Strong
	Younger's' cooperation with the student	Vertical groups developed the student skills	Moderate
	Vertical groups developed the student	Elderly cooperation with the student	Strong
		Younger's' cooperation with the student	Moderate

Table 1: Correlation among Variables and Impact Level on Collaborative Learning in Design Studios. (Source: Authors).

Table 2: URP and NON-URP Parametric Correlation Results. (Source: Authors).

URP PARAMETRIC CORRELATION RESULTS

	Team Player	Age	GPA	Design Studio %	experience in High School	University level	Teamwork evaluation in Univ.	Last teamwork level	Total teamwork Assignment	Total Dispute	Total team break	Elders Cooperation with the student
Design Studio Grade	-○		●									
Total number of Teamwork Assignments						-●						
Total number of leadership	●		●	●								
Total number of group break						○				●		
Grade importance							-○				-○	
teamwork Skills/ job opportunity									-●			
Elders Cooperation with the student		-○	-●	-●	●			-●			-○	
Younger's' Cooperation with the student								●		-●	-●	
Vertical studio Groups developed the student's Skills												●

● Strong (>0.5) -● Moderate (0.35-0.5) -○ Weak (2-3.5)

URP NON-PARAMETRIC CORRELATION RESULTS

	Studio	Team Player	Age	GPA	Design Studio %	Team experience in high school	Team experience in Univ. level	Team evaluation in university level	Last teamwork evaluation in univ.	Total number of teamwork	Total Dispute	Total number of break	Grade importance	Elders Cooperate with the student	Younger Cooperate with the student
GPA		●													
Design Studio %		●		●											
Last teamwork level			●												
Last teamwork Importance	●							●							
Total number of teamwork							-●								
Total number of leadership		●		●	●										
Total number of team break							○				●				
Grade importance	-●											-○			
Evaluation preferences									●				○		
teamwork Skills/ job opportunity										-●					
Elders Cooperation with st.	-●		-●	●	-●	●	-●		-●						
Younger's Cooperation with St.													●		
Vertical Groups Developed student Skills											-●			●	●

● Strong (>0.5) -● Moderate (0.35-0.5) -○ Weak (2-3.5)

APPENDIX

Horizontal Skills	Percentage	Vertical Skill	Percentage
Communication Skills	16.1%	Software	52.5%
Friendship	12.6%	Field and Data-collection	10.1%
Interaction	9.2%	General	9.1%
Software	8.0%	Design	6.1%
Cooperation	6.9%	Dealing with others	4.0%
Leadership	5.7%	Helping others	3.0%
Data management	4.6%	Management	3.0%
Commitment	4.6%	Teamwork	2.0%
Laziness	4.6%	Patience	2.0%
Learning from Experience	3.4%	Drafting	2.0%
Group-thinking	3.4%	Brotherhood	1.0%
Emotional Sharing	3.4%	Self development	1.0%
Patience	3.4%	Responsibility	1.0%
Time Management	2.3%	Thinking	1.0%
Discipline	2.3%	Project implementation	1.0%
Team Building	2.3%	Problem solving	1.0%
Organization	1.1%		
Peer Learning	1.1%		
Compromise	1.1%		
Carelessness	1.1%		
Dealing with Difference	1.1%		
Negligence	1.1%		

Table 3: Horizontal and Vertical Skills Percentage. (Source: Authors).

Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

OPEN AND CELL-TYPE DESIGN STUDIOS: THEIR IMPACT ON ARCHITECTURAL EDUCATION

Elmira Gur

Abstract

"Architectural design studio" class constitutes the basis of architectural education. In Istanbul Technical University Faculty of Architecture, architectural design studios are categorized into two types in terms of spatial use: "open design studios" and "cell-type design studios".

This study primarily aims to determine the physical characteristics of both studio types as learning environments where the "design process" takes place in architectural education, as well as investigating the studio space with its sub-components. Second, it aims to cross-examine the relation of communication and interaction between students and the tutor to the physical characteristics of the architectural studio space. Finally, the study attempts to examine various effects of different physical characteristics pertaining to "open" and "cell-type design studios" on both positive and negative behavior patterns among students. To this purpose, the study includes a survey on user experiences in design studios. The findings of the survey are expected to be useful for determining the design of architectural design studios.

Keywords

Architectural design education, design studio education, the physical environment of design studios, student-tutor interaction.

Introduction

As a fundamental course in the curriculum of architectural education, the "architectural design studio course" is an applied course in which the architectural design process takes place in an artificial setting. Considering the importance given by educational institutions in general and academics in particular, as well as the time allocated for the course, architectural design studios serve a highly significant educational purpose (Sener &Sener, 2003). The architectural design studio course in Istanbul Technical University covers a four-year education in eight semesters following one another. "Design studio" is not only the name of the course but also the classroom itself, where students have the opportunity to choose a different tutor every semester, who works with an average number of 10-15 students.

The Scope of the Research

The architectural design studio course offered in the Faculty of Architecture in Istanbul Technical University requires architect candidates to work on a pre-defined project plot for fourteen weeks

Figure 1: General View of Cell-Type Design Studio. (Source: Author).

and eight hours a week in each semester. The learning process consists of team work or group work, for creativity is reinforced by collaboration and cooperation (Salama, 1995). For this reason, collaborative and cooperative involvement establishes the core of design studio education.

In I.T.U. Faculty of Architecture, the studio courses take place in two types of physical environments: "cell-type design studio" (Figure-1) and "open design studio" (Figure-2). The main difference between these types of environment is that one or two project groups have the course in "cell-type design studios", whereas almost ten project groups share the same space in "open design studios".

Figure 2: General View of Open Design Studio. (Source: Author).

Therefore, given the fact that semesters last for a limited period of time, it is crucial to arrange the spatial and physical features of the architectural design studio course in such a way that the whole process will contribute to the design education period as much as possible.

Research Objectives

Similar to all other branches of design education, creativity plays a significant role in architectural design as well. In the studio environment, as soon as the first ideas start to appear, the indirect but strong link between design and creativity is

also established. As Candy and Edmonds (1996) highlight, it is important to gain experience from past examples, to produce possible methods and strategies out of collected information, to synthesize the visual perceptions, and to experience various information in this studio.

Cuff (1991), on the other hand, describes studio education not only as a "work place" but also as the combination of "home" and " work place", which is similar to the contemporary concept of home-office. The reason for approaching studio education in terms of home-office is the relatively long period of time spent in the process of studio education. In such an environment, students should perceive the studio as a place where they can work enthusiastically both in and after class hours.

Therefore, the first objective of this study is to observe and determine the physical characteristics of the studio types mentioned above, as well as the studio space and its sub-components, where "architectural design" takes place. Second, we aim to compare and cross-examine the relation of the results of communication and interaction between students and the tutor to the physical characteristics of the architectural studio space. In the case of a relation, we will investigate which distinct properties of each studio type cause what kind of behavior patterns, and whether or not they create discontent. The reason for a trend in spatial choices, and if there is, the advantages and/or disadvantages of the trend will also be investigated.

Research Method

A survey has been conducted among the students who use different types of physical environments to inquire about the above-mentioned educational requirements and spatial properties. The survey was composed of a self-designed standard questionnaire. By analyzing the effect of studio space on the design education, we tried to reveal students' preferences about the studio environment and its physical characteristics.

To this end, 174 students were inquired in the survey, 71 of whom were students using a cell-type design studio, while 103 of them were using open design studios. Data were collected about students' experiences and desires related to the studios they worked in, which could later be used for the design of architectural design studios.

Evaluation of the Survey Design

Two groups of students participated in the survey. In the first group, students were placed in a cell-type studio environment where a couple of tutors shared the same space with their separate student groups. On the other hand, the second group consisted of students working in an open studio where up to ten studio groups are separated from each other by separator panels. The same questions were posed to all the students in both groups, and their responses and tendencies are demonstrated in the graphics below.

The findings clearly indicate that students in semester 3-4 mostly study in "cell-type studios" (35% of students were in semester 6-7, and 65% of students studied in semester 3-4), while the ratio of students in semester 3-4 to the ones in semester 6-7 is equal in "open studios".

Considering students' satisfaction, the findings

reveal that 71% of the students studying in "open studios" are pleased with their physical environment while 29% are not. However, 38% of the students studying in "cell-type studios" are pleased with their study environment and 62% are not (Figures-3 & 4).

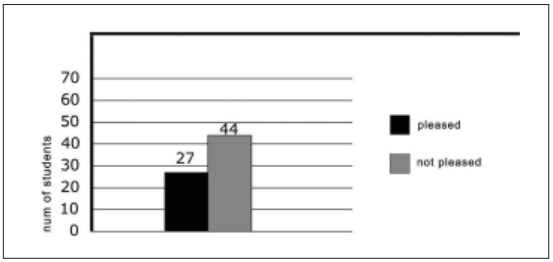

Figure 3: Pleased / Not Pleased Students in Cell Type Studios. (Source: Author).

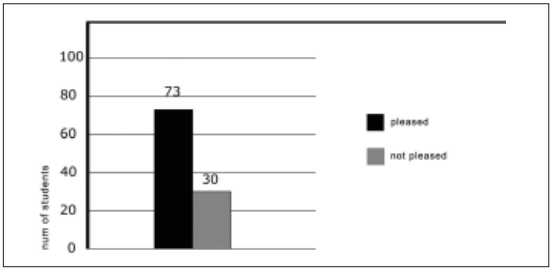

Figure 4: Pleased / Not Pleased Students iin Open Studios. (Source: Author).

Student Preferences of Studio Environment

When the students of "cell-type studio" group were asked in what type of a studio they would like to attend their courses, 27% preferred "cell-type studios", 30% preferred "open studios", 33% preferred "personalized space in open design studios", 7% preferred virtual (reality) studios, and %3 responded the question with the choice "other".

When the same question was posed to the students of "open studio" group, 13% preferred "cell-type studios", 60% preferred "open studios", 14% preferred "personalized space in open design studios", 10% preferred virtual (reality) studios, and again 3% gave the answer "other".

The Effect of Studio Environment on the Relationship between the Tutor and Students

It was interesting to note that both groups gave the same answers when the question "What effects does the studio space have on the tutor-student relationship?" was asked. 47% of the students stated that the studio environment did not contribute at all to their interaction with the tutors, while 29% suggested that space had a positive role on this relationship, and 24% suggested just the opposite.

Opinions about Separators in the Studio Environment

When the students were interrogated about how they would feel if the separator panels between different project groups in a large classroom were removed, 7% of the students in cell-type studios said that it would be positive, 66% negative, while 12% suggested it would not make any difference, and another 12% expressed that it would confuse them; finally 3% told they would feel more relieved (Figure-5).

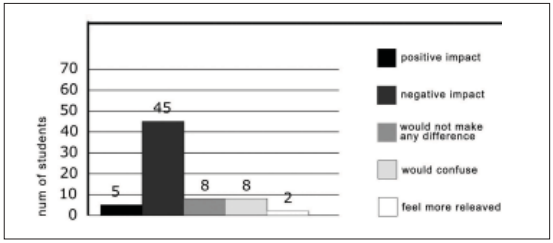

Figure 5: Impacts of Separators on Cell-Type Studio Students. (Source: Author).

On the other hand, when the students of open studios were asked the same question, only 4% thought it would be positive, 73% said it would be negative, 9% suggested it would not make any difference, 12% expressed that it would confuse them, and finally 2% told they would feel more relieved (Figure-6).

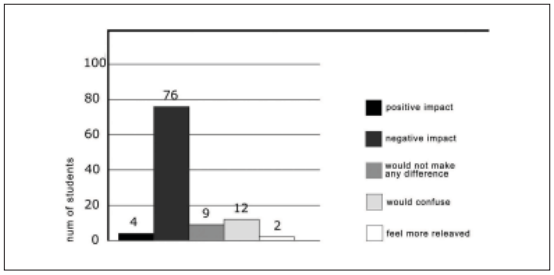

Figure 6: Impacts of Separators on Open Studio Students. (Source: Author).

The Advantages and Disadvantages of Cell-Type Design Studios

The survey also inquired the participant students about the advantages of cell-type studios. The findings of this particular question reveal that 29% of the students stated the main advantage as sincerity; for 23% it was individualization of the space; another 23% stated quietness was the main advantage; for 2% of students the advantage was prevention of distraction; for another 2% it was the separator panels, and 1% stated "other"(Figure-7).

When the students of open design studios were asked to evaluate the advantages of cell-type studios, the following results were obtained: 24% of the students stated the main advantage as sincerity; for 21% it was individualization of the space; 24% suggested that quietness was the main benefit; for 26% it was prevention of distraction; 4.5% highlighted the benefits of separator panels, and 0.5% stated "other" (Figure-8).

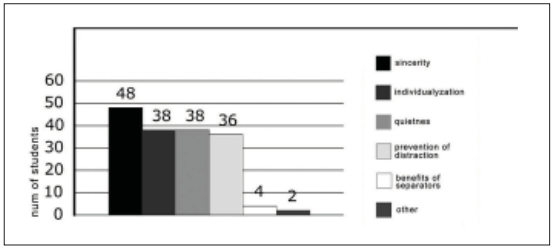

Figure 7: Advantages of Cell Type Studios according to Cell Type Studio Students. (Source: Author).

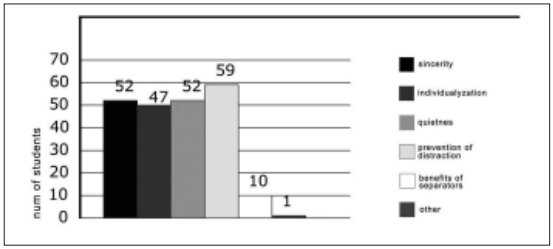

Figure 8: Advantages of Cell Type Studios according to Open Studio Students. (Source: Author).

When it comes to the disadvantages of cell-type studios from the point of view of the students in cell-type studios, 25% of the students stated that the disadvantage was unawareness of other groups' works; for 2% it was the quietness of the space; 20% stated that lack of communication with friends in other groups was the main disadvantage; for 21% it was inconvenience or distress due to the small space; 19% highlighted the negative effects of insufficient ventilation in the room; 12% felt that too much control of the tutor was a disadvantage, and %1 stated "other".

When the same question was asked to the students of open design studios, the following findings were obtained: 23% of the students expressed that unawareness of other groups' works was the main disadvantage; for 4% it was the quietness of the space; 19% mentioned lack of communication with their friends in other groups; 20% stated that inconvenience or distress due to the small space was a disadvantage; 19% underlined the negative impact of insufficient ventilation in the room; 14% pointed out the negative outcome of feeling too much control of the tutor, and 1% stated "other".

The Advantages and Disadvantages of Open Design Studios

Another parameter that was inquired in the survey was the size of the studio space. First, the students of cell-type studios were asked to assume that their studio type was open studio. They came up with the following list of advantages: 34% of the students stated that the main advantage of open studios was the opportunity to be aware of other groups' works; for 30% it was visual communication with other groups; 27% highlighted the flexibility of the space allocated for groups; for 7% the main advantage was less control from the tutor, and 2% stated "other".

The students of open studios were also asked to determine the advantages of their work environment. The findings reveal that 31% of these students suggested that being aware of other groups' works was the main advantage; for 32% it was visual communication with other groups; 26% stated the advantage to be flexibility of the space allocated for groups; 9% highlighted the advantage of less control from the tutor, and 2% stated "other".

When it came to considering the disadvantages of open studios, again the students of cell-type studios were asked about their opinions first. The findings reveal that 32% of the students of cell-type studios stated that distraction of attention was a major disadvantage, while for 38% it was noise; 4% suggested that low temperature in the studio was a source of disadvantage, and for 6% it was interior breeze or wind; 19% highlighted the distraction of the tutor, and %1 stated "other".

When the students of open studios were inquired about their opinions about the disadvantages of open studios, the following results were obtained: 27% of the students of open studios stated that distraction of attention was a major disadvantage, while for 40% it was noise; 7% mentioned the low temperature in the studio as a disadvantage, and for 7% it was interior breeze or wind; 17% highlighted the negative effect of the distraction of the tutor, and 2% stated "other".

Overall Evaluation

When the data collected from the survey are analyzed, it is seen that while the students of open studios reveal a high level of satisfaction with their work space, the same rate is lower for the students of cell-type studios.

Another conclusion is that the students of open studios mostly prefer studying in their current work environment; however, the students of cell-type studios desire more individualized space within an open studio in the first place. Their second and third choices are an open studio and their own cell-type studio respectively.

All survey subjects stated that the physical environment of the studios they worked in did not contribute to the interaction between the

students and the tutor. Also, all survey subjects seem to agree on the importance and positive impact of separator panels.

The common view of both student groups seems to suggest that "an open design studio" with individualized space" is the best form of study environment for them. However, it was also found out that a flexible arrangement of space within the cell-type design studio would enhance their satisfaction with their work environment.

The findings demonstrate that the most important aspect of a design studio for the students of open studios is "visual communication with other groups". However, for the students of cell-type design studios, it is "awareness of other groups". In fact, the students of cell-type studios have come to ignore the importance of visual communication that is already lacking in their work environment. For an increased level of creativity in the studio, the students prefer freedom of perception at their own will and timing rather than visual and cognitive isolation.

Although the open design studio is mostly preferred by students, this model also seems to be blamed for poor acoustics and distraction of attention on part of both the students and tutors. The preferred aspects of the cell-type studios are spatial sincerity, individualization, quietness and prevention of distraction. On the other hand, the major disadvantages for students in both groups include the distressing or inconvenient size of the environment, unawareness of other groups, and lack of communication with other groups.

Conclusion

Obviously, design studios play a crucial role in architectural education. The survey inquires about and demonstrates the positive and negative aspects pertaining to the effect of "open" and "cell-type" design studios and their spatial organization on the student-tutor behavior patterns. In this study, students' preferences and tendencies about the design studios they work in are expressed clearly. Consequently, considering the dual nature of the outcomes pertaining to the advantages and disadvantages of both groups, it is maintained that both types of studios should exist to offer a variety in architectural education. Naturally, the students who have not been able to enjoy the opportunities of a flexible environment may require other more individualized and small group spaces.

It would not be wrong to suggest that students in general opt for "open design studio groups" situated in a large classroom provided that acoustic convenience is maintained, individualization and belonging are provided by means of moveable panels, and interaction with other groups is always fostered based on students' preferences.

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FORM AND LANGUAGE: THE LANDSCAPE OF THE ARCHITECTURAL

Anna Hooper

Abstract
As part of my doctoral research I have constructed a play using Platonic dialectic to explore the concept-construct of "form." I am borrowing from the origins of western philosophy to explore the acquisition of knowledge, as well as the landscape of language to articulate the architectural. Ultimately I am asking a question that all students should ask: What is the shape of an idea, that is--what constitutes "form"?

The play's protagonist is Plato. Using his own voice is very much intentional as Plato wrote dialogues never having himself as the interlocutor in any. Early Greek philosophers Heraclitus and Parmenides appear as herms, and the poet Homer appears as a ghost. The dialogues are purely hypothetical and the "voices" of these characters, as well as Plato's, are based on their own words and writings. However, the voice of Pan, an interloper between the characters in the play and the readers of it, is purely fictional. Finally, every protagonist needs an antagonist, so I have introduced a gardener.

My thesis question is "what is the shape of an idea, that is--what constitutes "form"?" The gardener challenges Plato's theory of The Forms to promote an alternative theory of form, that of the shape-idea. I have replaced exemplars that Plato uses to explain his theory in his own texts with paradigms that are subsequently explored in the play.

Keywords
Form, becoming, language, knowledge, the architectural.

Introduction

This short play (with annotations in red) has been created to explore the concept-construct of form. Beginning with a question "what is the shape of an idea…" two players, Plato and a gardener, engage in a dialectic dialogue to reveal "…what constitutes form." Unseen by Plato or the gardener, a third player, Pan, muses about the discourse and its possible permutations while cameo players are given voice in various guises.

When not abroad during the 4th century BCE, Plato engaged his pupils in philosophical discussion in his own garden at the Academy outside Athens. Though nothing extant remains of it today, one can imagine how it may have been. Similarly, one can imagine how the garden in my play might be. The garden is an abstract construction, a landscape of language, of writing and of the mind itself. This is important in the context of the play, as part of the approach to understanding what is meant by a lexical

landscape is founded on an understanding of the Greek meaning for the term form, which Plato introduces in the opening scene. He then exemplifies this with his theory of The Forms.

I have not sought to interrogate Plato's writings on the subject of The Forms in this play, but have extrapolated them as abstract concepts for the purposes of the play's dialectic – a process of learning, of acquiring knowledge. Notwithstanding Pan's words, and the gardener's (whose voices are purely mine), the dialogues are purely hypothetical and based on my interpretation of the writings of the aforementioned players.

In summary, dialogue provides an opportunity for discussion in the original sense of the word, that of conversation. My research is embedded in an ongoing conversation that promotes a higher understanding of things-in-themselves as ideas. It is one of how education, philosophy, and the architectural are all constructions, and without language they would remain unknowable. That is not say that a finite conclusion has been, or can be, reached with regard to knowledge acquisition. Learning is ultimately a process, one of unlearning and relearning. It is perpetually becoming. Perhaps it is this becoming that is the true form of knowledge.

The Setting

Within the landscape of an ancient forest a garden is created; one of sacred groves and deified temples, of shadowy caves and sun-warmed meadows, of meandering streams and cultivated flowers. Beyond is the sea, bound only by the horizon.

Scene I: Early morning on the first day of Spring in 355 BCE. Plato and the gardener enter a grove engaged in discussion. Above them, among the branches of an olive tree, Pan muses poetically about the nature of becoming.

Pan: (Reclining idly, he smiles to himself and begins to recite his poetic conundrum).
If Boundary is the Threshold of Openness
Of what is yet Undisclosed and therefore
Embraces all Potentiality
And Building is the Openness of Expression
Between Man and Space and the Poetic that
Creates the (not-) Being of Ideal Form
Does Language Inhabit the Interstices
Collapsing the Internal and External and
Open the Way through becoming?
(He hears Plato and the gardener approach and falls silent).

Pan's nine-line conundrum can be analysed by examining the language tropes he employs, the wordplay that is inherent in all of his musings. Each line in the poem can be thought of as an aspect the concept-construct of becoming. In concert with an analogous interpolation of the lexical landscape it provides a frame of reference for the dialectic discourse between Plato and the gardener. In order to establish the concept-construct in Pan's conundrum I will begin not with Being or (not-) Being but with becoming.

Open the Way through becoming?

To begin to comprehend this term it is necessary to inquire first into the nature of becoming and secondly into the meaning attributed to it by Pan. Becoming equates to perpetual impermanence, a process that is ever-continuing. By definition

then becoming is forming, then deforming, and then subsequently reforming ad infinitum. Given the topic that our interlocutors are debating, it can be argued that becoming is an important element in the question of what is the shape of an idea as this implies form. However, what Pan means when he uses it is yet to be made knowable. Open and Way suggests Reveal and Path. Therefore the final line can be read as Reveal the Path through perpetual impermanence? This appears nonsensical until the rest of the conundrum is exposed so I will return to the opening lines of the poem that precede Scene I of the play:

If Boundary is the Threshold of Openness Of what is yet Undisclosed and therefore Embraces all Potentiality

The first three lines are the framework for the ensuing dialogue between Plato and the gardener. The first line indicates that there is a gateway into another landscape. The second line suggests that there exists a "thing" as yet "unknown" to us as it has not been spoken of. The third line unites the ideas of an "unknown" and "thing" by inviting us to imagine what this might be. These lines can be interpolated as If Frontier is the Gateway to Revelation/Of what is yet Unsaid and therefore/Encompasses all that is Imaginable. What then is this frontier and, even more intriguingly, what will there be beyond the gateway? Enter Plato and the gardener.

Plato: (Entering the grove with the gardener, he appears intrigued and slightly amused). I think your question is a very interesting one. What is the form or shape of an idea? If I propose that the word eidos can mean not only shape, but also idea, that is, two forms of form, that is an interesting proposition in itself. However, I have a more challenging proposition. What if I propose that there is yet a different form of form, a Perfect Form, and that all other forms are merely imperfect copies of this? This question is even more complex and requires proper discussion as there are really two distinctly separate ideas at hand.

Gardener: (Playfully). There is of course a further possibility--that they are neither one or the other, but are one and the same and manifested through the dynamic of the shape-idea. Take, for instance, the landscape of the architectural. I suggest to you that the architectural is a form merely becoming a thing-in-itself.

Plato: (Surprised). An obvious example of the architectural is the Form of Temple. The Form is absolute, stable. It symbolizes Order to which all else is subjugated. Without Order there can be no Arrangement, no Propriety, no Proportion. The Form of Temple would not be knowable. One must fully comprehend The Forms to recognise in them the architectural. This is ultimately revealed through the immutable Form of Knowledge.

Gardener: I disagree. Knowledge is born of ideas. Order, arrangement, propriety, and proportion are ideas in the landscape of language through which form is revealed. Only through the becoming of language can form be known.

Plato: The landscape of language merely reflects form. To explain this I will return to the idea of the Perfect Form. The Form is a First Principle, intangible, the Perfect Idea. To truly know the First principle as a Form one must engage

in rigorous and disciplined discourse until all possible suppositions are overturned. I believe there are four stages of acquiring knowledge. The first is conjecture, and the second, belief. Thereafter follows understanding and, finally, rational intuition. Borrowing from the great Socratic style of dialogue I have constructed what I call the Platonic dialectic. It is a useful tool to further debate your question. Would you care to join me on my walk and discuss this?

Gardener: (Enthusiastically). Indeed. I would enjoy the opportunity to debate the merits of both arguments. Let's take this path and see where it leads. (She joins Plato on the path and they disappear beyond the grove).

Pan: (Lowers himself from the branches to the ground). Ah, the realm of the Perfect Form. Is it an immutable reality that exists beyond the landscape of language? Or is language indeed the becoming of form? Let's follow our interlocutors and listen further to their dialectic. (Flute in mouth, he leaves the grove).

The dialogue thus far can be interpreted as Plato proposing a set of First Principles, a system by which all things are measured. The gardener rejects Plato's concept of The Forms as First Principles upon which all else is based. Instead the gardener asserts that language is the construct that facilitates knowledge and through its perpetually becoming form is made knowable. Tropes enrich the dialectic: a play of words within a play of words within a play (of words). Pan then summarises the scene and reiterates the critical premise before the next lines of the poem are discussed.

And Building is the Openness of Expression Between Man and Space and the Poetic that Creates the (not-) Being of Ideal Form

In these lines the architectural as trope is articulated. Implicit within the first line is that form gives meaning to ideas. The second line suggests the architectural is revealed through thought and language, and subsequently, as a constructed form. Finally, the concept-construct of unreal-reality, the mythical, the imagined, or virtual form is introduced: And Form is the Revelation of Meaning/Between Humanity and the Architectural and the Muse that/creates the (un-)Reality of the all-embracing Shape-Idea.

Scene II: Plato and the gardener are sitting on the steps of a temple, facing the grove. A warm breeze carries the scent of spring. Pan is sitting cross-legged inside the frieze, his hand cupped to his ear. Plato and the gardener continue their discussion.

Plato: (Running his hand down a column). Let's look at this temple to more deeply examine your question and my proposition. The temple has language but that of the Forms of Order, of Arrangement, of Propriety, and of Proportion. As such they also constitute the Form of Language upon which your landscape of imperfect language is based. The relationship between the landscape of language and the Form of Language is analogous to order and Order. (He pats the column). Indeed the orders are real, that is, tangible, but they are merely the physical expressions of a higher intangible Order, a Form.

Gardener: (Not convinced by Plato's argument). I will argue otherwise. Take the relationship

between this temple and the sacred grove. (Pointing first to the trees and then to the temple columns she continues). The columns of this temple are the petrification in stone of the tree trunks in the sacred woods. The symbolic nature of the temple and its context has now acquired a different lexical relationship, that of trope, a language/form paradigm. The column, the temple, they are part of the landscape of language.

Plato: Not so; the language/form paradigm does not change the immutability of the Forms. The relationship remains the same as the temple can only be the manifestation of The Form of Temple. The same principle applies equally to The Form of Garden.

Gardener: (She stands and looks directly at Plato). The garden and this temple are part of the landscape which is ever-changing. Through my own hand and those before me, and through Nature, it continues its becoming. Therefore, I argue there can be no Form of Garden. Or Form of Temple. Or anything else for that matter!

Plato: (Smiling, he continues). Indeed there is, though it is not known to you yet. Continue this dialectic and I am sure you will come to know the language of the Form of Garden. It will not be perpetually becoming as you would have it, but Perfect, the Ideal. The purity of the Form of Language and the Form of Garden will be revealed. (He smiles). Yours, though beautifully arranged, proportioned, and so on, is only an imitation.

Gardener: (Shaking her head). Language, landscape, form. I am not alone in my proposition. There are others, poets and storytellers, who have come before us and have said (and written much) that is worth considering about form. As well, their poetry, tropes, and narratives are forms themselves.

Plato: Bear in mind, however, those whose voices you cannot substantiate, and those who you know to be disavowed by others, unless you are prepared to defend them in their absence. But first I want to address the subject of poetry and tropes. Let's continue along the path. (Plato and the gardener descend the steps and rejoin the path beyond the temple out of sight).

Pan: There is much fun to be had in this garden if only the voices of the ancients could be heard, for they too have had some influence on our philosopher. Let us invoke them so that he may contest his point of view against their propositions. I will have him answer to Homer, whom he at once disparages and admires, and to Heraclitus and to Parmenides, whose theories he has tried to reconcile. (He springs from the frieze laughing, and disappears into nearby myrtle shrubs).

The dialectic has become more polemic. The gardener seeks to admit other voices into the dialogue whereupon Plato expresses his opinion about the veracity of secondary sources that Pan intends to exploit to further the dialectic between the interlocutors. The next line in Pan's conundrum contextualises the next two scenes. That it is embedded within the broader conundrum is significant and as such is explored in Scene III and subsequently in Scene IV.

Does Language Inhabit the Interstices

The tropes in this line have great import as will

be revealed by the propositions of the voices of others who appear in various guises. Their own tropes reinforce the significance of the translation of this line in the conundrum: Does Dialectic Dwell in the In-Between as the use of "in-between" here suggests not only a lexical but a spatio-temporal application.

Scene III: Plato and the gardener enter a clearing near a cave entrance. Pan is perched on a rocky ledge above them. From deep within the cave can be heard the echoes of water coursing over time-worn rocks fed by an ancient underground source. Echoes give way to unintelligible utterances, then a not-quite-human murmur, and finally a strong, bellowing voice. Plato and the gardener stand transfixed.

Homer: (His rich orator's voice swells).
Within the armoury of language the words of the poet
Are broader than the sword – and more eloquent
In their defence of epic deeds of heroes
And of battles lost and won
The valour of such men is recounted
As they sleep eternal in Elysium

Impassioned verse and lyric ode
Of lands before our time
Of Nature, Gods, and mortals
Their odyssey beyond our realm
Courageous feats we hold in memory
The ancients and their history
(The voice weakens, becomes utterances and finally it is gone. Pan blows a kiss and offers up silent applause towards to the cave).

Gardener: (She turns and smiles at Plato). It would seem that there are vestiges of history that still resonate today. It is from Homer that we learn of our forefather's battles and it is from him that we can imagine the glory of the ancients and the language of their heroic deeds. Homer's poetic tropes allow the imagination to see the gardens of kings, and the resting place of the immortals. It allows us to wander in those landscapes long after they have become lost to us. Homer uses the landscape of language to invite us to dwell within these gardens to become part of the language itself.

Plato: (He waves his hand in a negative gesture at the cave). I too enjoy poetry and have even tried my hand at it. But for pleasure, not the retelling of history. At worst it is a falsehood, at the very least it is a myth and myth-leading (He laughs at his own pun and winks). Homer composed his poems more than four hundred years after the wars with Troy. How could they possibly be first-hand accounts of battle? They cannot be presented as truth, as fact. How could Homer even claim to know details of such events, or such gardens of the kings? No this is conjecture, fantasy, and does not serve you well if you wish to know the truth of a matter.

Gardener: (Somewhat frustrated). Surely you would agree that accounts must be kept to record the events of history and that the evocative style of the orator engages the listener and transports the mind to faraway places and times, and that this is not harmful but to be encouraged in the imagination. Depictions of foreign forms are not only intriguing but also useful to scholars and architects, and I suggest that they build upon the concept-construct that is the language of the architectural.

Plato: Poets and their words have much to answer for. They capture the minds of men with fantastic tales as a general would capture an

enemy with cunning and deception. They make false claims to lead the unwitting to believe unreality is reality and fiction is fact.

Gardener: (Really frustrated, she begins to pace backwards and forwards). Plato, you have stated that the temple in this garden is an exemplar of first principles and that it is merely an imitation of a Perfect Form. Moreover, you argue this garden is similarly a copy. But what of Nature and its changing form? You reject the possibility of the landscape of language therefore you reject the language of the poet. Are not a poet's words ordered like a well sited garden, or so choreographed like the temple columns, to be pleasing in pattern and rhythm? Is not the structure of a poem as well considered as the garden or the temple within it? Is the landscape not only a garden of the architectural but also of the philosophical? Again you reject the reality of the landscape of language that contributes to our understanding of things-in-themselves, to our knowledge.

Plato: (He continues calmly). I am afraid that you have been seduced by the writings of the poets, both ancient and more recent. Unlike the poetic trope of the poet, the Form of Knowledge is stable and this is the true pursuit of the philosopher. Let me give you an example using the landscape of the city-state. The city-state is more than a collection of buildings and its inhabitants. It is a structure, an organisation, an ordered system of stable parts. All parts must work in harmony or the integrity of the structure of the city-state will be compromised. Equally the city-state is not simply the collective citizenship, it is the also the embodiment of the individual, therefore the stability of the city-state rests with the stability of the individual. Only then will knowledge be made manifest in its Perfect Form.

Gardener: (Alarmed). So, you are saying that language of the city-state must be so ordered that it has no poetry within its collective embodiment? Can the individual never dwell within the landscape of becoming which, I argue, is as bound to philosophy as shape-idea is to language? (They continue along the path in silence for a while).

Pan: (Alights from the ledge). Language is indeed the gardener's tool as it is the philosopher's. Each cultivates a form of language yet which will yield? There, my friends, is a little pun for you to ponder. (He winks and skips off in the direction of Plato and the gardener).

The landscape of language is made poetic through the voices of three Greek writers and thinkers. After hearing the oratory of the epic poet, Plato questions the validity of poetry as a means of communicating origins or imparting understanding about a subject. Using an analogy to underscore his argument, Plato is challenged by the gardener who draws upon the concept-construct of the architectural as a contextual referent within dialogue which is then further contested by both. Not only has Plato reinforced the Forms though the exemplar of the temple and subsequently through the analogy the superstructure of the city-state, he has dethroned the language of the poet-king in favour of the philosopher-king. The gardener continues to counter Plato's assertions through her tropes and Pan sums up the scene with yet another riddle. To reiterate, having been introduced in this scene, the translated line in Pan's conundrum Does Dialectic Dwell in the In-

Between is further explored in the next scene.

Scene IV: The path emerges from behind a copse of laurel trees and hugs the embankment of a meandering stream. A footbridge spans the banks. Heraclitus and Parmenides, two philosophers, are embodied in stone at the bridge crossing. Pan assumes the posture of a stone herm on the far side of the bridge. Shrubbery obscures the fourth herm, beyond which what appears to be a temple can be seen through some trees.

Plato: I can see that you are frustrated but it would be a shame not to continue the dialectic. (The gardener nods and Plato continues). As I have said, The Forms govern all things. All things are subject to them. They govern the shape of language because they govern the form of ideas. Yet we do not know the Form of Idea. We have not yet come to understand what constitutes a True Form. Do you follow my course of reason?

Gardener: I do; however, I find it very problematic. The relationship of Form and imitation is not plausible. Thought, like this stream, meanders and turns on itself, carving out form from the landscape of language. To demonstrate this let's revisit the language/form paradigm. We think of an idea and want to give it shape. We conjecture about what form it should be. Having conferred upon the idea a shape we know what the form is. Therefore, thought and language is the becoming of form. (Plato is about to speak when one of the herms interrupts, startling both philosopher and gardener alike. Pan changes his pose and puts his hand to his mouth).

Heraclitus: (Aloof). All is flux, like the river turning on itself at each bend in the landscape. Like language, what is formed must be deformed and reformed differently according to the landscape. It is the same and also not the same form for the many. I, Heraclitus, know this as landscape is [??] pattern, the structure of language, of form, and it is perpetual. We cultivate it, we build upon it, and we dwell within it. Yet we do not read it. The blind man has no sight yet he is not insensible to the language of the moist earth, or the drying winds, the flaming fire or the flowing stream, and knows that without each he cannot dwell. All is in flux, impermanent; earth and air, water and fire. And all turn in on themselves and each other, conflating languages and that is the becoming of form. (He suddenly becomes mute again. Pan covers his eyes to convey blindness).

Plato: Ah, the voice of the philosopher Heraclitus … (Parmenides abruptly interjects).

Parmenides: (Authoritatively). There is no flux, no conflation, no impermanence. When Heraclitus speaks of form he speaks of tropes. His is mere opinion, not a truth arrived by rigorous inquiry. I, Parmenides, argue that through inquiry a truth will be revealed and that you will find that form is not representative of the many, but that it is The One, constant and immutable. Earth and air, water and fire are but opposites, and remain so. Rather they, and all else exists only through The One. (He falls silent. Pan uncovers his eyes, winks, and assumes his original pose).

Gardener: (Intrigued by both propositions). Well, what do you make of the philosophers' words?

Plato: (Stroking his beard, he thinks for a while). Indeed, what do I make of these two philosophers' propositions? I suggest they both have merit – but only to a degree. In my own

philosophical inquiry I admit that I have tried to reconcile aspects of both Heraclitus's argument about the many and Parmenides's counter-argument regarding The One.

Gardener: (Quizzically). How so?

Plato: To explain this I will use, for example, the Form of Idea, and the Form of Soul which we will call the Form of Mind. The Form of Idea can only reside in The Form of Mind and as such unite as an immutable Oneness. Therefore, all other forms of idea must reside in the minds of the many.

Gardener: (She ponders this point and then responds). You posit Form as a construct, yet it is intangible. You argue that it is unchanging, immutable. For instance, you argue that The Form of Language is the model for all language. I say to you that your reasoning is not only flawed but your rationale is implausible. I argue language is dynamic. Furthermore, abstract forms are shaped in the minds of many, made materially different by the many, that is, through the becoming of language of the many. So, I do not accept that there exists a Perfect Form for each and every form, but I am sure you wish to persuade me to think otherwise!

Plato: (Gently). Persuasion is not the aim here. In order that the truth of a matter becomes known is only through logical deduction, through dialectic, which is what we have been engaging in, especially the Form of Language which has, of course, been the mediator between The Forms and forms in our debate. (He turns and points in the direction of the trees). Let me ask you a question: What is immediately beyond those trees; what can you see?

Gardener: (She looks first at Plato, then through the tree canopies, then smiles and looks back at Plato). I see a temple. Or rather, part of one.

Plato: (He waves his forefinger about). That is conjecture. How do you actually know that what you see is a temple?

Gardener: (She looks hard at Plato). I believe I know what a temple looks like.

Plato: And why do you believe it to be the temple? It is barely visible through the tree canopy.

Gardener: The language of the temple is easily read.

Plato: (Smiling slightly). Let me put it to you this way: You see and perceive this object, this form, exists, you believe it to be what you see it as, and you believe this because you can read the language of the form, am I right? (Plato looks to the gardener for confirmation. She nods several times). Tell me then, how you know it to be a temple? For all you know it could be another type of building. Might I suggest that if you were to look at the form from a different angle you might be able to ascertain whether it is indeed a temple or not?

Gardener: Yes, then the form will be known!

Plato: (Begins to cross the stream). Let's cross the bridge and continue on the path until we reach higher ground. We began with the Form of Temple (and of Order, of Arrangement, of Propriety and of Proportion) which lead us to the discussion of the Form of Language and then the Form of Ideas and the Form of Knowledge. But we still have further to go. (The gardener

crosses the bridge and joins Plato on the path. They continue in silence until they reach the top of the incline. Below them is a splash – Pan, having fallen asleep as a herm, has toppled into the stream).

Notwithstanding the words of the dead philosophers are from opposing arguments, they contextualise the dialectic as a process for learning, for inquiring into the landscapes of philosophy, of language, of the architectural; the landscape of forms. Can a landscape of Perfect Forms even exist at all? Further, can it be made manifest as an imperfect copy, and if so, how?

Collapsing the Internal and External and Open the Way through becoming?

In the final scene the dialogues are framed by the two last lines of Pan's poetic conundrum. (To recapitulate, the last line reads: "Reveal the Path through Perpetual Impermanence"). Plato has, by now, led the gardener through three of his four stages of learning; conjecture, belief, and understanding. This final scene draws together these three stages to reveal the fourth, rational intuition. Pan has posited a final problematic: the making of one shape-idea from two inherently independent ones (the Immanent and the Transcendent). Analysis of the penultimate line is fundamental to recognising Pan's meaning of becoming - Conflating the Immanent and the Transcendent and - which offers the possibility of an answer to the conundrum (or does it?)

Scene V: Plato and the gardener stand under a shade tree. Nearby is a double-colonnaded temple. Inside, a carved figure of Demeter gazes out over the landscape. At Demeter's feet sits Pan, crossed-legged, his head in the stone folds of her dress. He feigns sleep. Plato and the gardener approach the temple.

Gardener: (Laughing, she points at the temple). Well, what do you say to this? I was right. The temple grammar is true to form. (She laughs at her trope thinking she has outwitted Plato in the challenging dialectic).

Plato: (He smiles). Indeed it is the form of a temple, but it is not a Perfect Form. The elements are indeed a temple form, but you read this too literally.

Gardener: How so?

Plato: (Standing outside the temple columns). Again I refer back to The Forms of Order, of Arrangement, of Propriety, and of Proportion. They are not literal but are each a projection of the Form of Idea that constitutes the forms you read in the language if the temple. This is the architectural made manifest. Let me put it this way: We have discoursed and debated form until we have ultimately intuited the nature of Form and that is the pinnacle, the essence, the point at which we have true knowledge of a thing. What I speak of are Ideas known only through rational intuition premised on dialectic discourse which has lead to the highest form, that of the Form of Knowledge. Therefore to know the Form of Temple you do not need vision. Like the blind man, you are not insensible to the knowledge of the Perfect Form.

Gardener: (Standing within the temple columns). So, The Forms of Plato, if I may call them, exist not in the realm of ideas, of thought, of language, but are anterior to these landscapes. You argue that The Form of Idea, which resides in the Form

of Mind, is then the Perfect Form of Knowledge. These constitute the many, but together are The One that you talked about earlier.

Plato: Indeed. And so we have reached the conclusion of our discussion.

Gardener: (Smiling, she continues). I put it you that you have undone your own argument. You have consistently argued that The Forms exist outside the landscape of language yet the form that has enabled this dialogue is language, its becoming and poetic abstraction. Dialectic or poetry, discourse or prose--all are different in their measure and their rhythm, that is, their order, arrangement, their propriety, and proportion. This, I argue, is the articulation of the architectural. This is the true form of the landscape of language. Therefore, there can be no Perfect Form of Language. So you see we are not yet finished with this dialectic.

Plato: (He clasps his hands and shakes his head). Regrettably, we have for now. I must make my way to the Academy to continue my work there with some new students. I do, however, look forward to continuing our dialogue in your garden at another time.

Gardener: Perhaps I will see you again next Spring. (She laughs and runs down into the garden where she has seen a young man gathering flowers).

Plato: (Calling out after her). You didn't tell me your name or who bequeathed you the garden.

Gardener: (Faintly from a distance). My name is Persephone and this was my mother's garden.
Plato: (Unable to discern what she has said, he simply waves in her direction and then dismounts the four steps of the temple and scurries along the path muttering). Aristotle is waiting, Aristotle is waiting…

Pan: (Opening his eyes he leaps to his feet and puts his forefinger to his forehead and taps it twice. A riddle within a riddle within a riddle, my friends. Within the temple are the many, in which lies the potential of the oneness, and the potential of the oneness is made manifest only through the many. (He then bows a deep sweeping bow and weaves his way through the columns, down the steps, through the garden, and disappears).

What is Pan asking us to interpret through his riddle? Pan gives a clue when presenting it. He taps the side of his forehead which, of course, is his temple, thereby constituting a pun on both the form of the mind and the architectural form itself. He tells us that "within the temple are the many." What are "the many"? They are myriad shape-ideas, or forms. In the many, he suggests, "lies the potential of the oneness." What is "the oneness"? It is the perpetual impermanence of knowledge, the forming, deforming, and reforming of ideas in the mind. He reinforces this when he further says "and the potential of the oneness is made manifest only through the many." This last phrase is the key to resolving the riddle and actually reinforces the first two phrases. Decoded the riddle reads thus:

In the house of the mind there are the many, that is, shape-ideas or forms, in which lie the potential of the oneness of knowledge, and the knowledge of the potential of the oneness is made manifest only through the many.

How can knowledge exist in the many and at

the same time the many exist in knowledge? The answer is disarmingly simple: Man and Space and the Poetic. Through tropes mankind dwells within the poetic landscape of becoming. Through the landscape of shape-ideas mankind constructs tropes. Language, the temple, and the garden as tropes are all formed, deformed, and reformed. By its very nature, the landscape of language as the becoming of form has perpetuated the dialectic. Without it there can be no discourse about the Form of Knowledge or even an imperfect imitation. Without it the architectural cannot be revealed.

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IN-BETWEEN THE *OTHER* AND THE *THING* EMBEDDING ARCHITECTURAL EDUCATION IN AN ETHICAL DISPOSITION

Iris Aravot

Abstract

Whereas traditionally proper conduct on the part of the architect implied loyalty to a patron and to a craft-guild, in Modernism ethics came to constitute a major component of the normative approach of architecture towards form and design principles. Since the 1960s, this approach has been severely criticized for its contents. However, the conviction that architecture needs an ethical backbone has persisted unequivocally.

This paper suggests that prior to form and design principles, which necessarily vary in place and time, an ethical disposition should be cultivated that relates architecture to a larger sense of life.

The paper outlines a platform for such an ethically oriented architectural disposition, rooted in the triple cornerstone of "I", "The Other" and "Thing" - major phenomenological concepts in the writings of Husserl, Levinas and Merleau-Ponty. Although these universal concepts are ultimately irreconcilable, they are strongly recommended as part of architectural education precisely because architectural acts are so particular and specific.

keywords

ethical-disposition, I-other relation, I-thing relation.

Nobel laureate Herbert A. Simon, whose research focused on the nature of intelligence, problem-solving and decision making, classified architecture as one of the "sciences of the artificial," centered on the intentional action of design (Simon, 1969). Architecture, unlike science, is not about the world but involved in the world, intending to transform it through projects grounded in intentions, ends, and values (d'Anjou, 2004:211). As such, architecture necessarily embodies an ethical dimension, a nexus of ethics that is embedded in architecture (Wasserman et al., Spector, 2001; Ray 2005)

The nexus has a history (Bell, 1990:25) and a current situation, and it is against the backdrop of this current situation that this paper aims to outline an ethical platform for architectural education.

The Story of Architectural Ethics in a Nutshell

Vitruvius, the Roman architect and writer, endowed Western architecture with three basic qualities: "firmitas, utilitas, venustas" (translated by later generations respectively as durability / solidity / stability; functionality / usefulness / appropriateness / practicality; beauty / grace / delight). The architect's responsibility was to ensure realization of the three virtues in his

projects, on behalf of his patron. Architectural ethics was tacitly included in the domain of appropriate knowledge (as competence, as "theoretical" knowledge, and as acquaintance with precedents), and in the contractual relation of architect and client. Vitruvius inspired Renaissance theorists of architecture, such as Alberti, Serlio, Pacioli and Palladio, and through them succeeding generations through the Modern age. While interpretations of "firmitas, utilitas, venustas" metamorphosed, the virtues themselves persisted. Thus, for an architect, being professionally ethical entailed production of good architecture, namely the actualization of trusted professional knowledge.

In addition, and especially with the resurgence of city life in the eleventh century and the flourishing of craft-guilds, conforming to the rules of the professional organization was also part of ethical conduct. Alongside obedience to the guild hierarchy and compliance with well-formulated rules about quality control and regulation of work, this included the training of apprentices and social undertakings, such as assuring financial security for widowers and orphans (Gelerenter, 1995).

Ethics and morals were explicitly brought into the normative discourse of architectural form and creative procedures only with the Gothic Revival in the nineteenth century. In England, Pugin advocated the Gothic style as the true Christian form of architecture, together with a return to the morally ideal medieval society. Ruskin, in his "Seven Lamps of Architecture," argued that architecture could not be separated from morality, also referring to Middle-Ages craftsmanship, "true nature of material," and anti-modernization. For Viollet-le-Duc, in France, the essence of Gothic style was rational construction. He promoted "honesty" in architecture, which eventually transcended all revival styles, to inform the moving spirit of Modernism. In the light of positivistic reason, and with harsh criticism of past preoccupation with styles, Durand proclaimed that building ought to be solid, healthy, and economical, without decoration. This last idea reached its culmination in "Ornament and Crime," the effective 1908 article by the Viennese Adolf Loos. Still, as early as the mid-nineteenth century, architecture came to incorporate ethics in the widest social sense, as expressed in an important editorial just after the 1848 "the great instrument of all reform is first and foremost architecture" (Collins,1965:110).

When Le Corbusier, the most influential of Modernist architects popularized the notion of the new spirit - l'Esprit Nouveau in the 1920s, he also referred to the idea that "architecture is essentially an instrument of social reform" (Collins,1965:110). In the same vein and adopting a Hegelian interpretation of history, major theoreticians and historians of the time shed light on Modernist creative procedures and "no-style" forms as both the moral and the inevitable expression of contemporaneous Zeitgeist (Pevsner, 1960 [1936]; Giedion, 1949; Hitchcock, 1932). Aphorisms such as "Form Follows Function" (Sullivan), "Less is more"' (Mies van der Rohe), "Architecture or revolution" (Le Corbusier), "Clear slate" (i.e. rejection of all former styles), and "Honesty of expression" accompanied abstract aesthetics, innovative technology, and mass production, based on rational and scientific thought and laden with moral overtones.

Modernism included the conviction that through its approach and aesthetic preferences it was fulfilling the ethical function of creating a better future for all humanity, regardless of place, worldview, class etc. It reached its most extensive implementation in the two decades after the Second World War, and at the same time lost its credibility. (Banham, 1975:4) Criticism of modernism was heralded by Venturi (Venturi, 1966), who showed the fallacies of Modernist architectural ideology on its own grounds: Modernism was a style. He relegated reformative rhetoric and mass production aesthetics in favor of individual freedom as the highest value; implicitly legitimizing mass consumerism as the broader context of architectural production. Historiography declared the arrival of Postmodernism, and the re-legitimization of all that was banished by Modernism. (Jencks,1977; Portoghesi, 1983) In parallel, cultural theory and poststructuralist philosophy took over the scene of architectural discourse, showing how the architectural object, regardless of its style, was morally inert, but prone to infusion with ideology, according to changing political agendas. Far from ensuring social justice, Modernism was unmasked as a tool for manipulation in the interest of power in everyday life in the West, and even more so under Colonialism. Architects, and not Modernists alone, were exposed as complying with hegemony and their broader moral professional conviction trodden to dust. (e.g.Bataille, 1989; Lefebvre, 1991; Hayden, 1995; Alsayyad, 1992; Hirst, 1992)In the same vein, architectural education in the second half of the twentieth century was criticized for encouraging students to focus on form and aesthetics at the expense of ethics and social justice (Crawford, 1999). No specific form was questioned, but the very preoccupation with form.

This situation was summarized by Juhani Pallasmaa (1994):

"The view of the world and the mission of architecture that had appeared unquestionably grounded in concepts of truth and ethics, as well as in a social vision and commitment, has shattered, and the sense of purpose and order has faded away."

Setting the Question of Architectural Ethics in Architectural Education

Disappointment, as expressed in the above-mentioned quote, is only possible against the backdrop of the conceived function of architecture, as expressed by David Harvey, leading social theorist of international standing:

The architect shapes spaces so as to give them social utility as well as human and aesthetic/ symbolic meanings. The architect shapes and preserves long-term social memories and strives to give material form to the longings and desires of individuals and collectivities. The architect struggles to open spaces for new possibilities, for future forms of social life. (Harvey, 2000:200)

Indeed, the slogan of the Venice 2000 Biennale of Architecture was "Less Aesthetics More Ethics," hailing engagement with the enormous social, economic, and ecological challenges confronting the globalizing world (Città, 2000), albeit more of an intended agenda for the future than an exemplification of precedents. Thus, the conviction of the necessity of change towards higher architectural ethics exists. The question is what should constitute such a change and how it could be accomplished. The possibilities seem to be: legislation, professional code, normative theory of architecture, and

a larger, basic, professional sense of life. The present paper will advocate the latter. Ensuring good architectural artifacts and correct design conduct, through legislation and a professional codes of ethics, are certainly important fields of endeavor. These have been undertaken for centuries, and require updating and reworking according to changing ethos and more so, according to emerging practical needs. The first modern National Building Code of the U.S., for example, was published in 1905 by an association of fire insurance companies (Snyder and Cantanese, 1979).

Indeed, laws follow advances in technology and wider socio-cultural and economic considerations, albeit with considerable delay and in a rather restricted manner. For example: The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a recent phenomenon, while ideas of environmental sustainability have been strongly advanced in American architectural discourse since the 1973 OPEC oil crisis. Legislation is the most forceful means to ensure realization of norms, but it lags in time, is restricted in scope and of necessity, expresses the interest of ruling powers.

Professional codes have been criticized for other limitations, especially for being pragmatic, self-serving and the intention of preserving the social privileges of the profession (Bourdieu, 1977). As opposed to that, examination of the 2004 Code of Ethics & Professional Conduct, AIA - The American Institute of Architects, for example, does reveal a clear reference to broader values. The code mentions conservation of natural and cultural heritage and environmental sustainability (E.S. 1.2. and E.S. 1.3.) because they are leading social ideals, and because they are clearly, though not exclusively, related to architecture. Still, it would be difficult to assert when an E.S. (Ethical Standard) is violated, and in any case - no disciplinary action is prone to follow, the less so any legal prosecution.

Such ideals may be promoted politically and re-enacted in architectural practice through legislation, civic campaigns or other democratic undertakings, eventually being wholly or partially reformulated into laws. They may however also be intrinsic to architecture as such, and hence definitive of it. After all, as acknowledged in the AIA 2004 Code: "Often, only one architect can recognize that the behavior of another architect poses a serious question as to the other's professional integrity" (commentary to E.S. 4.2 Dignity and Integrity). Thus, the most important place to plant architectural ethics would be the individual architect. For ethically inclined architects, ethical work would be a primal component of any professional action. Architects would have absorbed ethical principles so fully that they would cease to think about principles (Ballantyne, 2005). In an Aristotelian formulation: "Virtue (arête) then is a settled disposition of the mind determining the choice of actions and emotions" (Book II, Ch. 6). It is a state acquired through habitual application over time, a level beyond mere competency, a state of excellence. An ethical disposition may be acquired during the architect's professional education, which involves the reconstruction of knowledge, beliefs, and identity (Austelitz and Aravot, 2007; Kolb, 1984). Students are exposed to architectural education in their early twenties - significantly the highest, post-conventional level of Kohlberg's stages of moral development. At this age the individual is concerned with

societal issues, with providing the greatest good to the greatest number of people, with universal principles and conscience (Kohlberg, 1981 in Magun-Jackson, 2004:221). Indeed, professional architectural education has always been interwoven with values, both explicitly and tacitly. This paper proposes adding an explicitly ethical platform into the curriculum of architectural education (not to be confused with the study of law or professional code).

In Pursuit of a Phenomenological Approach

In contrast to Modernism and other normative theories, this ethical platform will outline a disposition to be activated in specific circumstances, rather than general principles of form or design. The latter would inevitably be critically deconstructed, regardless of seemingly appropriateness as design principles. Such, for example, the approach of "critical regionalism" (Frampton, 1983), was exposed as a product of precisely the same forces it sought to overcome, rather than architectural resistance to global capitalism. (Jameson, 1983).

A more basic approach is needed, one between ontology and ethics, "A larger sense of life to which the architect positively contributes" (Skolimowski, 1993:496). For Vitruvius and the following long tradition, such a larger sense of life, was the view of all arts as imitation of nature. In Modernism it was the underlying belief in progressive science and technology. (Perez-Gomez , 1983)

Some thinkers refer to sustainability as providing the platform for architectural ethics (e.g. Skolimowski, 1981; McDonough & Braungart, 1992; Scott, 1998; Kibert, 2005; Feireiss & Feireiss, 2008). This wide set of principles, interpreted as the "triple-e" - "environment, (social) equity and economy," is vital for our future, with many environmental aspects already being legally incorporated throughout the world. However, it transforms architectural making into a service based on scientific research. It should be emphasized that some scholars advocate precisely such a position (e.g. Agrest, 1991; Bell, 2004)Heidegger's "dwelling" (Heidegger, 1971) is an additional concept that provides the desired "larger sense of life." It was of the utmost influence in the 1970s and 1980s (Norberg-Schulz, 1979), and was directly connected to architectural ethics in the late 1990s (Harries, 1997). While providing one of the most basic interpretations of architectural making, it is currently suspected of sentimentality and generalization (Leach, 2005:135-142). Dwelling is undergoing re-interpretation, and its profound kernel is once again being integrated into contemporary, manifold, architectural thought. (Vesely, 2007).

Dwelling and sustainability do not exclude each other; on the contrary, they hold much in common, and are actually included in architectural education programs. The ethical platform proposed below pre-supposes this inclusion, but it seeks a different sort of counterparts. In standard terminology, dwelling and sustainability are teleologically oriented, whereas the desired platform is deontologically oriented. Following Ricoeur (1992), these orientations are complementary, not incompatible.

For these deontological counterparts, we turn, therefore, to phenomenology. There are

several reasons for this turn: Phenomenology is the study of our experience — how we experience. Since more than anything else, architectural making is directed towards its experience by users, from sensing to perception and from remembrance to interpretation, the search in phenomenological writings for additional counterparts for the architectural platform is very close and. (Dwelling is a major phenomenological concept.) Furthermore, the phenomenological method, which focuses on conscious experience from a first-person point of view, is very much the method applied in architectural practice and the one tacitly forwarded as part of architectural education. Even architects unaware of phenomenology as a discipline of philosophy practice its method as procedural knowledge or know-how. (Aravot, 2008)

Finally, phenomenology is both a critical and a humane field of thought and research, and therefore a most appropriate starting point for the architect's creative task of reconstructing and reconstituting the already structured and constituted worlds of other people. (After Ricoeur, in Kearney 1996:149).

Premises of the Essence of Ethics in Architecture

Beyond professional integrity, which precedes all other premises, there are several premises as to the essence of a platform for architectural ethics that can guide us in the exploration of phenomenological writers:

First, ethics is a relationship between oneself and an "other." Second, ethical relationships are rooted in responsibility. Third, responsibility is dependent on a conscious "I," able to exercise free decision-making. This is not to imply that architectural making (poetics) is led only by conscious decisions, on the contrary: poetics is led by rich pre-reflective components. An ethical act, however, is not "simply the outcome of happenstance, a mere whim, or a blind insistence. At the core of ethics, one might argue, is an imperative within an imperative. Not only ought one act for the good; one ought also to become insightful about the reason for that action" (Hatley, 2006:2). Fourth, "I" and "other" are capable of achieving mutual understanding to a considerable degree. Fifth, for an "I" to become an architectural "I" a profound mode of contextual responsiveness is required. Sixth, this responsiveness includes the inanimate architectural artifact. The emphasis on an architectural "I" and its relationship to the "other" is laid in contrast to the current tendency of the individual's responsibility to dissolve into a larger, abstract architectural corporation (excluding "starchitects"). The stress on contextual responsiveness opposes the trend of "post-critical-architecture," which locates the ideal of architecture in business management practices (e.g. Speaks, 2002; Roemer van Toorn, 2007), detaching architectural production from meaning and context. Ethical business issues are concerned with financial, power, or image gains of the corporation or firm, whereas the ethical platform hereby pursued emerges from the opposite humane pole.Phenomenological references that shed light on the sought-after essence are:Edmond Husserl's "'intentionality" and "intersubjectivity"; Maurice Merleau Ponty's "flesh"; and Emmanuael Levinas's "face of the other."

Intentionality and Intersubjectivity

On the premise that an ethical act is, by definition, an intentional act and not an inevitable natural occurrence, ethical acts cannot be expected from anybody regarding him/herself as a mere victim of circumstances, or as an ideological fiction. For an ethical disposition in architecture, an "I" must be reinstated with the ability to intend architectural making and, at the same time, to critically exercise ethical intentionality within his/her life/world. Husserl's concept of intentionality had of course a very different focus. For present concern the value lays in the significance of intentionality as subject-object (thing) relationship.

For architectural ethics, intentionality reassures the self as a part of the world: plural streams of consciousness become one subjective and identified "I" through its affinity to the body, one body. In The Crisis of the European Sciences (Husserl, 1970) the ideal essences revealed to the "I" give way to historically shared kernels, and intersubjectivity is explained as historical. "In our continually streaming perception of the world, we are not isolated but rather stand within it in contact with other men. In living with one another, each can participate in the life of the other" (in Kearney, 1994:23)Thus, Husserl's intentionality and intersubjectivity are concepts that reinstate the "I"-- connecting the "I" with the world of things and with other selves, and assuring a foothold for the creative "I" in that which is different from oneself. Ontology of Flesh The Ontology of Flesh is called upon because architecture, according to the disposition sought here, is poiesis: the making of things, objects, matter, the tangible, the sensible, and the perceived. These, so it is hereby proposed, should be assigned primary importance in a lived world of historicity, contingencies, and inconsistencies. The sought-after architectural disposition should overcome the convention of conceiving of ourselves primarily as minds in our head that examine the world of objects as "mere" phenomena.

Merleau-Ponty's doctrine of the lived body--the ontological primacy of phenomena and the epistemological primacy of perception, forms the counterpart of the desired platform that involves reaching out to the world. In his writings, perception is not merely a mental activity that uses the body as tool or agent. Mind, body, and world are inseparable. Perception is always active, embodied and generative of meaning. Merleau-Ponty uses the terms flesh, chiasm, reversibility, and intertwining to overcome the subject-object dualism prevailing in Western philosophical and scientific thought, by turning to a primordial realm which precedes objectivity and subjectivity (Merleau-Ponty, 1968).Intertwining and chiasm refer to the same concept: subjective experience and objective existence as intertwined. Chiasm, however, does not imply synthesis. The moment of intertwining is followed by the "I" who posits himself in opposition to the other and to the world. This positioning is only possible due to the former moment of flesh. At the moment of flesh there is reversibility. The relationship between the hands is reversible: the hand that touches can be felt as touched, and vice versa, though never both at the same time, and it is this "reversibility" that Merleau Ponty picks out as the essence of flesh (Merleau Ponty, 1968:251).

Perception, Merleau Ponty writes, is the "art of interrogating [the thing] according to its own wishes" (Merleau-Ponty, 1968:133). In a nutshell

- this is what architecture is about.Face of the OtherIn the present essay, an ethical relationship is premised on responsibility towards the other. This presupposition, which can readily be accepted by architectural Modernists, receives a very different interpretation in Levinas. While the former would imply beneficence entirely extended from the "I" towards the other, even in spite of the other, for Levinas responsibility is the ultimate respect of the other; an "other" that can never be reduced to a concept "I" might have; another "I" who I can never entirely know. Levinas's first major book Totality and Infinity (1961) was subtitled "An Essay on Exteriority." Levinas refers to the human other as "Autrui," which is different from "autre." "Autre" is any-thing other, part of my world, the "I"'s intentionality. "Autrui" is the human other with whom ethical relations are possible precisely because his alterity is transcendent. His being as exterior is named by Levinas "face" or "appeal." When one "I" encounters the other, my "I" is exposed to his exposure, unable to resist his approach; my "I" becomes "hostage" to the other. This encounter is a performance, an approach, an addressing, an act that cannot be captured in propositional description. Hence the potential for non-propositional expressions as ethical acts including (so this paper proposes) architectural acts. Thus, in Levinas there is an "I" that is revealed to itself as responsive to the other, as completely surrendering to the other. There is hardly any ethical "I" more extreme in her/his relationship to the other than this.

Shared Aspects and Profound Differences

There are important shared aspects within the chosen phenomenological texts: All three philosophers write from an approach rooted in a phenomenology of the body. All three acknowledge the centrality of lived experience, of the immediacy of everyday-life, prior to the constitution of subject--object differentiation. All three retain the idea of subjectivity. These perspectives are essential to ground the ethical disposition of architecture. There are however, profound differences among any two of the three philosophers (Figure 1).

Merleau Ponty and Husserl: In Husserl's early writing there is a quest to disclose suposionless, ultimate truths - absolutely certain essences. For Merleau-Ponty this approach is unacceptable. Husserl's subject is a thinking subject, whereas Merleau-Ponty's is a bodily able being: not "I think" but "I can." He reinterprets Husserl so that essences are always bound to the life-world of their origin, to temporality, and always based on pre-suppositions. This is much more in accord with Husserl's later writing, which described subjective consciousness as inseparable from a life-world of existential communication within an intersubjective community.

Husserl's "zu den Sachen selbst," (Husserl, 1973) the experience as prior to separation between subject and object, finds its parallel in "le monde vécu" (Merleau Ponty, 2005). Man and world in Husserl's writing are "in relation" - i.e. intentionality itself - in a mode reminiscent of flesh, intertwined prior to division by reflection and logic. Thus, Husserl's later epistemology and Merleau-Ponty's ontology could form counterparts of one and the same disposition. A Levinasian counterpart is however, impossible without inclusion of inner contradictions within the disposition itself. Levinas and Husserl--Levinas sees intentionality as a horizon of possibilities, which one unfolds around oneself. Anyone or anything meaningful that appears to

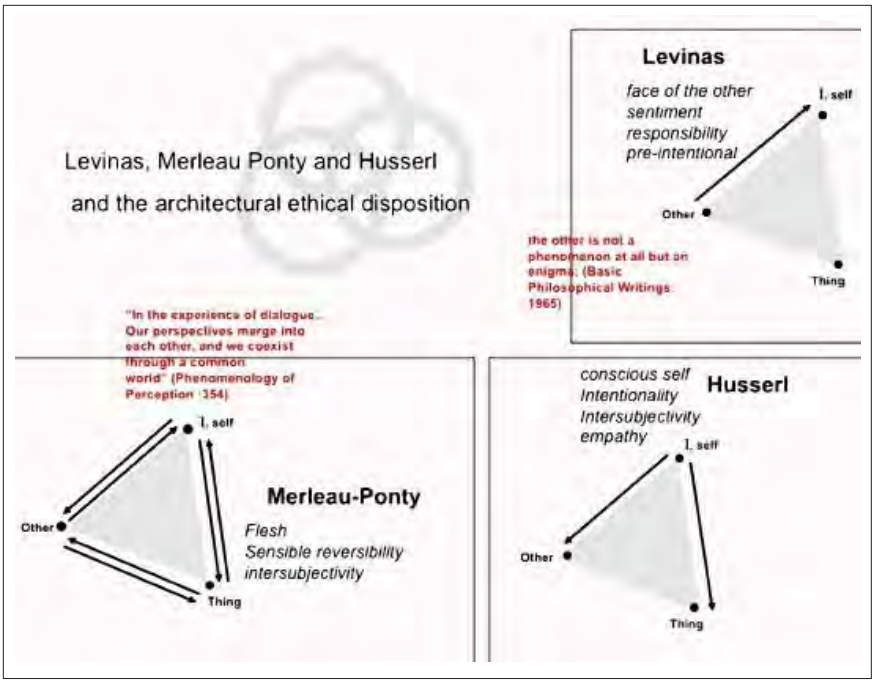

Figure 1: The Three Cornerstones of an Ethically-oriented Architectural Disposition. (Source: Author).

the "I" necessarily conforms to this horizon. This enclosing horizon ends up in stripping things of their reality, in assimilation of other people, in the impossibility of acknowledging the novelty of the present.

There is a huge, unbridgeable gap between Levinas and Husserl, which is perhaps best expressed when Levinas clarifies that the other is not a phenomenon at all but an enigma (Basic Philosophical Writings, 1965). "The other remains infinitely transcendent, infinitely foreign" (Levinas, 1969:194). Despite the best of a subject's intentions, his deepest empathy and utmost generosity - the other cannot appear within the horizon of the subject's intentionality without being bereft of his otherness. Merleau Ponty and LevinasThe enigma of the other is approached by Merleau Ponty and Levinas in different ways: while Merleau Ponty, especially in his later writings, tries to deepen the experience to the extent that the invisible can be found within the visible, and the untouchable within the touchable, i.e. through the concept of reversibility, for Levinas the other remains in his transcendence. From Levinas' perspective, Merleau-Ponty's embodied subject still grasps the other as a phenomenon, albeit not in a full

but a perspectival grasp. Within the subject's horizon of body and extended sedimentation of culture and language, the other is assimilated to the same.

Nevertheless, much has been written to show that Merleau-Ponty refused the reduction of the "Other" to the "Same," and that a sense of alterity does run through his writings. (Johnson and Smith, 1990; Busch, 1992; Hatley et Al., 2006). Through dialogue, the Merleau-Pontyian subjects become aware of each other, there is true reciprocity; one lends and draws from the other.

Furthermore: Merleau-Ponty's entire approach has been re-evaluated by Bernhard Waldenfels (Waldenfels, 2006) as an implicitly ethical initiative, very close to that of Levinas. Waldenfels shows that in both Levinas and Merleau-Ponty, the genesis of subjectivity itself includes responsibility. He claims that responsibility is embedded in the initial structure of Merleau-Ponty's responsiveness.

Conclusion: An Ethical Disposition for Architecture

The three cornerstones for an ethically oriented architectural disposition meet the pre-requisites, but do not form a unified platform for ethical creativity because they are irreconcilable. Although there are major affinities, the "I-other" relationships vary in their most basic essence. The very meaning of the ethical varies, and at the same time, all three meanings are needed.

Architecture is not a philosophy and, therefore, irreconcilability is not a logical deficiency. Architecture is poiesis - the making of things: material or virtual, conceptual or real. It is interfering with the world and with others and contributing to the transformation of the world. It is agency.

If an architect is to create - his subjectivity, the root of his creativity, must retain a dimension of freedom. Therefore, the ethical disposition for architecture must include a self-constituting subject (Husserl), at least partially. To be ethical, the architect must be a sensible subject (Levinas) and a responsive subject (Merleau-Ponty). Both sensibility and responsiveness however, are passive. Creating is active. Architectural poiesis must therefore be embedded in the agent's self-reassurance of his potential to contribute to a better future through conscious and intentional acts. At the same time, it must be rooted in the pre-conscious, the embodied, and the indecipherable, that which is forever a wonder. The agent is at the same time a sensible subject (Levinas - primacy of heteronomy), an embodied and dialogical subject (Merleau-Ponty) and a conscious subject (Husserl and Kant - primacy of autonomy).

All three cornerstones are indispensable and irreconcilable. They can be accommodated only through a stratified or split platform (Fig. 2). Both stratified and split platforms maintain the irreconcilable.It was actually a phenomenological researcher of ethics, Nicolai Hartmann, who showed that axiological systems vary between those that include contradictory principles, and those which are absolutely harmonious. The proposed platform belongs to the former.Architectural acts as poiesis are always intended at particularities in their historicity. The substratum for such acts is never exhausted in any specific act, but is rather an

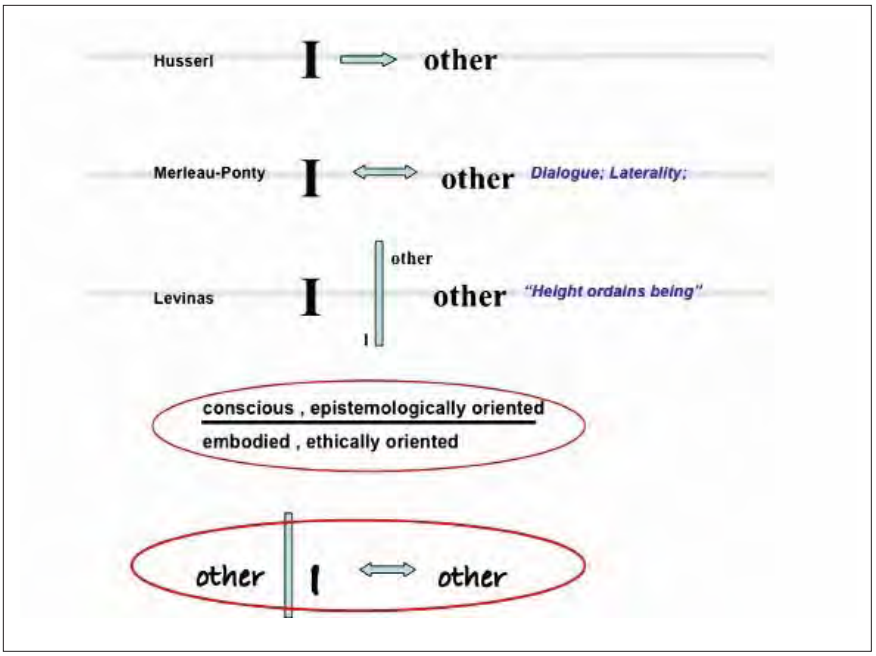

Figure 1: The Stratified and the Split Platforms. (Source: Author).

array of possibilities, used to fuel the creative imagination towards acts that are actual and contextual compromises. As such they constitute a negotiation among various irreconcilables. Therefore, there is no need to reconcile the three cornerstones of the proposed disposition.

The ethical platform of architecture hereby proposed is an inclination, a disposition present before any specific act of intentionality. It is not a deep structure to be revealed in the self. Although necessarily rooted in the deep structure of subjective experience, which is in itself a relation of responsibility and responsiveness to the other, architectural disposition must be nurtured and nourished in the process of architectural education - when the architectural subject is emerging. Such education is a web of intentional acts, which, through conscious efforts, mean to saturate the budding architects with reflective as well as pre-reflective ethicality.

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Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

TOWARDS TOTAL INTEGRATION IN DESIGN STUDIO

S. A. Deshpande and Asif R. Khan

Abstract
Transmission of knowledge has been defined as "bringing the right knowledge by the right route at the right time to the right places." In this context there is need to analyze the various pedagogical shifts associated with the decisive process of transmission and transaction of knowledge in design studio. Critical understanding of the importance of tangential knowledge and its integration within the design studio, leading to a comprehensive whole, is a significant aspect to be properly evolved and nourished in the studio.

It can be argued that knowledge is not a substitute for architectural imagination but inadequate knowledge would handicap the general level of design. Being satisfied to manipulate formal configurations does not provide insights into the human experience. If the different types of knowledge that architecture requires are ignored, the profession will lose its credibility in the eyes of society. With the body of knowledge expanding diversely with the escalating wants of the user, and to further sustain the built environment with further progression, it's quite certain to have an innovative design process that has a feel of antecedents yet is nourished by rationalism.

Architectural Design is to an extent the yield of a creative process brought out through a refined approach, skill, and dexterity to suit the purpose. The assessors, the jury, or the teacher has created an aura of mystique around good design, without much explaining what good design is. Architectural education involves application of a theory of knowledge – what is known and how it is to be known. Nothing is taught unless it is learnt (Bono). Does the key to these issues lie in shifting from conventional mode to Total Integration Mode of Education?

Keywords
Design studio, architectural education, applied knowledge, integration.

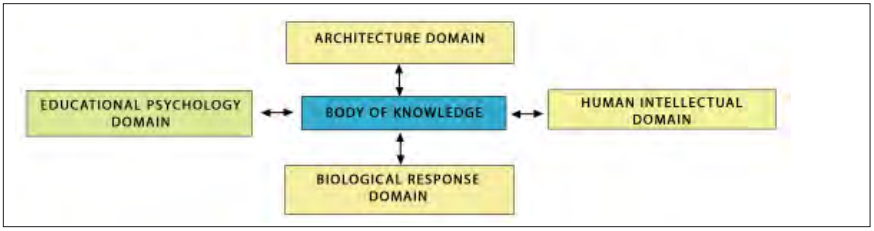

Figure 1: Critical Domains – Body of Knowledge. (Source: Authors).

Introduction: the Studio in Architecture

The Studio in Architecture has held its sway for about a century now. The 20th Century is commonly accepted as the most important period in the development of the human intellect through cultural, moral, and scientific as well as social and religious transformation.

In the early stages, the studio as an analogical learning environment borrowed and adopted the domain of the artist's creative activity space, which was personal in nature. Later, as in most art schools, a master artist imparted his style and technique to the learners who were few in number (Toy). Gradually, the studio was institutionalized to allow more students and more artists to impart mainly the skills of handling the subject of painting, the techniques of the brushwork, and the chemistry of the medium. To a large degree the studios in music and sculpture bore similarities.

The culture of the architecture studio was linked to learning–preparation of drawings from which buildings could emerge. This approach gradually changed during the movement of Modern Architecture. It is well known how the new masters faced the challenges of the new materials of construction and the emerging new forms. The studio was now transformed from the apprentice to the atelier and then to institutionalized environments for learning architecture design. Practice and the philosophy of the masters infiltrated the studio, as in Bauhaus in Germany (Droste), and to a large degree jeopardized the established means and methods. Study of new building materials, techniques of their application, and influence due to market forces along with the concern for rationalism seemed to dominate the designers mind more than the romanticized approach of the earlier days. In recent years globalization has brought about a number of radical changes that are offering new pedagogical challenges and possibilities.

The studio today in most architecture schools had successfully produced portfolios of drawings – not necessarily design. It is more fragmented than amalgamated. Fragments have become

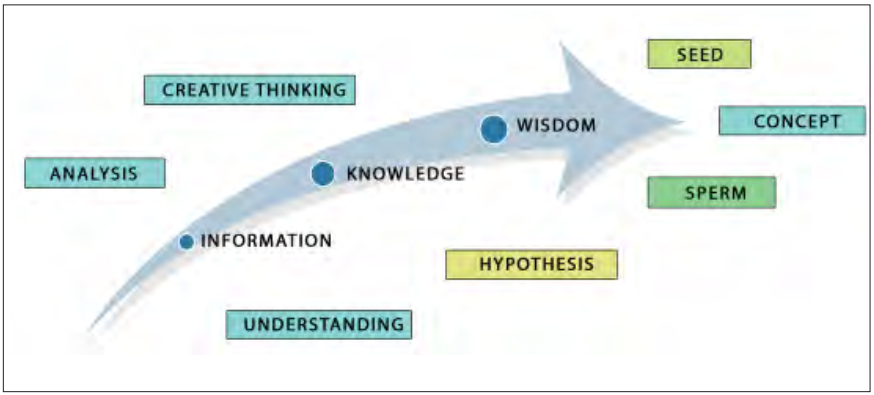

Figure 2: Desired yield from transmission and transaction of learning. (Source: Authors).

a domain for the studio teacher – leading to the loss of the comprehensiveness of the design studio (Deshpande, D is for Design). The usual scenario of evaluation of Learning Process in the design studio of a student is often limited to the End Product/Portfolio appraisal and criticism by a panel of experts. "What" the student has assimilated throughout the tedious years of transmission and transaction of learning is often not properly understood.

As we all know, design is an iterative process, involving research, , and the integration of knowledge. It takes time, space, and careful mentoring to acquire the practical and mental agility, the complex interaction of skills, knowledge, and creativity that is central to the practice of architectural design. What of studio culture? How does one start to define such a thing?

Total Integration

Disproportionate focus on design as a product rather than a process is a cause for academic concern. This situation has arisen in the design studios due to the lack of understanding of the critical linkage between the essentials of design studio: the conception of architecture design, the design process, and the teaching style (Wilkinson). It has been our practice to split architecture study by subject that forms the core--the technical and the humanities streams. Architectural design, per se, is not to be seen as a subject of study by itself, but an opportunity to bring together into a comprehensive whole the subject matter and knowledge acquired from peripheral area of study. If we accept Design as the soul of learning architecture – it is omnipresent. It has no physical existence, but like the human soul is present only as a "spirit." One can dare say therefore, that "Design" is the result of a process of integration of the real and the palpable material that is provided by other areas of study that are essentially of an applied nature and the emotive response of the learner. As such, Design ought to be seen not as a "subject" of learning but an application of what is learned from support subjects to Design. The studio is like a crucible where all applied knowledge and the essentials of design melt into each other to obtain a unified whole. This is what we call as the "Total Integration."

This is what Mies attempted within the vast space of the Crown Hall. Although the idea is decades old – it can be acceptable in principle. If the studio as a vechile has to deliver architecture, then it could be what Gropius called "Total Architecture." Every teacher can be treated as a

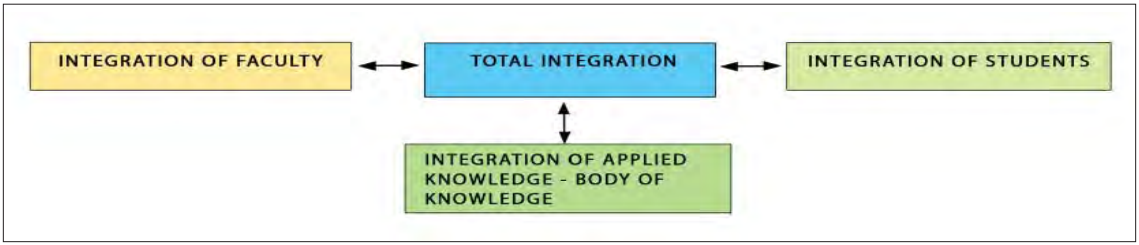

Figure 3: Critical Domains – Total Integration..(Source: Authors).

"design teacher," contributing to the integration of the cognitive domain of adjunct subject at various levels of teaching. The concept of an integrated studio for the realisation of "Total Architecture" is not necesseraliy new, but an innovative approach is needed to be adopted in its implementation (Deshpande, I Studio). The rigid format that has been established and followed today in many schools must loosen up. But we can derive some solace from the universal English proverb "Old order changeth yielding place to the new."

Transition is a historical phenomenon. It is important because it links the previous with the next. The present is always transitory. We have experienced such transition. It is with retrospection that we evaluate the present. There is that uncanny feeling that our studios do not foster creativity. In fact, the studio might actually be suffocating it (Badrinarayan). True as it may be, our studios are fragmented, isolated, irrelevant, soulless, and whatever spirit that may have remained is gradually evaporating. Transition as a process of change indeed can be excruciating. Ignoring the winds of change will result in our adopting the action of an ostrich! This transition could be based on a unique and innovative approach:

- Methodology should be a practical way of following a process, a movement from a known beginning to an unknown end.

- In design process one is always trying to restructure concepts – one is continually having to generate fresh approaches.

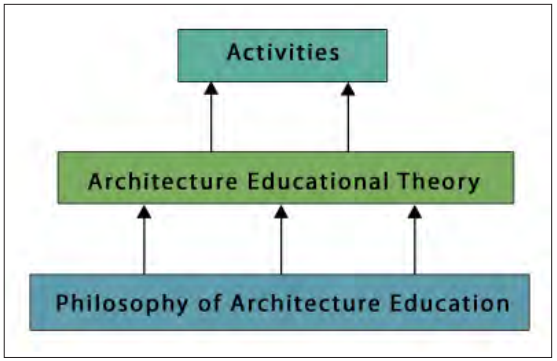

Figure 4: Split Structure --Architectural Education (Source: Authors).

Integration of Students

Architecture pedagogy has been a complex process since initiation of formal education modes. Educators have focused heavily on theories of design that determine these methods. Philosophical, theoretical, and practical issues have played a pivotal role in determining the right process to be implemented in a particular context and the same updated with time by the introduction of various new domains of bodies of knowledge into the architectural pretext. But the paradox of the issue is the lack of understanding of the levels of transition in maturity levels of the learner during the stages/ duration of the architectural study program and the psychological and emotional impacts on the process of integration of knowledge (Educational_technology).

Pedagogy is derived from the Greek word "paid" meaning "child," plus "agogos," meaning "leading," therefore defined as the art of leading and teaching children. The pedagogical

model is a content model concerned with the transmission of information and skills, where the teacher decides in advance what knowledge or skill needs to be transmitted and arranges a body of content into logical units, selects the most efficient means for transmitting this content (lectures, studio work, readings, laboratory exercises, films, tapes, for example), then develops a plan for the evaluation of learning by the learners. Pedagogy is a teaching theory, rather than a learning theory, and is usually based on transmission.

Andragogy is derived from the Greek words "anere," meaning "man," and "agogos," meaning "leading," and is used by adult theorists and educators to describe the theory of adult learning. Learning theory is usually based on transmission. Theories of transmission work on the basis of filling deficits in student knowledge and comprehension of their environment, while theories of transaction work on the basis of addressing the immediate, practical needs of context-dependent learners (Alexander_Kapp).

Offering an alternative to pedagogy, the andragogical model considers the following issues to be addressed in the learning process: allowing the learner to know why something is important to learn; showing the learner how to direct themselves through information; relating the topic to the learner's experiences – individuals will not learn until ready and motivated to learn; and finally, a need to have a life-centered, task-centered, or problem-centered orientation. The andragogical model was conceived by Knowles (1984) and is predicated on five basic assumptions about learners, all of which have some relationship to our notions about a learner's ability, need and desire to take responsibility for their learning (Malcolm_Knowles):

- *Self-concept: As a person matures his or her self-concept moves from one of being a dependent personality toward one of being a self-directed human being.*
- *Experience: As a person matures he or she accumulates a growing reservoir of experience that becomes an increasing resource for learning.*
- *Readiness to learn. As a person matures his or her readiness to learn becomes oriented increasingly to the developmental tasks of his social roles.*
- *Orientation to learning. As a person matures his or her time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly his orientation toward learning shifts from one of subject-centeredness to one of problem centeredness.*
- *Motivation to learn: As a person matures the motivation to learn is internal (Knowles 1984:12).*

This is in sharp contrast with pedagogical teaching, where the concern is with transmitting the content; in andragogy, the concern is with facilitating the acquisition of the content. Andragogy requires adult learners to be involved in the identification of their learning needs and the planning of how those needs are satisfied, and learning should be an active rather than a passive process.

Andragogy is based on a transactional process of design where the teacher manages "... a process for facilitating the acquisition of content by the learners" and serves "as a content resource (who can) provide leads for other content resources" (Knowles, 1980).

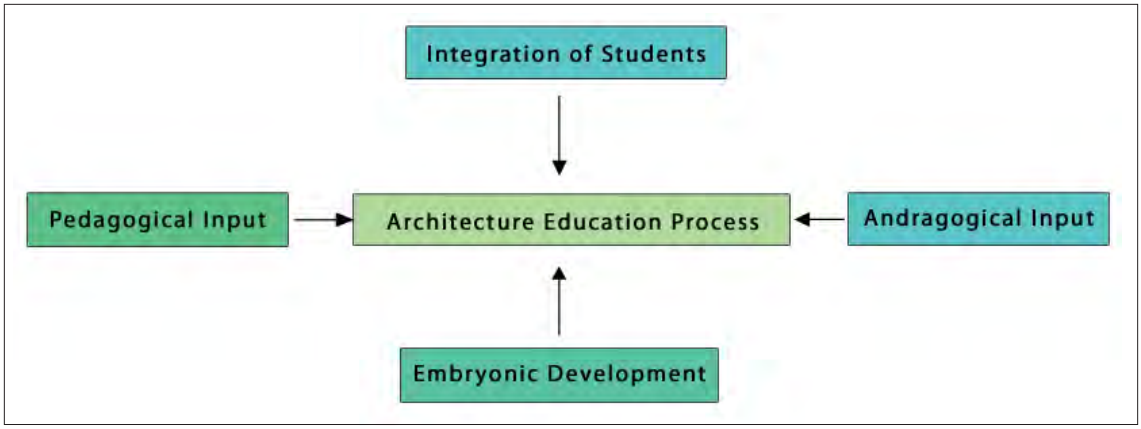

Figure 5: Integration of Students – Critical Components. (Source: Authors).

A proper realization would help in modulating the change as per present/future requirement. What is needed is a unique process to bring about integration of students during various stages of learning, a process catering to and understanding the overall development of the learner as he/she progress in age with the stages/duration of the program. This holistic approach would lead to the realization of this domain related to students, as part of Total Integration in all its glory.

Integration of Faculty

Design is the core subject, accounting for 40% or more of the teaching time (Minimum Standards 1983). It is the main stream of architecture studies into which other subject streams are said to converge. In terms of the weight of marks it, too, is the heaviest. Even the philosophy of a school is seen through its attitude to design teaching. It may even have the honor of being the most widely discussed. Its syllabus is also written in a way that makes impressive reading, but gives the least direction to a new teacher on how to teach it. In fact, the position at some top schools is that design cannot be taught.

The design issues to be dealt with in the studios is often generated in an unsystematic manner. By and large, design problems are set in an "off-the-cuff" manner. The visiting studio master attempts to incorporate current projects that she or he is involved in as the design focus without taking into account the activities carried out in the previous design studio, while the full-time critic evolves design issues in a pragmatic manner, resulting in a puzzled transition state of mind when a student moves ahead in his or her studio ranks. This tedious process of initiation of the design issue is backed by evaluations of works of the students by the jury panel. Thus the design issue slowly transforms into design ultimately,

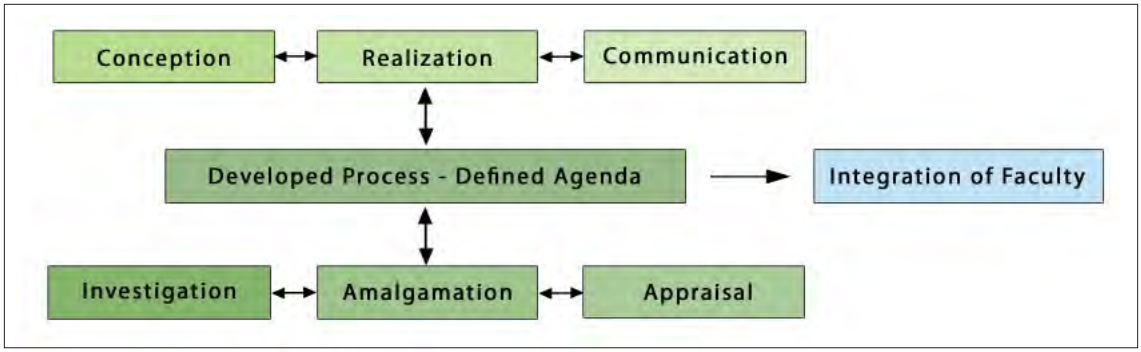

Figure 6: Integration of Faculty– Critical Components.. (Source: Authors).

duly assessed, and returned. The faculty assumes that transmission and transaction have successfully taken place. If a few of us can say that this is not how we teach design, it only shows how true it is.

Molding a learning process requires a dedicated group of faculties working within the framework of a carefully developed pedagogy that teaches a body of knowledge. Students would benefit from a strongly developed sense of increasing competence and the ability to learn, from being productive in design and problem solving, and from understanding their work within a framework of ¬¬¬¬¬¬ a larger body of knowledge. Students and faculty alike would benefit from an agreed-upon and explicit body of knowledge and pedagogy that provides the basis for constant improvement. Such a process would initiate an series of activities that unites the faculty members and the transmission/transaction process to deliver a "whole" rather than broken up fragments. Leading to the realization is Integration of faculty as part of Total Integration.

Integration of Applied Knowledge – Body of Knowledge

The most critical domain; Integration of Applied Knowledge – Body of Knowledge is vital for establishing the pillars of education process – Curriculum, Pedagogy, and Assessment.

Framing, adopting, and implementing a Universal Comparative Approach with a focus on regionalism could become the area of revitalization and thought at various schools of architecture. The main thrust of such an approach should be towards international proficiency and achieving minimal competence, rather than producing a few genius architects. Architectural education is a sub-domain of education technology and associated with the entire spectrum of human activities. The awareness of inputs of educational technology and biological response of the learners would elevate studios to greater heights of practicability.

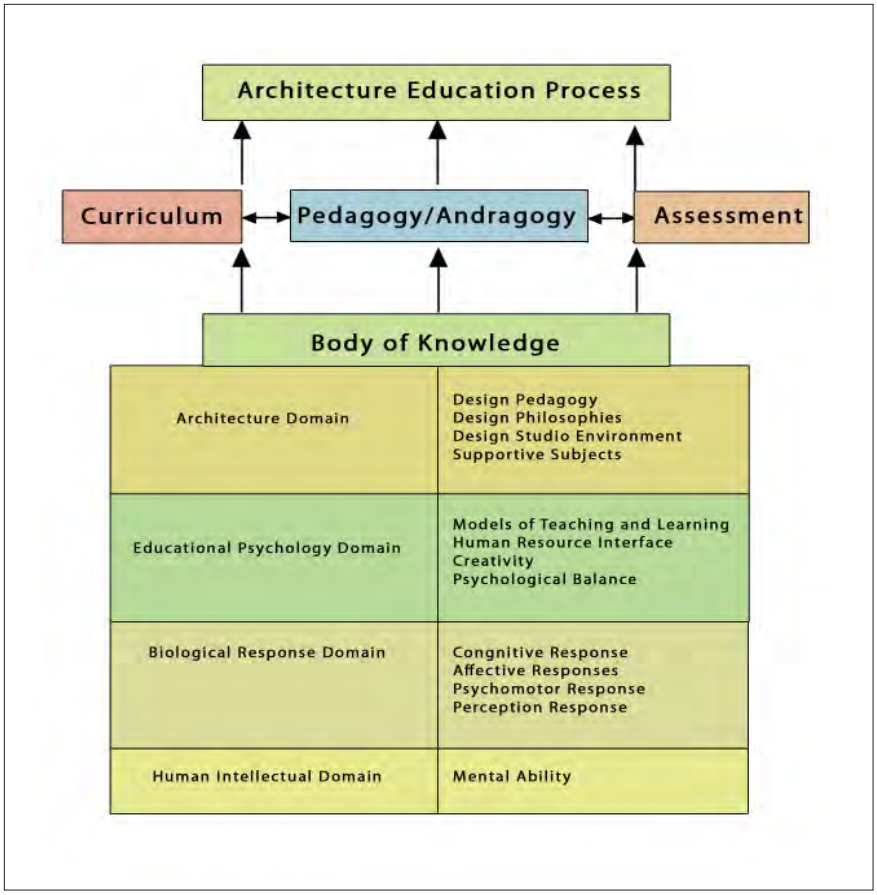

Figure 7: Domains of Applied Knowledge. (Source: Authors).

A noble venture towards realization of Integration of Applied Knowledge has been initiated at SMM College of Architecture, Nagpur University, India, in the form of a Post-Graduate Program open to practicing architects as well as to teaching fraternity, dedicated towards revitalization and improvement of architectural education (Smt. MM College of Architecture, Nagpur).

Architectural education involves application of a theory of knowledge – what is known and how it is to be known. Nothing is taught unless it is learnt.

Concluding Remarks

The realization of the need for remarkable paradigm Shift from the established conventional modes of transmission and transaction to a refined mode necessitates rethinking the architectural education process. The proper understanding of the various domains of integration and modes of approach could act as the pathway towards evolving new models of teaching architectural design. The architectural teaching fraternity must start on a new journey toward self realization and to mold budding minds in the most appropriate manner. The paradigm shift is towards focusing more on the individual's understanding and assertion with the design realm and the built environment.

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LEARNING STYLES AND STUDENTS' PERFORMANCE IN DESIGN PROBLEM SOLVING

Elçin Tezel and Hernan Casakin

Abstract

Design curricula and all core design studio courses are prepared for performance attainment by giving theoretical and professional training. However students' performance may be affected by both the constraints set on a design problem, and their learning styles. This study explores the performance of interior architectural students in relation to their learning styles (as proposed by Kolb's Experiential Learning Theory), and different types of constraints set on design problems. Design performance, measured as conceptual development, form and spatial configuration, structural innovation and ergonomics, and craftsmanship, was found to change throughout the two bipolar continuum of the learning cycle with regard to two design conditions characterized by different types of constraint use.

Keywords

Design education, design constraints, experiential learning.

Introduction

One important goal of design education is to develop students' independent abilities of designing and to enhance their cognitive and representation skills. To achieve this aim, diverse teaching methodologies have been employed in design studios around the world. Among these is the traditional approach, which entails teaching design based on studio critiques (Uluoğlu, 2000; Webster, 2001). The traditional method considers project-based learning as the main pedagogical method of design education, by means of which design knowledge is transmitted from instructors to students (Heylighen & Verstijnen, 2003; Schon, 1985). During the 'crit' sessions students develop design projects in a trial-and-error manner, while they receive feedback from their instructors.

The design process generally begins with the definition of a design problem, design goals and intentions, preferences and constraints, and ends up with the production of an outcome solution or a design prototype (Uluoğlu, 2000). Preferences and constraints affect design specifications, so that a large part of the design process involves the recognition, formulation and satisfaction of

Practices

such specifications (Lin & Chen, 2002). Problem specifications help to frame the problem solving context within which the designer acts (Özkaya & Akin, 2005; Schon, 1983). Specifications not only help students understand the complexity of the design problem, and to develop problem solving strategies, but are also used as main criteria in the assessment of the quality of design solutions.

In the last two decades, the relation between design problem solving and learning styles started to capture the attention of scholars who specialize in design education. Nilson (2003), for instance, examines Fleming and Mills's educational theory about sensory-based learning style that accentuates preferred physical senses involved in learning. In another survey conducted in the field of architectural design, Newland and his colleagues (1987) identify four kinds of experiential learners classified as: common sense, dynamic, contemplative, and zealous learners. Mc Caulley (1990) evaluates character and temperament profiles dependent on learning behavior in engineering design, and Brown et al. (1994) examines learning styles of students in landscape architecture.

The structuring, constraining, and definition of design problems is a critical stage of the design process that can be affected by the learning styles of the designers. Aiming to gain insight about design studio teaching, some researchers investigated the relationship between learning styles and design constraints. Using Kolb's Experiential Learning Theory (Kolb, 1984), Kvan and Yunyan (2005) examined the influence of differently structured design tasks on the performance of diverse learning groups. Design situations assigned in that study to architectural students had different requirements and specifications. In one situation, design problem requirements dealing with structural features were largely specified, whereas in the second situation they were more general. These researchers found significant differences among performances of students with different learning styles when the design task was largely unconstrained, as opposed to the other more constrained task where almost no differences in performance were found between the groups of learners.

In another work also based on Kolb's model, Demirbaş and Demirkan (2003) assessed the performance of design students with regard to their learning preferences in design tasks that were constrained by different types of representations. Results showed that whereas the accommodators performed significantly higher when they were asked to solve problems by means of sketches and drawing representations, assimilators overcame the other groups of learners when they were asked to use mockups. Demirbaş and Demirkan (2003) concluded that a combination of students' learning styles and the type of representation used to solve a design problem have an effect on design performance.

Following with the above studies and considering Kolb's Experiential Learning Theory (Kolb, 1984) as a main research framework, the present study continues exploring the influence of design constraints on various abilities of learning groups of students. The major aim is to identify what kinds of relationships exist between design situations characterized by different constraints and specific design abilities of the four learning groups proposed by Kolb (1984).

In the first part, the literature review centers on design learning and the design studio. The focus is set on the design project as an educational tool, and the constraining of design problems. Thereafter, Kolb's Experiential Learning Theory is presented, and the four learning styles are described and analyzed with regard to design practice. In the second part, an empirical research is presented. Major findings are shown and discussed before main conclusions are offered, with implications for design education.

Learning in Design Studio

The Nature of the Design Studio

Design studio is a social environment where the interaction among students and studio masters is the backbone of design education (Ledewitz, 1985). In the design studio, communication enables free exchange of ideas and educational experience. It is in this social environment that a personalized teaching takes place, although not always considering individual differences regarding skills, aptitudes, and learning abilities of students.

In addition to providing intellectual stimulus and expertise, an important role of the design studio tutor is to organize the design program, also known as the brief. In response to a given brief, students develop their projects while they receive critiques from their studio tutors (Uluoğlu, 2000; Yürekli, 2007). According to Ashton (1998), project briefs are the starting points of design thinking in studios where the interaction among students and the studio master is the main vehicle of learning. In this interactive process, students are encouraged to elaborate on their design projects, and internalize new abilities, values and conceptions (Roberts, 2006), while they learn new graphic and verbal languages, and develop skills of visualization and representation (Schön, 1984).

Among different educational approaches, project-based learning is considered to be central to the design studio curriculum. The benefit of design projects is that they enable students to simulate an actual process of professional action in a simplified way. Hence, the design studio provides an environment where talking, reflecting, discussing, drawing and modeling are among the major activities that aid students to enhance their design thinking (Ledewitz, 1985)

Framing and Constraining Design Problems

Design problems are by nature ill-defined, meaning that they have a weak structure that can be characterized by vague initial requirements, partially specified goals, indefinite possible solutions, and limited operators to generate solutions (Cross, 2001; Simon, 1984). Due to the ill-defined character of design problems, an important aspect of design thinking is structuring and framing design problems (Schon, 1983). Rosenman and Gero (1998) consider design thinking as an explorative activity that proceeds from the description of needs and specifications of a design problem, to the description of a concrete solution. In this sense, design specifications play a fundamental role in structuring and framing design problems, and establishing initial constraints. Framing and constraining designs enable designers to set concrete boundaries to the ill-defined problems, as well as to understand potential directions along which design thinking can develop. During the design process, designers actively participate in the definition of problem constraints, which help

to refine and develop initial design concepts and ideas (Schön, 1988) and to enhance innovative design thinking (Portillo & Dohr, 1994).

An important aspect of the interaction between students and teachers deals with structuring design situations, and fostering design ideas based on initial design specifications and problem constraints. Given a design problem, students are expected to describe the functional, behavioral and structural properties that may satisfy the requirements and programmatic needs of a design problem (Kroes, 2002; Rosenman & Gero, 1998). Teachers, on the other hand, evaluate design solutions by referring to initial design constrains (Portillo & Dohr, 1994). As Harfield (2007) argues, constraints are used to show to what extent initial design goals are attained, and to assess outcome solutions.

The Experiential Learning Theory

In his Experiential Learning Theory, Kolb proposes that knowledge can be obtained by grasping and transforming experience (Kolb, 1984). It considers reflection as a critical learning ability, by means of which it becomes possible to receive and internalize information. The Experiential Learning Theory refers to the process of acquiring knowledge as a dynamic cycle composed of four modes of learning: experiencing, reflecting, thinking and acting in a recursive manner. According to this cycle, concrete experience is followed by observation and reflection; this is continued by the formulation of abstract concepts and generalizations, and thereafter by active experimentation that leads to the creation of new experiences. In experiential learning, learners refer to different stages of this cycle depending on their preferred way of constructing knowledge. (Kolb, 1984; Kolb, 2005; Kolb & Kolb, 2005a).

Individuals' preferences for receiving and internalizing knowledge are considered to influence their particular learning style. However, Kolb's theory promotes integrated learning, and thus encourages individuals to become competent in all learning styles.

Learning Styles

Learning styles are not innate features but, are developed through experience (Kolb, 1984). They are rather the combination of how people perceive and process the information that characterizes their own learning style. Kolb structures this process in a four-stage model that encompasses two continuums:

The concrete-abstract continuum (vertical axis) is concerned with how people perceive new information. Consequently, some learners might have a tendency to deal with novel problem situations according to concrete experience (CE), while others will prefer to approach them by abstract conceptualization (AC). In contrast to this, the active-reflective continuum (horizontal axis) is about how we process new information. Some learners have a predisposition to try things out by active experimentation (AE), while others might be inclined to think and evaluate by reflective observation (RO).

The theory maintains that the extremes of each continuum are reciprocally exclusive. If, for example, a learner attempts to perceive new information by concrete experience and by abstract conceptualization, a conflict will emerge (Kolb & Kolb, 2005a; Wu, Dale & Bethel, 1998). This conflict is resolved when the learner acts according to a preference or a learning

style, in order to perceive and process the new information. It should be noted, however, that none of these stages is considered by Kolb (1984) to be superior with respect to the other, and therefore the learner's preferences are not better or worse. These stages are rather viewed as steps of a learning cycle that can be entered into at any stage.

The two continuums described above represent bipolar axes, where individual preferences can be seen as intersecting coordinates that enable one to identify the relative position of a learner within a quadrant of the model. Each of these quadrants represents one of the following learning styles (see Figure 1):

Diverging learners

This type of learners is characterized by preferences for concrete experience (CE) and reflective observation (RO). They are skilled at gathering and synthesizing a broad range of information, viewing it from different perspectives. While they are less interested in theory, they tend to tackle problems in a non-systematic way.

Assimilating learners

Assimilators prefer for abstract conceptualization (AC) and reflective observation (RO). As a result, they can understand a wider range of information, which they are able to organize into a concise and logical form. They are interested in ideas and concepts and value the logic and accuracy of these ideas more than their practical applications.

Converging learners

Having the opposite abilities of a diverging learner, the main preferences of convergers are for abstract conceptualization (AC) and active experimentation (AE). Their learning abilities rely on logic and organization. They are pragmatic thinkers characterized by having hypothetical-deductive reasoning. They do extremely well at practical applications of theories and ideas.

Accommodating learners

Contrary to assimilators accommodators prefer concrete experience (CE) and active experimentation (AE). Their learning tendencies are based on practical experience. These types of learners find pleasure in taking risks and challenges. They are unsystematic, they also prefer to act according to instincts and intuition and learn by trial and error.

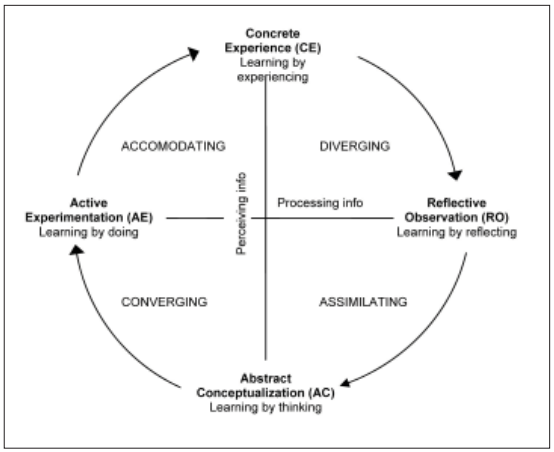

Figure 1: Four learning styles of the experiential learning theory. (Source: Authors).

Experiential Learning, Reflection, and Design Education

The Experiential Learning Theory is a propitious framework for design learning. In Kolb's (1984) view,

learning is defined as the creation of knowledge through the transformation of experience. This implies that different learning styles are related to dissimilar forms of knowledge. The design studio is the place where new knowledge is generated through the modification of design experiences, while simulations of real situations are carried out (Teymur, 1996). In this process, students continually perceive and process information, as they learn by doing, as well as by reflecting on their actions. Reflection is critical in the development of students' knowledge and thinking abilities as they are prepared for future practice of the profession. Kolb's learning cycle points to the necessity of reflective observation in order to bring the concrete experiencing of events or experiences to the state of abstract conceptualization.

Constructivist approaches which also emphasize reflective practice, acknowledge that knowledge cannot be transmitted by mere explanations given to the learner, but that it has to be generated and transformed through personal experience (Philippou, 2001). Project-based reflective practice is frequently applied in the design studio to encourage the development of individual experiences. Since design projects pose problems of uniqueness, uncertainty and instability, they require a combination of action and reflection-in-action (Schön, 1983). Reflection-in-action, enables to simulate real professional action in a studio environment. This approach, which requires students to be involved in a dialogue with their tutors, is critical to construct and transform their knowledge, and to decompose and reorganize their design thinking.

Designers construct frames to reflect on and evaluate a design based on their belief, perception and appreciation of a problem situation (Schön & Rein, 1994). Stumpf and McDonnell (2002) refer to the construct of framing and naming through the consideration of premises. In this process, premises, which are defined as facts, truths, presumptions, values and hierarchies (Stumpf & McDonnell, 2002), are considered for establishing design constraints. In this sense, premises are viewed as guidelines that can aid students and teachers in their evaluation of design outcomes as well as instruments for reflective dialogue.

Empirical Research

Aim and Hypotheses

The aim of the current research is to provide preliminary evidence on the relationship between learning styles, design performance, and constraints used in design problem solving. Two different design conditions are examined with respect to different learning styles, and design performance through four design criteria. (See The Assessment Criteria). While in the first condition, students solved a design problem using specific constraints, in the second one they were allowed to freely choose their own constraints to accomplish the task. By considering strengths and weaknesses of each learning style, we expected to find differences in design performance regarding each design condition.

Different design achievements were expected in each design condition regarding the CE-AC continuum of perceiving information, and the AE-RO continuum of processing information, as proposed by Kolb (1984). In the constrained condition, design performance by concrete experience was expected to overcome

performance by abstract conceptualization. On the other hand, in the unconstrained condition, performance by reflective observation was expected to overcome active experimentation.

Considering the proposition that the design process can be characterized by analytic and synthetic phases (Beckman & Berry, 2010), it is claimed that some of the criteria used to evaluate students' design outcomes are related to finding and discovery (analysis), while other criteria are related to invention and making (synthesis).

In the constrained design condition, we argue that structural innovation and ergonomics (SE) and craftsmanship (CR) criteria, which are concerned with invention and making, can be better achieved by practical applications and concrete experience (CE) through the available technical information. Hence successful performance on SE and CR criteria are expected to refer to the 'perceiving information' axe by concrete experience rather than by abstract conceptualization.

Moreover, in the unconstrained condition we argue that conceptual development (CD) and form and spatial configuration (FC) criteria, which relate to finding and discovery, are suggested to be better achieved by reflective observation (RO) than by active experimentation (AE). Therefore, successful performance on these criteria are expected to refer to the 'information processing' axe by thinking and reflecting rather than by active experimentation.

The following statements are presented regarding the relation between learning styles and the criteria considered to assess design performance: In the constrained design condition, Accommodators and Divergers, who perceive information by concrete experience, are expected to be more successful than Convergers and Assimilators, who perceive information by abstract conceptualization, in structural innovation and ergonomics (SE), as well as in craftsmanship (CR) criteria. Newland and his colleagues (1987) refer to the perception of concrete experiencing learners as "a rapid, conscious absorption of the presence and properties of things" (p. 5). Therefore, the tendency of this type of learners to perceive information from specific experiences is expected to improve their performance in SE and CR, since these criteria are more related to invention and making.

On the other hand, in the unconstrained design condition, learners who process design information by reflecting (i.e. Divergers and Assimilators) are expected to perform better than those who process information by active experimentation (i.e., Accommodators and Convergers) in conceptual development (CD) and form and spatial configuration (FC) criteria. In the absence of constraints, students need to frame and define their own criteria, and this requires reflecting and abstract thinking. Newland et al. (1987) refer to reflective observation as a way of handling and combining information from different perspectives. In the unconstrained condition, reflective learners are expected to define their own frame of criteria and to evaluate the situation from various perspectives. Hence they are expected to be more successful in concept development (CD) and form and spatial configuration (FC) since these criteria are more related to finding and discovery.

Participants

Participants were 90 students of the Department of Interior Architecture and Environmental Design, Bahçeşehir University in İstanbul-Turkey,

who enrolled in the course of furniture design studio in two consecutive academic years during 2006-2007 and 2007-2008. In the first group (2006-7), named the test group, 40 out of 41 students completed the learning style inventory, of which 27 (67.5%) were females and 13 (32.5%) were males, in the age range 20 to25. In the second group (2007-8), named the control group, all 50 students completed the inventory, of which 28 (56%) were females and 22 (44%) were males, in the age range 20 to 24. Detailed instructions were given to all the participants to complete the survey, and the learning inventory. Students volunteered their time to participate, and in compensation were informed about their personal learning style preferences.

Design Conditions

Two design conditions in which students were requested to solve a design task were enacted as follows:

Test condition: Solving design problems with technical constraints

In this condition, students were assigned a problem consisting in the design of a sitting unit, and a task sheet containing general instructions. They were asked to construct their design products with corrugated cardboard material using a specific technique, which involved intersecting cardboard layers at perpendicular angles (See Figure 2). An advantage of using this technique is that it strengthens the structure of the sitting unit, but on the other hand it prescribes a certain formal language that limits the range of possible design solutions.

Control condition: Solving design problems without technical constraints

A problem similar to the previous design condition

Figure 2: Examples of four design products made by students in the constrained design condition. (Source: Authors).

was assigned to students. However, in this condition they were encouraged to use any other preferred technique to work with the corrugated cardboard material. Likewise, in order to deal with structural and formal requirements of the sitting unit, students were allowed to use additional materials such as any kind of cardboard, wood, and wire, as well as any other construction technique that they might consider appropriate (See Figure 3).

Design Problem

Students were requested to design a sitting unit prototype that should meet basic requirements such as comfort, and appropriate ergonomics. The design outcome had to satisfy formal, functional, and structural specifications.

Procedure

The design task was carried out during a period of five weeks in the design studio, where students

Figure 3: Examples of four design products made by students in the unconstrained design condition. (Source: Authors).

met with their instructors once a week for six hours. In order to deal with the task, students were divided into two main groups, named the test and control groups. At the beginning of the task, students were given two lectures about the design and development of sitting units. The first lecture focused on functional concerns, and spatial relations of component parts of sitting

units. The second lecture dealt with ergonomics and the act of sitting. An additional lecture about the use of cardboard sheets by means of the interlocking technique was presented to those students who took part in the test condition. All students were encouraged to investigate further the information given in the different lectures. Furthermore, during the first week different groups of 9-12 students participated in 20 minute long brainstorming sessions that were coordinated by two studio instructors. In the consecutive meetings, students developed small scale cardboard mockups, and received feedback from their design instructors in one-to-one critic sessions. At the end of the task, they presented the final design represented by a full-scale mock-up of the sitting unit and main sketches produced during the design progress.

In both the test and control design conditions, students were asked to explain how they developed ideas and concepts during the design process. This provided additional information to understand how the existence or non-existence of technical constraints affected their design decisions and design outcomes.

The Assessment Criteria

In both design conditions, design solutions were assessed according to four major criteria, considered to be critical for the successful design of the sitting unit: (i) conceptual development, concerned with the main idea that guided the design process. It could be retrieved from different inspiration sources such as visual references, iconic representations, metaphors and analogies; (ii) form and spatial configuration, related to the designer's control of geometry and volume; (iii) structural innovation, dealing with the materials and techniques used to produce an innovative structure, and ergonomics entailing the compatibility of the sitting unit to the human body dimensions;, and (iv) craftsmanship, dealing with precision in construction, and consistency in production technique.

Scale of Assessment

An ordinal scale divided into 9 ranges was established to assess the design solutions produced by the students. Scores were assessed according to the following ranges: A (93-100); B+ (88-92); B (83-87); B- (82-78); C+ (75-77); C (70-74); C- (65-69); D+ (60-64); D (50-59); F (49-0). Final scores for each student were calculated by computing the average of the assessments carried out by five referees.

Referees

The design outputs obtained from the two design conditions were scored independently by five judges. All of them were architects with at least 5 years of experience, who were unaware of the design conditions, and received no payment for their participation.

Grades were given by independent judges, and mean scores of different design criteria were examined by T-tests.

Results

Analyses were carried out in order to verify differences between performance scores in the two design conditions with regard to the four groups of learners, through the four assessment criteria. A graphic depicting a distribution of the four groups of learners according to the two design conditions is shown in Figure 4.

Results indicated that design performance scores obtained in each design condition differed among the group of learners with respect to

the two bipolar axes, namely the perceiving and processing axes, through the assessed design criteria. Firstly, two learning groups, namely Accommodators and Divergers (Group A) versus Convergers and Assimilators (Group B) were examined according to AE-RO axis of the cycle for SE and CR criteria of the constrained condition. Secondly, the other two learning groups located at the opposite ends of AC-CE axis of the cycle, namely Divergers and Assimilators (Group C) versus Accommodators and Convergers (Group D) were examined for CD and FC criteria of the unconstrained condition. An illustration of the hypothesized and found results is presented in Figure 5.

In the constrained design condition, Accomodators and Divergers, located at the 'concrete experience' extreme of the perceiving information axe, were found to be more successful in SE design criteria than the other learners, namely Convergers and Assimilators located at the opposite 'abstract conceptualization' extreme. No differences were found between these groups for CR criteria since the performance average was similar. Results from the constrained condition showed that:

Group A versus Group B for SE criteria: T= 2,023, p=0,031, df=13.

Group A versus Group B for CR criteria: T=0, μA = μB.

In the unconstrained design condition, Divergers and Assimilators were found to be more successful than Accommodators and Convergers both for CD and FC criteria. Findings from the unconstrained condition showed that:

Group C versus Group D for CD criteria: T= 2,484, p= 0,017, df=13.

Group C versus Group D for FC criteria: T=2,018, p= 0,0214, df=13.

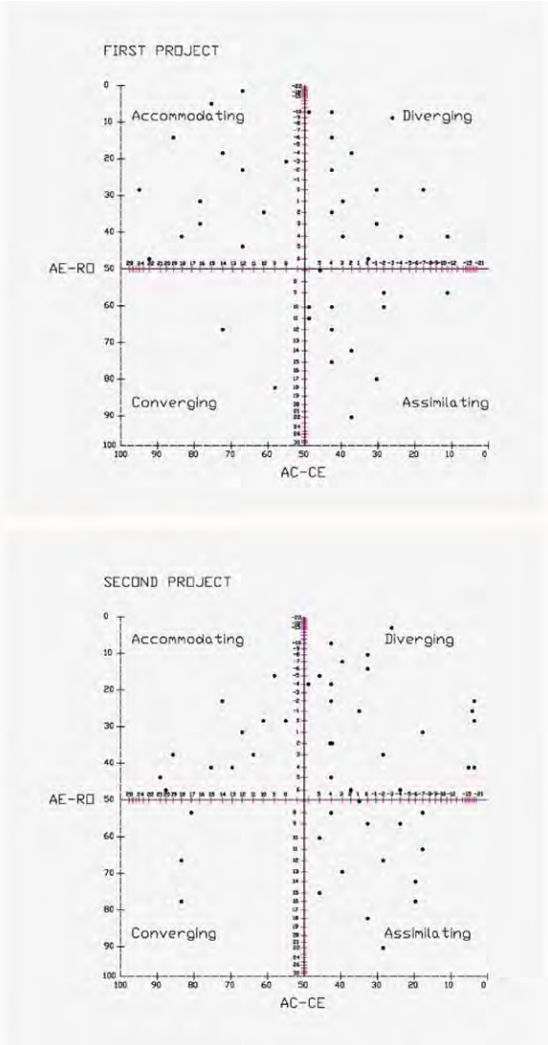

Figure 4: Distribution of learning styles in two treatment groups. (Source: Authors).

	Hypothesized for SE criteria	Results for SE criteria	Hypothesized for CR criteria	Results for CR criteria
Constrained Condition	Accomodators Divergers (Group A)	Accomodators Divergers (Group A)	Accomodators Divergers (Group A)	Non
	Hypothesized for CD criteria	Results for CD criteria	Hypothesized for FC criteria	Results for FC criteria
Unconstrained Condition	Convergers Assimilators (Group C)	Convergers Assimilators (Group C)	Convergers Assimilators (Group C)	Convergers Assimilators (Group C)

Figure 5: Comparative analysis of research hypotheses and findings obtained through the design conditions, group of learners, and performance criteria . (Source: Authors).

Discussion

The present investigation provides further evidence on the relationship between learning styles, design performance, and constraints used in design problem solving. The study fosters prior research carried out by Kvan and Yunyan (2005), who examined the effect of differently structured design tasks on the performance of learning groups, and develops further the research done by Demirbaş and Demirkan (2003), who assessed the effect of design tasks constrained by different types of representations on the performance of learning styles. By considering strengths and weaknesses of each learning style, differences in design performance were observed with respect to the CE-AC continuum of perceiving information, and the AE-RO continuum of processing information (Kolb, 1984) for each design condition.

In the constrained design condition, performance by concrete experience was assumed to be more successful than performance by abstract conceptualization. Structural innovation and ergonomics (SE) and craftsmanship (CR) involve invention and making activities, and therefore they were expected to be better achieved by the learners located at concrete experience side of the axis. However, this hypothesis was partially verified. Technical requirements provided in the constrained condition contributed to the successful performance of Accommodators and Divergers, who are good at perceiving design information by concrete experience. Hence they were able to excel the other groups in structural innovation and ergonomics (SE). .

In this constrained condition, design constraints compelled students to follow rules of production technique. Therefore, Accomodators who sense the world continually, and learn by trial and error, and Divergers who tend to readily accept useful information (Newland, Powell & Creed, 1987) found an opportunity in the ready-given information to perform well in SE criteria. In contrast to them, Convergers and Assimilators who prefer abstract conceptualization, and are interested in ideas and concepts were expected to find themselves disadvantageous by the limitations posed by technical requirements on the universe of possible design solutions available in the metaphorical space of searching (Newel and Simon, 1972). So an outcome of the constrained design condition might be the generation of solutions characterized by similar concepts, forms and structures.

On the other hand, no difference in craftsmanship performance (CR) was found between the groups located at the opposite ends of the AC-CE axis. Since technical requirements in this design condition were provided and ready to use, , it is suggested that all groups might have found equal opportunities to apply the already available technique to excel in craftsmanship (CR).

Furthermore, according to what was hypothesized in the unconstrained design condition, learners who process design information by reflecting were more successful than those who act by active experimentation. Freedom to use any types of requirements helped Diverging and Assimilating group of learners, who are strong in the processing of information by reflective observation, to overcome Accommodators and Convergers. A reason since the latter group of learners was disadvantaged in the unconstrained condition may be due to the fact that they are pragmatic and their learning tendencies are based on practical experience.

The unconstrained nature of the second design condition particularly encouraged Diverger and Assimilator learners to set their personal goals and establish their own design requirements, as Kolb and Kolb (2005b) suggested for the processing continuum of learning cycle. This might be a reason since Divergers and Assimilators, who are located at the reflective observation end of the AE-RO axis, performed better than the other group of learners in concept development (CD), and form and spatial configuration (FC). As noted above, these aspects of design performance involve finding and discovery.

Findings from this design condition, which can be considered to be more representative of creative design problem solving, are in line with Kolb and Kolb (2005b), who characterized architectural students at the 'reflective observation' end of the AE-RO axis on the learning cycle.

Conclusions

In their influential study, Kolb and Kolb (2005b) proposed that learning is a holistic process that involves thinking, feeling, perceiving and behaving, during which the adaptation to the world is achieved by the integrated functioning of a person. Considering this holistic view of the learning process, cognitive skills of students were examined in the design studio. Two design conditions were considered to examine the effect of learning styles on design performance through different design criteria that dealt with concept development, structure and material knowledge, innovative form generation and crafts.

Major differences were found with respect to the CE-AC continuum of perceiving information, and the AE-RO continuum of processing information (Kolb, 1984) in each design condition. In the constrained design condition, performance by concrete experience was more successful than performance by abstract conceptualization in SE. On the other hand, in the unconstrained condition, reflective observation learners were stronger than active experimentation ones in CD and FC.

Findings from this study are of great importance for intervention programs of design education that aim to enhance the performance of design students with different learning styles. Considering individual differences among students, and applying the Experiential Learning Theory, which is basically a theoretical framework for understanding learning abilities, can contribute to the enhancement of individual skills and abilities under different design situations. The great advantage of the Experiential Learning

Theory is that findings can be operationalized in the design studio in a straightforward and easy way. Intervention programs based on this instrument can be implemented not only by promoting those design conditions, and design aspects where learners with a certain ability have an advantage, but also by training and strengthening students' learning skills to match those design situations where they find themselves disadvantaged.

It is imperative for design educators to be conscious of the role of learning preferences in the design studio, as well as to develop awareness of individual differences with respect to how information is perceived and processed. Findings resulting from the present study provide design teachers with a concrete instrument for training students while bearing in mind personal learning styles developed through the learning cycle. In some design conditions certain learners are more successful than others. Hence, teachers should try to adapt the transference of design knowledge according to the particular needs and requirements of each student. Gaining insight into the different learning preferences can provide educators with more refined criteria to assess design outcomes, and better tools to support the design activity.

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DELIVERING THEORY COURSES IN ARCHITECTURE: INQUIRY-BASED, ACTIVE, AND EXPERIENTIAL LEARNING INTEGRATED

Ashraf M. Salama

Abstract

Advocating the integration of interactive learning mechanisms into theory courses in architecture, this paper responds to the misconceptions that continue to characterize the delivery of knowledge content in architectural courses. Such misconceptions are identified as: a) science as a body of knowledge versus science as a method of exploration, b) learning theories about the phenomena versus getting the feel of the behavior of the phenomena, and c) the real versus the hypothetical. Based on reviewing the literature on pedagogy the paper explores the value and benefits of introducing active and experiential and inquiry-based learning (IBL) in theory courses in architecture. A framework is developed and employed to demonstrate the way in which these types of learning can be incorporated. The development and implementation of a series of in-class and off campus exercises in two different contexts reveal that structured actions and experiences help students to be in control over their learning while invigorating their understanding of the body of knowledge delivered in a typical lecture format.

Keywords

Architectural education, inquiry-based learning (IBL), experiential learning, active learning.

Introduction

Recent discourse on built environment education asserts that a course mission should foster a learning environment that nurtures exploration and critical thinking. Inquiry and investigation are now viewed as activities central to architectural pedagogy. This presents new opportunities for us as academics in architecture to strengthen our courses, to enhance our role in shaping architectural design education, and to improve the quality of that education (Salama, 2006 b). However, in the decade, the level of concern has intensified and the flood of reports and position papers has crested at an alarmingly high level (Schaffner et al., 1999).

Within the discipline of architecture influential reports have been introduced to the international community including "UIA-UNESCO Charter of Architectural Education-1996," the Carnegie Foundation's report on "A New Future or Architectural Education and Practice-1996 and the AIAS report on "the Re-design of Studio Culture-2002". These reports indicate that architectural education does not take full advantage of the unique opportunities

Practices

available in higher education institutions. On the one hand, links between education, professional practice, and academic research are often oversimplified; opportunities to enrich and strengthen professional education through exposure to the research processes are missed. On the other hand, recent research on pedagogy indicates that the attention span of the average adult during a lecture is 8 to 10 minutes. Since most lectures are at least 50 minutes and some lectures are scheduled for up to two hours, there is a serious disparity between our ability as educators to lecture nonstop and our students' ability to learn. According to Judith Liebman (1997), although some students learn best by listening, others have difficulty but find it easier to learn in more active learning environments that involve visual and critical thinking.

Arguing for a fresh look at theory courses in architecture, this article illustrates the implementation of a number of in-class and off-campus exercises that foster interactive learning and communication through active and experiential mechanisms as forms of inquiry-based learning. The exercises involve individual and group work and class discussion. In-class exercises range from 15 to 45 minutes and address issues that examine and translate students' understanding of the topics introduced, including relating culture to architecture, recognizing building types, developing responses to different building images, and understanding building objectives and requirements. While off-campus exercises promote the utilization of the built environment as an open textbook—as an effective teaching tool, they enable students to get as close as possible to the realities being studied.

The results of conducting these exercises corroborate that inquiry-based learning invigorated students' understanding of the topics, sensitized them into the understanding of course objectives, while creating excitement in the classroom. In light of these results, the article calls for the need to incorporate active and experiential learning strategies into classroom instruction in theory and lecture based courses. Students' feedback on these experiments reveal that checklists and survey tools for investigating the built environment helped them structure their understanding, recognize what to look for in the building or an environmental setting, understand relationships between different design factors, while comprehending the impact of one factor over others. Based on the findings and results of implementing these exercises a number of concluding remarks are introduced to highlight the need for integrating inquiry-based learning into architectural design pedagogy.

Misconceptions in Teaching Lecture-Based Courses in Architecture and Design

In traditional architectural pedagogy, architecture students are typically encouraged to engage in site visits and walkthrough the built environment in order to observe different phenomena. Unfortunately however, research indicates that these visits and exercises are simply casual and are not structured in any form of investigation or critical inquiry (Bose 2006, Fernando 2007, Salama 2005, and Salama and Wilkinson 2007). Moreover, in large classes, the proposition of a site visit is often met with logistical difficulties, with little opportunity for individual student mentoring (Salama and Osborne, 2009).

While architectural educators strive to impart

the requisite knowledge necessary for successful practice, the approach to this is often divergent, depending on the priorities and ideals of the educator. What and how knowledge is transmitted therefore has significant professional and social implications (Mazumdar 1993, Salama 1998). Concomitantly, there is an urgent need to confront issues that pertain to the nature of reality ("what") and the way in which knowledge about that reality is conveyed to our budding professionals ("how"). Traditional teaching practices suggest that gaps exist between "what" and "how". Along this line of thinking, Amos Rapoport (1994) argues for the need for the discipline of architecture to develop a quantifiable body of knowledge by calling for a dramatic departure from the art paradigm that the profession and its education are based upon to one based on science and research. Rapoport introduced a number of questions underlying the heading of "knowledge about better environments"; these are: "what is better, better for whom and why is it better?" (Rapoport 1994:35).

Three major misconceptions can be envisaged in the context of this critical discussion based on reviewing the literature on architectural education and professional practices (Fisher 2006, Salama 1995; 2005; 2008; Salama and Wilkinson 2007, Seidel, Eley, and Symes 1995). They continue to characterize teaching practices of lecture based modules in architecture, and can be labeled under the headings of: a) science as a body of knowledge versus science as a method of exploration b) learning theories about the phenomena versus getting the feel of the behavior of the phenomena, and c) the real versus the hypothetical.

Science as a body of knowledge versus science as a method of exploration

When teaching any body of knowledge, educators tend to present it as a body of facts and theories and as a process of scientific criticism. The processes that led up to this product are always hidden and internalized. Therefore, there should be a distinction between the types of knowledge resulting from research in architecture and students should be made aware of them and experience them as well. First, knowledge that results from research that seeks to understand the future through a better understanding of the past, research that tests accepted ideas. Second, knowledge that results from research that develops new hypotheses and visions, research that probes new ideas and principles which will shape the future.

Learning theories about the phenomena versus getting the feel of the behavior of the phenomena

Knowledge is usually presented to students in a retrospective way where abstract and symbolic generalizations used to describe research results do not convey the feel of the behavior of the phenomena they describe (Schon 1988). The term retrospective here means extensive exhibition of the performance of the work of an architect over time. In essence, the analysis of precedents as part of the curriculum should be introduced. How projects were created and in what context, what was the client nature and intentions, how the building was delivered, and how construction was undertaken are integral parts of learning. The story telling teaching mode carried out by educators in lecture and theory courses tends to ignore these issues.

The real versus the hypothetical

Educators tend to offer students hypothetical

experiments in the form of hypothetical design projects where many contextual variables are neglected. In this respect, learning from the actual environment should be introduced. Real life experiences can provide students with opportunities to understand the practical realities and different variables that affect real-life situations. Typically, educators focus on offering students ready-made interpretations about the built environment rather than developing their abilities to explore issues that are associated with the relationship between culture and the built environment. If they do, they place emphasis on one single culture, which is their own.

In the context of discussing the preceding misconceptions, it should be noted that recent years have witnessed intensive discussions on the value of introducing real life issues in architectural education teaching practices (Morrow 2007, Romice and Uzzell 2005, Salama 2006a and b, Sanoff 2003 and2008, and Sara 2000). However, while published experiences have debated innovative practices exemplified by exposing students to primary source materials in generic terms; little emphasis has been placed upon how structured experiences could be introduced in theory and lecture courses.

A Sketch of Inquiry Based, Active, and Experiential Learning

Inquiry-based learning is an instructional method developed during the 1960s but continues to characterize current interests in higher education (Bruner, 1961, Ackoff, 1974, Salama, 2009). In essence, it was developed in response to a perceived failure of more traditional forms of instruction, where students were required to simply memorize and reproduce instructional materials (Ackoff, 1974). Active and experiential learning are sub-forms of inquiry-based learning (IBL), where students progress is assessed by how well they develop experiential, critical thinking, and analytical skills rather than how much knowledge they have acquired.

Over the past decade several studies have emerged to challenge university educators to develop teaching approaches that represent transformative pedagogies, simply moving away from thinking of students as passive listeners to active learners (Salama, 2009). However, this would seem "easier said than done." According to Bonwell (1999), gradually and especially in recent years, the incorporation of active learning strategies into the daily routine of classroom instruction has become a necessity. While there is a surge in the development of knowledge on active learning (Judith S. Liebman http://education.forum.informs.org/active.htm), one would limit this discourse to the characteristics of and the need for active learning.

The major characteristic of active learning is that students are engaged in individual or group activities during the class session including reading, discussing, commenting, and exploring. While these activities are carried out by the students, they are facilitated by the professor, and students can receive immediate feedback (Bonwell 1996). Notably, in active learning students are involved in higher order thinking that simultaneously involves analysis, synthesis, and evaluation of a wide spectrum of issues and phenomena. In the context of university classroom, active learning involves students in doing things and thinking about what they are doing.

The value of active learning becomes evident

when looking at the literature and research findings that were developed over the past several decades. The amount of information retained by students typically declines substantially after ten minutes (Bonwell 1996). The results of research comparing lecturing versus active discussion techniques indicate that students favor discussion methods over lecturing and the one way mode of knowledge transfer. Dean (1996), Bonwell (1999), and Liebman (1997) all accentuate that students do not learn much by sitting in class, listening to faculty, memorizing pre-packaged and ready-made interpretations; they all agree that students must talk about what they are learning, write about it, and relate it to past experiences.

In terms of experiential learning, several education theorists including Benjamin Bloom; David Kolb; Jean Piaget; John Dewey; and Paulo Freire voiced the opinion that experience should be an integral component of any teaching/ learning process. Their work can be traced back to the famous dictum of Confucius around 450 BC "Tell me and I will forget. Show me and I may remember. Involve me and I will understand." Experiential learning refers to learning in which the learner is directly in touch with the realities being studied (Keeton and Tate 1978).

Experiential learning is contrasted with learning in which the learner only reads about, hears about, talks about, writes about these realities but never comes in contact with as part of the learning process. Mistakenly, some educators equate experiential learning only with "off campus" or "non-classroom" learning. However, in architectural pedagogy a class in history or theory of architecture might incorporate periods of student practice on theory exercises and critical thinking problems rather than consisting entirely of lectures about theories of architecture and the work of famous architects (O'Reilly 1999; Salama 2006b, Salama et al., 2002). Similarly, a class in 'principles of architectural design' or in 'human-environment interactions' might involve critical analysis exercises on how people perceive and comprehend the built environment. Both classes might involve field visits to buildings and spaces where students are in close contact with the environment, exploring culture, diversity, people's behavior, while being part of that environment. All of these mechanisms involve an experiential learning component (Salama, 2006b).

Learning through experience involves not merely observing the phenomenon being studied but also doing something with it, such as testing its dynamics to learn more about it, or applying a theory learned about it to achieve some desired results. Assessment of environments as a valuable research vehicle needs to be introduced in lecture courses, establishing a knowledge base about the built environment that has the capability of endowing students with more control over their learning, knowledge acquisition, assimilation, and utilization in future experiences (Salama, 1999; 2007). This argument corresponds with an eloquent statement made by John Habraken when he argues that:

We need to teach knowledge about everyday environment. How it is structured, what we can learn from historic and contemporary evidence, how different examples compare, how it behaves over time and responds to change of inhabitation or other circumstances... Teaching architecture without teaching how everyday environment works is like teaching medical students the art

of healing without telling them how the human body functions. You would not trust a medical doctor who does not know the human body. Knowledge of everyday environment must legitimize our profession… (Habraken 2006: 18)

Active and experiential learning as concepts and instructional strategies appear to be two sides of the same coin underlying the inquiry-based learning method. While they differ in terminology they represent interactive learning mechanisms and share similar aims and qualities. They both aim at increasing students' motivation, place emphasis on the exploration of attitudes and values. In both of them, less emphasis is placed on knowledge transmission but greater emphasis is placed on developing students' critical thinking abilities.

Linking assessment research and active and experiential learning as interactive learning mechanisms, one can argue that architecture students need to be involved in assessment processes that should be conducted objectively and systematically - not through casual interviews or observations that may only reveal what is already known. In this context, they learn about problems and potentials of existing environments and how they meet people's needs, enhance and celebrate their activities, and foster desired behaviors and attitudes.

The results of the literature reviews convey that while there have been several attempts to incorporate assessment research into architectural pedagogy; it would appear that they did not go beyond individual attempts of committed scholars and educators. Thus, one could argue that traditional teaching practices do not utilize interactive learning mechanisms that address the dialectic relationship between people and their environments and that help students understand and comprehend the multifaceted nature of the built environment. Therefore, the need for both in-class and off campus active and experiential learning seems to be on the rise.

Contexts for Integrating Inquiry Based Learning (IBL) into Theory Courses

As a continuous effort to introduce inquiry based learning into theory courses, a series of tools were developed by the author and were implemented as exercises during his teaching in two different contexts as follows:

- Socio-Behavioral and Socio-Cultural Factors in Architectural and Urban Design, 1st Year, M. Arch.-RIBA-II at the School of Planning, Architecture, and Civil Engineering--SPACE, Queen's University, Belfast (academic year 2008-2009).
- Community Design Workshop, 3rd Year, Bs. Arch., Department of Architecture and Urban Planning at Qatar University (academic year 2009-2010).

While the exercises were introduced in different grade levels of students' learning, there was one shared aspect; that is the nature of the courses in which they were introduced, specifically—courses that address person-environment interactions, explore the relationship between human behavior and different types of environments and the impact of those environments on individual, community, and societal attitudes . In essence, this reflects the amenability and implement-ability of the exercises on different levels and in different contexts. Despite the fact that each course is introduced in a context aimed at achieving specific objectives and learning outcomes, an integral component in the two courses is

an intensive discussion of issues that pertain to ways in which information about socio-cultural factors and environment-behavior knowledge can be applied to design projects. However, it should be noted that the objective here is not to compare between the two different contexts, but to illustrate they way in which inquiry based learning was introduced and implemented. The shared objectives of the courses offered in the two contexts can be exemplified as follows.

• To increase students' sensitivity to the built environment and to break any habits of taking the environment for granted.
• To acquaint students with particular knowledge of a variety of environments including residential, work, learning, and urban environments.
• To enhance students' understanding of the core concepts regarding human-environment relations and how these concepts vary by different cultures and sub-cultures.
• To develop students' critical thinking abilities about the role of the built form in fostering, enhancing, or inhibiting cultural behaviors and attitudes.

"In-Class" Inquiry-Based Learning Mechanisms

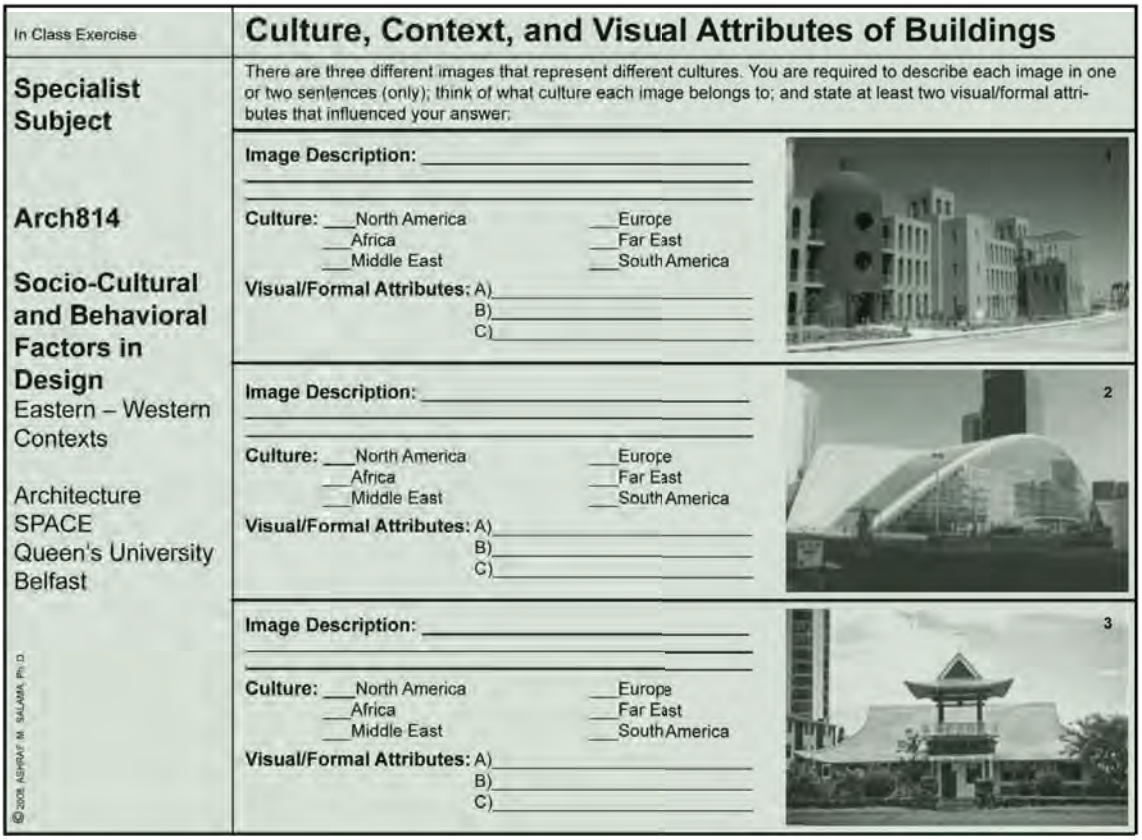
The selected examples of exercises were envisioned to complement different types of knowledge offered to students in the typical lecture format. All exercises were explained to the students, and the way in which they are linked to the body of knowledge and experiences they have already gained in the course and also in other courses. While some exercises were performed in groups of two or four, others were individual exercises based on the nature of each and the type of issues involved. Each exercise was followed by a class discussion moderated by the tutor where all students have opportunities to voice their thoughts to the whole class. The following are three examples selected from a wide variety of exercises utilized as in-class inquiry-based learning mechanisms.

Culture and Environment: Relating Visual Attributes of Buildings to Culture

• Purpose: The purpose of this exercise is to offer students the opportunity to translate their understanding of a building image into some responses that relate culture to architecture and that link the built environment to the community within.

• Prior Knowledge: Students have been introduced to the dialectic relationship between culture and environment and how culture is manifested in human artifacts, and buildings/built environments. The basic premise in this context is that culture appears in objects and in the environment as a result of people's interpretation of such an environment and based on a set of values and beliefs. In essence, it adopts the view that any object is designed in the sense that it embodies human choices and preferences.

• Requirements: Three different images that represent different cultures were presented. Students were required to describe each image in one or two sentences (only); think of what culture each image belongs to; and state at least three visual/formal attributes that influenced their answer (Figure 1). The exercise is conducted in 15 minutes and is performed in teams of two, as each two neighboring students have to articulate an answer based on their agreement.



In Class Exercise

Culture, Context, and Visual Attributes of Buildings

Specialist Subject

Arch814

Socio-Cultural and Behavioral Factors in Design
Eastern – Western Contexts

Architecture
SPACE
Queen's University
Belfast

There are three different images that represent different cultures. You are required to describe each image in one or two sentences (only); think of what culture each image belongs to; and state at least two visual/formal attributes that influenced your answer:

Image Description: _____

Culture: ___North America ___Europe ___Africa ___Far East ___Middle East ___South America

Visual/Formal Attributes: A)_____ B)_____ C)_____

Image Description: _____

Culture: ___North America ___Europe ___Africa ___Far East ___Middle East ___South America

Visual/Formal Attributes: A)_____ B)_____ C)_____

Image Description: _____

Culture: ___North America ___Europe ___Africa ___Far East ___Middle East ___South America

Visual/Formal Attributes: A)_____ B)_____ C)_____

Figure 1: Relating visual attributes of buildings to culture (Source:Author).

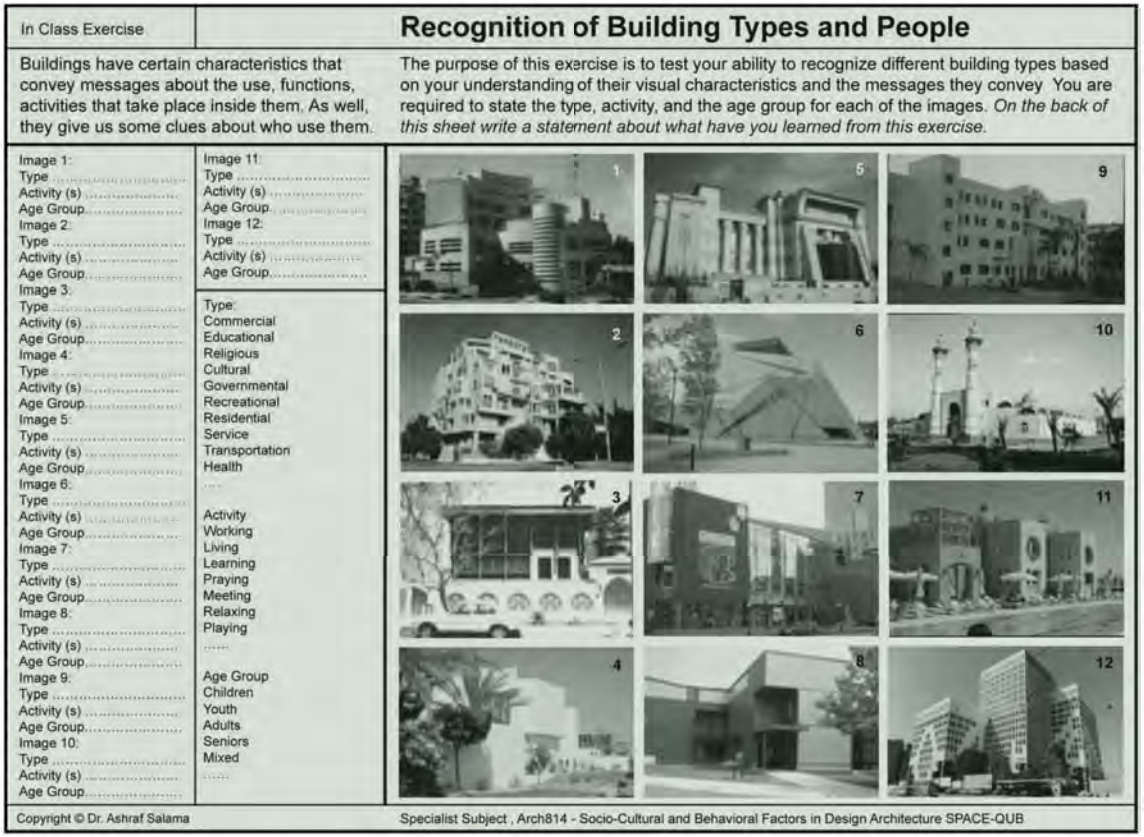
Recognition of Building Types: Relating Building Images to Functions and Users

• Purpose: The purpose of this exercise is to develop students' visual perception abilities on how to recognize different building types based on their understanding of their visual characteristics and the messages they convey.

• Prior Knowledge: Through a series of lecture presentations preceding this exercise, students were introduced to notions that pertain to "expression" in architecture, how buildings have certain characteristics that convey messages about the use, functions, activities that take

place inside them, and how they offer some clues about who uses them.

• Requirements: Students were offered a sheet that includes 12 images of different buildings selected from different environments. They were required to look carefully at the images, and then state the type, activity, and the age group for each of the images utilizing the two left columns given in the sheet (Figure 2). The exercise is conducted in 45 minutes and is performed in teams of two, as each two neighboring are required to discuss the images and reach an agreement on identifying the building type, activity, and user type of each image.



In Class Exercise

Recognition of Building Types and People

Buildings have certain characteristics that convey messages about the use, functions, activities that take place inside them. As well, they give us some clues about who use them.

The purpose of this exercise is to test your ability to recognize different building types based on your understanding of their visual characteristics and the messages they convey You are required to state the type, activity, and the age group for each of the images. *On the back of this sheet write a statement about what have you learned from this exercise.*

Image 1:
Type .....
Activity (s) .....
Age Group.....
Image 2:
Type .....
Activity (s) .....
Age Group.....
Image 3:
Type .....
Activity (s) .....
Age Group.....
Image 4:
Type .....
Activity (s) .....
Age Group.....
Image 5:
Type .....
Activity (s) .....
Age Group.....
Image 6:
Type .....
Activity (s) .....
Age Group.....
Image 7:
Type .....
Activity (s) .....
Age Group.....
Image 8:
Type .....
Activity (s) .....
Age Group.....
Image 9:
Type .....
Activity (s) .....
Age Group.....
Image 10:
Type .....
Activity (s) .....
Age Group.....

Image 11:
Type .....
Activity (s) .....
Age Group.....
Image 12:
Type .....
Activity (s) .....
Age Group.....

Type:
Commercial
Educational
Religious
Cultural
Governmental
Recreational
Residential
Service
Transportation
Health
.....

Activity
Working
Living
Learning
Praying
Meeting
Relaxing
Playing
.....

Age Group
Children
Youth
Adults
Seniors
Mixed
.....

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Specialist Subject , Arch814 - Socio-Cultural and Behavioral Factors in Design Architecture SPACE-QUB

Figure 2: Relating building images to functions, activities, and users. (Source:Author).

Seeing and Verbalizing the Environment

• Purpose: This exercise is developed to elicit evaluative comments about students understanding of different environments. The aim is to help them recognize the importance of the terminology used by the public and the terminology used by architects and designers. Another aim is that students can express their concerns of different environmental settings, and eventually be able to work toward improving existing environments or designing new environments.

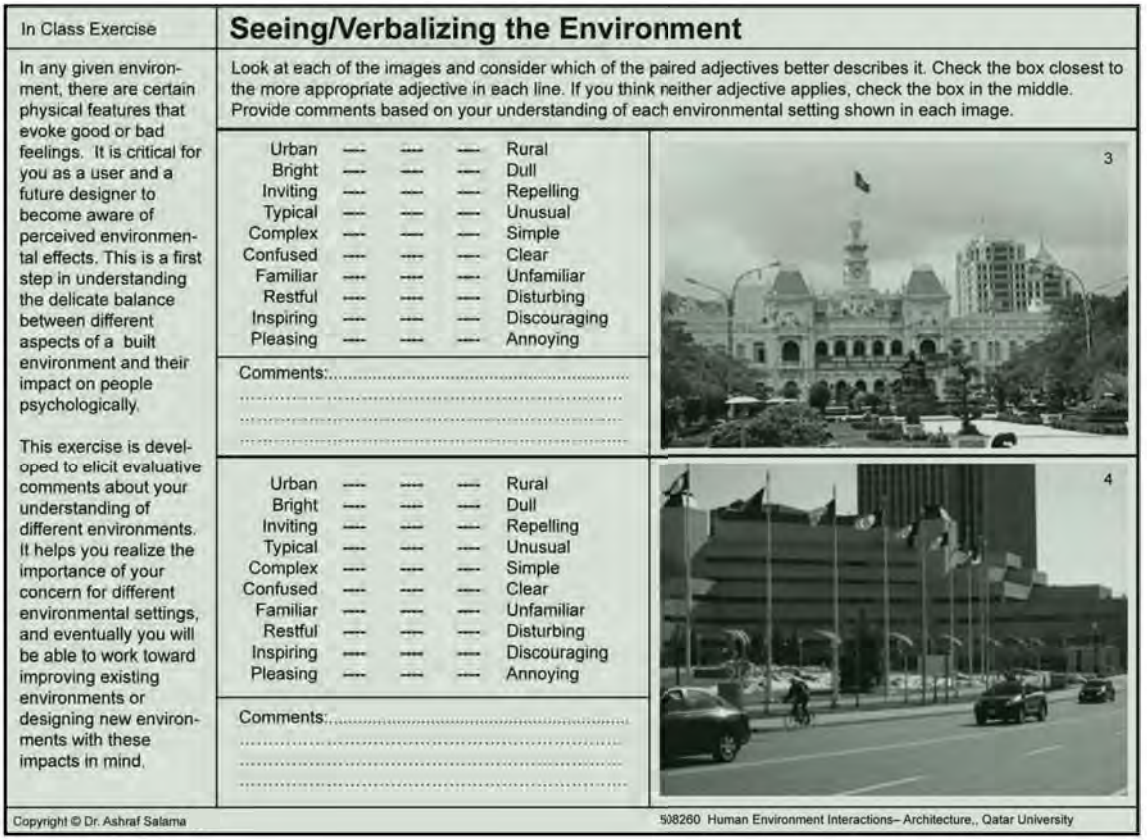
• Prior Knowledge: Students were introduced to the way in which buildings relate to the psychology of the users. Knowledge delivered and discussed prior to conducting this exercise included issues that pertain to the fact that in any given environment there are certain physical features that evoke good or bad feelings. It is critical for them as users and as future designers and architects to become aware of perceived environmental effects. This is a first step in understanding the delicate balance between different aspects of a built environment and their impact on people psychologically.

• Requirements: Students were offered 6 images and were required to look at each of the images and consider which of the paired adjectives better describes them. They were to check the box closest to the more appropriate adjective in each line. If they think neither adjective applies, they were to check the box in the middle (Figure 3). As well, they were required to write generic comments based on their understanding of each environmental setting shown in each image. The exercise is conducted individually and is performed over a period of 30 minutes where each student was expected to spend 5 minutes only on each image.

After conducting each of the three exercises students were asked to elaborate on what benefits they have gained out of their engagement and reflect on their experience. The findings point out that the students were able to make judgments about the built environment and to give reasons for those judgments through a wide spectrum of exercises. However, a few students were not able to recognize similarities and differences between the building images or to fully comprehend the crux of each exercise. Never-the-less, they commented that utilizing checklists and discussion tools for relating the content of the course to the exercises helped them recognize what to look for exactly in the building images. Students reported that they were excited during the discussions. In their comments, the majority felt that their experience of the buildings in a structured manner invigorated their understanding of many of the concepts typically delivered in a lecture format without exposure to generating discussions or debates in the classroom. As well, writing and presenting were felt as important skills they need to further develop. The discussions that followed each exercise corroborate the value of introducing in-class inquiry-based learning mechanisms while creating an atmosphere amenable to responsive reflection and critical thinking.

The Built Environment as an Open Textbook: "Off-Campus" Inquiry-Based Learning Mechanisms

In the two contexts outlined earlier, continuous efforts were made to integrate assessment research through experiential learning in order



In Class Exercise

In any given environment, there are certain physical features that evoke good or bad feelings. It is critical for you as a user and a future designer to become aware of perceived environmental effects. This is a first step in understanding the delicate balance between different aspects of a built environment and their impact on people psychologically.

This exercise is developed to elicit evaluative comments about your understanding of different environments. It helps you realize the importance of your concern for different environmental settings, and eventually you will be able to work toward improving existing environments or designing new environments with these impacts in mind.

Seeing/Verbalizing the Environment

Look at each of the images and consider which of the paired adjectives better describes it. Check the box closest to the more appropriate adjective in each line. If you think neither adjective applies, check the box in the middle. Provide comments based on your understanding of each environmental setting shown in each image.

Urban	----	----	----	Rural
Bright	----	----	----	Dull
Inviting	----	----	----	Repelling
Typical	----	----	----	Unusual
Complex	----	----	----	Simple
Confused	----	----	----	Clear
Familiar	----	----	----	Unfamiliar
Restful	----	----	----	Disturbing
Inspiring	----	----	----	Discouraging
Pleasing	----	----	----	Annoying

Comments:.....

3

Urban	----	----	----	Rural
Bright	----	----	----	Dull
Inviting	----	----	----	Repelling
Typical	----	----	----	Unusual
Complex	----	----	----	Simple
Confused	----	----	----	Clear
Familiar	----	----	----	Unfamiliar
Restful	----	----	----	Disturbing
Inspiring	----	----	----	Discouraging
Pleasing	----	----	----	Annoying

Comments:.....

4

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Figure 3: Seeing and verbalizing the environment. (Source:Author).

to get students involved in the production of knowledge while exposing them to primary sources of information. This took place by assigning two major "off campus" inquiry-based learning mechanisms in addition to the in-class exercises; the first was "Contemplating Settings," and the second was the "Walking Tour." The two exercises adopt the concepts of the built environment as an open text book—as a teaching tool.

Contemplating Settings

In the first part of the course, students were introduced to a number of socio cultural and behavioral phenomena that include privacy, personal space, territoriality, crowding and

density and how these concepts relate to people as individuals and in groups. Examples describing these phenomena were displayed to students to illustrate what each phenomenon encompasses (Figure 4). The purpose of the exercise was to complement the body of knowledge acquired in lectures by exposing students to real life conditions. They were required to take concepts underlying each phenomenon in abstract terms and turn them into concrete terms through description and interpretation of the situations observed.

Students were to record and document cultural and behavioral phenomena by photographing selected settings. Two photographs that illustrate each phenomenon were required. A number of rules were established where photographs should be taken for a real life situation to represent indoor or outdoor spontaneous settings. Students write one statement describing the setting in physical, cultural and/or behavioral terms. Simple questions such as: who is doing what, where, how, for how long, and with whom represented the structure of each statement. Assessment criteria were delivered to students; these included how accurately their text and photographs reflect the meaning of the phenomena as discussed in the lectures. How their interpretations show a scholarly understanding of the term, the

Figure 4: Different environmental settings illustrating behavioral phenomena that were discussed with students. (Source:Author).

selection of the setting, and the overall quality of photographs and graphic layout of their submissions were important criteria for assessing their work and the overall learning outcomes.

An important finding indicates that while all students were able to observe, document, and interpret the information, most of them could not phrase concise statements that describe each setting. However, in a group discussion for debating students' work among themselves with the facilitation of the author, they were able to recognize how people behave in a specific environmental situation, their body gestures, degrees of socialization, how they attempt to control their environment, regulate their interaction with others, how they shape and transform the physical aspects of the setting to support their activities, enhance their position in space, create views, or block distraction.

The Walking Tour and the Multiple Factor Building Appraisal

To introduce the walking tour mechanism, a survey tool was devised; the purpose of which is to develop students' ability to have control over their learning by establishing links between visual and functional issues of a building or a group of buildings. The exercise is devised to facilitate a deeper understanding of the built environment through self-guided tours. Checklists were provided to offer students a procedure for taking a structured walkthrough and around a building. The assessment strategy in this context is considered to be impressionistic which increases students' awareness by focusing on specific factors (Salama, 1996, 1998; Sanoff, 1991).

Students were divided into groups; each conducted a walkthrough exercise utilizing the multiple factor building appraisal tool. A number of key factors were identified and included: context; massing; interface; way-finding; socio-spatial elements; and comfort. Checklists were phrased in the form of questions underlying each factor. The process included the use of notes, sketches, diagrams, and verbal description. Matrix 1 illustrates an example sheet used to conduct the procedural assessment exercise.

Questions were designed in a generic manner that reflects the essence of each factor. However, students' attention was drawn to the fact that the list of questions underlying each factor is not exclusive and is introduced to help structure and guide their tours for the purpose of the exercise. Numerical scores were then assigned to the questions to represent the degree of appropriateness underlying each factor using a point scale method. Scores were averaged and an overall score for the building was then computed. Students were required to develop a report that would consider the following:

- Description of the building appraised with the support of photographs and illustrations;
- Appraisal of the building using the checklists with numerical scores assigned for each question;
- Analysis of numerical ratings by computation of an average score for each factor and for the overall score;
- Writing comments or remarks based on their impressions and understanding of the building.

Across the two different contexts, the findings point out that the students were able to make judgmental assessment about the built environment and to justify their assessment. However, students' analyses reveal some

shortcomings in their abilities to comment, where some of them could not express their concerns verbally and could not write an understandable reporting statement. Also, a few students were not able to recognize similarities and differences between the questions. However, they commented that checklists and survey tools for investigating the built environment helped them recognize exactly what to look for in the building and to understand relationships between different factors, while comprehending the impact of one factor over others.

Factor 3: INTERFACE	
A building is essentially an enclosure that separates an interior private space from exterior public space. The interface is the crucial meeting place where the inside of the building connects with the outside.	
Highly Appropriate 1 2 3 4 5 Highly Inappropriate	**Score**
How clearly or effectively does the exterior of the building indicate its interior functions?	----------
How effectively does the interior of the building connect with the outside of the building? Are the connections appropriate and functional?	----------
Are the exits and entrances easily accessible?	----------
Are the various openings related to thoughtful planning of interior? (Consider entry of light, view, privacy, noise, heat, glare, etc.)	----------
Are the exit-ways appropriate from a safety point of view?	----------
When moving from the exterior of the building to the interior by means of the main entrance, is the experience pleasant, interesting, or special in anyway?	----------
Has the designer, in your opinion, handled the problem of interface well in his/her design of this building?	----------
	----------
Photographs or other forms of illustrations that represent the factor of "Interface"	***A Summary paragraph should be written describing how well the design of the building has addressed the factor of "Interface"***

Matrix 1: Example sheet utilized to conduct the walking tour exercise.(Source:Author).

Conclusions: Analytical Reflections and Way Forward

By and large, the results implementing in-class or off campus inquiry based learning exercises are not exclusive, ye they accentuate the value of introducing structured interactive learning mechanisms in lecture courses while utilizing the built environment as an educational medium. Students developed a deeper understanding of the relationship between visual and functional factors and focused on critical issues that go beyond those adopted in traditional teaching practices.

The two widely held conceptions of the built environment; the conceptual/subjective and the physical/objective, are embedded in the exercises. While the first set of in-class exercises place emphasis on knowledge acquisition based on students' perceptions and interpretations of the building images that are driven by the knowledge delivered in the classroom, the second set of off-campus exercises attempt to develop students understanding of how qualitative aspects of the built environment could be translated into quantifiable measures. However, on the one hand, while the exercises are aimed at introducing structured experiential learning through some form of assessment research, they do not provide comprehensive panacea to the misconceptions that characterize traditional teaching. On the other hand, the exercises do not address the complexity of the physical environment, but they helped students focus on specific aspects of the built environment that pertain to a specific knowledge content while bridging the gaps between "what" and "how" types of knowledge.

A considerable portion of students' education in architecture and design is based on "experience", "making" and "active engagement." Students are typically encouraged to study the existing built environment and attempt to explain it through theories or typologies, always looking at outstanding examples. However, underlying these theories, there are assumptions about the built environment and the people associated with it, and usually these assumptions remain hidden. It is in this relationship lies the "lesson" to be learnt. Whether people associated with the environment were the actual users of it or were students acting as observers and users at the same time, the incorporation of exercises similar to the ones introduced in theory/lecture courses would foster the establishment of links between the existing dynamic environments, the concepts and theories that supposedly explain them, and the resulting learning outcomes. Concomitantly, the contribution of inquiry-based learning to architectural and design pedagogy lies in the fact that the inherent, subjective, and hard to verify conceptual understanding of the built environment is complemented by the structured, documented interpretation that is performed in a systematic manner in a classroom or off campus setting amenable to critical thinking and reflection.

The built environment is variant, diverse, and complex. Buildings and spaces are major components of this environment: planned, designed, analyzed, represented, built, lived in and occupied. They are also experienced, perceived, and studied. They should be re-defined as objects for learning and need to be transformed into scientific objects. In this respect, one should emphasize that in order for an object to be taught and learned, its components

should be adapted to specific pedagogic and cognitive orientation that introduces issues about specific bodies of knowledge.

It is the perception and position of this author that the incorporation of critical inquiry—through active and experiential learning—into architectural education represents a true frontier and a learning paradigm in architecture that integrates the real and the hypothetical, the process and the product, the objective and the subjective, and ultimately the behavior of the phenomena future architects are exposed to in their education. In this respect, it is firmly believed that introducing and implementing tools that utilize the built environment, buildings, and spaces as a teaching tool and as open textbooks foster the capabilities of future architects to be critical thinkers while designing new buildings or introducing any change in the environment.

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STIMULATING STUDENT INTEREST IN DESIGN HISTORY CLASSES

Tasoulla Hadjiyanni and Stephanie Watson Zollinger

Abstract

With history being an established course in design education and sparking creativity being one of design education's primary objectives, questions arise as to: What forms of history teaching capture student interest? How can the lessons of history resonate with youth in ways that tie the past to the present? How can assignments spark excitement in students and engender a passion for the subject? And, where can faculty draw inspiration from in re-envisioning the role that history can play in their program and profession? Two interior design educators from the University of Minnesota share techniques, assignments, and pedagogies that respond to the above questions and help set a trajectory for both creatively teaching design history and sparking students' interest and creative potential.

Going beyond traditional methodologies and discourses around the teaching of history, these educators take a unique perspective and strive for a diverse set of objectives. Employing techniques such as digital games and free-hand sketching, they challenge students to engage with the material first hand. By tying a design project into a history course, they present students with the opportunity to conceive of ways to bridge the past, present, and future. Infusing history classes with creative and critical thinking that encompasses and responds to pressing social concerns reinforces the meaning of history classes and makes history relevant to students' lives. Through this sharing, the authors aim to spark a dialogue across the disciplines around the teaching of history and the renewed role it can play in design education.

Keywords

Design history, creativity, pedagogy, sketching, technology.

Introduction: History in Design Curricula

One of the few undisputable courses in design curricula, history has survived as an instrumental course despite changes in attitudes and approaches towards the past (Attoe & Moore, 1980; Swenarton, 1987). The central position of history in architectural and interior design education is reflected in journals devoted to the subject, societies, extensive scholarship and inquiry, as well as expectations outlined in both fields' accreditation standards (CIDA, 2009; NAAB, 2009). In parallel, creative teaching is inherent in these visual disciplines, where novelty and imagination are used to grasp and explore the past as well as understand the unfamiliar (Boland, 2000; Jackson, 2005).

Practices

Given the many facets of architectural and interior design history that can be unraveled (from chronologies to design characteristics, ideas, and forces impacting designers—social, political, cultural, technological, environmental, economic, etc.), the challenges to those teaching history are many. The proliferation of books, articles, conferences, films, and other mediums available to faculty do not make today's teaching of design history any easier than before. Questions abound: What forms of history teaching capture student interest? How can the lessons of history resonate with youth in ways that tie the past to the present? How can assignments and exercises be developed that spark excitement in students and engender a passion for the subject? And, where can faculty draw inspiration from in re-envisioning the role that history can play in their program and profession? With answers to these questions, faculty can enliven their material, strengthen student engagement, and reframe the value of history courses in students' lives.

Part of the challenge of imbuing creative teaching into history courses comes from transforming established traditions of how to teach history and what exercises to employ in the process into ones that strike a cord with a student body whose diversity has reached unprecedented levels and for whom technological gadgets are almost second nature. Typical history assignments include investigating original works or even obscure historical buildings' proportions, composition, use of the orders or decorative elements, etc. through papers and models that often adopt a comparative perspective—comparing for example the domes of Santa Maria del Fiore, Florence, and St. Peter's, Rome (Shvidkovsky & Chorban, 2003).

Yet, in this era of global interconnectedness, technological dependence, and innovation as well as emphasis on critical thinking and ethically responsible design (Fisher, 2008), a meticulous study of masterworks might not be the only avenue for reaching aspiring architects and interior designers. Critics, such as Creese note: "Novice architects should be permitted to move off into as many realms as their imaginations can legitimately command...To have the students correlate only one building type out of the past to their new assignment, is to leave them without the power of reconciling themselves within a much larger inheritance" (1980, p.11-12). Faculty have to re-envision exercises and pedagogies adopted, translating them into ones that account for students being able to take ownership of the subject and use history as a tool to find answers to questions that emanate from their own experiences and lived realities.

Additional critiques surrounding the teaching of history also relate what is perceived by some as a disconnection between history teaching and practice. In the North American system, the intersections of history and theory are strong (Jarzombek, 1999/2000). The debate that arises centers on the issue that, because of its ties to theory and the humanities, history "becomes ever more remote from the concerns of architectural practice" (Jarzombek, 1999/2000, p.489). Teaching in fields which are so closely linked to practice, design faculty are thereby caught in the struggle of having to define ways by which the 'practical' application of history lessons can manifest in exercises and assignments. This idea of bridging 'learning' and 'applying' has been at the core of design history courses and design curricula, albeit a difficult one to achieve (Morgenthaler, 1995).

Exploring ways to mediate between the two opposing polarities of what history can be about (theory or practice) is inextricably tied to defining the role of history courses. Attoe and Moore (1980) describe the two kinds of architectural history courses that have prevailed in design education: "One... studies buildings as expressions of the society, with a goal of making the student a better informed, more thoughtful person, better fortified for the making of his own decisions. The second... involves the felicitous presentation of routes into mines where there might be found a vast store of precedents and inspirations for the students' own designs" (p.1). They go on to assert the need for an intertwining of the two approaches. In this paper, we contribute to the literature by sharing an exercise that leads to both outcomes: students being better informed about design history and finding inspiration for their own designs.

Apart from how history relates to practice and to design, an additional dimension of the role of history courses is also under questioning: how history relates to the present and the future. While the place of the past is secure in history curricula, some historians have called for an architectural history marked by a critical interest in the present as well as the past (Swenarton, 1987). Weaving the present in courses already overloaded with material that needs to be covered takes creativity on the part of the instructor who is called to broaden the class's scope and expand the ways by which to instill in students the lessons of the past. Assignments that enable students to make a difference, like the one we will be sharing below, are a step in this direction.

Embarking on the endeavor of stimulating student interest through history courses has an underlying ethical element. Ethics are infused into a subject whose teaching can be the "means of readjusting the indispensable value systems, which can then be used by following generations" (Creese, 1980, p.11). As Otto (1982, p. 29) also notes, "For when the circumstance that contains history and architecture is honest, forthright, and vigorous, the interaction between them can be an ethical achievement, one with the capacity to possess architecture". Additional questions that surface revolve around how can faculty guide students through what can be conflicting political or national agendas and their relevance to design history? How much should faculty push a student unwilling or uncomfortable with 'differences' in design—be those historical, cultural, social, economic, etc.? And, how do faculties members develop and execute exercises that might induce ambivalent feelings, anger, and confusion? Such transformative pedagogies, which imply a change in consciousness that will have lasting effects in ways that are recognizable by both the person and others (Clark, 1993), ask of faculty to critically reflect on their teaching techniques and knowledge of the subject matter as "the sincerity of their intentions does not guarantee the purity of their practice" (Brookfield, 1995, p.1).

As two interior design educators, this paper becomes a medium by which we can start a dialogue around expanding the pedagogical approaches to the problem of teaching history and stimulating interest, learning, engagement, and creativity. Our goal in sharing the three pedagogical techniques that follow is for discourses around the teaching of history to strengthen, becoming a forum through which the question of "How can we effectively teach history?" can begin to dissipate.

Stimulating Interest: Three Pedagogical Techniques

"History is not 'what happened in the past;' rather, it is the act of selecting, analyzing, and writing about the past. It is something that is done, that is constructed, rather than an inert body of data that lies scattered through the archives" (Davidson & Lytle, 1986, p.xix). It is this dynamic nature of history that makes it exciting for both instructors and students. As material that is not static or stagnant, but instead it is subject to interpretation and critical analysis (Flores, 2003), historical content can serve as the fertile ground on which creativity and originality can flourish, thereby turning the subject of history into one of interest for the students and the faculty.

Creativity, originality, and student engagement are often not among the course objectives and outcomes one would typically associate with large enrollments classes that heavily rely on lectures and PowerPoint presentations, such as interior design history classes. Guiding our approach to the problem of using history to stimulate interest and spark creativity is Margaret Boden's (1990) premise in her book The Creative Mind, that "What makes the difference between an outstandingly creative person and a less creative one is not any special power, but greater knowledge (in the form of practiced expertise) and the motivation to acquire and use it" (p. 24). Pushing creative boundaries, we argue, must be grounded in an in-depth exploration and understanding of the issues surrounding the subject matter on hand. Although a discussion of research methods is beyond the scope of this paper, the techniques shared below will shed light on the connections among facets of knowledge, ways to acquire knowledge, and creativity and how all are used to both describe and push knowledge and originality to the next level.

Drawing from over 20 years of combined experience in teaching history, we have developed pedagogical techniques by which to stimulate student interest in interior design history classes. Here, we share three of these techniques: study tools that appeal to technologically savvy students; sketching as a form of engagement and reflection; and a semester-long project that challenges students to examine their role in the world and the difference they can make.

Prior to delving deeper into more detailed descriptions of the three teaching techniques, it is beneficial to briefly elaborate on the scope of the two courses from which these pedagogies are drawn. The first course, taught by Stephanie Zollinger, focuses on the study of European interiors and furnishings including furniture, textiles, and decorative arts. This course begins with the study of the ancient Egyptian, Greek, and Roman civilizations, the societies that introduced the classic idiom that consistently reappeared over the following centuries and established the framework for inquiry by which historical study is analyzed in this field. The framework is then applied to the evolution of interiors and furnishings in Italy, France, and England. The second course, taught by Tasoulla Hadjiyanni, focuses on the United States, covering 1650 to the present. The emphasis is on uncovering the interconnectedness of design ideas and how they can be appropriated or adapted to match one's own culture's aesthetics and needs. Exploring how design elements from the Orient, Europe, and Central America are used to create a distinctly American design identity, class discussions unearth the multiplicity of

factors that impact the design of interiors and furnishings.

Although a combination of teaching methodologies are used, including visits to museum exhibits, films, and guest speakers, the primary means by which material is shared with students is PowerPoint presentations that we have developed. The objectives range from sharpening design abilities by strengthening students' design comprehension and skills through the study of historical precedents to creating responsible designs, fostering critical thinking, and learning teamwork. Ways to reach these goals are by: increasing understanding of the historical, environmental, socio-economic, political, technological, artistic, and cultural developments that affect the design and manufacturing of furniture and interior design elements; increasing understanding of the meaning of objects within their own time and across time; developing associations between the past, the present, and the future; increasing visual literacy of both furniture and interiors and through that increasing students' design stimulants and perspectives on possible solutions to design problems; developing a vocabulary for discussing and analyzing historic furniture and interiors; developing an understanding of the chronology of historical periods in design and the relationships between these periods; developing an understanding of craftsmanship, materials and technology as these relate to furniture and interior design; and developing the ability to identify the stylistic features corresponding to various historical periods and to make generalizations based on specific examples.

As a way to attain the above objectives and guide students through the process of discovery, lectures adopt a macro-to-micro approach, shedding light on the forces impacting interiors and furnishings as well as highlighting the work of masters and specific masterpieces, such as Palladio's Villa Barbaro and Le Corbusier's Villa Savoye. It is the following three pedagogies however, that infuse energy and excitement in these classes, engaging students and stimulating their creative potential: embracing technology, sketching, and making a difference.

Embracing Technology

"Tell me and I forget. Show me and I remember. Involve me and I understand."Chinese Proverb.

The design history courses at the University of Minnesota are embracing technology by incorporating numerous computer games into their classrooms. The history faculty agree with research by Salen and Zimmerman (2004) stating that games are effective tools for learning because they offer students a hypothetical environment in which they can explore alternative decisions without the risk of failure. Thought and action are combined into purposeful behavior to accomplish a goal (Prensky, 2001). Faculty members believe playing games teaches students how to strategize, to consider alternatives, and to think flexibly. Educational games are argued to enhance learning, engage learners, and provide learning methods that correspond with students' learning styles (Martinson, Zollinger & Gardner, 2009). Different games appeal to different people. This appeal may be based in content, activity, or personal affinity for game playing.

Interior design faculty member, Stephanie

Zollinger, has developed numerous games such as flashcards, matching, and a Jeopardy-based game. The games are used to reinforce concepts that are covered in the textbook as well as in class lectures. For example, matching games are used to reinforce vocabulary and time periods. Several matching games have been developed to help students identify design motifs (see Figure 1), architectural elements, styles of furniture, interiors, architecture, and art. Students match images to appropriate labels (i.e. vocabulary terms and time periods). Matching games provide motivation by: a) the opportunity to be played repeatedly until success is achieved; b) immediate feedback; c) allowing students to be in control of the game; and d) enhancing student concentration. These are particularly helpful when terms taught are so 'foreign' to the students both in terms of the vocabulary and spelling. Given that the following history course relies on the knowledge gained in this first course, the matching games make the learning process fun and effective.

A game based on the Jeopardy format has been very successful as a way to review fundamental concepts for unit tests. The Jeopardy session is typically held the class period before an exam. To play, the class is divided into teams of two to three students each. Three teams are grouped with a designated "master of ceremonies" (MC). Subject headings parallel topics and time periods covered in class and outside readings. The game board is displayed via a computer projection unit. Each team, in turn, selects a category and a point value and must answer the accompanying question. This format makes it unnecessary for the MC to determine which team "buzzed in" first. Team members are encouraged to discuss answers among

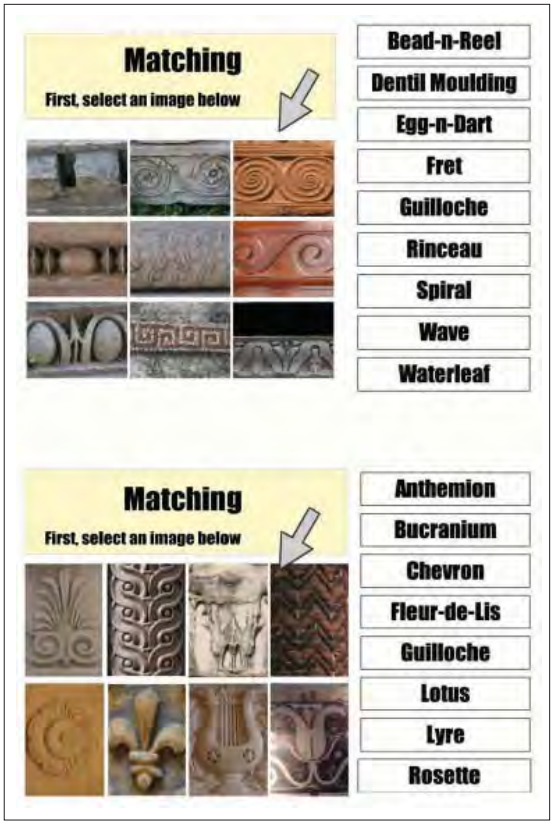

Figure 1: Matching games – motif identification. (Source: Authors).

themselves, but a 30-second time limit is enforced. If the answer is incorrect, one of the other two teams has a chance to "steal" the question and the points. The team with the lowest point total has the first opportunity to steal. The team format is quite useful for a number of reasons: it doesn't put the individual "on the spot" in front of classmates; it increases

the chances of getting a correct answer; and the students usually end up teaching each other. Although some friendly competition arises during the game, it is important to shift the focus away from the competition and direct it towards the learning/review process.

Additional emphasis must be placed on reminding students that the purpose of playing the game is not to provide a comprehensive review. Rather, the game is used as a prod to initiate the review process by going over the basic concepts in the various time periods. Overall, students are enjoying the games and are constantly asking for more. By playing online games, students claim that they understand the history material better and retain it longer. Student evaluations also reveal that the technology-enhanced learning environment has a positive influence on student motivation, through factors such as novelty, curiosity, control, personal choice, and effort.

As in any learning situation, students are usually more engaged when they face a challenge that they feel they can meet. Therefore, the games are developed to reflect course content and various skill sets. If the task is too hard, the students will give up easily, and if it is too easy, the student may become bored. Students also benefit from games that become progressively more complex and difficult. Thus, Jeopardy is an effective game as it allows students to begin at different levels of challenge and gradually take on more challenge.

In summary, games can be a valuable part of an educational curriculum. As with all learning, students need guidance and opportunities to reflect on their work. Games need to be sufficiently challenging to engage students, and the level of challenge should be flexible, changing as students become more proficient. As students can attest, games are not just fun – they can be powerful learning tools.

Sketching

During lectures that draw from PowerPoint presentations, students in Hadjiyanni's history course are expected to sketch the design examples shown. These sketches serve multiple purposes. First, they can be helpful reminders when students are studying for tests. Second, they can serve as a reference book that students can use later in their careers. Third, sketches sharpen students' critical engagement with the subject because students are actively reflecting on which type of sketch to use to convey a particular idea, choosing from a diverse range of possibilities that include a whole piece of furniture, building form, interior, elevation, etc.; details, such as legs, feet, seats, ornamentation style, etc; interior characteristics of buildings such as moldings on openings, mantel pieces, stair designs, etc.; exterior characteristics of buildings, such as massing, elevations, window types, railings, landscape elements, etc; conceptual-type sketches that evoke the essence of a piece or the design ideas behind it; artists' renditions, such as paintings and decorative arts pieces; and other elements presented (Figure 2).

Lastly, sketching as a means of note-taking allows assessment of a student's ability to grasp the concepts being taught and a student's comprehension of the design elements that make up the design shown. Assessment through sketching takes place both informally, during

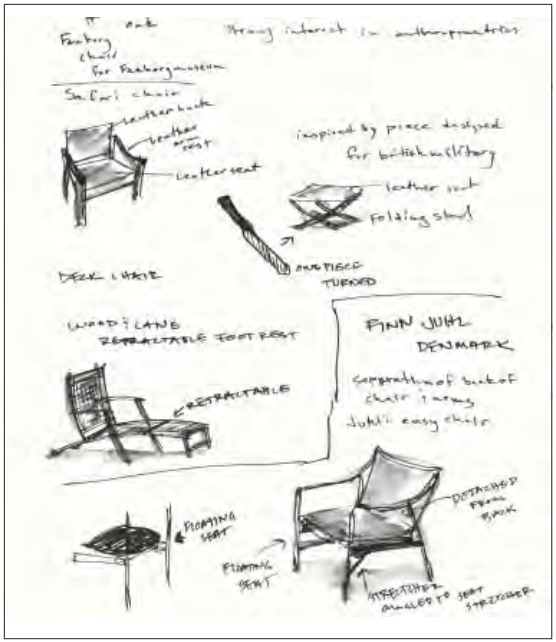

Figure 2: Students exercise critical thinking in deciding what to sketch and how – by Anna Yust. (Source: Authors).

class time, and formally via tests. For example, three students use the board to sketch images of the varying ball-and-claw foot types prevalent in different regions during the American Chippendale period. The rest of the class follows while commenting on what is missing or what the major differences are (Figure 3). The test builds on this lesson by asking students to use words and a sketch to relate one of these designs. An indication of the effectiveness of sketching in teaching concepts and ideas is the fact that, in spite of the level of detail and difficulty involved in this task, over two-thirds of the students in the class answer correctly. Through this exercise, students get exposure to the many facets of a design that they have the power to manipulate while creating identity and differentiation among pieces—from overall form down to the nails on a ball-and-claw foot.

Interacting with a furniture piece, an art work, or a building shown makes history 'present' to the student, connecting the image on the screen to their hand and ultimately their cognition. This process of engagement lends a tangible essence to a past that is now felt and reconstructed. The patience that sketching requires asks of the student to pay attention to detail that would otherwise be lost if the student relied only on words to capture the lessons learned. With a visual to carry home the message, students are better able to embed the material taught not in a 'reproduction-type' manner but in an evocative recreation of what the piece means to them, what stands out to their critical eye.

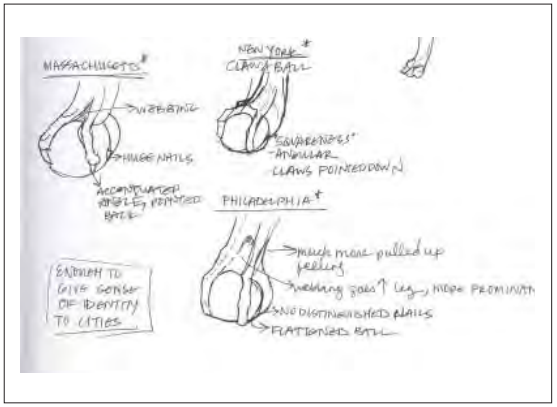

Figure 3: Sketching as a means of assessing students' comprehension – by Marissa Fredrickson. (Source: Authors).

Making a Difference

As creating responsible designs and fostering critical thinking are among the history classes' objectives, the courses aim to engender an understanding of the artistic, historical, social, environmental, economic, political, cultural, religious, technological, and intellectual forces behind the design and manufacturing of furniture and interior design elements. With that understanding on hand, students in Hadjiyanni's class are challenged to consider how their designs and they as designers can respond to current forces and societal debates. Through a semester-long assignment titled 'Design Manifestations Across Historical Time,' students develop associations between the past and the present in order to plan for the future.

In teams of four, students select a design problem to study across time and propose a design solution that addresses current societal needs. The design problem can be a building type; an interior space; a part of building, like a window; a piece of furniture; a wallpaper; a fabric; a lighting fixture, etc. and the historical periods must fall in the domain covered by this course, that is, after 1650. Three team members study one period from the past while the fourth, studies the present. The openness of the assignment enables students to select something they are passionate about, stimulating their interest and engagement and challenging them to reframe the role of designers in solving present concerns.

As a semester-long project, this assignment has two parts: a) a paper-like part that relates the research phase of the assignment and provides students with the knowledge needed for an intellectual, sophisticated, and informed understanding of the design problem they wish to pursue and how others before them used it to respond to the forces of their time, and b) a design proposal part that includes key process drawings in the form of plans, elevations, sections, axonometrics, material selections, details, and other forms of documentation as well as rendered design development type drawings in enough detail to comprehend the design. In some cases, construction documents and models are also part of the final submission. Because of its design component, this pedagogical method ties design teaching to the teaching of history.

Apart from picking the topic on which they want to focus on, students are also encouraged to be creative and take ownership of how they will explore solutions to the design problem they identified. These can again vary tremendously, from spatial and material to artistic and technological. Serving as a catalyst for students to explore contemporary issues they care about and their historical evolution, these projects range from public art pieces, to web sites, and a desk design. An example is Scream for social change. Students studied feminism and delved into the lives of women who changed history. Reaching the present day, they were concerned with the 'negative' female images promoted by the media—i.e. extremely thin, anorexic-looking models. Looking at the role of women throughout history, they proposed a series of statues to be placed on Nicollet Avenue in downtown Minneapolis (Figure 4). Turned into public art, these statues would juxtapose 'media-promoted' body images with those of prominent 'real' women who would serve as roles models for a healthy and positive body image. Their pink color is eye-catching and their

Figure 4: SCREAM for social change – map of where the statues will be located. (Source: Authors).

Figure 5: Statue examples from SCREAM for social change. 'Real' women on the left, 'media-promoted image' on the right. (Source: Authors).

provocative casting is enhanced by them being unclothed yet non-sexual (Figure 5).

While responding to a similar call, the need to promote a positive and healthy body image among young women, another team employed digital design instead . For them, a vanity was seen as a vehicle for reinforcing the intersections of beauty and health (physical, mental, and emotional). A mirror transforms into a digital screen that includes links to updates on a person's well-being, categorized as: my mind, my body, my spirit, and my health. Personalized for the user, 'my mark.com' keeps the user informed of everything, from news of the day to inspirational and spiritual direction as well as healthy choices. Being a mobile unit that caters to a transient population, the vanity can be transported as people move or change living arrangements (Figure 6).

In a more traditional approach to furniture design, members of a team were moved by news that Minneapolis lacked behind other major cities in high school students who graduate on time. This disconcerting statistic prompted them to investigate desks and their evolution. The complexity of such an undertaking was underscored by additional factors that impact school attendance and performance, among them the increasing numbers of students suffering from Attention Deficit Disorder (ADD) and the alarming statistics for children with autism. Cognizant of the special needs of these students, the team drew inspiration from Eero Aarnio's Bubble chair, designed in 1968 Finland, and designed a 'hanging chair' that can double as a study area. With its ability

to move, this desk can enable children and teens with ADD and autism to release energy while still studying and be free from the 'corner desk prison'. Apart from a writing surface, the chair-desk accommodates the technological gadgets children are accustomed to using.

Figure 6: Vanity with digital mirror helps reframe notions of beauty and health. (Source: Authors).

Conlusions: Closing Comments and Implications

Although a lot has changed since the role of history courses in supporting both the present and the future direction of the interior design profession was first questioned (Jennings, 1998), much remains to be done. This sharing of pedagogical techniques and exercises aims to continue earlier dialogues; revitalize energies devoted to re-thinking the role of history in design education; and foster collaborations among interested faculty. By rethinking the role that history can play in the design curriculum, students' understanding of how the past relates to the present and the future will be strengthened. In these tough economic times, when employers value "the ability to innovate and be creative" (Zernike, 2010, p.3), directing all courses to the objective of boosting creativity and stimulating students' interest, can also translate to better employment opportunities for graduates.

Developing new frameworks from which to approach a subject with deeply embedded roots can serve as a platform for new perspectives to be shared. What once was a traditionally white and male domain, history is now also taught by women faculty as well as faculty from non-western backgrounds. Scholarship on the unique takes that women and teachers from other cultures bring to the teaching of history courses would be intriguing and can illuminate aspects of history that were previously ignored.

Intriguing would also be the development of pedagogies that stimulate the interest of students from diverse backgrounds – ethnic, racial, and age differences are some of the variables that come into play. Assignments that allow students to experience the continuity of historical change and perceive design in a holistic sense and within varying contexts can be more meaningful to students from varying racial, ethnic, and historical backgrounds. The question of "Whose history is being taught?" has never been more pertinent. Concerns have long been raised about the Eurocentric nature of interior design and architectural history and the use of conventional understandings of the notion of culture (Akkach, 2002; Hillenbrand, 2003). Coupled with the need to engender students' global and multicultural perspectives (Dutton, 1991), a rethinking of history's breadth and focus becomes adamant.

With 'capturing student interest' guiding the revisions of design curricula, administrators and educators can search for ways to incorporate a broader and more global overview of historical precedents: the mosques of Isfahan, the towers of Yemen, the temples of India, Japanese and Chinese castles and palaces, traditional building types from Albania, and Mongolian yurts. Capitalizing on students' travels abroad, international students or students from immigrant families, and students' passion for another place/culture can be mediums through which to creatively expand students' horizons.

In parallel, at a time when interdisciplinary inquiry is a driving force in the missions of many major institutions, another avenue of exploration would be to investigate the role of history courses and history itself in forming and sustaining collaborative partnerships. Such an undertaking increases chances that students' interest would be engendered for those with majors and minors in different fields, particularly since at the graduate level, many students come from non-design backgrounds. Given that design schools often offer professional programs at both the graduate and undergraduate levels, explorations of what should be taught at each level would also enable faculty and administrators to propose a holistic set of objectives that builds on years of knowledge and exposure.

The lessons drawn from the above pedagogies point to flexibility on the part of the instructor being crucial for students' engagement and interest to be nurtured. Technologically-based design solutions for example might have to be communicated via sample web pages instead of a model. Time must also be allotted for syllabi revisions and for the development of teaching techniques and exercises that capture students 'in the moment' and challenge their creative and critical thinking skills. Allowing students to fully engage with a subject/topic they believe in or have concerns about, makes the study of history relevant to their lives. At the same time though, it challenges the instructors to open their definitions of what history is and the role it can play in design education.

Fascinating opportunities to further the reach of history courses are presented with on-line course offerings. Being lecture-based and relying on digital imagery, history courses are among the most suitable means for expanding to a nationwide/international audience. Given the current economic climate and the need to attract more students, history courses lend themselves to serving as income generators and as vehicles for broadening a student body. How this would impact faculty's ability to stimulate student interest would need to be redefined and new forms of relationship-building must be put in place. How for example, do you engage a student via cyber space?

In closing, if design educators are to meet the needs of today's students, strategies for how to engage these students in the learning process are essential. Hands-on learning activities, such as digital games and free-hand sketching can increase the retention and comprehension of course material. Opportunities to experiment with ideas, develop concepts, and integrate personal insights and interpretations into solutions that make a difference, can build in students the confidence they need to develop their own answers. We see this paper as a step in the process of re-framing what history can be

about and how it can be taught. With so much to be done and so many avenues to explore, we are eager to continue these dialogues.

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HOW DO ARCHITECTS THINK? LEARNING STYLES AND ARCHITECTURAL EDUCATION

Magda Mostafa and Hoda Mostafa

Abstract

Architecture is a complex process involving the divergent resolution of a multitude of factors- social, ecological, technical, economic, functional, ethical and aesthetic. Despite this diversity all architectural problem solving processes share one common factor- they must be resolved spatially. This paper sets out to explore how best to develop these spatial thinking skills in young architects through addressing their learning styles in education. The primary hypothesis tested is twofold. First- using the Solomon & Felder (2007) definition of learning styles and their Index of Learning Styles Questionnaire- the average profile of a study group from the freshmen and sophomore architectural student body at the Architectural Engineering Program of the American University in Cairo is mapped and compared to that of a control group from the general population of the university from a cross-section of majors. Secondly, using the Spatial Ability test by Newton & Bristoll (2009), the spatial ability of both the control and study groups are measured and compared. The analysis of these results tests the assumption that the majority of architectural students will be visual, rather than verbal; and active, rather than reflective, learners; as well as exhibiting higher spatial abilities, as compared to the control group.

The performance of students in these tests are then correlated against their learning styles profile using the following sets- low spatial ability against both reflective and verbal learning; moderate spatial ability against neutral learning styles; and high spatial ability against both active and visual learning. The results show a particular corroboration between high spatial ability and active learning in the entire group of students- both study, and control- as well as a strong corroboration between high spatial ability and visual learning- with a higher correlation in architecture students, reaching 100% in some classes. It is hoped that by understanding how our students think and learn, rather than operating on assumptions, we can provide more responsive and customized modes of learning and teaching in our studios.

Keywords

Architectural education, pedagogy, learning styles, spatial ability.

Introduction

Architectural education is based primarily around the design studio as a pivot and gathering point of all knowledge and skill accreted throughout the curriculum. Within this design studio the realm of 3-dimensional analysis, assessment, organization, manipulation and representation occupies a predominant role. A major and necessary part of every architect's education becomes the ability to think, evaluate, problem

Practices

solve and generate form three dimensionally and volumetrically, on the cognitive as well as communicative level. This objective is never more so the case than in an age when digital technology is permeating our every activity bringing with it the risk of replacing our student's cognition with that of a micro-processor- where computers are very tempting replacements for the basic skills of volumetric thinking and three dimensional problem solving.

Many pedagogical practices in design studios today have been based on a number of assumptions, particularly those revolving around such abilities. Each of us- as an educator of young architects- has an image and template in our minds of what makes a good architect, and consequently what makes a good architectural student. Such templates usually revolve around issues of critical thinking, artistic capability, geometric acuity and spatial problem solving and thinking. Although with the increasing complexity of architectural practice today, research tells us that we must address the multiple intelligences of our students, visual and spatial form generation skills remain at the forefront of the skill set we seek and cultivate in our students (D'Souza, N., 2007). We imagine students who learn through doing and experiment and explore creatively the three-dimensional world that it will become their responsibility to shape.

We assume that it is those with spatial ability and visual/active learning styles that will be drawn towards, and accepted into, our architectural programs (Goldschmidt, G., 2000). We also assume that our curricula are structured as such to nurture and empower these abilities, taking what initial skill and ability is present in each student and cultivating it to grow towards a level that is required of the professional world. Finally we assume that our assessment strategies and methods of evaluation reflect such spatial, visual and active abilities, and that students exhibiting such talents will perform better in the design studio, as attested to by the grade with which we award them.

But is this the case? The objective of this paper is to test these assumptions through a case study of the Architectural Engineering Program at the American University in Cairo.

Methodology

The methodology used to test the above outlined assumptions involves two stages, assessing spatial ability and learning style at each stage. The first stage takes a comparative look at a study group of students at the freshman and sophomore level of the architectural engineering program and compares them to a control group of students from the general population of the university, with a diverse cross-section of majors and intended majors, as represented by those enrolled in one of the core curriculum freshman courses. The total number of students participating in the test is 70, evenly distributed between the control and study groups.

The second stage takes a look at the correlation between spatial ability and learning style. Specific trends are looked at, as represented by the following correlation sets- low spatial ability with both reflective and verbal learning; moderate spatial ability with both neutral learning styles; and high spatial ability with both active and visual learning. Research has shown that students learning style profiles are not absolute,

and may shift according to the subject matter at hand (Smith, P., Dalton, J., 2005) nonetheless they provide a primary indicator of how an individual student assimilates knowledge into skill. Research has also shown that education can alter learning styles towards more favorable modes relevant to the material and knowledge being experienced and assimilated (Harvey, R., 2004).

Much research has been conducted analyzing the complex process of design thinking (Lawson 2006), and consequently tools have been developed to quantify how designers think and learn. Among these tools are psychometric testing and learning styles profiling, examples of which are used for both tools applied in this research.

Each of the above study stages uses two tools to assess the spatial ability and learning styles profile of students. The first tool is a Spatial Ability test adapted from the work of Newton & Bristoll (2009) - with permission from the publisher. Based on psychometrics this test uses a multiple choice format with 8 questions. Psychometric testing has been established through research as a viable tool to assess spatial visualization and problem solving skills, as well as a predictor of performance in architectural programs. Although not sufficient to independently ascertain architectural ability, it gives an indication of aptitude and is used by various architectural schools worldwide (Goldschmidt, G., 2000).

The test uses 8 visual puzzles and maps, with multiple choice answers. Each set of questions looks at one of the following spatial abilities- shape matching with spatial manipulation; spatial assembly; visual/spatial manipulation; mapping and navigation. Scores are measured out of 80, and stratified as follows- low spatial ability for those awarded between 0-30, moderate spatial ability for those awarded between 40-50, and high spatial for those awarded between ability 60-80.

The second tool is the Index of Learning Styles (Felder & Solomon, 2004). Research supports the importance of addressing learning styles as part of pedagogical development, particularly in areas related to design and engineering (Mills et al, 2005) & (Felder & Silverman 1988). This survey, consisting of 44 questions designed to ascertain the subject's learning style profile, maps a subject's preferred style according to a 4 sets of learning style pairs using a bipolar 11 point scale. These pairs represent opposite extremes of each learning style spectrum and are- active vs. reflective; sensing vs. intuitive; visual vs. verbal; and sequential vs. global. A student may be classified as one of the poles of learning - active or reflective; sensing or intuitive; visual or verbal; sequential or global- if they score from 5-11 along either pole. A student is considered neutral if they score between 0-3 along either pole. A particular attention is paid to the visual-verbal and active-reflective sets, as they are the most relevant to the assumptions of the research.

Patterns throughout the various student cohorts of the study group and control group are looked at and trends are outlined, particularly in correlation with the assumptions set forth in the research- namely a prevalence of visual and active learners amongst students of architecture- as opposed to those of the general population- with a tendency to increase more towards these poles throughout the program. Research has shown that such trends are not

uncommon in architectural students, particularly in design studios, and that specifically designed studio exercises can actually shift these profiles (Mostafa, 2008).

The reliability of this tool has been verified (Litzinger et al, 2007) and although previous research has looked at the link between learning styles and design acuity, it has been primarily using the experiential learning model by Kolb (Kolb 1984). Such research has focused on the importance of the active pole of the active/reflective skill set and the assimilating experiential learner as opposed to the accommodating learner in their link to student performance in the design studio (Demirbas & Demirkan, 2003) and (Kvan & Yunyan, 2005). This paper sets out to verify these findings and expands them to include the visual/verbal skill set, in its correlation to performance in the design studio, as well as a distinguishing factor of architectural student, as compared to those from other disciplines.

These surveys were conducted over a 15 week semester and administered to a random sample of students currently enrolled in the core curriculum courses and architectural program respectively. Both surveys were posted on an online academic portal, accessible to all students enrolled in the test. All data was analyzed with the help of the university's Center for Learning and Teaching to preserve anonymity of students. For academic integrity purposes, students were made aware that the results of the test would not influence their course assessment in any way and any publication of results would be summative and anonymous.

Results and Discussion

The first stage of the testing indicated the following trends in Spatial Ability amongst the study and control groups. The study group of architecture students was found to exhibit predominantly high spatial abilities, with 60% of the freshmen and sophomore students scoring between 60 and 80. This trend was also found in the control group, with 53% of the general population scoring between 60 and 80. (Figure 1).

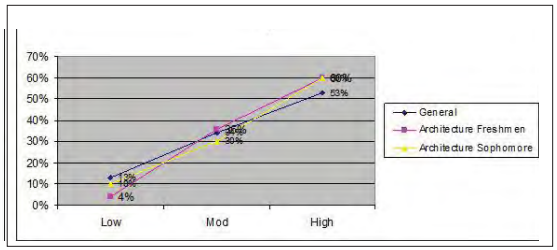

Figure 1: Spatial Abilities- Study Group (architecture) vs. Control Group (general). (Source: Authors).

The distinction between the study and control groups became more apparent in the learning styles profiling - with 100% of the architecture sophomores testing as visual learners. This is followed by 70% of architecture freshman and 61% of the general population of the control group (table 2). This distribution seems to confirm two the things- the first is that architecture students are predominantly better visual learners than general students, and their visual learning skills increase as they move through the program. Given that learning styles have been shown not to be absolute, or permanent, but rather subject to development and change

(Harvey, R., 2004), this seems to indicate that the curriculum set forth in the program is successfully shifting students thinking towards the more visual. Additionally, given that learning styles may shift according to subject matter (Smith, P., Dalton, J., 2005), and the fact that these tests were conducted by design professors in the design studio, students may also be applying more visual learning to the design process.

The distinction, although apparent, is not as exaggerated in the comparative analysis of the active-reflective set amongst the study and control groups. Again architectural sophomores were seen to be the most active with 50% scoring between 5 and 11 on the active learning scale, confirming the active pole as the preferable architectural trait. This is followed by 39% of architecture freshmen and 25% of the general population scoring as high active learners. Interestingly 50% of architecture sophomores were also found to be reflective, with none scoring within the neutral range, illustrating an intriguing polarization of the group. Although not as indicative, these results also show the trend of architecture students to be more active learners, as compared to general students, confirming another of the assumptions of this research (Figure 3). They also show the role of the curriculum in shifting students learning, particularly in the design studio, towards the more active mode.

The second stage of the research illustrates the correlations assumed by the research in the following sets- low spatial ability against each of reflective and verbal learning; moderate spatial ability against neutral learning styles; and high spatial ability against each of active and visual learning. The highest correlation was found between high spatial ability and visual learning, in both study and control groups. Architecture students of the study group showed a 60% and 100% correlation of spatial ability with visual learning amongst the freshmen and sophomore groups respectively, as compared to 65% amongst the general population (Figures 4, 5, and 6). This confirms, firstly, the strong link between spatial ability and visual learning styles, and secondly its predominance as a phenomena amongst architecture students.

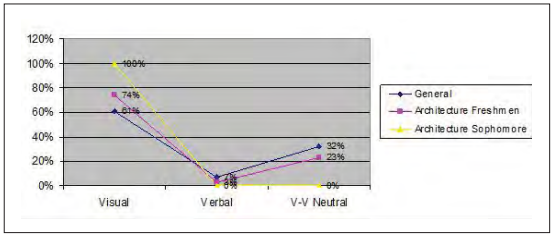

Figure 2: Visual vs. Verbal Learning Styles- Study Group (architecture) vs. Control Group (general). (Source: Authors).

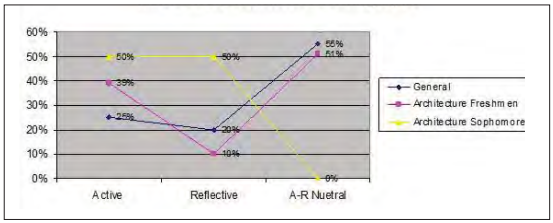

Figure 3: Active vs. Reflective Learning Styles- Study Group (architecture) vs. Control Group (general). (Source: Authors).

Regarding Spatial Ability and the Reflective-Active learning style set, again a strong correlation was found amongst the study group of architecture students. One class of freshmen

exhibited a 100% correlation between spatial ability and active learning, with an average correlation of 50% across the entire study group. Sophomore architecture students generally showed a tendency toward a higher correlation between moderate spatial ability and neutral reflective-active learning, at 67%, although there was a 33% correlation between high spatial ability and active learning. Again this may indicate an influence of curriculum, where more design foundations courses involving hands- on, manual and active process are found at the freshman level, shifting to a more balanced approach as the student moves through the curriculum. It also indicates a weaker link between spatial ability- as assumed to be required of a student of architecture- with active learning, but rather towards a more balanced neutral type of learning, a hybrid between physical or experiential learning (active) and cognitive or perceptive learning (reflective).

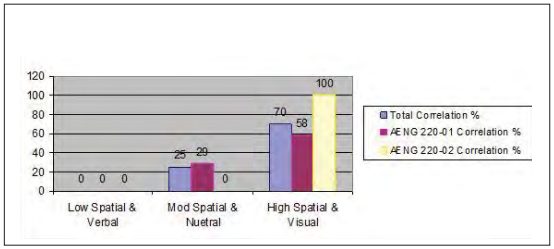

Figure 4: Correlation between Spatial Ability & Verbal vs. Visual Learning in Freshmen Study Group. (Source: Authors).

This correlation was not as strong amongst the control group, which generally exhibited a tendency towards a higher correlation of the moderate ability to neutral learning style set, with a 70% correlation between the two. There was only a 20% correlation between low spatial skills and reflective learning; as well as between high spatial skills and active learning in this group. This seems to confirm the natural distribution of this correlation amongst the general population of the control group.

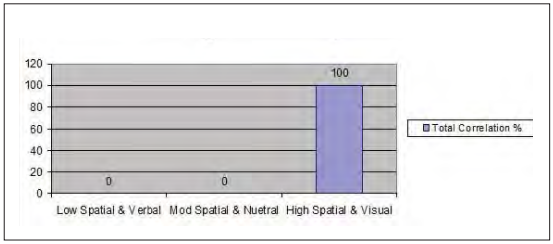

Figure 5: Correlation between Spatial Ability & Verbal vs. Visual Learning in Sophomore Study Group. (Source: Authors).

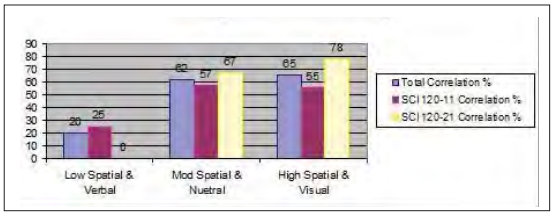

Figure 6: Correlation between Spatial Ability & Verbal vs. Visual Learning in Control Group. (Source: Authors).

Conclusion and Recommendations

In conclusion this research seems to confirm a number of the assumptions set forth in this paper- that architecture students exhibit higher spatial abilities and generally learn more visually and actively than the average student. Additionally

they show a higher correlation between strong spatial ability and visual learning, to a high degree, and strong spatial ability and active learning to a lesser degree. The results also indicate that the curriculum at the American University's Architectural Engineering program is preparing its students favorably with spatial abilities, and shifting learning styles towards the more active, and particularly towards the increasingly visual.

Recent research encourages educators to formulate their curricula and modify their teaching methods to accommodate the learning styles of its students (Smith & Dalton 2005). The results of this research paper can therefore be used a departure point for the program at the American University to develop its curriculum to address such an accommodation, particularly of the visual and active learning styles of its students within the design studio. Teaching material, references, exercises, assessment techniques and general pedagogy will shift with this accommodation- hopefully to the more favorable. This process should be documented, and further research may track the progress of accommodating the curriculum to address the conclusive results of this research.

Further research could also look at the correlation between the sets of spatial ability, visual learning and active learning- with student performance. Again previous research indicates such a correlation which can be verified (Kvan & Yunyun, 2005). This will give an indication whether current assessment strategies and tools are appropriately awarding students' spatial abilities and visual/ active learning, and additionally whether the material is appropriately addressing and improving these skills.

Finally, it is proposed that with a better understanding of what our students know, and how they learn and acquire that knowledge, the better prepared we shall be to teach them, preparing them to be the comprehensive architectural thinkers required of this changing age.

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AN APPROACH TO TEACHING AESTHETICS: LINKING MENTAL AND MANUAL SKILLS

Nabeel Elhady and Raghad Mofeed

Abstract

Aesthetics in Cairo used to focus on the discussion of the psychological aspect and its related theories such as the Gestalt. This approach seemed that it does not address the full potential of studying aesthetics whether theoretically or contextually. Therefore, the authors of this paper proposed an alternative approach to study the subject when they had the opportunity to do so a few years ago. Naturally, they were faced by a number of challenges regarding the content as well as the context of the subject

The authors suggested an approach that attempted to relate 'theorizing' with 'observations' as means to approach the aesthetical experience. In addition, they encouraged the students to create, make, and 'reconstruct' their observations in order to cultivate their sensitivity to beauty. The aim was to investigate a number of issues, namely:

- The exploration of the deep qualities of traditional architecture.
- The relevance of these traditional qualities to the making of architecture today.

This approach was first introduced in fall 2006 at Cairo University. In each following cycle, a different traditional architectural element was used to contemplate the issues of aesthetics; a courtyard, a doorway, a ceiling, etc. This paper attempts to reflect on the experiment with special concern to its first two cycles.

The paper runs three lines of inquiry in addition to the introduction that outlines the approach. The first line is a discussion of the local understanding of aesthetics and the theoretical grounds of the approach. The Second is an overview of the experiment with its two phases; exploration and manifestation. The third inquiry assesses the experiment and outlines students' view point. Finally, the paper attempts to reflect critically on the experiment where a continuous process of contemplating, theorizing, making and designing is suggested to link manual and mental skills and to challenge students' customary clichés.

Keywords

Education, aesthetics, ethics, traditional architecture.

Introduction: An approach to Teaching Aesthetics

Teaching as well as studying aesthetics in Cairo used to focus on the discussion of the psychological aspect and its related theories such as the Gestalt. A few years ago, the authors had the opportunity to introduce an alternative approach. In doing so, they were faced by a number of challenges regarding the content as well as the context of the subject.

Practices

Concerning the content, we opted for an approach that tries to combine the two approaches that Lang (2003) pointed to: the physiological and the philosophical. While the physiological approach is more tangible and comprehendible, the philosophical one is more elusive as it focuses mainly on the meaning of aesthetics and its relevance to the essence of architecture and design in general.

The other challenge arose from being interested in exploring the aesthetic qualities of local traditional architecture and their relevance to the making of architecture today. As Egyptians and Cairo residents, we were lacking solid grounds upon which to address and discuss aesthetics. This is mainly because these issues are not addressed or discussed adequately from a local point of view and especially in the field of architecture. Rather it is usually discussed through the studying of Gestalt theories, Aristotle, Plato, and other western intellectuals (Matter, 2002).

On the other hand, Arab attitudes regarding art were thought to be more practical. This view allowed aesthetics to be considered as a 'norm of life'. Hence, meaning of art or beauty, as Abouseif (1999: 3) asserts, has to be deduced from "scattered literary and cultural statements in addition to the works of art themselves". Thus, our approach to teaching amalgamated theorizing with observations as means to approach the depth of the aesthetical experience. In addition, we believed that, by encouraging students to create, make, and reconstruct the explored qualities, they will be able to cultivate their sense of beauty. This way of addressing aesthetics is thought of as relevant to conceptualization of object of the study in the following phases of the experiment; especially the design phases.

Theoretical Grounds

Abouseif (1999: 7-8) claims that "The separation between the 'good' and the 'beautiful' in the Arab culture, and the appreciation of beauty for its own sake, without commitment to religious or moral criteria" were among the main characteristics of medieval Arab understanding of beauty. Yet the linguistic and practical usage of the word 'beautiful' might have a different indication. The term jameel meaning beautiful is frequently used in the Koran in a moral context, referring to fortitude (sabr), forgiveness (safh), abandonment (hajr), etc (Kotb, 1995). In addition jameel is used in the Arabic language to describe both beautiful sights and acts (Mokhtar Al-Sehah). Jamal or beauty also is related to jamal or camel who was worshiped in the era before Islam and used to be a symbol of abundance, fertility and beauty (Zayoor, 1992). Husn is another Arabic term used to mean beautiful, it is derivative from ihsan that is related to good acts and is considered the highest level of belief in Islam (Bastawisi, 2004). This would indicate that the good and the beautiful are not separated at least from the linguistic view point.

From the practical view point that is still connected to the linguistic one, art or fann points to good work or craftsmanship, hence fannan or artist is the creative maker. Understanding art as good act can be related to Sufis who were considered the main contributors in acts of buildings and related craftsmanship in Cairo at the time when Zainab Khaton and other selected pieces where built (Raymond, 1984). Sufis believed in three basic principles of undertaking of any good act; imagination, taste and patience (Shemail, 2006). It is also important to note that Ihsan is the Islamic ethical principle that denotes attaining beyond

normal obligations; it includes "itkan" or precision, and perfection (Elhady, 1997).

Aesthetics, then, was introduced through the course from a perspective where architecture can be seen as the vessel that embodies the underlying qualities in some pieces of architecture in Cairo. In this view, beauty is not separated from the Good or from life, so contemplating is an essential activity to deduce the hidden qualities (AbdelHameed, 2001), (Scruton, 1979), (Eco, 2004). Contemplation, in this regard, is a way to perceive and to reflect; to examine and to theorize. (Blomstedt, cited in Pallasmaaa, 2005: 233).

Architecture is a process of exploring where the creation of good or beautiful piece of work becomes a constant matter of making choices between polarities. In this view architecture can be seen as an ethical process. But as this process aspires to the beauty, aesthetics becomes the dominant or the superior. We here agree with Wilson in his view that the task of architecture is to mediate the artistic domain and the real life domain and to "draw them together and to make of that very occasion an act of discovery, a revelation about a way of framing the daily activities and celebrations and rituals of society in ways that offer them both place and identity." (Wilson & Stonehouse, 2000: 45).

Exploration and Manifestation

In light of the previous understanding of beauty, we sought an object that holds for us, the students and Cairo citizens what can be collectively representing an intensive level of beauty. Through our visits and wandering in Cairo, we came across a number of what we thought of to be beautiful buildings, for instance Zaynab Khaton house, khan Alzaraksha, Ibn Tulun mosque, etc.

When this approach was first introduced, in fall 2006 at Cairo University, the traditional courtyard of Zinab Khaton house was used as a window to contemplate the issues of aesthetics. In the second cycle, the doorways were investigated along Mohamed Abdu street where number of buildings were selected as seen in (Figure 1). Each following cycle was an opportunity to investigate a new element in the rich context of Cairo and to dive into its latent qualities. Amongst these elements were the courtyard, the doorway, the ceiling, and the skin.

The course was organized to comprise two main phases; exploration and manifestation. While the first was concerned with contemplation and observation to deduce the underlying qualities of the investigated element, the second focused on embodying and manifesting these qualities through modeling (Figure 2). For us as well as our students, the manifestation phase was more experimental where number of approaches was introduced; the reconstruction, the deconstruction and the direct embodiment. These approaches were inclined to be a design activity especially in the first two cycles of the course that we will focus on through this paper.

Exploring the Qualities

The weekly classes of the course were moved, as much as possible, to the site itself to increase the sensitivity of our students to the place. In the first weeks of the course, students were asked to run deep investigations and to contemplate the investigated element. Through contemplation, "the richness and multiplicity emanate from the things themselves" as Zumthor (2006, 31) asserts.

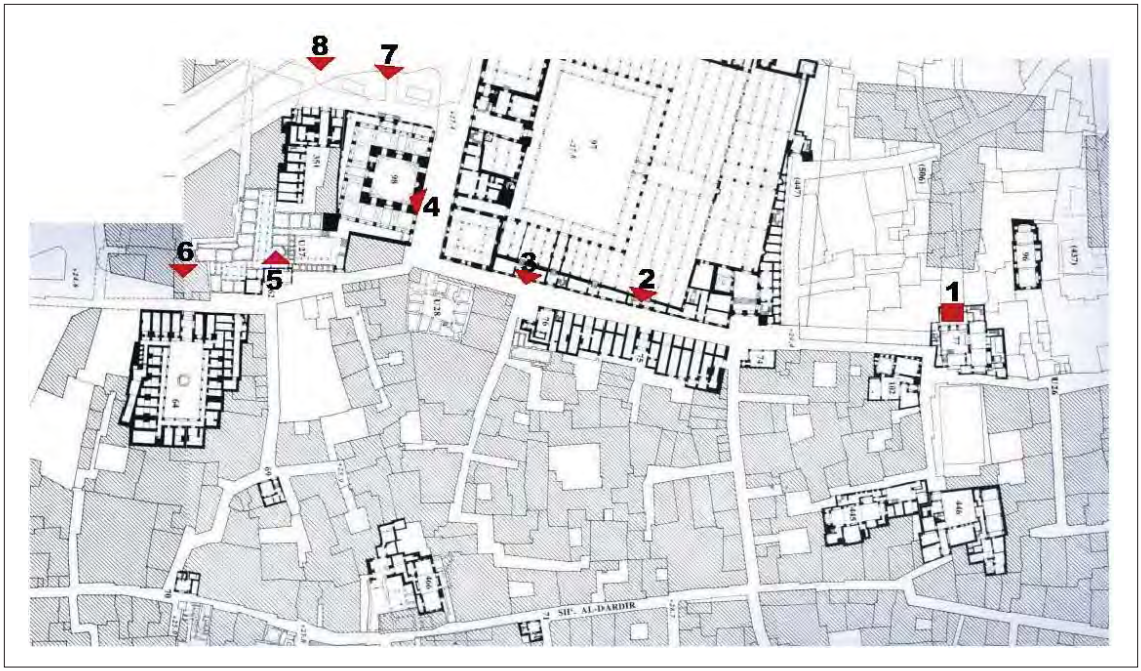

Figure 1: The selected cases for investigation in the first two cycles: In 2006 the courtyard of (1) Zainab Khaton house. In 2007, the doorways of: (2) Rab'a Kayetbay, (3) Sabeel Kayetbay, (4) side gate of Abouldahab mosque, (5) Sabeel Abouldahab, (6) Wkalet Al-Ghouri, (7) main gate of Abouldahab mosque, (8) Khan Alzaraksha. After (Warner, 2005). (Source: Authors).

Our tools in this phase were a sketch book and a camera, yet the sketch book was more stressed as while sketching the unification between hand and thoughts has a great chance to occur. Pallasmaa (2009) clarifies that through sketching and drawing three different sets of images are produced; the drawing image on paper, the visual image in mind and the muscular memory of hand. In that sense, sketching is not only a kind of expression but rather a process of thinking and reflecting (Figure 3).

The continues process of visiting the sites, making sketches, writing comments and feelings, discussion and brain storming as well as lectures resulted in some general observations or characteristics of what can be seen as aspects of beauty in the various subjects we investigated. While in each year we got a different set of observations and impressions, yet some common characteristics can be observed such as: layering, subtleness, ambiguity, calmness, grace, and humility. These results of previous contemplation can be seen in the following:

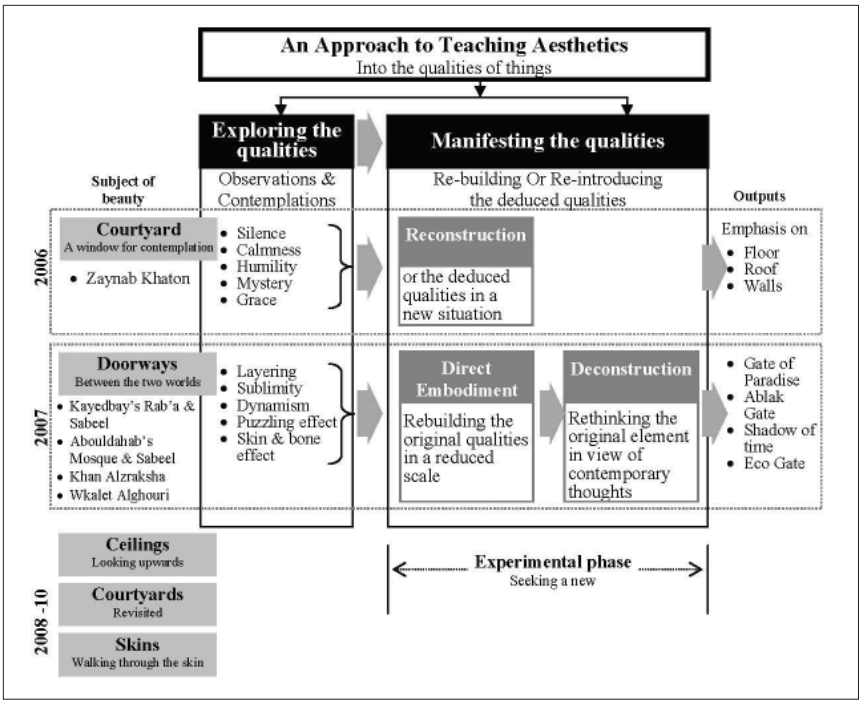

Figure 2: The researchers' approach to teaching Aesthetics through its various cycles. (Source: Authors).

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Figure 3: Observations by sketches. The left sketch illustrates the filtered drops of light through Mashrabia and the feeling of subtleness, done by Nabeel El-Hady. The right sketch illustrates the feeling of sublimity and hierarchy, done by Kareem Kotb 2006. (Source: Authors).

a) Layering

When looking at the architectural elements that exist in the court yard or in the doorway there is a sense of detailing that takes you from certain level to another in a continuous way (Figure 4). This sense of connected layers of things unfolds at the same time to the observer other things and qualities or other connected worlds. Hence, suggesting multiple readings and interpretations. Such richness of detailing calls for nearness, tactility, and slowness where "tactile sensibility replaces distancing visual imagery through enhanced materiality...and intimacy." (Pallasmaa, 2005: 323).

Figure 4: Examples of layered details, from left to right: Inner view of the main Mashrabia overlooking the courtyard of Zaynab Khatoon, Photographed by Ne'ma Hisham 2006. Doorway detailing of the Sabeel and Tekyat Abouldahab, photographed by Rami Osama 2007. (Source: Authors).

b) Subtleness

Look at how openings meet their wall, and note how are very fine detailing is used to declare this relation. Also note how stone are cut in different sizes and forms, how wood is treated in doors and in windows. There is a sense of subtleness that means in a way that builders were very sensitive to different situations, locations, and materials (Figure 5). This reminds us with Bryggman's (1991: 279) understanding of beauty as the "logical result of having everything in the right place."

Yet this doesn't mean a case of perfection, instead there is also odd relations that might be a result of dealing with the accidents that took place during the building in a clever way and turning them into meaningful acts. This sense of spontaneity and imperfection is not only sign of life but source of beauty (Ruskin, 1865; Pallasmaa, 2005).

Figure 5: Examples of the clever dealing with material. From left to right: Stone detailing at Zaynab Khatoon courtyard. Photographed by Raghad Mofeed 2006, Mukarnas at Abouldahab mosque, photographed by Rehab Zahran 2007. (Source: Authors).

Figure 6: Examples of mystery. From left to right: Looking through the Mashrabia and the pleasure of disguise, photographed by Ne'ma Hisham 2006. A gate into the gate of Khan Al-zaraksha, photographed by Eman El-zoghbi, 2007. (Source: Authors).

c) Ambiguity, mystery, secrecy.

The sense that there is something hidden or concealed can be noticed whenever you look in the courtyard or through the doorway. The lattice structure of the Mashrabia, the way you enter the courtyard, and the scale of the gate, even if it is large, all reinforce this sense of ambiguity (Figure 6).

The investigated elements simultaneously veil and unveil, simulate and dissimulate and this is part of the pleasure they create. They work, in Tschmi's (1996) term, as a 'mask' that provokes number of meanings and interpretations yet never discloses reality. The doorway, as a mask, works in a similar way to the veil or hejab of Muslim women. It also remind us with Sofis' veils or hojob that separate man from the ultimate truth.

d) Grace and glory

In the court yard there is a sense of glorifying the sky in the way by which the court surrounds and ascends to it (Figure 7). This glorification that some considers as a condition of architecture (Wilson & Stonehouse, 1992) might have a connection to the genesis of the courtyard as it came to being in Sumer. The universe to the Sumerians was mainly heaven and earth. The mythology says that they were united until 'Lil" which is wind, breathe, and spirit came and separated them. The courtyard became the place where they come together again (Ujam, 2006).

e) Calmness

When entering the court we and the students observed this overall calmness. You feel offended when somebody raises his voice, as if the court yard telling you to be quite. Calmness here is not the mere absence of sound, but an "independent sensory and mental state." (Pallasmaa, 2005: 305). One might think that calmness is derived not only form profound sense of stability of elements and how they relate to each other, but it is also a result of a sort of slow rhythm that relates the objects. It may be also noted in the slow rhythm of Arabic music and

Figure 7: Looking up from the courtyard of Zaynab Khaton and from the doorway of Khan El-Zaraksha . Photographed by Raghad Mofeed 2006-07. (Source: Authors).

Figure 8: Inner façade of Zinab Khaton courtyard. Example of the stability of elements and the sense of calmness. Photographed by Ne'ma Hisham. (Source: Authors).

azan (Figure 8). This calmness is what Day (2004) calls the healing silence. To him this was one of the greatest qualities of environments around us. It is not death; rather it is the sound of resting where you are hearing the sounds of your body.

d) Humility

Objects in the courtyard/ doorway are not striking in the first instance. Instead they look as they are good neighbors to each other (Figure 9). This creates a sense of harmony where cordiality is the law (Mekdashi, 1992). Cordiality is considered a governing principle not only in the Islamic art but also between Muslims, where difference is a source of harmony rather than clash. Such kind of harmony could be described as a fragile structure or image. The strength of this fragility is of adopting "a posture that is not aggressive and dominating but tangential and weak." (Pallasmaa, 2005: 328).

Figure 9: Examples of the cordiality between elements. From left to right: inner façade of Khaton's courtyard, photographed by Ne'ma Hisham 2006. Detail of the doorway of Khan Al-Zaraksha, photographed by Reham Karam, 2007. (Source: Authors).

Manifesting the Qualities

In the second phase students were asked to manifest the qualities they previously observed. Two main approaches were employed during the presented two cycles; the first is the reconstruction approach which was concerned with regenerating the observed qualities in the original building in a new situation. The second approach can be thought of as a deconstruction approach, which was concerned with the rethinking of the existing elements while maintaining the same qualities. In that sense, the two approaches were inclined to be a design activity where reaching a new object was main focus. Sometimes, students were asked to directly embody the original qualities and elements in a reduced scale. This approach was incorporated parallel to one of the previous approaches to raise students' sensitivity to both qualities and elements.

The reconstruction approach

In the first cycle, fall 2006, we adopted the reconstruction approach. Each student was asked to create his/ her own courtyard, named after his/ her family, based on the qualities learned from Zaynab Khaton courtyard. The students were free to choose any medium they can think of. It can be certain material, color, covering or otherwise. This exercise aimed at investigating the possibility of creating contemporary houses of deep aesthetical quality, and hence further investigates on the nature of beauty in architecture.

The exercise ended up with various proposals that in one way more concentrating on the formal aspects of the old courtyard. Few yet were in there way to touch on the qualities of beauty and were able to propose a tart of creative ideas. There were three points emphasized in the students' proposals; the first was the ground of the court yard (Figure 10). The second was the openings of the courtyard (Figure 11), and the third was the Roof of the courtyard (Figure 12). Samples of these experiments are outlined as follows.

The House of Creativity

In this experiment the Ground floor of the house was suggested to be a creative workplace for an architect. In doing so, students proposed a dynamic floor that was inspired by the reflection of the inner facade on the ground in a rainy day.

Students thought of re-introducing this quality while using modern techniques such as the hologram. Four layers were suggested to create a dynamic and changeable floor pattern based on the Islamic geometric patterns. They were, from bottom to top, a solid Islamic geometrical pattern, a hologram display of arts, a hologram blocking patterns, and a transparent walkable surface, (Figure 10).

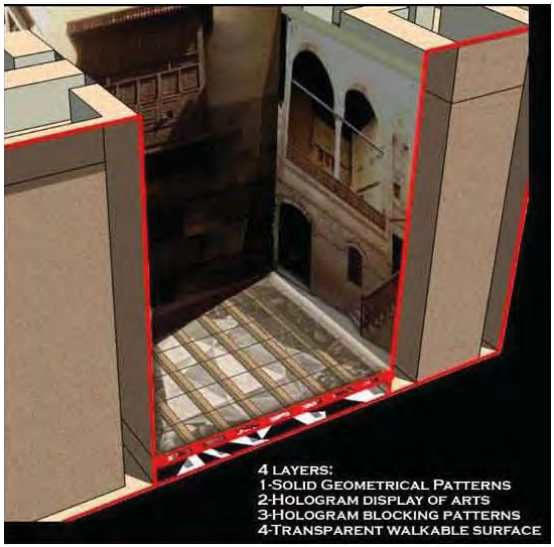

Figure 10: The House of Creativity is an example of re-producing the ground of the courtyard. A rendered image by: Mennatollah Alhosieny, Tarek Rakha, Doaa Al-Sheshtawi. 2006. (Source: Authors).

The House of Mystery

In this experiment students thought of re-introducing the veiling effect of the Mashrabya with modern techniques and materials. They suggested a mask of smart vertical glass panels to cover different parts of the inner façade.

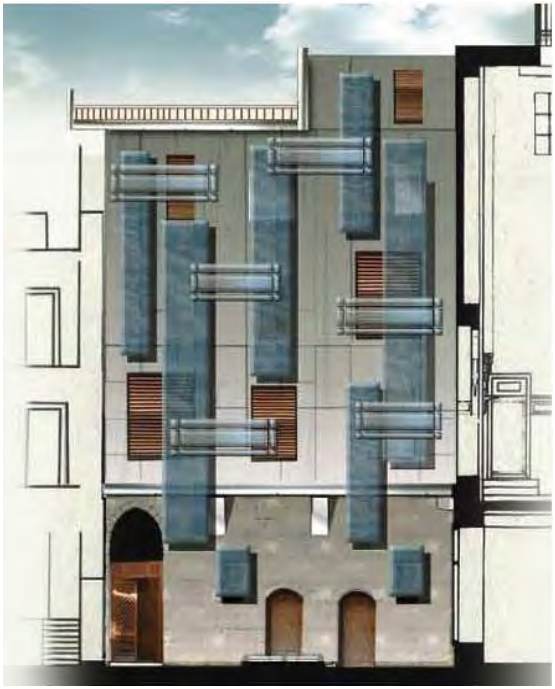

Figure 11: The House of Mystery is an example of re-producing the opening of the courtyard. A rendered image Samar AbdelSalam and Heba Neseem. (Source: Authors).

These sensitive panels can change their degree of opacity, color, and position according to light intensity and temperature. Along the day these panels creates an effect of dynamism and disguise (Figure 11).

The House of Light

Inspired by the Islamic geometric patterns and the mystery of the original house, students created a dynamic shed of two layers. The spacing between the two layers varies all the day creating a mysterious atmosphere where a

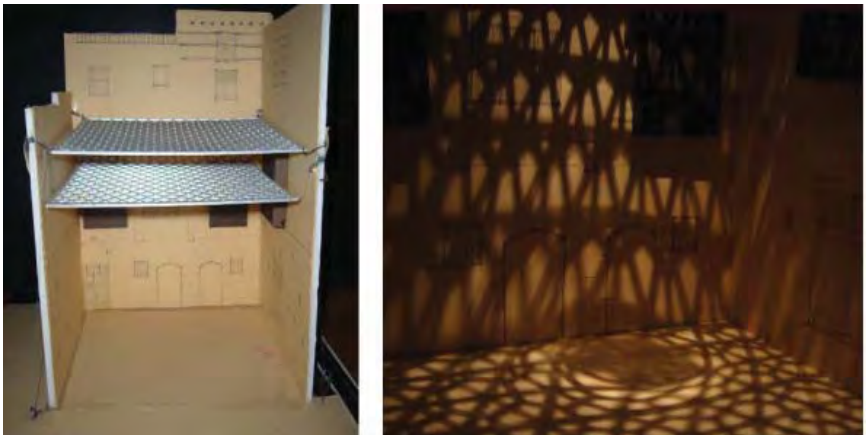

Figure 12: The House of Light (Nour) is an example of re-introducing the roof of the courtyard. A model by: Sara Abdoullah, Ammar Yasser, Mennatollah Mohamed. 2006. (Source: Authors).

dynamic mesh of shade is laid on the floor and walls of the courtyard (Figure 12).

The embodiment and deconstruction approach

Fall 2007, was our second cycle, which focused on exploring the doorways of a number of historical buildings, see (Figure 1). In this cycle, Students were asked to build a1:10 or a 1:20 white foam model to embody the observed qualities of the doorway. Through this phase, students were given the chance to think, imagine, experience and appreciate the challenges and ideas that exist in these specific conditions of buildings of quality. How to build a model of the mukarnas, the mashrabia, or to express the texture, the striped stone "ablak", was central question to each group. The students made a number of attempts and discussed it with the professors regarding how they convey or capture the sense in the original building. Not all the attempts were successful yet the importance here was in the attempt and the thoughtful efforts regarding the qualities in the building elements. Some of final models as shown in (Figure 13) clearly reflect this process.

These qualities were further looked at and rethought an exercise where the students were asked to rework their doorway into a contemporary doorway. As in the courtyard experiment, the new doorway was to be given a name, yet the approach this time was indented to be more related to contemporary architectural theories. Theoretical grounds related to deconstruction as a philosophy and practice were introduced in addition to some techniques such as; dispersal, unfolding, sliding, scaling, etc.

Through this phase, students presented number of alternatives, yet as the exercise shows the majority kept some traces of the original doorway, which did not necessarily lead the way to exploring and reinterpreting the original qualities of their case study. The following samples are some of the students' ideas.

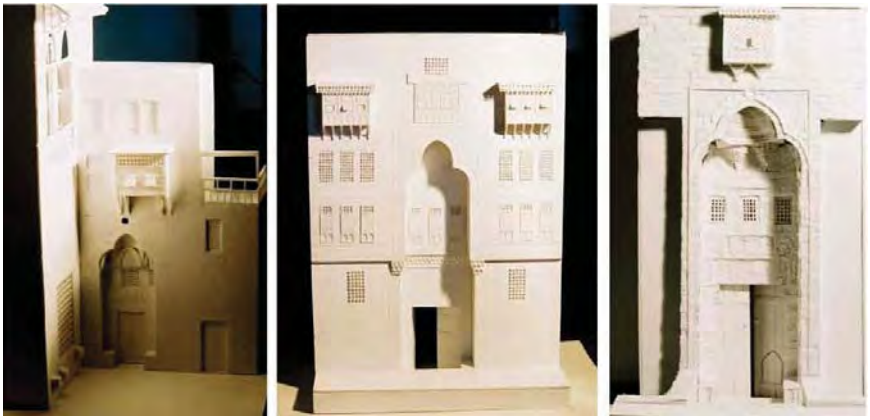

Figure 13: Models of the investigated doorways. From left to right: Sabeel Kayetbay- Wkalet Al-Ghouri- Khan Al-Zaraksha, 2007. (Source: Authors).

The Gate of Paradise

In this experiment, students were committed to the idea of sublimity that they observed in the doorway of Sabeel Abouldahab. They thought of reintroducing this quality through manipulating the form of the mukarnas. By means of magnification, the mukarnas became the gate. It is a kind of binary opposition, where the detail became in the position of the whole. In other alternatives, students used slicing, dislocation, and explosion techniques to lighten the mass of the doorway (Figure 14).

The Ablak Gate

This group of students was influenced by the ablak order that they found in the doorway of Sabeel Kayedbay. They thought of reintroducing it in a form of recessed and projected horizontal layers. These layers were cohesive at the base of the building yet dispersed at the top. In another alternative, that is more conservative, students filled the recessed layers with identical mokarnas units (Figure 15).

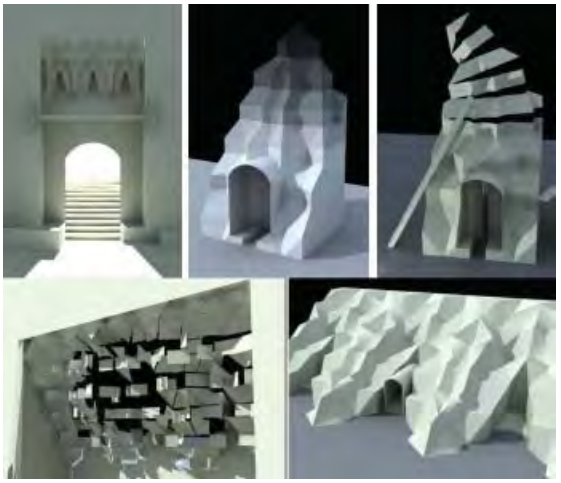

Figure 14: from left to right: A 1:20 model of the doorway of Sabeel Abouldahab. Computer modeling of the reintroduced gate where the mukarnas was magnified in different ways. By: Rami Osama, Rami Mohamed, Mohamed Ibrahim, and Haytham Emadeldeen, 2007. (Source: Authors).

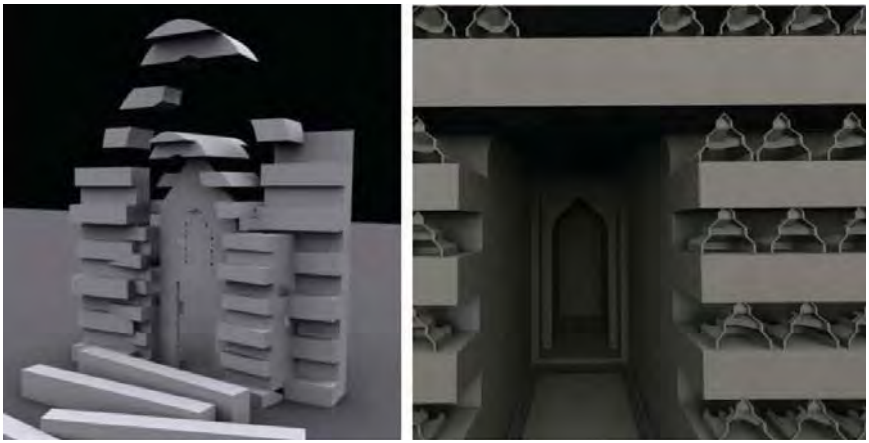

Figure 15: Two alternatives to manifest the ablak order that is found in the doorway of Sabeel Kayedbay. Computer models by: Mohamed Hamed, Mohamed Hosam & Mohamed Sa'ad, 2007. (Source: Authors).

The Shadow of Time

In this experiment the dynamism and layering qualities that students observed in Khan Al-Zaraksha were reintroduced through repetition. First, the surface layer of the doorway of the Khan was extracted then its shade was traced along the day. These traces of shade sat the order for self similar shapes of the original doorway to be repeated. Through the exercise, students tried different materials to express the deliberate qualities. While white foam was thick and rigid, using copper wires of different thickness gave a fair sense of dynamism and movement to the new gate (Figure 16).

The Echo Gate

For a group of students, the doorway of Sabeel Kayetbay represented an incessant narrative that tells the interplay between in and out, dark and light, ups and downs. For them, this eternal dynamism was attributed to the broken silhouette of the gate and the double fold of doorway zone. In this view, the broken silhouette was taken as a starting point. Then it was amplified, repeated, and vanished to form a three folded doorway. The new gate became an echo of the old one in a very abstracted way (Figure 17).

Assessing the Experiment

By the end of each cycle we used to meet our students in a more relaxing environment to reflect on our experiment. Reflections took the form of a written questioner in addition to an open discussion. This feedback helped us to develop our approach through the years. In the first two cycles, the results of the questionnaire indicated that the majority of the students, around 80%, enjoyed the experiment as a whole. A fair number of them, around 55%, found the assignments an opportunity to promote their imaginative and creative abilities. In 2006, when we applied the reconstruction method, 60% of the students found the approach they applied

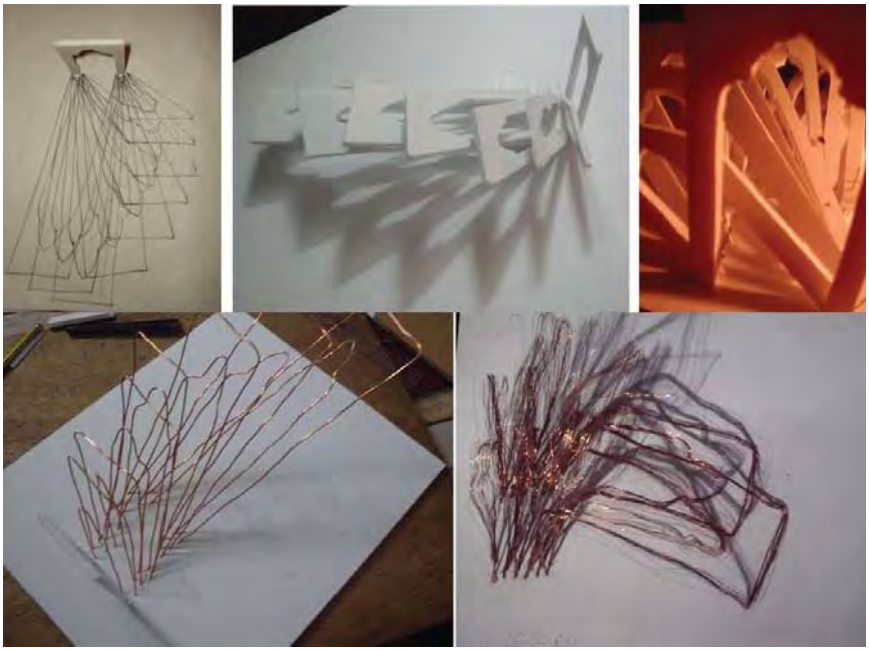

Figure 16: The multiple trials that students did to express the qualities of dynamism and layering of the doorway of Khan Al-Zaraksha. Models by Reham karam & Shaymaa Mostafa, 2007. (Source: Authors).

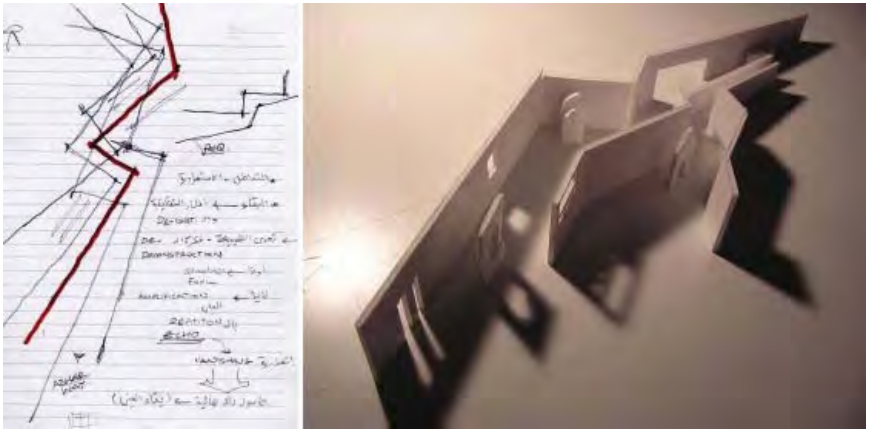

Figure 17: The broken silhouette of Sabeel Kayedbay was unfolded and amplified to create an effect of infinite. Done by: Ahmed El-Hussieny, Shady Mohamed, Ramy Ahmed & Mostafa Salem, 2007. (Source: Authors).

is relevant to design and could help them to generate contemporary designs laden with deep qualities. Yet, in 2007, when the deconstructive approach was applied, only 30% of the students appreciated the approach. This may have to do with the nature of deconstruction itself or the multiple phases they went through that year.

The open discussion with the students pointed to some issues. We will focus here on three issues that we would like to discuss in relation to the broader environment of design learning, which are distortion, confusion and contradictions. The first issue arose from claim of number of students who considered their design attempts to reproduce the investigated quality were in themselves a kind of distortion of the original qualities. They wished if we worked on a modest space rather than a beautiful one, so their designs would solve the problems of the original space hence generating beauty. This way of thinking reflects the reformist attitude that students are used to adopt through design studios. Being in a place of value seemed for some problematic in two ways; first it implied the absence, or at least scarcity, of weak points to build their designs on, second the existing situation they deeply contemplated was so powerful that they couldn't imagine other solutions. This may has to do with the emotional factor and the kind of relation they had with the building.

The second arose when some students expressed their confusion about the nature of the course and whether it is about design and not learning aesthetics. For us this has to be understood in the wider context of the design education in Cairo University. While in most design studios students are asked to make site visits and analysis, such investigations doesn't exceed the physical components of the site. The latent qualities of the place, the impressions, and the non physical values are not deeply investigated. Students are trained to deal with physical aspects; they are not trained to sense, to contemplate, or to live the place before introducing their designs. In that sense, students were confused, for them contemplation is not related to design activity, rather it is more related to aesthetics as working with values is not deeply introduced in their design studios.

The third issue is concerned with the contradictions that some students thought of between reconstructing the courtyard/ the doorway while maintaining the original qualities. For them It was difficult to imagine reproducing qualities apart from their original characteristics; color, material, texture, and even age. For us it was about how to learn to identify qualities and then how to incorporate these qualities in a contemporary situation. This was the most difficult for the students to handle as they associated the qualities with the forms materials, age, and other aspects of the original building.

Reflections: Aesthetics to Design

The exercise was first introduced to encourage students to be more sensitive to beauty. Yet, this proved to be more difficult and required more time than what was allocated. In the following years we decided to focus more on the understanding and embodying of the observed qualities. We thought that the second part of the exercise which concerns itself with reintroducing the qualities in a new situation can be more effectively addressed through a design course. What we suggest is a kind of splitting the experiment into a theoretical course for a studio

course. We think that the approach we adopted in teaching aesthetics where observations, making, theorizing, and designing became continuous with no clear cut could be relevant to the design realm in two ways; it maintains a contentious dialogue between intellectual and manual skills in one hand and keeps the tension between risk and certainty in the other.

For the design activity such dialogue between mental and manual skills is crucial; the unconscious collaboration of the eye, hand and mind fuse into a unified and singular response. From this point the action of the hand and thought lose their independence and turn into a singular and subliminally coordinated system of reaction and response." (Pallasmaa, 2009: 82).

Yet, observations as most students are accustomed to in design course are bound to the eye. Instead we opted to a multisensory approach, where various tactile, olfactory and acoustic qualities were deeply investigated and linked with its physical characteristics in one hand and the emotions and feelings it evokes in the other. During observations students were given a chance to extend their understanding of architecture beyond theory. Through layers of contemplation and discussion, students were not only able to reach a deep level of philosophical thoughts but also to link them with tangible elements and treatments.

The multiple hours of concentration to reach the essence of objects, while not losing connection with reality, enabled students to pass through an actual experience rather than the abstract understanding of theory. Through contemplation theory and practice are linked and a balance between thoughts and reality is approached; a balance that most design studios seeks to maintain.

For a considerable number of students, the relation between theory and practice is turned into certain clichés. We used to observe such clichés in students' proposals when, for instance, tradition is reduced to arches, stone, rough texture, etc. in light of that, the exercise we introduced intended to challenge this safe way. It challenged the association between the quality and a precise shape through reintroducing it in a new situation with new materials and techniques. Instead of the safe way students were pushed towards risk.

As design is always about searching for something that is unknown in advance, it lies mainly in the category of 'risk' (Pye, 1995). Yet working on the edge of risk would encourage students to tolerate uncertainty, vagueness, and open-endedness, it would also encourage them to experiment novel structures, forms, and materials instead of the safe way of concretizing a preconceived idea.

What we suggesting here is an approach that links tactile and mental skills through a continuous process of contemplating, theorizing, making and designing. This approach is engaged with reality or specific qualities. Moreover, it can be seen as a continuous investigation and exploration into one of the essential aspects of architecture, and in doing that it encourages future architects to cultivate a sense that can help eventually in making intensely humane objects.

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Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

VERNACULAR ARCHITECTURE: AN INTRODUCTORY COURSE TO LEARN ARCHITECTURE IN INDIA

Miki Desai

Abstract

"The object in view of both my predecessors in office and by myself has been rather to bring out the reasoning powers of individual students, so that they may understand the inner meaning of the old forms and their original function and may develop and modernize and gradually produce an architecture, Indian in character, but at the same time as suited to present day India as the old styles were to their own times and environment." Claude Batley-1940; Lang, Desai, Desai, 1997 (p.143).

The article introduces teaching philosophy, content and method of Basic Design I and II for first year students of architecture at the Faculty of Architecture, Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad, India. It is framed within the Indian perspective of architectural education from the British colonial times. Commencing with important academic literature and biases of the initial colonial period, it quickly traces architectural education in CEPT, the sixteenth school of post-independent India, set up in 1962, discussing the foundation year teaching imparted. The school was Modernist and avant-garde. The author introduced these two courses against the back drop of the Universalist Modernist credo of architecture and education.

In the courses, the primary philosophy behind learning design emerges from heuristic method. The aim of the first course is seen as infusing interest in visual world, development of manual skills and dexterity through the dictum of 'Look-feel-reason out-evaluate' and 'observe-record-interpret-synthesize transform-express'. Due to the lack of architectural orientation in Indian schooling; the second course assumes vernacular architecture as a reasonable tool for a novice to understand the triangular relationship of society, architecture and physical context and its impact on design. The students are analytically exposed to the regional variety of architectures logically stemming from the geo-climatic forces, human and material resources and techniques that satisfy the socio-cultural needs and desires of a given people. Research analysis, large scale model making, simulation, actual size mockups and such engage the students in make-believe world of architectural learning in this course.

Keywords
Basic design, visual literacy, vernacular, heuristic learning, socio-cultural.

Introduction and Background

The aim of the article is to introduce the teaching philosophy, content and method of teaching/learning the two introductory courses named Basic Design I and II for first year students of architecture at the Faculty of

Practices

Architecture, Centre for Environmental Planning and Technology University, Ahmedabad within the perspective of architectural education in India starting from the British colonial times. The issue of whether architecture and architectural education should or should not be context based has been a debate that started way back in1865 when Lockwood Kipling came from England as a professor of Architectural Sculpture to India and was astonished by the use of Greek and Greco-Roman plaster casts for teaching purpose in the art school.

The debate was embedded in the pan Indian socio-cultural context as well as indigenousness. In intent, in a similar vein, James Ferguson advocated the understanding of the principles of Indian traditional architecture. His History of Indian and Eastern Architecture in 1887 was an important work towards this debate of architecture and context. Jeypore Portfolio of Architectural Details in 1890 by Swinton Jacob was not just a plain architectural or academic work but was a hinted manual of elements and details from bygone eras to be used in the 'modern' architecture of the Raj. In a sense, it was creating an alien ownership and authentication of the traditional Indian artisan's craftsmanship. The portfolio of over six hundred drawings in six volumes "...focused on the elements of the facades of buildings. The spatial character, organizing principles of spatial form and the nature of sequential experience of space were little considered." Indirectly speaking Fredrick Salmon Growse's work in Bulandshahr (18878-84) and his Bulandshahr or sketches of an Indian District (1884) were unique examples of architecture and architectural literature. In a sense it was similar to Jacob's attempt, however, different in the spirit. Growse allowed and fostered the local craftsmanship with little intervention and created Indian imagery of British 'patronage'. (Lang, Desai, Desai p.70, 88, 89, 99,122, 131).

The Nationalist movement and the works or arguments of Anand Kentish Coomarswami, RabindranathTagore,NandalalBose,Surendranath Kar, Annie Besant and later Malaviyas give us some idea about the debates. An early work, Architecture of the Hindus by Ram Raz was published in 1832 and had a clear stand explicit in the title of the publication. The radiating plan of Banaras Hindu University bring about yet another overtone to architectural interpretation of Vedic nature.. Art and architecture, concepts and form, building decoration, murals, sculpture, etc. got debated from the viewpoint of indigenous and the Swadeshi content and expression.

Genesis of Architectural Education

The educational institutes of early nineteenth century were oriented towards draftsmanship and construction. It was during the pre-independence period that the schools started modernizing. First, five year diploma in architecture was started at Sir J. J. school of Art in 1913 and it became first institution to be granted recognition outside Britain in 1920s. Sir Claude Batley headed the J. J. School in the mid 20s 30's and taught or mentored many important architects at J. J. School or in his/their office (Gregson, Batley and King) respectively. Batley's or his practice ranged from International style to Art Deco and that of forms interpretative of Indian concepts. This was in tune with his teaching. His portfolio is another example in comparison with that of Swinton Jacob's. As a teacher, Batley used to conduct measured drawing trips to places with

traditional acumen and included residential types in documentation. There were a few other teachers of high stretcher but he epitomizes the era of modern architectural education in India.

In 1960 there were 15 schools of architecture (1). Thus one can see that in India, from the mid-nineteenth century to mid-twentieth century, the triangular relationship of architecture, education and practice have had a direct and indirect bearing on the context and tradition. The debate has proven useful in examining the precedents and the antecedents, the architecture and the education, including formulating and modifying the curricula and the course content.

It was during the heyday of Brutalist modernist architecture in Chandigarh and Ahmedabad in particular and the International Style and Art Deco in India in general that the first Modernist School of Architecture was established by a small group of Modernist architects lead by Balkrishna Doshi in 1962 in Ahmedabad. Doshi was a student of Claude Batley. By mid-eighties, Post Modernist architecture had come into vogue and had faded, creating room for experiments in Deconstruction. During this period of about 25 years architecture in the above mentioned isms and styles got constructed in both the developed and the developing world. Today, some important modernists design with their original stance intact and others with a modified idiom in favor of one rationale or the other. Architectural education in India and also the architectural paradigms and pedagogy got refined to certain extent during the seventies.

The School of Architecture in Ahmedabad had a Bauhaus stance while following Modernism ala mode Brutalism. It was natural. Its proponents were trained in the ateliers of the masters like Walter Gopius (Jitendra Mistry), Le Corbusier (Balkishna Doshi), and Louis Kahn (late Anant Raje). All have taught at the School and the later two have headed the school. For all of them and others who taught, regionalism was a far-fetched narrative to be used in the modern Indian teaching till 1980s. In a sense they were hardcore modernists and did not want to water down their belief system in principle and practice. Thus, the agenda of modernist curriculum and the teaching came into practice. However, at the same time, another thing was happening. Students were going on measured-drawing trips and were appreciating, studying and recording traditional, classical, vernacular and folk architecture. To date, of the number of thesis written, at least 80% are in these genres. Like elsewhere in the world vernacular architecture was relegated to a non–subject and a supposed unnecessary hindrance to the agenda of Modernism in architecture.

Lacuna of Modernist Movement, An Argument

In India, tremendous complexity exists due to enormous social, cultural, geo-climatic and architectural variations in its regions which could not be fitted within the Modernist credo. Essentially speaking, the modernist premise had overlooked or deliberately denied social, cultural and regional aspects within its manifesto. Modernism was a universal suggestion, especially as it came to India in the fifties. It was to be seen as a tool to project the ideology of being modern irrespective of being in Europe, America, Africa, Asia or India. It was homogeneous and denied heterogeneity of cultures in the formation of

built environment. If one said that "the Modernist architecture failed" in many developing countries, Indian scene should be examined as an important one both for its success, failure and most importantly for its overall impact on the architecture of the country at large.

Author's Teaching Career

In 1986, a course on Regional Architecture was introduced by me and my architect wife at the School of Architecture, Ahmedabad. Later on this course was divided into two full courses, namely Colonial Architecture and Vernacular Architecture as part of the History stream. It was through these two new courses that a certain shift in the curriculum was intended. The awareness about the colonial (architectural) past and the wealth of traditional architecture needed a re-linking to complete the framework of architectural education that was becoming increasingly more western-oriented till the 1980s at least. At the same school, besides teaching design studios, the author introduced a course for the first year (undergraduate course) titled Basic Design in two parts (2).

Basic Design: General Introduction

The aim of the first two courses of Basic Design is to introduce the students to the world of design and architecture while emphasizing the role and issues related to creativity in art and sciences. In the Indian context, this introduction is crucial because in the pre-graduate high school education, the exposure to humanities in general and arts, crafts, creative processes and issues of dexterity in particular, are ill- imparted and least cultivated in favor of 'rational sciences'. Thus the course intends to put forward one of the ways of learning about design issues in a manner that would sensitize a student in the direction of creative exploration and lead him/her towards built environment. The exercises are formulated in order to achieve different objectives.

The objective of the course is first to generate an atmosphere of curiosity and a positive response amongst the students. It is also to make the students aware of the 'self ' as a personality in context of childhood and the immediate past and how it has affected them unknowingly. It also attempts to bring out their concerns and values for architecture and to show them the enormity of built environments. Idea, concept, exploration, transformation, process, expression, simulation and such words are objectified through lectures and exercises.

The approach entails exposing the learner group to various processes that would enable them to express themselves by means they have not used much before. Thus, the skill of drawing, abstracting, making and simulating become their preoccupation as designers. Even at the risk of some individuals learning* less, group learning is encouraged in certain exercises. The word learning is emphasized by stating the fact that in most Indian languages there is no direct verb for teaching, rather, the verb for teaching is indirectly made from 'learning'. In short, throughout the process of learning, it is stressed that the production of architecture is all encompassing and, therefore, a keen eye for the animate and inanimate should become one's sole preoccupation. "How do you see what you see", "Observe in order to ask good questions", "Designed objects, people's behavior, climate, ever changing aspects of nature, vernacular built forms, our daily environment, form an

immense source of learning for a designer", etc. are some of the issues discussed with students in the process of teaching.

Basic Design I

Main aim of this course is to learn Visual Literacy for visual communication and to introduce Built Environment. It aims to develop skill sets, observational aptitude and recognition of the basic forces that shape architecture. I tend to treat the learning group's rudimentary as well as thus far unexpressed thoughts, ideas, impressions and naïve or awkward ways of drawing and making things as an asset for the creative exploration of their world-the manipulated and built human environment. Thus, group dynamics on the one hand is used to shape the 'person' in context of others whereas personal and subjective expression on the other hand are used in order to comprehend the self and 'reality' before becoming subservient to abstraction. In the process, I give importance to visual literacy and the art of abstraction therein but stay away from treating abstraction as the only and prime mode to understand and express design thought. 'Look-feel-reason out-evaluate' and 'observe-record-interpret-synthesize transform-express' are used as quasi-formulae to provide a framework to the exercises and studies. The primary philosophy behind learning design emerges from heuristic method.

The ideas related to graphics, environment and architecture are clearly explained as separate entities while showing their interrelationship. We look at the idea of man-made environment with an emphasis on places and objects therein. Inquiry into the logic behind objects that we use or come across along with people and environmental factors discussed in general, provide for sufficient clues as to where the scope for the study lies. Place

Figures 1 and 2: Words, feelings, ideas and expression through the medium of clay. (Source: Author).

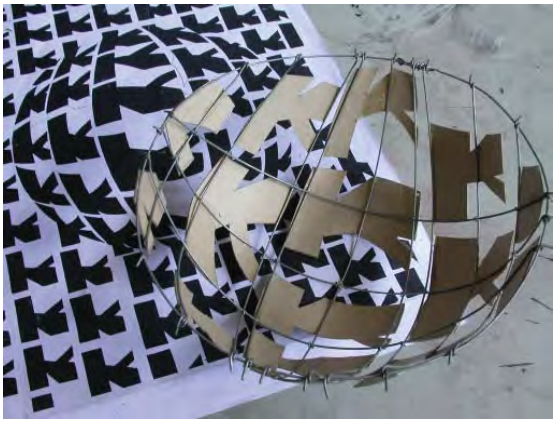


Figure 3: Alphabet, graphic development and metamorphosis of ideas. (Source: Author).

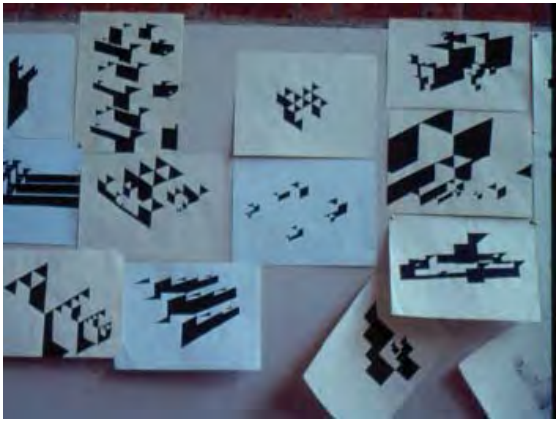


Figure 4: An exercise to understand the notions of container, periphery, play of volumes and spatial relationship. (Source: Author).

and activity rather than space; sequence, arrangement and organization rather than form and structure; guessing dimensions and sizes, measuring space with hands and feet, rather than with a tool; guessing the number of people or vastness rather than accurate areas; mapping rather than photography and drawing plans and 'do-it-your-way' and 'go wrong' rather than 'come-up-with-correct-image-at-first-shot', etc. are relied upon for the ultimate understanding of the wider context of human environment in the first course of Basic Design. Observation, memory, recording, participation in live situations, participatory object making, live simulation and such make up for the bulk of exercises in which internalizing as well as expressing information as a group and as an individual happen simultaneously.

Self and environment assessment, evaluation of mundane objects to learn the criteria and parameters for their design, doodles to patterns, exploration of geometric shapes, recoding school campus by pacing only (without using measuring devices), recording a Sunday flea market, a week on the railway station (measured drawing all types of compartments, bogies and paraphernalia structures and stalls on the platform) and such are the exercises in Basic Design I. Thus the learning happens through recording, sketching, drawing, drafting, model making and life size installations. Without dwelling further on part one of Basic Design, now, about teaching of Basic Design II as a course that focuses on Vernacular architecture.

Basic Design II

Origins of this model of teaching are in the one day visit to the class of Professor Frederic Aubry of Federal Institute of Technology at Lausanne in the early 1990's. I have modified the method

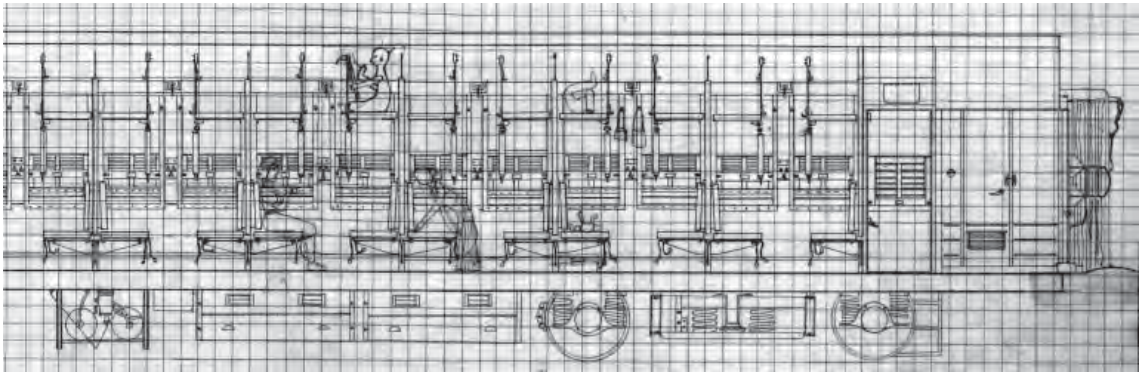
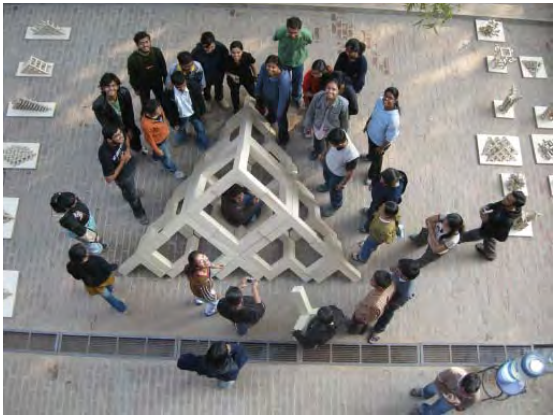


Figure 5: A week on the railway station, accurately measuring all types of compartments and paraphernalia structures. (Source: Author).



Figures 6 & 7: Small and large tripods are made as models. (Source: Author).

Figure 8: A Japanese agrarian semiotic structure constructed to be designed and built in different locations of the campus burnt as apart of the ceremony. (Source: Author).

Figure 9: Variety of tents designed by the students, to be constructed in different locations of the campus. (Source: Author).

Figure 10: A house example from north India. (Source: Author).

Figure 11: A house example from south India. (Source: Author).

substantially to suite the Indian learning processes. I believe that building design and 'architectural space making' should not be expected from the students in the first year. Rather than this, ideas regarding shelter and place making should be explored. This belief

Figure 12: An Ethiopian House.

Figure13: Ise Shrine in Japan.

Figure14: Models (1:10 scale) of a wooden temple and salutation pavilion, Kerala.

Figure 15: Models (1:20 scale) of a Chinese gate structure.

forms the basis of my attitude to teaching Basic Design II. Consequently, vernacular architecture is assumed to have an enormous potential in exploring preliminary architectural design. Culture, simple space making with behavioral meaningfulness, appropriateness in terms of materials, techniques and climatic response, anthropological nuances, etc. become available in a singular package in vernacular examples. Here the society and culture are seen as the prime modifiers of a satisfactory living environment. Thus, learning basics of design happens through vernacular, folk and traditional architecture in general. The central question is- 'how does one modify the modern of/for a place?' The intention is to design with an awareness of forging the local modern, informed by the positive nuances of the vernacular architecture that has awarded continuity to places for life to happen- the home and the settlement.

While doing so, it is made amply clear that the course does not advocate designing in vernacular ways, however, it does advocate learning from the vernacular to modify the modern idiom as would be practiced in different situations and regions of the country. It is clear that we learn and build for the times we live in, its materials, techniques, and circumstances and for the people for whom we build.

Having clarified the premise and after having given feedback on the vernacular and folk architecture, groups are formed and the students are asked to go to the library to select suitable examples from all over the world. Discussion is held on the examples brought in the class and about twelve examples are selected while developing a focus on the Asian and the African examples. A discussion on typology is emphasized and the aims of the exercise are elaborated.

The relationship of society, culture, settlement and architecture in the context of regional types is explained. Impact and shaping of community-specific plan organization within the

said relationship is seen as the basis of forging the selected examples. Climate, materials, craftsmanship are put forward as the important modifiers of the plan and the form. The role of local craftsmanship, oral tradition, generational handing over of craft and issues of articulation as a matter of production system of the vernacular architecture are made apparent. Tectonics is explained as a way in which, materially speaking, how a building comes together. It is pointed out as to how, within certain examples, disaster response has been a prime modifier of a given type. Correlation of sustainability architectural attributes and the scale of the settlements are discussed.

A group of three students then develops two to three A3 size sheets each on the comprehensive understanding of the selected example which is discussed in class forum. A comparative understanding of all the examples helps in driving the logic and reasoning of regionalism. Geo-climatic, socio-cultural, materiality and technique, details and system aspects are spelt out in these sheets.

200-scale models of the ground floor are made for all the examples. 50- and 20-scale detailed or part models respectively are made as per the complexity and repetitive nature of selected examples. The idea of materials in real situation and those used in the making of the models are brought into discussion. This triggers off a nuanced understanding of tectonics. When the models and the A3 plates are ready, a comparative discussion about all the previously discussed issues becomes lively and fruitful. As a part of the original method, and as a matter of application of the learning, a small problem of one building of about 150 Sq. Mts. is given to all the group members to be designed individually. In this exercise, while attempting the problem individually, each student is allowed to import one material from outside! Thus, the entire experience is brought to a full circle.

Notes

1. The number of colleges of architecture increased over a period (1889-1, 1940-1, 1950-8, 1960-15, 1970-17, 1980-36, 1990-91, 2010-152).

2. It replaced the courses that were titled Workshop I and II which had their roots in carpentry.

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VISUALIZATION SKILLS FOR THE NEW ARCHITECTURAL FORMS

Khaled Nassar, Magda Mostafa, and Amr Rifki

Abstract

The practice of architecture is continuously changing, mirroring the paradigm shifts in the world it builds for. With increasing use of digital technology, we need to ensure that learning and teaching do not shift from the fundamental skill set required of an architect. Architectural problems are unique in their nature, requiring volumetric visualization and problem solving skills, and although many of these skills can be replicated using digital technology, can digital technology replace the cognitive development which occurs through manual problem solving? Over the last three decades we have seen the almost ubiquitous use of computers in the design practice and professional studios with increasingly more complex forms being thought of and turned into buildings. This development obviously raises challenging questions of architectural theory and perplexing issues for those concerned with the future of architectural education and its effect on the design process. But how can this effect be analyzed subjectively remains an open question. Recent research efforts have shown that perception and visualization abilities reflect the quality of a design outcome. Very limited research however exists which attempts to understand or document the spatial analysis and visualization abilities of new generations of architects. This paper reports on a novel scalable test that could be used to investigate the processing and synthesis of visual information related to the new kinds of free form encountered in today's architecture. Unlike traditional missing views and orthographic projection problems, proposed test can be used to accurate assess freeform visualization. A number of 2-mainfold very high genus surfaces were selected. Physical models of these surfaces are manufactured from a durable thermoplastic material by Fused Deposition Modeling rapid prototyping machines. Students are then asked to position a digital model of the surface to match that of the physical model and vice versa through a number of progressively timed attempts. Results on the average time to success, failure rates, manipulation rate as well as manipulation rate to total time are calculated and analyzed. Statistical analysis of the outcomes was conducted and the results and conclusions of these experiments are presented in this paper along with limitations of the experiments and suggestions for future research. The results should be of interest to architectural educators and architects concerned with the effect of computer technology on the design process, as well as the future of manual skills in our design studios.

Keywords

Design studies, architecture, education, linkographs, entropy, design experiments, pedagogy.

Practices

Introduction

One Digital media has revolutionized the creation and manipulation of spatial form in the realm of architecture. Specifically, digital free-form space is now becoming easier to generate as the use of the computer has increased in academia as well as in professional practice. Since computers today are becoming ubiquitous and used in various stages of the design process, the kinds of architecture form, structure, and planning are also becoming increasingly complex. Many free from architectural designs that exist today are either inspired by or fully generated by computers. As such present day digital architecture emphasizes dynamic surface, with its three-dimensional curves, and the interior and exterior continuity of the architectural and urban spaces.

Although shown to be unsurpassed in ability to draft, correlate, coordinate and mass-produce many architectural artifacts (Callieri et al 2006), research has shown that digital media has profound influence on the cognitive development of architects, particularly from the pedagogical standpoint (Boucherenc, C.G. 2006). Such pedagogical research supports the adaptation of manual media in the areas of design cognition and conceptualization. Additionally, and from the realm of practice, manual media has been shown to facilitate and enhance the cognitive design process, preferably, over digital media. Results of such studies "showed that traditional media had advantages over the digital media, such as supporting the perception of visual–spatial features, and organizational relations of the design, production of alternative solutions and better conception of the design problem." (Bilda & Demarkin 2003).

The concept of design cognition, and indeed spatial perception and visualization, themselves have begun, however to undergo changes and shifts as a result of the proliferation of digital media. The computer generated virtual world to which we are increasingly exposed, has begun, however to alter how we perceive reality, and consequently space. Beginning with the work of Van de Bogart in 1990 to current studies of this phenomena, the complex relationship between design cognition, conceptualization and spatial perception has been challenged and must be reviewed carefully. Computer-generated virtual worlds have been shown to "catch the attention of the viewers, making them more interested in the narrative and engaged with the visual elements, but does not necessarily enhance their critical awareness" (Neto, P. 2003) Although digital media has begun to develop highly advanced form generative tools that perform spatial manipulations impossible to achieve or even conceive using traditional manual media given that architecture exists in a tangible reality, the role of virtual space through digital media must be appropriately addressed.

Research has addressed this complex relationship and illustrates both pedagogical and professional examples of how this complex relationship can be used to the advantage of the design process. Such examples range from attempts to link both manual and digital media in the design studio (Hadjri, K. 2003) to combining traditional and digital visualization in planning (Al Kodmany, K 1999). More recently hybrid approaches- which capitalize on the palpable, multi-sensory cognitive values of manual media and the complex generative and simulative powers of digital media- have been presented. New representational tools such as rapid prototyping begin to introduce tactility

and palpability to virtual forms (Snoonian & Cuff 2001) and (Séquin, C. 2005) .From the e-studio (Al-Qawasmi 2005) to new tectonics (Liu & Lim 2006) and ideation software (Dorta et al 2008), these hybrid techniques seem be paving the way forward (Snoonian & Cuff 2001).

Yet, there is a lack of understanding of how architects interact with these new surfaces and meshes in the digital space. At a more fundamental level is how well do the new generation of architects visualize and interact spatially with freeform complex architecture. Therefore, this paper sets out to assess the development of fundamental spatial manipulation and basic perception skills using of the new digital media. A scalable experiment is designed and implemented to in order to test the manipulation and perception skills of architectural students in terms of the high genus meshes. The development and the execution of the experiment are presented along with

Figure 1: Sample High Genus Models that were developed and considered for testing. Note that they are all a-symmetric high genus shapes (shapes with high number of handles and holes) as symmetric high genus shapes were excluded from the start. (Source: Authors).

interesting findings and results. The experiment involves designing and manufacturing a physical model of a complex mesh surface and then using the model to test the spatial orientation ability of the students in space. Furthermore the experiment is scalable as it could be conducted with different surface models and test conditions. The results should be of interest to educators, professionals and industry developers.

Developing a Visualization Test

In order to explore how new generations of architects are able to visualize the new free form architecture, we set out to try and develop a rigorous experiment that could not only assess whether new generations have adequate projection and spatial manipulation skills but also understand how these skills are used and distributed among this new generation.

Developing and Manufacturing the Experiment Model

One of the most complicated surface or free form types that are becoming increasingly used and developed by professional and experimental architects are high-genus surfaces. High genus meshes are among the most exciting new developments in architectural form due to their distinct topology and have already gained fame in the world of sculpting Some of the most well-known examples of such high-genus sculptures include Bathsheba Grossman's 3D metal printed sculptures [Helman 2006], Brent Collins's saddle sculptures [Sequin 2006], Charles Perry's aluminum and bronze sculptures [Perry 14], Helaman Ferguson's bronze and marble sculptures [Helman 2006, Ferguson et al 1992], Carlo S´equin's 3D printed sculptures [Sequin 2006], and Rinus Roelofs' [Roelofs 2006] and George Hart's [Hart 2006] puzzle like sculptures. These surfaces are also making their way quickly into the design studio and students are experimenting with them in very interesting ways. The genus of a shape refers to it topological structure so that a torus has genus one, as does the surface of a coffee mug with a handle. More details on high-genus surfaces can be found in 17, however three

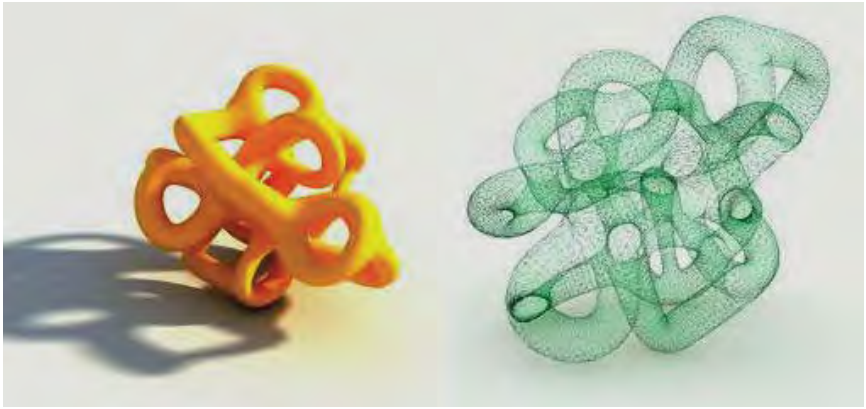

Figure 2: The 3D model of the proposed testing sample. (Source: Authors).

features of these surfaces are important for the visualization exercise developed in this paper; firstly, the high number of holes which makes it difficult to orient the shape. Secondly, the non-orientable property which means that the inside of the model is not distinct from the outside and thirdly, the high number of handles which also created complexity in terms of orientation.

A number of very high genus 2-manifold meshes were created to study the visualization skills of students in terms of the new architectural freeform surfaces. In the real world, every object is an orientable 2-manifold surface, which in simple terms means that the object has a well defined interior and exterior. We made sure that the resulting shape is topologically 2-manifold and additionally we avoided self-intersection so that the resulting models are 3D-printer-ready, i.e. they can be printed by using a rapid prototyping machine will be described below. After initially creating a number of various high-genus models (Figure 1) they were compared to select the most suitable surface for the experiment. Criteria for selection included asymmetry, high Gaussian curvature as well as being non-orientable (which means the view from various angles will be different). A positive Gaussian curvature value means the surface is locally either a peak or a valley. A negative value means the surface locally has a saddle points. And a zero value means the surface is flat in at least one direction (ie, both a plane and a cylinder have zero Gaussian curvature). So a model with a high Gaussian curvature appears to be more deformed and freeform. Figure 2 shows the rendered and wireframe mesh of the selected surface.

We used a new software called Topmod that allows users to interactively create high-genus meshes. The software allows users to develop the model using primarily controls of the high-genus mesh as well as automatic methods, where there is minimal user interaction and the program automatically creates the high-genus mesh. We used the interactive method to create the surface by creating multi-segment curved handles between two different faces, and by ``rind modeling'', which provides for easy creation of surfaces resembling peeled and punctured rinds.

Figure 3: The Manufactured Rapid Prototyped Model. (Source: Authors).

After settling on the most appropriate high genus surface to use, the model was converted into a stereo-lithography file for rapid prototyping (i.e. 3D printing). We used the Dimension 1200es 3D Printer because it was able to print functional, durable 3D models (whose size was about 10” x 10” x 12”). The printed model would be used by the students latter for evaluation and testing

under real-world conditions. The model was made from a production-grade thermoplastic that is durable enough and also accurate enough to look virtually the same as original CAD model. The model was printed from the bottom up with precisely deposited layers of modeling and support material. To help the students orient the model better the model was printed in two sections with two different colors as shown in Figure 3. After manufacturing, the model supports were snapped off to reveal the final model. Finally the model was cleaned and polished.

Experiment Design

The experiment described below is highly scalable as it could be conducted in different ways. The most basic way is to place the fabricated surface in different positions and then present the test subjects (the students) with the computer model of the fabricated surface. Then the students are asked to modify the computer model to face the same position as the one in the physical fabricated surface. Digital manipulation involves only orbit rotation operations which are easy to use and comprehend.

The use of computer manipulation of the model allows for more accurate measurement of the sequence of events (moves made by students) because the whole experiment can be recorded and analyzed later as described below. There are multiple other testing alternatives which include the reverse process, where students are asked to position the physical printed 3D model to match the position of the digital model. Also the use of animation of the digital model can be used to enhance and test even further the visual reasoning skills of the students. The animations

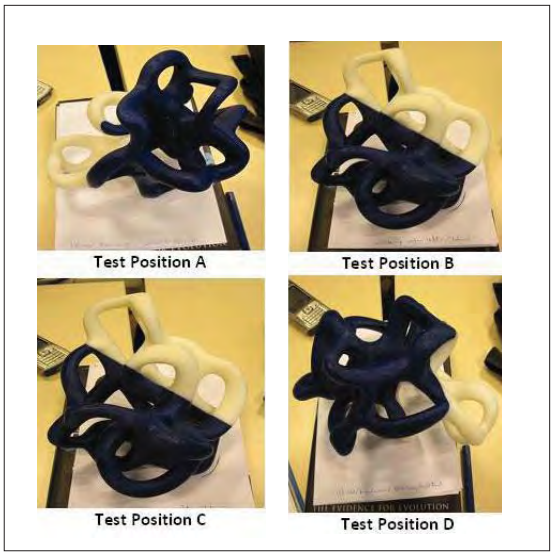

Figure 4: The four test positions considered (note the scale of the model in comparison to the cell phone). (Source: Authors).

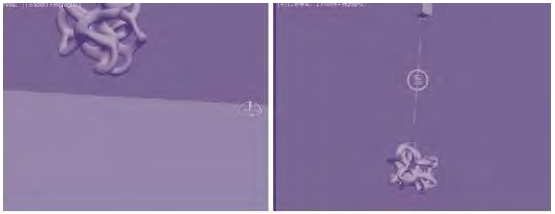

Figure 5: Animated positions of the test model. (Source: Authors).

can be in the form of an object being dropped from a height and landing on one of the natural resting position or being suspended form a spring such as those shown in figure 5. Animating the object significantly enhance the visual reasoning

skills of the students as they are able to grasp the topology of the objects in a more natural way.

It was noticed that some students are more natural when dealing with the orbit rotational manipulation of the software. When rotating the digital model it was found that Orbit manipulation of the object was much quicker and easier for students than axial rotation and therefore it was chosen.

The timing strategy used in the experiment refers to how much time is given to the students to complete the various sequential exercises. Three different timing strategies could be used; Fixed timing, progressive timing or open timing. The test timing strategy depends on the type of analysis needed and variability in the student spatial and visualization skills. With the fixed timing strategy, the same time is allotted for the various test positions which means allows for assessing differentiating between the students in terms of their abilities but does not give an indication on the distribution of these abilities since results will be binary in nature. Failure rates are hypothesized to be uniformly distributed among the different trials. In progressive timing strategy, less time is given with each attempt. This allows for more detailed analysis on how quickly the students can visualize and learn the form in question as more pressure is put them with each trial. As such it can provide another level of differentiation between the students with better visualization skills and the distribution of the failure rates is hypothesized to be more skewed and sharp. In open timing students are given as much time as they need to solve the problem and hence data could be collected would differentiate between students with poor visualization skills more as they are the ones who will probably remain behind. Although failure rate data in the open timing strategy would probably not be useful, the distribution of the time to success is hypothesized to be normally distributed.

The following steps for conducting the test are suggested:

1. Students were first told about the exercise and it was mentioned that participation was voluntary. Students were not told any details about the exercise and the actual model was not revealed.

2. Students then were admitted one at a time and were first briefed about the exercise and told that this was a research project and that the results would not affect their grades in anyway. It is important to note however that due to the unique nature of this exercise the students were very excited about it and showed great sense of competition. Although every new student going through the exercise did not know in advance about the specific nature of the exercise, it became very competitive with students asking about the record score so that they can beat it.
3. Students were then given an introduction into orbit navigation of the 3D model to ensure that they felt comfortable navigating the model in 3D space.

4. The timing strategy used was explained to the students. This involves initial calibration of the timing strategy by having 2 or 3 volunteer students take the exercise at the beginning and analyzing their times. For example, in our run we used progressive timing strategy after measuring the amount of time it took 3 random students to complete the exercises.

5. The positions of the model are recorded

in advance (as the exercise protector could easily forget the original positions) and then the first position is shown to the student. It may be necessary sometimes to have the progressive timing strategy start after an initial open time test so that the students get familiar with the interface. Any CAD software can be used, however one that can support real-time rendering and animation is preferred. In our run we used 3D Studio Max.

Number	1st attempt	2nd attempt	3rd attempt	4rth attempt
1	2:17	0:29	1:14	0:48
2	1:07	1:08	X	X
3	1:11	x	1:35	1:48
4	7:47	1:03	0:45	0:25
5	1:03	x	0:09	0:50
6	2:02	1:00	0:18	X
7	13:00	0:20	X	0:57
8	1:55	1:43	X	0:45
9	1:50	1:24	0:08	0:12
10	3:55	0:23	0:54	X
11	1:01	0:41	X	1:02
12	1:20	1:10	1:00	X
13	3:14	2:00	0:46	1:30
14	0:40	0:25	1:00	1:05
15	3:45	2:47	1:00	1:21
16	6:40	2:06	1:37	X
17	1:00	1:20	X	X
18	2:29	2:40	0:50	1:12
19	6:22	1:30	1:15	X

Table 1: Sample results: (Source: Authors).

6. The various positions are then shown to the students while the entire session is being recorded with a screen capture video for further analysis. The various positions can also be photographed and the picture shown to the students. This allows multiple concurrent session of the experiment to take place simultaneously.

7. The results are then calculated from the recorded videos after all students have completed the exercise. To increase the level of engagement of the students, the current record score can be continuously announced.

Analysis and Results

After conducting the experiment the results were tabulated and analyzed. Table 1 shows sample results of the experiment. The results show the time to successful completion of each student for the 4 different positions, with an "x" indicating failure. In our sample run we used a progressive timing strategy 8 minutes, 2 minutes, 1.5 minutes and 1.25 minutes. The main results calculated are those relating to the time to successful completion and the failure rates (i.e. the number of students who failed to complete test).

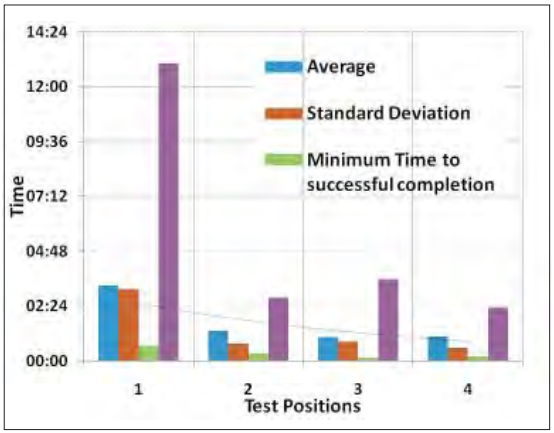

Figure 6: Correct and wrong results versus test number (1 to 4) as well as overall correct and wrong percentages. (Source: Authors).

Figure 6 shows the summary scores versus the

various sequential test positions. The average time to successful completion decreased from 3:17 minutes in trial one to 1:04 in trial 4. This is expected as students become more familiar with the model. It is interesting to note however that while minimum time decreased from 0:40 in the first trial to 0:12 in the last trial the maximum time taken remained fairly unchanged over the last three attempts. This can be explained if we look at the various strategies employed by the students during the experiment. Some students where moving too rapidly while other took their time. Some focused on a specific loop and tried to find that loop. They were able to differentiate between the various loops in the model and their relationship to other loops. Therefore the main orientation guide or aid used was the ability to focus on one specific portion of the model and its relationship to the entire model. As such they used an "anchor" to orient the model so that they could achieve the orientation they wanted. Other students reported that they were relating the view of the model to the resting position. The model had exactly 12 different resting positions, all of which were three-point resting positions, while the model had about 24 loops. Still more students used the loops as a visual anchor. They were able to differentiate between the various loops in the model and their relationship to other loops.

If we look at the variability in the students' performance versus the number of position attempts, we find that the variability of the average time to successful completion as measured by the standard deviation significantly decreased. During the first attempt the standard deviation value was 3:08 (96%) which reached 0:35 (55%) at the last attempt. This is further demonstrated by the distribution of the average

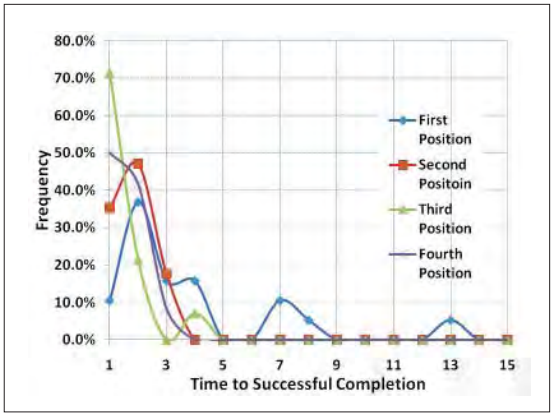

Figure 7: Distribution of Correct Timing overall and by test number (1 to 4). (Source: Authors).

time to completion as shown in figure 7 above. During the first attempt the success time was more evenly distributed when compared with the last trial. This fact along with the decrease standard deviation indicated a very interesting issue. As students become more familiar with the model they seem to improve their spatial understanding of the model and as such as they take less time to complete the exercise but even more importantly, their performance seems to converge, i.e. so that after more trials most students would achieve more or less the same success time. But is this true for all students?

Figure 8 shows the failure rate versus the average time to successful completion. What is evident here is that although the time to successful completion is significantly reduced, the failure rate increases. Although this could be partially attributed to the progressive timing strategy, it also indicates that some students are more able to visualize freeform spatially than others. In

essence the good get better and the bad get worse. This duality can be also explained by the fact that some students who initially fail end up giving up at the end.

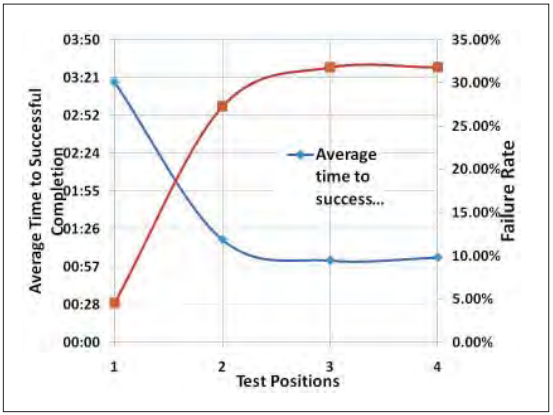

Figure 8: Number of manipulations to correct solution versus test number (1 to 4) as well as overall correct and wrong percentages. (Source: Authors).

One of the results that could analyze is the timing of each digital manipulation (rotations). Since a video of each trial for each student was recorded, it is easy to segment the time of the video to determine the number of the rotations made until success as well as the time between each of the rotation and the next. From these two values the following rates could be calculated:

Manipulation rate = Number of Manipulation / Total Success Time (in seconds) (1)

The manipulation rate represents the average speed at which the students make their manipulations and is important to assess how students interact with the digital model. Students with a high manipulation rate tend to either have a high trial and error approach (if their time to successful completion is high) or tend to have a crisper visual understanding if their time to completion is relatively small. Figure 9 shows a recorded sequence of manipulations during three different trials.

Therefore, it is important to calculate another important measure which is the ratio of manipulation rate to total time as:

Ratio of (Manipulation rate) to total time = Manipulation rate / Time to successful Completion

This value is critical in differentiating between the students. Students with a high manipulation rate and long time to success are basically on a trial and error mode and have not definite strategy. On the other hands students with a low manipulation rate and a low time to successful completion are methodological and efficient in reaching the correct position. There are two other permutations, i.e. students with a high manipulation rate but and a large time to completion, which could indicate luck, or students with a low manipulation rate and a large time to completion, which could indicate a different visualization process where more time is taken to comprehend and synthesis the model in each move. It is important to note that another measure that could also be important is the Manipulation rate change (first derivative of the manipulation rate). This is important to study the behavior of the students with time as it gives an indication on the change in their manipulation rate and could be related to panic and failure.

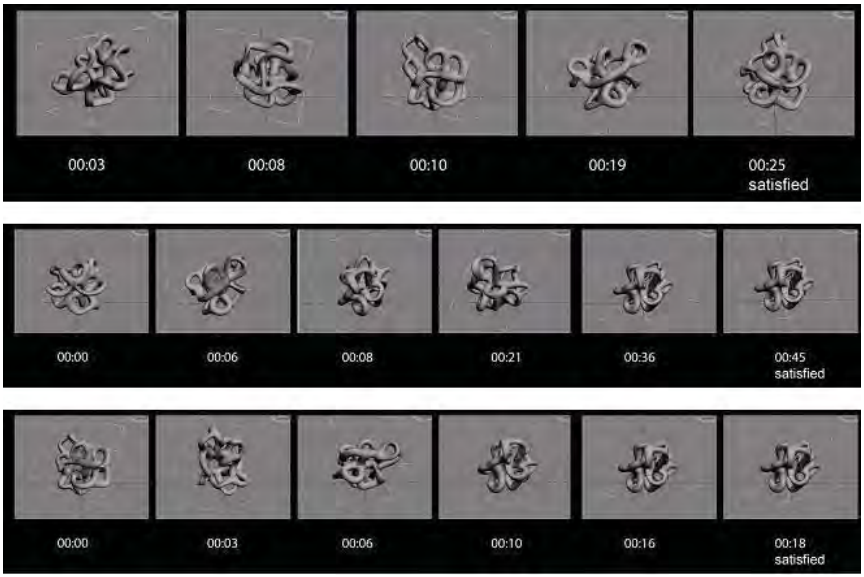

Figure 9: Recorded sequence of manipulations for three attempts. The last two are of the same position. (Source: Authors).

Conclusions and Recommendations for Future Work

This paper presented an experiment that could be used to investigate the processing and synthesis of visual information related to the new kinds of free form encountered in today's architecture. The effect of introducing computer-aided drafting and design tools to new students of architecture and the impact on the quality of their spatial thinking abilities is addressed. In particular this paper seeks to address whether the early introduction of computers enriches the ability of freshman and sophomore architecture students in terms of their ability to solve design problems requiring spatial arrangements, or handicaps it. Statistical analysis of the outcomes was conducted and the results and conclusions of these experiments are presented in this paper.

Future extensions include assessing the performance of the students based on the courses they have taken or other background aspects. Also future extensions include studying the manipulation rate more accurately from video recordings and comparing two-way test where the users have to orient the physical object from the computer model as well as using augmented reality systems for the comparison. Furthermore, one other extension the authors are working on includes assessing the visualization skills and design skills. Experimental data from protocol studies of a number of student

designers solving similar design problems would be analyzed. The verbalization of the students during the design session was segmented and coded to produce linkographs. Entropy of the linkographs was calculated and analyzed in relation to the design outcomes. Previous research has indicated that design outcome is more related to the rate of change of entropy than to the entropy alone and consequently the change of entropy over time of these linkographs was focused on along with the various measures described above.

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DESIGN WITH THE SENSES AND FOR THE SENSES: AN ALTERNATIVE TEACHING MODEL FOR DESIGN STUDIO

May al-Ibrashy and Tammy Gaber

Abstract

In the 1990s, Juhani Pallasmaa wrote a compact, yet, eye-opening book expressing his growing concern about the architectural profession's waning ability to reference all the senses of the body in the design process. Bit by bit, the perceptive chasm between the architect and architecture was widening both in the design process and in the cognitive experience of existing architecture. More than a decade later, these concerns have heightened as the ramifications of this design divide appear in the form of architecture whose divorced virtual quality has spilled over from the design process into built reality. The illusion of virtual reality – as achieved by 3D simulation in all its glories – has pulled the architect into a zone of false confidence where he/she feels that the design has come to life before it is built and that every corner and detail can be simulated and therefore understood. But can it be touched, smelt, tasted or heard? In fact, is even what we see on the screen anywhere close to what we see as we move bodily through its spaces?

This phenomenon is addressed in a design studio run by the two authors of this paper. The purpose of the design studio, which is held in the Department of Architectural Engineering, of the Faculty of Engineering of the British University in Egypt, is to design a community centre linked to a place of worship within a residential compound currently under construction on the outskirts of Cairo. The graduating class of ten students is in the final and fourth year of a program that emphasized the engineering and project management aspects of architecture at the expense of theory and history of art and architecture. The university has no humanities or liberal arts program as yet, and students have minimal contact to arts within the university system. Contact hours in design studios are limited and design is mostly computer-aided. The need to re-emphasize the physical, tactile, polemic and holistic aspects of the architectural design process is urgent, especially that this was the first graduating class of architecture in this young, privately owned university.

The design brief lent itself easily to the purpose of reinstating the body and the senses both as design tool and design purpose because of the dual iconic intimate nature of the place of worship in particular. Spirituality, although a transcendental out-of-body experience is stimulated and enhanced through physical rituals of sound, taste, smell, touch, and vision, and the design process is only successful if it constantly refers to the senses as tool and purpose.

The design studio re-instates the role of the senses in a number of ways. In addition to preparing a standard comparative report after field visits to local case-studies, students are asked to convey the effect of their case-study on one of the senses through a series of five conceptual installations each addressing one building and one sense. Installation

Practices

art in itself is a foreign concept to the students and in expressing themselves through an art form that uses holistic sensory stimuli to convey its ideas, students found themselves rethinking their own design process. Furthermore, the design is grounded in a real site that they were asked to visit and report on, and in a program that was arrived at democratically through brainstorming. Finally, designs are to be developed in a tactile physical manner through modeling and sketches. Traditional orthographic representation and computer aided design will be relegated from design tool to representational tool applied to the design after it is almost fully developed. Evaluation throughout the duration of the studio is not only transparent but focuses on the student's ability to palpably grasp and express ideas beyond graphics. As this is a studio-in-progress it remains to be seen the developments, effect and impact this approach will have on the graduating class and their final product.

Keywords
Design Studio, senses, installation, model-making.

Introduction

"It may be that our unpoetic dwelling, its incapacity to take the measure, derives from a curious excess of frantic measuring and calculating." (Heidegger, 1997, p.118).

A good part of architectural education is consumed in teaching students how to represent a building; the concept behind it, its details, its structural system, its interiors, its exteriors. At the core of these tools of representation is the ability to convey through lines, in two dimensions what is, of course, a three dimensional product. It is a skill that is not easy to learn or to teach and it is an important component of almost all aspects of the architectural education process.

In the 1990s, Juhani Pallasmaa wrote a compact, yet, eye-opening book expressing his growing concern about the architectural profession's waning ability to reference all the senses of the body in the design process. "The problems arise from the isolation of the eye outside its natural interaction with other sense modalities, and from the elimination and suppression of other senses, which increasingly reduce and restrict the experience of the world into the sphere of vision" (Pallasmaa, 2005, p.14). Bit by bit, the perceptive chasm between the architect and architecture was widening both in the design process and in the cognitive experience of existing architecture. More than a decade later, these concerns have heightened as the ramifications of this design divide appear in the form of an architecture whose divorced virtual quality has spilled over from the design process into built reality. Pallasmaa's book ostensibly champions the skin over the eye and called for an architecture that designed for a superior tactile experience, but in the process, it addresses all the senses. He, in fact, prefaces his book with quotes that poetically evoke how to experience life is to be constantly bombarded by an undistinguishable mix of sensory stimuli;

'The hands want to see, the eyes want to caress' (Goethe qtd. In Pallasmaa, 2005, p. 14)

'My perception is not a sum of visual, tactile and audible givens: I perceive in a total way with my whole being, which speaks to all my senses at once' (Merleau-Ponty, 1964, p.48).

The illusion of virtual reality , as achieved by 3D simulation in all its glories, has pulled the architect into a zone of false confidence where he/she feels that the design has come to life before it is built and that every corner and detail can be simulated and therefore understood. But can

it be touched, smelt, tasted or heard? In fact, is even what we see on the screen anywhere close to what we see as we move bodily through its spaces?

The idea that no representation of architecture (whether orthographic, perspective, or even virtual) can truly represent the space that we traverse, touch, feel, smell, is of course, not a new idea. Neither is the idea that as we learn the skill of architecture, our traditional ways of representing it can become a handicap. It is with these ideas in mind that the writers of this paper approached the task of co-teaching a design studio course to graduating students of architecture of the British University in Egypt. We were agreed on what we did not want to do, but still had a long way to go before deciding on what to do. We both had an aversion to computer-aided design and to the kinds of designs the students tended to produce when using it early in the design process. We had no objection to using it as a draughting tool, but wished to propose design processes that better addressed the sensory nature of architecture. We were also suspicious of the plan-section-elevation sequence of design (whether drawn by hand or the computer). While we were agreed that the physical motion of hand-draughting was preferable to the punching of keys and the miniscule movements of a mouse, we still felt that starting the design with orthographic representation limits spatial thinking, thereby handicapping the design early on. We were drawn to the idea of starting with scale models, then, after the concept is clear, progressing to orthographic drawings. The physical action of modelling emphasised the sensory over the virtual and was a constant reminder of Lefebvre's (1991) cry for texture not text. But at the back of our minds was a lingering doubt that while these ideas were a step in the right direction, they were all within the same framework, the same measure, of architectural practice that reduces the bodily experience of architecture to a visual representation to be seen not sensed. We felt that there was another aspect to the design process that could get the students closer to the sensory understanding of their designs. This other aspect was 'more' than model-making.

In architectural education, ruled as it is by figures (both pictorial and numerical), conveying the idea of the body and how it moves between the walls and within the spaces of a building, is extremely difficult to teach. The phenomenological approach is complex, but it is our contention that it – or some approximation of it – has to be part of an architectural student's education. The next step was to find a way to introduce the students to a measure for architecture different from the measure they employ in their representation (and consequently) their understanding of architecture through drawing and/or model-making. Along his poetically meandering yet extremely evocative path towards the answer to his question about how Man can dwell poetically, Heidegger visits the meaning of measure and takes it beyond the limit of numbers. His reflections are on Hölderlin's poem which starts with the verse, Full of merit, yet poetically, Man dwells on this earth, and ends with the statement Is there a measure on this earth? There is none. To Heidegger, there is a measure, and the measure, if we are to dwell the earth not simply build on it and farm it, is poetry.

"Yet it strikes us as strange that Hölderlin thinks of poetry as a measuring. And rightly so, as long as we understand measuring only in the sense current for us. In this sense, by the use of

something known – measuring rods and their number- something unknown is stepped off and made known, and so confined within a quantity and order which can always be determined at a glance. Such measuring can vary with the type of apparatus employed. But who will guarantee that this customary kind of measuring, merely because it is common, touches the nature of measuring? When we hear of measure, we immediately think of number and imagine the two, measure and number, as quantitative. But the nature of measure is no more quantum than is the nature of number. True, we can reckon with numbers – but not with the nature of numbers" (Heidegger, 1997, p.116).

So, even though we 'measure' architecture by our images of it (drawings – photographs), how can we measure the nature of architecture? We have to, otherwise, we will produce spaces of unpoetic dwelling. Could it be that, as Heidegger (1997) asserts, "that our unpoetic dwelling, its incapacity to take the measure, derives from a curious excess of frantic measuring and calculating"?

Again, the quest to represent the un-representable, to measure the un-measurable has been a concern of the discipline of architecture for years. In a book of documents and manifestos provocatively entitled The End of Architecture?, Eric Owen Moss urges us to "find the measure the measure can't measure" (Moss, 1993, p.62), while Coop Himmelblau describes their process of design and collaboration as a mix of drawing, model-making, verbal description and body language. They observe that the "more forcefully the designer experiences his design, the more vital the completed space" (Himmelblau, 1993, p. 18). The question still remains, how does one forcefully experience a design?

Frank and Lepori (2007), on the other hand, premise their book Architecture from the Inside Out, on the legitimate concern that the architectural profession is producing abstract, objective, un-engaged buildings that alienate and distance their user. They exhort us to create users' spaces not spaces conceived as representations. According to Lefebvre, "a user's space is lived – not represented (or conceived). When compared with the abstract space of the experts (architects, urbanists, planners), the space of the everyday activities of users is a concrete one." Frank and Lepori refer to a number of architects and theorists who have expressed these concerns in a variety of ways. From psychologist Robert J. Sardello's advocating the use of the language of adjectives rather than nouns for self-presentation, to Eileen Gray's admonition to fellow architects not to conceive a house for the pleasure of the eye, rather for the comfort of its habitation, Frank and Lepori continue to guide their readers back to the human body as the original reference of architecture, its point of departure, as subject not object.

"Would you like to live there?"

Frank and Lepori (2007) also refer to a number of experiments in architectural education that aim at sidestepping the limitations of traditional representational methods in order to coerce the students into producing designs for users, for the body, designs made up of nouns not adjectives. From simply asking a student if they would like to live in their own design, to making students walk barefoot up and down many types of stairs and describe the sensation, to asking students to critique buildings and landscapes as receptacles of sound, smell and other sensations, these teaching methods are all attempts to free the

students of the necessary yet restraining tools of traditional representation that as their stock in trade, will be ever-present in their professional life as both boon and bane.

But how will students describe these sensations? What tools will they use if they are asked to forgo drawings and models? Will they say them? Write them? The question is, as Alice, of Wonderland fame, has previously asked Humpty Dumpty, "whether you can make words mean so many things" (Lewis Carroll qtd. in Forty, 2000, p.9) . How can one use one skill that impacts one sense (talking – hearing / drawing - seeing) to convey the "polyphony of the senses" (Bachelard qtd. in Pallasmaa, 2005, p.41) of traversing through any space, let alone great architecture? It might be that the process needs to be inverted. Rather than target one sense to convey a myriad of senses, we needed to ask the students to isolate

Figure 1: Appropriation of the Design Studio. (Source: Authors).

Figure 2: Learning through Making. (Source: Authors).

one sense and convey it in a manner that impacts all the senses of the person on the receiving end. In other words, we arrived at the idea of asking students to describe how a building impacts one of the five senses and to do that through a genre of art that addresses a number of senses simultaneously, installation art. We hoped that this additional method of expression, installation art, would prove to be what we were looking for in addition to the model making in the design process.

Installation art has been used as a teaching tool in architecture design before, but not that we know of in Egypt, and certainly not within the curriculum of our department, a curriculum that gave far more weight to the engineering aspect (with emphasis on structure and project management) than the conceptual dimension of architecture. We felt that combined with the use of modeling as a design tool, this studio structure would be a perfect conduit for imparting with tacit knowledge or "learning by

doing rather than acquiring rules for doing" We would use exemplars (case studies) and models (both analytic and poetic, but with the emphasis on the poetic) to "learn how the subject acts by treating the model 'as if' it were the subject itself" (Zeisel, 2006, p.81).

In summary, the design studio, the purpose of which was to design a community centre annexed to a place of worship, was to re-instate the role of the senses in a number of ways. In addition to preparing a standard comparative report after field visits to local case-studies, students were to be asked to convey the effect of their case-study on one of the senses through a series of five conceptual installations each addressing one building and one sense. Furthermore, the design was to be grounded in a real site that they were asked to visit and report on, and in a program that was arrived at democratically through brainstorming. Finally, designs were developed in a tactile physical manner through modelling and sketches. Traditional orthographic representation and computer aided design was relegated from design tool to representational tool to be applied to the design after it was almost fully developed. Evaluation throughout the duration of the studio would be transparent and would focus on the student's ability to palpably grasp and express ideas beyond graphics.

The Students – 'We are the first group'

The British University in Egypt is a university without a humanities department and the department of Architecture is part of the Faculty of Engineering. The curriculum of the pilot cohort has shifted from project management and civil/structural emphasis towards a more design oriented focus but it is still lacking in sound conceptual grounding. This group is the first graduating class with ten students.

Figure 3: Graduating Class 2010. (Source: Authors).

Project and Site – Sacred and the Suburb

This last design studio before their graduation project was a challenge in and of itself; it was an important opportunity to reinforce lessons of the design process with the added dimension of conceptualization and sensory understanding they had not been previously exposed to. The design brief was to design a religious space (with a choice of the denomination) with a community

center. The site was a new gated compound on the edge of Cairo in the design phase (residential community mainly comprised of neo-Mediterranean villas) with a large formation of petrified wood (Stone Park, the name sake) as the focal point of the site. This type of carte blanche site was deliberately chosen so that the students could be freed from the historic preconceptions, particularly prevalent in Egypt, associated with the design of places of worship.

Syllabus – Sensory Based Process

In designing a design studio to address the side of architecture these students had never been exposed to, we decided to begin with student analysis of local and international case studies (of similar types of buildings to their design brief), the selection of which we guided. Following this students were asked to visit the site and analyze it. Thus, fully immersed in the context and requirements of the design brief, we presented to them argument for architecture as sensory experience as proposed in 'The 'Eyes of the Skin'. We also introduced to them the ideas and examples of installation art as applied to the expression and understanding of architecture. Pivotal texts like Butterworth's taste analysis of the Barcelona Pavilion (Butterworth, p.18-25) pushed the students comfort zone and helped to re-orient them to a seemingly drastic new way of understanding buildings. With this, each group was asked to rethink their local example from the perspective of how it interacted with one of the five senses. Over six weeks, each group presented their installations– allowing for ample time for development and discussion. Students were simultaneously asked to model the site at 1:400, which had some topographic variation. Students then developed model schema for their program using variety of materials and were guided to relate ordinance systems to structure their layout based on their conceptual and individual approach to the site. The final stage of the design studio was the documentation of their ideas and designs in drawing form. Students worked on translating their model ideas into plans, sections and elevations.

Although all aspects of the studio could be described in detail, it is the installation aspect that we felt was both unique and provocative in the design process. Upon completion of the studio, we reflected with the students about the process and this specific facet of installation design and found that although there were many particular benefits, there were also aspects that we as instructors could learn from – and fine tune - for subsequent inclusion of installation making in subsequent design studios.

Installations

In Detail

Students found the task daunting and confusing as they were used to expressing buildings through drawings, photos and words. This is how they knew how to analyse and design. We asked them to translate the ideas and understanding of one of their case study buildings into a bodily experience and to refer to conceptual and installation art as a genre. We found that we had to explain what this was, so we chose examples that addressed architecture and space including the work of Gordon Matta-Clarke and Christo. While we asked them to use their experience of the local example as a spring board, some groups chose to specifically do this and other were more general.

The first group had the sense of smell and the

group created a 'prayer box' out of cardboard. It was barely the dimensions of a single person praying and was oriented towards Mecca. The prayer box was completely dark with perfumed white powder and rocks inscribing a prayer niche on the floor. After entering the box a small purple florescent light was turned on.

The second installation was one person who was addressing the sense of sound and chose to simply play a recording of the commercially available 'Ameno' by Era, and asked the class to sit and shut their eyes and imagine a church.

The third group presented their interpretation of taste of a local church from the early 20th century. They used a double structure, where the interior was made of Styrofoam sheets and the exterior was composed of cardboard sheets at a person's height and was held up by an arrangement of drawing tables and chairs. People entered the space via a bent unlit corridor that shifted direction and emphasis to reveal a small white soft space. On entering one found oneself ankle deep in cotton wool and enclosed within walls covered in cotton wool and a cascading ceiling of what one comes to realise is white cotton candy.

The fourth installation was based on vision and was made by one student. The student magnified the visual aspect of the Muslim rosary by making it at a large scale out of plastic jars with stencil spray of religious words. This was lit from inside (highlighting the stencilled text) echoing the local traditional lantern (fanus) used during holy month of Ramadan.

The fifth installation also addressed vision and was a model of the ovoid form of the mosque that they had chosen as case study. They used hundreds of Dixie cups stapled together to generate the shape and created the minaret bases out of water cooler containers; one filled with dark fluid and the other with red fluid. These fluids alluded to the main activities held in the mosque which were not prayers but gatherings for condolence (black coffee is served) and for weddings (red sherbet is served). The rest of the minarets were then formed out of Dixie cups.

The sixth and final installation was meant to address the sense of touch but evoked a mix of all of the senses. As well, this installation included materials and elements of the earlier installations in an attempt to both summarize the senses/ installations and to evoke 'touch' with any actual touching. We were asked to enter the room in line with our eyes closed, with each person's hand on the previous person's shoulder. Incense was burned, alluding to the smell installation. We were then seated in front of two screens made of the Styrofoam (from the taste installation) and served water in the Dixie cups of the previous installation. A video montage of various images meant to evoke the history of Islam as recounted in the religious lessons held in the case-study mosque were shown synchronized on the two screens.

As we mentioned previously, the inclusion of installation design was a unique addition to the architecture design process, especially in this university. The students' response in general was beyond our expectations, with moments of revelation for all of us regarding the senses and architecture. Our students benefited from many aspects of the installation design process including: process of making and materials, understanding the physical qualities of space, and engaging a larger forum of response and

criticism beyond their small circle of class and professors.

Lessons of Making and of Materials

"Our most sacred convictions, the unchanging elements in our supreme values, are judgments of our muscles' (Nietzche , 1967, p.173).

The first lesson of installation making involved bringing the student back to primal actions of making with their hands. The 'real' properties of materials, their textures, ability to stretch, stand, support, transmit light and so forth became part of the design process for the students. While each student had a preliminary idea of what they wanted in their installation, modifications were made while making, often with improvisations and unexpected solutions. In recognizing the inherent physical properties of materials and manipulating these materials for the desired effect the students learned many unspoken lessons. The students' choice of material itself was also surprising. It was expected by the instructors that the students would search and find large scale 'architectural' materials like plywood, or aluminum but all of the students created their installations from large scale material sources similar to their model making materials including cardboard, Styrofoam, cloth etc.

"The skin reads the texture, weight, density and temperature of matter... The tactile sense connects us with time and tradition: through impressions of touch we shake the hands of countless generations..." (Pallassmaa, 2005, p.56).

Of the six installations, three used packaging cardboard to create their installations, although very differently, successively expanding from box enclosure to larger space occupation. The first installation, 'Sound', used the packing cardboard literally as a box similar to its original shape. The 'Taste', installation used cardboard to create an inner sanctum within a larger framework of haphazardly placed Styrofoam which had formed a transitional space. The final installation, 'Touch', took over the whole studio, using cardboard to cover the windows, and along with Styrofoam, to form the display panels for the video projection.

The 'Smell' installation also used perfumed stones and powder to inscribe the prayer niche (mihrab) on the floor within the box. Criticism of the project pointed out that the installation may have been more engaging had the user been asked to remove their shoes and if the place had been dark, so that the act of prostration may make the user "see" the mihrab through smelling the rocks and powder on the ground.

The 'Taste' installation learned from the lessons of the 'Smell' installation, by attaching a bent entrance (majaz) of Styrofoam to the cardboard sanctum. The only criticism was that the 'construction' of the Styrofoam and cardboard need a designed structural system of support, rather than just being held up by class furniture. The creative use of cotton wool and cotton candy within the final space, along with the opening in the ceiling allowing in light, proved to be an enjoyable surprise for all of the class. The students immediately wanted to touch, sit in and eat the installation. The creators wanted to simulate the comfortable feeling they had felt in the space of the local church they had studied. For the instructors, the space seemed to trigger images of the heavenly copula in renaissance

churches that were covered in frescoes of cherubs in the clouds.

One installation did not use any materials ('Sound') and two installations used common, non-architectural, materials (jars and cups) to create their installations.

The two 'Vision' installations each used one repeated element. The first 'Vision' installation, that of the Muslim rosary, involved the creative use of painted plastic (pickling) jars, that were painted, lit up and strung tighter. The proportions of the round jars and the cylindrical tops that allowed for simple connections to each other, effectively mimicked the geometries common to many rosaries. But because this installation did not create/ re-create any kind of space the student was asked to reconsider the context of the piece, which was initially hung in the studio, so the piece could be seen as an extension of, or reaction against architectural spaces on campus.

The second 'Vision' installation, the dome made of Dixie cups, proved that the use of a common, non-architectural material, could teach invaluable lessons of design and structure. The oblong dome of the Cairo mosque they had studied was recreated with this repeated element. What was gained was the important lesson that the case study dome was essentially poor in aesthetic because it was built using a structural system that showed no clear logic. On the other hand, the repeated units of the installation allowed for an immediate aesthetic and logical structuring of such a large curvilinear form. Furthermore, the fluidity of the connection (using staples on the edges of the cups) encouraged the students to engage the piece by going underneath it and move it, creating other organic shapes that were both aesthetic and structural. The students also used long bolts of cloth to demarcate their section of the studio and to allow for a moment of revelation of their dome.

Understanding the Physical Qualities of Space - Real and Imagined

"Our bodily felt sense of being in the world… thinking needs to learn by feeling and the need to quiet the conceptualizing mind in order to listen to the body's own speech, its own logos' (Levin, 1985, p. 233)

The second lesson of making the installations was the ability to select and grasp the existing qualities of the space which will house the installation and learn to play off of it to recreate their imagined space. So by engaging real space constraints, opportunities for imagined and different spaces were possible.

Two of the installations, both which had used packing cardboard, essentially created boxes within their space. Again, the singular installation that did not use materials, did not engage the space. One installation engaged the entire context of the university by being relocated several times to different places on the campus. Two of the installations engaged part or all of the space of the studio by making modifications that affected the entire room.

As with the expansion of the use of simple materials so too did the installations expand with the amount of space they occupied, changed or affected. Beginning with the 'box' of the 'Smell' installation, and the other cardboard board

based installation of 'Taste' which not only grew to occupy more of the studio but also modified the space with the double structure and the created transition space from outside (studio) to inside (cotton inner sanctum). The majaz forced the users to change their posture (bend down, because it was lower than standing height) and allowed time for the eyes to adjust to the dimness of space, and to 'feel around' to move within the haphazard corridor. This was an intuitive lesson as well about the architectural importance of allowing for and creating transition spaces that were integral to traditional places of worship. The 'Vision' installation of the Muslim rosary was relocated several times around campus, first in the studio, then in the entrance atrium of the main building which is used mostly by the entire Faculty of Engineering. Many assumed it was a version of the decorative lantern left over from Ramadan. Its effect on the space was minimal but it did garner some attention and forced people to look up to the upper floor of the atrium where they normally would not have. On the next day it was moved to a south facing balcony looking onto the main student outdoor area. In the bright sunlight, and at a distance it began to look like Christmas decorations on the building! On the third day (and where it remained until the end of the semester) it was hung on a connecting bridge between two buildings.

The second 'Vision' installation and the 'Touch' installation modified the studio itself for complete effect of their installations. The Dixie-cup dome was screened off from the rest of the room with a curtain structure hanging from the ceiling. The 'Touch' installation, modified the room by covering the nine large windows with black cardboard. Through modifying and occupying the space, the students took ownership of the studio and other classes scheduled to use it were moved to other locations.

Figure 4: The two 'Vision' Installations. (Source: Authors).

Engaging a Larger Architecture Community

".. simulations can have heuristic value... students can simulate experiences of design with the understanding that.. the experience itself constitutes a worthwhile 'outcome'. Full size mock-ups of student designs are one example" (Wang, 2002 , p.290).

Figure 5: The Cascading Cotton-Candy Ceiling of the 'Taste' Installation. (Source: Authors).

Figure 6: The Taste of Architecture. (Source: Authors).

Figure 7: Emerging from the Mihrab Box of the 'Smell' Installation. (Source: Authors).

Figure 8: Inside the Dixie Cup Dome of the 'Vision' Installation. (Source: Authors).

Engaging the larger architecture community of the university is mostly done by way of annual shows of (best) student work. Rarely do classes interact, either with each other or with instructors that do not directly teach them. Part of the issue is policy related. Each year does not have a studio dedicated to them. Rather, the same studios are used as classrooms for students in

other courses. Students do not have a studio that they feel they own and the nuclei of 'habitation' common in many architecture schools do not exist, and as such, there is not a sense of physical belonging and community. One happy by-product of the students in-studio installation making and display was that the other classes scheduled to take place in this studio were transferred to other rooms and the studio began to 'belong' to the students. This encouraged architecture students and instructors to come by throughout the day and discuss the installations. The students benefitted greatly from having their work exposed to a larger audience of peers and instructors – gaining a variety of feedback to help them understand the problems and questions they had posed with their installations.

Two of the installations were very time based and only occurred once, for the class, and thus did not gain feedback beyond the class. The 'sound' installation with the recording playing as well as the video display of the 'touch' installation were very temporal, and both garnered the attention of only the class and faculty directly involved. Three of the installations engaged the studio in some way or another and were on display for a number of days were the 'Smell' box installation, the 'Taste' cotton installation and the 'Vision' Dixie-cup dome installation. Because they took several days to construct and were on display for days afterward, it allowed for continuous visits – and help and feedback - from students and staff. The one installation that moved from the studio (Muslim rosary) and was located in different parts of the campus, garnered the attention and commentary not only from architecture students and instructors but from a much larger audience of the university. Despite the exposure, the installation itself was not clearly architectural in nature, the way it affected the spaces and viewers was not entirely clear – even to the author of the installation herself.

Lessons Learnt: Student Feedback

After the final installation, a round table discussion was held in which students were invited to critique the process and reflect on what they learned from it and how it applied to the design process. Most were agreed that it made them more aware of the multi-sensory experience of architecture and more careful in choice of material, design of light and acoustics. In the process, they came to experience buildings in a more conscious manner and to register how their bodies reacted to them.

On a more specific level, some of them expressed the idea that parts of architecture could take on the qualities of installation art. They were inspired by the empowerment they experienced when invited to modify their space and wanted to encourage the user of buildings they design to do the same. For example, one student wished to include a wall for graffiti in her design. The wall would double as a backdrop for a water fall that would wash the graffiti away to make room for more self expression from the user. They felt that in including these types of spaces, architecture would engage the user more, making him a more pro-active user – a shaper rather than a receiver.

One final comment was made by one of the designers of the cotton candy 'Taste' installation. He was struck by the reactions and interpretations of the users of his installation. He felt that, while some of the aspects of his concept and ideas were grasped intuitively by the users, others

were not. They were, however, replaced by other ideas and interpretations that the users projected on his design. His bemusement soon turned into revelation when he realized that these alternative readings added value to his original design. His conclusion was that while the user will not necessarily grasp the conceptual intentions of the designer, it is still the latter's responsibility to make the designed as nuanced and multi-valent as possible. In doing so, he/she creates a space that provokes the user into weaving his own stories and interpretations. In re-conceptualizing the building, the user takes ownership of it and perpetuates it through the layering of meaning.

Impact on Design Studio

The most frustrating part of the exercise was the immediate impact on the architectural designs they produced for project. Most of the insights the students said they gained, and the ideas they expressed did not translate into inspired design. While both student and staff who had taught them before said that they had improved as architects, the instructors were disappointed by the level of the final designs.

This anti-climax was due to a number of factors. The nature of these kinds of exercises is accumulative in the sense that it has to be repeated, fine-tuned and built on for it to be effective. It was therefore optimistic to expect and immediate result within a 12 week semester.

Another problem was related to the difficulty of reconciling time constraints with intended learning objectives. A community centre was added to the brief so that complexity of the project better suited the expected the fourth year design studio intended learning outcomes. The result was a project that gave more weight to the spatial urban organization of the different buildings, limiting time for in-depth design of the place of worship. This was counterproductive because by virtue of its spiritual character and the sensory nature of the rites and rituals that take place in the place of worship which would have benefited the most from the lessons gained from the sensory installations.

As well, the reality was that this was a pilot group that had been subjected to quite a few curriculum changes, and that it was a small group of varied talents and vocational skills. They had not reached the level of proficiency in architectural representation and were still developing their skills to the extent that they could adequately express the innovative design ideas that had been inspired by the alternative teaching method. On the other hand, this naiveté was probably a contributing factor to the fine results they produced in the hands-on exercises.

Conclusion: Lessons Learned

In planning a design studio that addresses the sensory nature of architecture one has to employ alternative methods of instruction that break free from Cartesian geometry and deal with design in a more phenomenological manner. This can be done through enhancing the physical process of design and concentrating on the three dimensional aspect of the building through model-making. Another, more alternative and complementary process, is to forgo all forms of architectural representation and use installation art as a form of expression that addresses the user in a more bodily manner. This method was employed in fourth year architectural design

studio in the British University in Egypt. The impact on general advancement and architectural awareness was extremely gratifying, with students engaging in the process in a creative manner, learning from each other, engaging students from other classes, and responding with insightful and thoughtful feedback that. Students expressed a more heightened awareness of the effect of architecture on the senses and felt more in tune with the user and his/her rights as future physical and conceptual owner of the buildings they design. Immediate impact on design studio was more problematic, as these kinds of exercises tend to be accumulative and their results more long-term. It was therefore felt that the level of sophistication needed to translate insight gained into design application had been under-estimated by the instructors. The instructors needed to gage the varied levels of skills and talents early on in the course so that the time allotted for the design process was appropriate. As well, the design brief needed to target one building in a more in-depth manner rather than deal with an ensemble on a macro level. While the exercise was fruitful and will be repeated by the instructors, it will involve more hands-on training for the students to help them translate insight into design application, possibly making the process come full circle through asking them to include an installation component in their final representations of their own designs.

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WHEN ROLE PLAYING IS NOT ENOUGH: IMPROVED UNIVERSAL DESIGN EDUCATION

Núbia Bernardi and Doris C.C.K. Kowaltowski

Abstract

In this paper the principles of Universal Design (UD) are discussed in the context of design education. The application of the concepts of UD to building and urban design has ensured a better quality of life for users with disabilities, however, to create an accessible environment the design profession needs to adopt new attitudes and the design process and its teaching strategies must change. Design education is discussed in relation to role-playing and participatory design activities. A teaching experience is presented, with the goal to develop student awareness of users with special needs. New design communication instruments were developed, such as tactile maps, to enable user participation of the visually impaired. Design is primarily based on visual communication and visually impaired users were included in the teaching experience in view of their inability to evaluate typical design documentation, such as drawings and models. Role-playing, as a means of bringing students closer to the issues of users with disabilities, was shown to be insufficient and the creation of a collaborative design process was important to increase student's sensitivity. The active participation of users with disabilities ensured that future professionals gained a deeper understanding of user needs and were able to create appropriate and quality environment. The inclusion of visually impaired users in the design process is seen as original in design pedagogies. The use of tactile maps for design documentation was shown to be an important contribution to research in the area of design methods. Some research questions arose from the teaching experience, relating to technical details of tactile map production, as well as pedagogical and ethical issues involved in participatory design.

Keywords

Universal design; architectural design education; design process; spatial orientation; people with visual disabilities,

Introduction

Many efforts have been made in the last thirty years to make the world and particularly the built environment more accessible to people with a variety of disabilities. Regulations and laws have been introduced to ensure that the planning, design and construction of buildings and urban places provide adequately for such users. Barriers, mostly physical, have been removed and research has formed principles and concepts on which to base decision-making in the building industry. Universal Design (UD) has gained importance as a research area.

The training of design professionals, especially architects, has felt the influence of these trends.

Practices

Many universities have made efforts to include the principles of UD in their curricula. This educational enhancement is considered important, in relation to job market trends and the globalization of the profession with increased competitiveness. Higher design quality is expected from architects, producing designs that are fresh and new to the problem domain. The new order implies that design students gain a deeper understanding of essential design knowledge. They need to acquire new abilities and attitudes towards design, with an increased demand on being sensitive to user needs. The affective taxonomy of Bloom (1956), based on five levels of development, has for some years been discussed in higher education to improve student's awareness and willingness to receive knowledge. Design professionals should then respond to this new acquisition and value a deep commitment and dedication to what is considered good design. To this effect universities and architecture schools in particular, have introduced new pedagogies and curriculum content.

The synthesis of knowledge, coming from multidisciplinary areas, continues to be a challenge in the typical design-studio of most architecture schools. The studio teaching method relies mainly on the interaction of students with experienced professionals and unstructured discussions concerning the specific, mostly hypothetical, design problems posed. Many studies have examined the typical studio design teaching method in relation to diverse aspects: learning experiences, efficiency, quality of designs, etc. (Carsalade 1997; Oxman, 1999; Gouveia et al., 2001; Rufinoni, 2002; Goldschmidt & Tatsa, 2005; Kowaltowski et al., 2006 a; Nicol & Pilling, 2000). Viewing architecture as pure art has often been identified as a problem and investigations of typical professional practices have uncovered that architects often lack knowledge on, or fail to anticipate, user needs (Nicol & Pilling, 2000; Salama, 1995 & 2005).

In a recent report on design education the essential basic interest and knowledge about human beings is found to be still missing to a great extent in the design profession (Paulsson, 2005). The same report shows that design is too often, unconsciously, based on careless and superficial concepts, and design solutions are essentially based on artistic or economic premises. Importance given to the artistic content may cause architects to ignore social aspects in architecture and to emphasize their self-expression. The aesthetic or formal bias is further reinforced by most architectural publications, used as teaching material in design disciplines. Architectural criticism is virtually devoid of human content and directed towards the formal aspects of design (Kowaltowski et al., 2006 b).

Recent criticism of architectural pedagogy also suggests that schools of architecture tend to use as role models a narrow section of designers, with what may be defined as limited skill-sets, which neglect individual differences of people. In order to encourage architectural pedagogy to become more inclusive, the value of multiple skill-sets should be explored. For instance, the framework of Gardner's (1993) multiple intelligences should have a place in design education. This framework consists of 8 skills: spatial, interpersonal, intrapersonal, logical, verbal, natural, kinestethic and musical (D`Souza, 2009). Also, if design education is to continue to be relevant to current public and political debates, it must actively re-adjust its focus to give students opportunities to learn more about, both

their discipline and themselves. The questions are: "How can design education respond to this challenge?" and "Where in the curriculum?". With answers to these questions and guidance into these uncharted waters, educators can help students make sense of their work, as well as define their space in the world (Hadjiyanni, 2008).

New teaching methods are seen as important to enrich the pure artistic vision of architecture, through the insertion of scientific knowledge and social responsibility. The inclusion of UD in the design curriculum depends primarily on in depth presence of the social science, with a real need to instil sensitivities towards the relation of human behavior and elements of the built environment. To contribute to the discussion of preparing planners, designers and architects in dealing with the concepts of UD in their professional activities, this paper presents a building design education experiment in which role playing and user participation were important collaborative factors in the improvement of design education. To further enrich the teaching experiment the visually impaired were chosen as user participants. Communication in design is primarily visual, through drawings and models, and the participation of people with low vision, or the blind, increased the challenges students faced in the presentation of their design solutions.

Design Education

Most studies on the design process in architecture show that it does not follow rigid rules. Designers do not apply universal methods and rarely externalize their thought process (Kowaltowski et al., 2006 c). Research in design methods consider the creative process complex, solving what are termed wicked or ill-structured problems (Rittel & Webber, 1973). Thus, design problems are only loosely formulated, at times through a detailed brief or architectural program. Wickedness consists in the continuous redefinition of the problem during the period of its resolution and the impossibility of testing the validity of solutions (Coyne, 2005). A rigid systems view of design cannot be defended, even in the face of losing credibility regarding the design profession, since rationality in design may not embrace important concepts, such as value judgment, context and uniqueness.

Most design education, especially architectural design, occurs through the studio system and how students are stimulated in their design efforts is less related to the pedagogy applied, then to the personalities (instructors) present and their individual ways of approaching design. Schön (1983) describes design as a reflective conversation with the design situation, thus addressing the human thought-processes and the language (drawings and models) used to make design decisions.

In design education, the question of preconception, pre-judgment or prejudice must be addressed, since students, although without previous experience in design per-se, do not come to the studio as a "tabula rasa". The pre-understandings students bring to their academic work come from their personal life experience and studio instructors may attempt, in vain, to free the student's mindset of such presuppositions. A more appropriate approach to design education considers to engage students in questioning such presuppositions, expanding, and at times, rejecting responses in the design dialogue. The engagement of

students in new ideas and concepts depends on how knowledge is disseminated and on objectives and purposes of design work (Snodgrass & Coyne, 2006). Thus, the focus should primarily be on the interaction between man and environments or artifacts and students need to acquire reflective skills, and essential knowledge must include: facts, understanding, skills and familiarity with a subject or concept (Paulsson, 2005).

The Concept of UD in Architectural Education

Since architects are inclined to rely on their intuition, rather than hard science, when it comes to detailed decisions, there is a need to deepen the conceptual knowledge of designers on first principles of many new concepts, such as sustainability and in particular UD. Designing is a form of problem solving and reasoning proceeds from objective and functional assessment to means or (product) design, but does not follow a formal process in which, by deduction, one reaches a logical result from posed premises. This informal practice may cause sidestepping and missing opportunities. Brainstorming or other creativity methods, criticism and decision-making activities should intertwine with traditional design, drafting, prototyping and testing activities to provide the foundation for greater innovation and awareness raising in the building design process. There is also a need to deepen the knowledge of designers in relation to the concept of UD, which up to now has only been touched on in most architectural education. Design education should focus on the strategic, tactical and operational management of a building or urban design process. Productivity and a recognized quality of design solutions continue high in the agenda of professional practice and of formal design education.

The sensitivity of students has improved in the last 20 years, due to many inclusion programs in primary and secondary education, but is still not fully connected to the, at times, very specific needs of people (Paulsson, 2005). Most students, entering design courses, may have only a slight knowledge about the diversity of human capabilities, such as body functions, cognitive abilities, health conditions and personal interests and ambitions to mention only a few. What is still often missing is knowledge about human senses, and that an impairment or disability connected to one sense, may enhance other senses. Thus empowering design can only occur with a profound knowledge about human capabilities and less on disabilities.

“Design for all”, that is for people of varying abilities, should be the aim in architectural programs or the brief (Hadjiyanni, 2008). The needs of the disabled are often not well formulated and it is important to remember that, for instance, the blind and disabled don’t have the same needs. Thus, the information these users give to architects and planners are sometimes confused (Christophersen, 2002).

The reality of a design problem must be brought to the attention of students, and direct or inspire their interests away from what is usually more attractive, the latest shiny architectural masterpiece, hailed in glossy magazines. This can be achieved through student’s documentation of the lives of people with disabilities. These experiences can develop the intellectual rigor and motivational skills required to find inspiration in the everyday lives of ordinary people. In many

cases, such activities are the few times during a design course that the eye of an architecture student falls consciously on such mundane objects as a simple access ramp, a public lavatory and the likes. Immersion in reality can stimulate creative solutions, closer to the source of problems. Innovation thus no longer is only a quest to be different, but an attempt to respond critically to everyday problems and challenges (Morrow, 2001).

Morrow (2000) states, as well, that in many architectural circles UD is considered a threat to good design, usually based on the latest architectural esthetic expressions. The restrictions imposed on design by UD, should however be seen as inspirators for new and fresh ideas, no longer only for a few privileged users, but for those with various degrees of disabilities and capabilities. The long term goals in enhancing and promoting the development of "Design for all" issues in architectural education programs, should be that UD perspectives and competences be comprehensive, come naturally and be sustained in the design profession (Paulsson, 2005). To change the typical scenario of higher education, many strategies have been used. Among them are: faculty training; introduction of innovative new courses and the expansion of student design assignments into new fields. Cooperative projects between architecture schools and special user organizations are also encouraged. New teaching methods, such as role-playing have been tested.

Role-playing was introduced in discussion groups in Universities already in the 1980s (Radford & Stevens, 1988; Quayle & Paterson 1989). Ostroff (Welch, 1995) encouraged the development of educational programs for UD in five courses: architecture, industrial, interior and landscape design, as well as urban planning. Ostroff´s proposal included financial support for new educational programs and was inspired by a design studio experiment from the 1970s, when Ray Lifchez (1987) introduced studio consultants and jury members with disabilities at the College of Environmental Design at University of California, Berkeley.

Role-playing is defined as the experiencing of a problem under an unfamiliar set of constraints, so that one's own ideas may emerge and understanding increases. It allows students to interact with others in certain roles. One of the many forms of role playing, empathy exercises allow students to experience the views of a variety of users, with an increase in a student's ability to recognize his/her own and other peoples feelings. In relation to reflection, role playing can be used to diffuse a student's close proximity to a project and engage the student in a more objective and creative mode of thinking (Quayle & Paterson, 1989; Duarte, 2003).

Participation of special users in design classes has also been a fairly long standing pedagogical tool in architecture schools. Paulsson (2005), for instance in relation to thinking of the visually impaired, recommends lectures by vision experts and participation of individual users, explaining their life endeavours and experiences. While experts can bring evidence based facts about the causes and effects of impaired vision, the individuals, affected by this disability, can describe their daily life activities and coping techniques. The introduction of both experts and special users should enhance empathy exercises in the design studio.

Although several schools of architecture will stage studio design projects with users, it is in exceptional cases that the learning participation techniques are a key concern (Luck, 2007). According to Johnson (1979), user participation in the design process is not only a question of an application of some new design method, but should be an aid in the decision-making process, thus representing various viewpoints and enriching design debates. The professional designer must learn to act with ethics and responsibility in serving the needs of others. Thus, user expectations must be guided towards a proper understanding of a design's response to needs, to avoid disappointment and dissolution. The education of future professionals must deal therefore with questions of ethics.

Students need to gain confidence in dealing with conflicting user needs and adopt adequate professional attitudes towards users with varying physical and cognitive abilities. Most participatory design occurs not in the classroom, but in professional practice, with users acting as participants in the design decision-making process (Sanoff, 2000; Luck 2007). Thus, users are no longer mere design recipients, but engaged design decision makers. In design education, where hypothetical problems are discussed, effective engagement is absent and this aspect may weaken the impact of user participation on the design process of students. As stated before, an ethical problem may also arise in raising user expectations through enthusiastic student encouragement, later impossible to deliver. Till (2005) pointed out that in many public works situations consultations with a population have risks. Till called such inclusion of users as pseudo participation, judging such practices as poor in most cases.

The introduction of users with disabilities in a participatory design process usually transcends the dialogue between designers and potential users. The perception of the future built environment usually occurs through the reading of a design, represented essentially through graphic documentation. This graphic representation is specific for each of the traditional phases of a design process (sketch plan, preliminary design, final design and construction documentation), targeting different readers and agents of a typical design and construction cycle. For the users, it is important that the graphic symbols help to understand key aspects of a space, its size and wayfinding within a building complex. Thus, participatory design processes, especially those involving users with visual impairments, must pay attention to these factors and future design professionals must go beyond the usual two-dimensional drawings required in most design studios, to include richer sensorial values in their design representations.

Designing with and for users has become a mainstay of interaction design, to better understand how products and spaces are used and to inform future designs. Training design professionals for interaction design touches on several key issues of expertise: ethics of conduct and representational as well as ethnographic skill development (Luck, 2007). Thus, being able to adequately convey ideas, with respect for others and insight of special needs, is an important pedagogical goal.

According to the UNESCO/ UIA Charter (2009), architectural education requires continuous learning through the interaction of practice and training. Also the application of various

educational methods should develop a cultural richness and allow flexible curricula to be responsive to changing demands. Awareness of responsibilities toward human, social and cultural values is stressed in the charter, as well as understanding professional ethics and codes of conduct. Finally, students need skills with the ability to act and to communicate ideas through collaboration. Speaking, writing, drawing, modeling and evaluation skills are important. The traditional design studio meets some of the goals of the UIA charter, especially with regard to interactive learning between student and teachers.

Creative thinking strategies in design education include visual thinking techniques, unstructured brainstorming and role playing, developing a questioning attitude, thinking in alternatives and engaging in non argumentative conversations (making deals, agreeing to disagree). Architecture students are usually readily open to engaging in such exercises, although not always for the purpose of producing innovative solutions, rather than enjoying the activity per se (i.e. having fun).

Design education must concentrate attention to the application of innovative teaching methods at the analysis pre-design phase and recent design education debates have pointed out that the need for new theoretical approaches to teaching and understanding inclusive design. From this, it follows that inclusive design or UD, is not all 'ramps and railings' and that 'disabled' does no refer exclusively to wheelchair users or 'paraplegics' (Karusseit, 2005). Thereby, the new approach establishes an awareness and appreciation for diversity and design for society as a whole. Furthermore, legal requirements (the Constitution and National Building Regulations) and their shortcomings should be critically considered (Christophersen, 2002).

From the literature on design education it becomes clear that efforts to introduce the principles of UD responsibly exist, but that most schools have been slow to respond to new influences and movements. Also, no consensus as yet exists of what the best methods are in bringing about a change in attitude in students, reflected in the design quality they produce. Some of the more promising pedagogical methods, which are seen to overcome the difficulties pointed out above, can be participatory procedures and role playing. Both methods are seen as techniques for encouraging reflection in design. Reflection is seen as the reconsideration of an idea or experience and an increased consciousness. Retrospection, introspection and self-knowledge are facets of such reflective act (Quayle & Paterson, 1989). The challenges in introducing all these goals and objectives are great and often academicians are reluctant to add one more issue to be taught in the already overloaded higher education curricula. Incentives should be given and may be linked to service education, seen to provide students with practical and real creative problem solving opportunities (Beaverford, 2006).

A Teaching Experiment

An educational experience is presented in this paper which was conducted in the second semester of 2005 and again in 2006 in the School of Civil Engineering, Architecture and Urban Design of the University of Campinas, UNICAMP, Brazil. A specific course was developed which emphasized the principles of UD. Second year

architecture students primarily participated in these classes and some civil engineering students as well. The course activities included theoretical and practical classes, student seminars, technical visits and a final design project. Practical activities included urban design assessments. Role-playing of users with different difficulties (motor, visual and hearing) was performed (Figure1) and students designed university community service buildings as their final project. Interaction design was included with user participation of several persons with different degrees of visual disabilities.

The goal of the courses was to heighten future design professionals' perception of the difficulties in incorporating the UD principles into the design process and create a greater awareness and sensitivity in students.

The visually impaired were especially chosen as users in the design projects students developed during the course. The special condition of these users was emphasized to make students rethink design presentation and documentation, traditionally based on drawings, models and other visual iconography.

Three subjects structured the courses: building performance assessment, environmental perception and UD. As pedagogical tools, participatory design methods, role-playing and

Figure 1a.

Figure 1b.

Figure 1: Role-playing activities in a design course with UD in mind. (Source: Authors).

awareness heightening activities were applied. The evaluation of this teaching experiment is seen as a research on the appropriateness of design pedagogy. The study touched on issue of qualitative spatial inclusion and encouragement of students to apply the principles of UD, as well as the development of tools to improve design interpretation by users with varying degrees of visual disabilities.

A further methodological concept was analyzed in the experiment. Through the introduction of tactile maps as special design models, reading and understanding of design solutions by users with visual impairment was assessed. Pseudo-users were present in the study. The design and fabrication of tactile maps was supported by classes on model building. Emphasis was given on the scales of models, materials used, color coding and symbols present. The participating volunteers evaluated the design solutions and the usability and robustness of the tactile maps or special design models produced by students of their design solutions. A tactile and visual pathway for reading the models was included in all tactile maps of this teaching experiment.

The teaching experiment was finally analyzed as to: assimilation/ perception by students of the principles of UD for a building design project; assimilation/ perception by volunteer participant users of the proposed design solution, through the manipulation of tactile maps and finally evaluation of the usability (handling by users) of tactile maps.

During the second offering of the course in 2006 three groups of students developed three different types of buildings. Project "A" was a public service building, Project "B", a small visiting

Figure 2a: Ground floor plan of a students´ projects for a public serve building for the Campus of UNICAMP.

Figure 2b: Tactile map of the service building for the Campus of UNICAMP student project.

Figure 2: Example of design project (drawing and tactile map) produced during the teaching experience of 2006. (Source: Authors).

professors housing complex and Project "C", a student union building. Figure 2 shows drawings and the tactile map produced by the student group of project "A". Design development proceeded in parallel to the special awareness activities presented above in a typical design studio environment. Instructors discussed the design development individually with the groups and students periodically presented their progress to the class as a whole.

Once the design proposals were transformed into tactile maps, the final participatory phase of the teaching experience started. Volunteer groups, with low vision, analyzed the tactile maps and traditional design models to evaluate their understanding of the proposals. They also evaluated the ease of understanding the tactile maps in relation to colors, materials, symbols and Braille legends used.

During the first offering of the course teachers learned that such tactile maps must be robust to withstand the typical physical handling during a participatory session. Thus, some types of models were shown to be too fragile and also confusing for people with subnormal vision. Figure 3 shows the dynamics of reading the tactile maps in the participatory process between students and volunteers. The reflection of shiny material of the tactile map, shown in figure 3b, caused confusion with volunteers. Specific color coding of spaces was read by people with subnormal vision as contrasts, not related to the legend used. In some cases, the volunteers confused the tactile route marked on the maps with the wall protrusion indications, making the understanding of the design more difficult.

Figure 3a: Student helping in manipulation of map

Figure 3b:Volunteer using special magnifying lens to help in the reading of the map.

Figure 3: User participation with volunteers with subnormal vision. (Source: Authors).

Discussion

The role-playing exercise was shown to be important to increase students` awareness. On the other hand, limitations in provoking deep-rooted design centered approaches became apparent during this teaching experience. The walk-through and wheelchair exercises brought forward a heightened perception of details, mostly in the form of barriers to students. However, the fact that the exercise was only a role-playing activity became evident when students inadvertently used their own abilities (non-deficient) to overcome obstacles (Figure 1b). These "slips" of behavior as a person with a specific difficulty were in large part unnoticed by students, but in some cases registered in photographs and later commented in diaries and discussions. Further activities must be implemented to bring about changes in professional attitudes in relation to the accessibility issues that transcend role-playing.

The studio design project with specific users taught students and teachers many lessons and gave valuable feed back to students. When presenting their ideas to participating users it became clear to students that their first approaches toward designing an inclusive environment were often wrong. They proposed simple, open and flexible spaces, without any encroachments, barriers, columns, level and direction changes. Through this approach students thought they would avoid difficulties for the blind, by removing any obstacle in the day-to-day use of such spaces. However, the visually impaired user needs references for wayfinding and these can be in the form of architectural elements. Flexibility was considered an inappropriate design concept, since persons with sight deficiencies need permanent conditions to gain confidence in an environment and reduce the need for new learning (getting-around on their own) periods. Also, acoustics plays a role in defining space for such users. The reverberation of sound coming from walls, floors, ceilings define the dimensions of spaces to people without sight. Often such users will snap their fingers in new places to obtain such signals and orient their paces. The introduction of some elements, which enhance such acoustic effects, was also considered important. The introduction of a fountain with water noises could help in wayfinding. One has to remember however that during design phases the acoustics of a space or design solution is absent in design representation and mock-ups are seen as important design analysis tools.

Although the visually impaired cannot see details in the built environment, they often have some discernment of contrast or light. Architecture should therefore use this ability to orient users. Thus, pools of light may be introduced to mark special areas of importance. Color contrast can also be explored to define surfaces. Care must be taken not to confuse users. In the teaching experience described in this paper, students learned that non-orthogonal configurations are more difficult to comprehend by people without vision. The tracing of the wayfinding paths on tactile maps confused most volunteers in the project shown in figure 2. Although the project was organized with a central functional distribution scheme, students had to help volunteers in the manipulation of the tactile map and needed to revert to extensive verbal explanations. This result does not mean that more accessible designs should avoid

radial functional organizations. However, such schemes need careful detailing to improve wayfinding.

The activity of handling of tactile maps showed that the tactile and visual pathway highlighted in the maps occurred efficiently. Additionally, students learned from users, as active partners in the design process. The creative process is no longer a "lonely" activity and students felt more secure in their proposals, since they were shared with users. Subjectivity was reduced and solution justifications were produced with more confidence. The presence of volunteer users with real disabilities heightened students awareness such users encounter in their daily lives and reinforced the lessons learned through role-playing. From this close contact with real disabilities, the true sense of the difficulties of users was made clear.

The teaching experience taught students that traditional ways of design are no longer sufficient. Students noted that especially, other than visual sensorial perceptions must be introduced into design analysis and criticism. A rich diversity of design communication media was considered essential in the new design process with UD in mind.

The participation of users (volunteers) in a learning environment demands new communication skills as well from students. The reading of drawings and handling of tactile maps and models was insufficient in all cases. Verbal communication between students and the pseudo-users was of great help in the recognition of intentions of design solutions. But at times, frustration occurred when verbal and tactile explanations were insufficient. These frustrations alerted students to design errors and a further important communication skill was learned, that of listening, rather than talking. Several studies, since Schön (1983) have shown that the activity of design is a form of social constructivism and acknowledges that design occurs in conversation. Thus, design facilitation is produced in talk (Luck, 2007). In formal education the opportunities of observing seamless conversations where the users quickly understand the subject being discussed are important, as are the opportunities of performing as design interpreters.

Conclusion

The teaching experience described here was positive in relation to learning levels of students, increasing their awareness and perceptive sensitivities towards accessibility issues. Knowledge on participatory design processes with users with degrees of disabilities was also gained. Role-playing was shown not to be enough and the combination of user participation is recommended. Further research is needed to develop teaching methods to change future design professionals' attitudes towards inclusive design. Studies must be devised to elucidate queries such as: Do students need to come in contact with the principles of UD constantly in their design courses, or is a specific class content sufficient? How can the design process (and the teaching design process) ensure participation of users with different disabilities? More research is necessary to define design documentation for users with impaired vision. Questions should be asked: What scales are appropriate for tactile models or maps? What textures should be used? Where and how can colour contrast be used in drawings? Should drawings use Braille?

The authors have developed several projects aiming to study some of these issues. A campus tactile map has been produced to trace accessible routes for users with varying disabilities, which contribute to strategic planning of the campus and introduce improvements to increase the quality of local university life. Special tools to aid this process may also be in the form of "talking" models or maps, as interactive design tools, and a project in the development of such a tool is at present under way. With the advent of rapid prototyping available to the profession and in most architecture schools today, drawings with textures and information in Braille are more readily produced as well.

Although the results of the teaching experience presented here showed insights from observations of a specific situation in a design class of primarily architecture students, these findings may be meaningful to participatory processes in other situations. The insights gained on the performance of design facilitation can be extended to collaborative design in professional practice and the construction phases of building projects. Techniques for encouraging reflection in design are important to improve both the design and building processes and their inclusion in high education curricula is essential.

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WAYFINDING AND ACCESSIBILITY IN THE SAN ANTONIO RIVERWALK: A MODEL FOR URBAN DESIGN EDUCATION

Azza Kamal, Sedef Doganer, Judith Ruvuna, Jennifer Flores, Eduardo Hernandez, and Taeg Nishimoto

Abstract

The San Antonio RiverWalk is an exquisite and dynamic destination for tourists from Texas, as well as from other states in the US. Because of its location in downtown area, the entire area including the RiverWalk, has been incorporated into various guides and maps, all of which seem to be disregarding the interrelationship between the RiverWalk level and the street level. While most maps show either the street level or river level, there are none that illustrate the accessibility the RiverWalk offers to major attractions and buildings at both levels, and none offer an orientation for pedestrians to the destinations on the RiverWalk level, which encountered the lack of visual clarity due to the multilayered terrain. This study investigates the visual obstacles of wayfinding in, and accessibility to the East RiverWalk area. This study, which represents the first phase of a multi-phase analysis of a broader research, emerged from urban research undertaken by a group of architecture educators and students which sought to allow students to become more involved in empirical and action research. A number of tools to investigate pedestrians' ease of wayfinding and efficiency of identifying accessible transition points in the East RiverWalk area were developed. These tools categorize a number of spatial urban and accessibility features (i.e., entryways, ramps, staircases, and circulation elements) which were used to create 3-D virtual environments demonstrated on two focus groups. The study concluded with a number of recommendations for improving the existing visual and graphic tools, enhancing planning and design considerations, and incorporating the voice of community businesses in addressing wayfinding and accessibility concerns. This study and its outcomes not only engage architecture students in urban research, but also emphasize the significance of the RiverWalk in creating a more livable downtown San Antonio.

Keywords

Wayfinding, accessibility, qualitative methods, urban pedestrians, San Antonio RiverWalk

Introduction

The challenge of pedestrian navigation in most urban milieus increases with the complexity of the urban area, particularly in unfamiliar territories, and has become an even more complex endeavor throughout the field of urban tourism. This notion has been addressed by Karski (1990), who stated that urban environments have for many years been among the most significant of all tourist destinations. He emphasized that people with the means and preference for urban experiences have been drawn to various cities in order to visit and experience a multiplicity of sensations, engaging with such sensations by

Practices

both seeing and doing. Due to its complexity, which increases with the size of each city, finding one's way becomes an obstacle to tourism and a major issue for study, particularly by urban designers and planners who need to respond to what Carpman and Grant (2002) have suggested are the basic principles of successful wayfinding. These principles involve being aware of where you are, knowing your destination, knowing and following the best route to your destination, being able to recognize your destination upon arrival, and being cognitive of the process of finding a way back out (Carpman and Grant, 2002).

This process is currently a challenge for many visitors to the San Antonio RiverWalk area, which is one of the more tourist-friendly areas in the US, and which offers an abundance of activities. This area, located in the heart of a San Antonio downtown neighborhood, has been identified for this study on wayfinding and accessibility because of its richness of complex and dual-level walkways. It offers an upper level of streets, pedestrian walkways, and parking facilities, as well as a lower level of river, pedestrian walkways, and area attractions. While visitors are usually eager to explore area attractions and activities, the existing urban context encompassed in the RiverWalk experience is a product of complex structures and articulations, and irrelevant street patterns, all of which result in obstacles to finding one's way. These pathways lack the clarity necessary to facilitate pedestrians locating easy access points for circulation among the various RiverWalk elements and desired destinations.

Despite the availability of different guides and maps of the downtown and RiverWalk areas, a visual illustration of this multi-layered locale is needed. This study aims at responding to this need through its methodology and analysis which provides a clear 3-D map of the RiverWalk area with an overlay of the street level. Such an output will ease the obstacles to wayfinding and enhance both circulation and accessibility. This study is also an attempt to provide a better understanding of the relationship between urban design research and education.

Background

Understanding Wayfinding

Finding one's way in an urban setting is a process that requires knowledge about one's current location, destination, and the spatial relationship between the two which, according to Cubukcu (2003), can be referred to as spatial knowledge. In most complex urban settings, spatial knowledge decreases the risk of decision-making influenced by uncertainty (Holscher, Buchner, Meilinger & Strube, 2009).

Wayfinding studies, as observed by Passini (1981), have mostly been integrated into the literature on environmental psychology, psychology, geography, and even anthropology. In these disciplines, wayfinding is generally portrayed as a spatial problem-solving process and, in particular, as a form of investigation of spatial orientation, and of cognitive maps and imagery.

Arthur and Passini (1992) noted that to achieve spatial knowledge, one has to take into account previous experiences and possess the ability to read and evaluate environmental contexts. This would involve the ability to understand and synthesize the spatial characteristics of a setting, as well as to determine different locations within that setting. In their study of the

relationships between signage and wayfinding, Arthur and Passini (1992) acknowledged the first use of the wayfinding term by Kevin Lynch in his book The Image of the City. In that book he described maps, street numbers, and route signs as wayfinding devices. Lynch's studies examined cities with regards to the legibility of the cityscape, a concept which he explained as the ease with which an individual recognizes the different components of the city and organizes them in a coherent pattern (Lynch, 1960). He also suggested that legible surroundings are the most effective means of stimulating emotional satisfaction, communication frameworks and the conceptual organizations of everyday experiences.

Lynch (1960) also concluded that there is a connection between the contextual image and the generalized mental picture of the exterior physical world that is established by an individual. The individual, then, uses the present sensation and past memories of a given experience to interpret the information that guides him or her in finding a desired location. Like Lynch, Spiers and Maguire (2008) referred to the ability to make use of long-term spatial memories to guide wayfinding. They stressed the need for a wide range of cognitive abilities in order to find one's way in a spatially extended environment.

Wayfinding as a Behavior

Wayfinding has been explored as a behavior in the context of the discipline of environmental psychology. This exploration was supported by the notion of Carpman and Grant (2002) who emphasized the need for integrating environmental psychology analyses when design and behavioral professionals become involved in improving wayfinding in a given setting. In such processes, wayfinding ought to be conceived as a macro-issue involving the physical and operational environments in which that wayfinding occurs, rather than being understood as something dealing with individual perception and cognitive behavior. Similar to this notion, Cubukcu (2003) stressed the importance of incorporating behavior into the process of wayfinding through the perception and cognition of a setting. While perception refers to the experiencing of the world, which happens in a particular moment of time and requires little or no information processing, cognition refers to the comprehension of an environment which is a process that involves more information processing, and requires some level of mental activity. One needs both perception and cognition to develop spatial knowledge about a given built environment in order to maintain orientation and to find a way from one location to another.

Montello and Sas (2006) also emphasized the incorporation of human factors into wayfinding and navigation. They referred to successful navigation as when one demonstrates the ability to identify one's whereabouts. This requires identifying one's location in reference to one's destination, as well as to other landmarks. Their study identified three major environmental factors that affect orientation and wayfinding, including differentiation, visual access, and layout complexity. Visibility was later examined by Omer and Golddbatt (2007) in their study which suggested that wayfinding is more feasible when a good form of the urban environment is available. This configuration of form is characterized by simplicity, symmetry, regularity, and continuity. They also suggested that a high degree of overlap between the visual fields of an origin and target landmark could help people

to construct the spatial knowledge required for wayfinding tasks (Omer and Golddbatt, 2007).

Montello and Sas (2006) added a fourth environmental factor, signage, which also includes posted maps. According to Arthur and Passini (1992), a sign's design and placement in the urban setting clearly affect orientation, as people tend to need graphic information in order to formulate an action plan with respect to wayfinding in an unfamiliar setting.

Wayfinding Tools

Successful wayfinding systems enhance the pedestrian experience, and make a pedestrian's trip both safe and easy (Grant and Herbes, 2007). Researchers have developed a number of supporting tools to investigate the experience of success in finding one's way, from the use of conventional paper maps to modern Location-Based Services (LBS) such as electronic navigation systems. These systems, according to Gasibauer and Frank (2008), are currently commonly in use. The Virtual Environment (VE) is another prominent tool that has been explored in a study by Richardson, Montello, and Hegarty (1999). They compared the use of VE for spatial knowledge acquisition by locomotion versus by viewing a map.

They concluded that: 1) even though individuals are able to acquire substantial amounts of spatial knowledge from a VE, important differences in spatial representations are found after learning from real environments; 2) map learning leads to superior performance only when directions are aligned with initial orientations on the map; and 3) the cognitive process necessary for maintaining orientation in a real environment can be used to control a virtual one. Adding to this, the application of VE has been examined by Li (2006), who utilized a simulated LBS for investigating user preference in information requirements throughout the process of wayfinding. Li concluded that in new settings, individual need a range of information for completing spatial tasks such as wayfinding.

Designing for Wayfinding

Most designers underestimate the importance of wayfinding and rely on the utilization of signage (Carpman and Grant, 2002). However, according to Hunter (2010), incorporating the principles of wayfinding throughout the design process can help designers provide more inclusive solutions, especially when wayfinding obstacles such as poor identification of building entrances and lack of clear access from parking facilities or mass transportation hubs are issues that could be resolved during the design phase, as was clearly illustrated by Chapman and Grant (2002). In a broader context, Arthur and Passini (1992) stressed the often-seen absence of considerations regarding wayfinding during the planning of buildings or cities. As in HVAC drawings, their study urged for the generation of wayfinding plans by planners and designers. They went on to suggest what they referred to as a utopian situation which could be created via a three dimensional, colored model. This model would reduce the complexities and increase the ease of knowing one's way, as well as the direction to one's final destination.

The Study

This study developed different tools to establish a method for identifying pedestrian wayfinding in the East RiverWalk area of San Antonio, Texas. The developed tools were utilized to investigate users'

views towards spatial obstructions, including a number of visual urban features identified by the research team. The team examined the impact of those identified features on the clarity of wayfinding, as well as the ease of circulation in the RiverWalk area. This was followed by examining a number of computer-generated virtual images of the pedestrian walkways in two focus groups: 1) local employees of the commercial area and security personnel, and 2) visitors to East RiverWalk area. Focus group discussions concluded with how those two groups of users perceived wayfinding and accessibility in the East RiverWalk area, and suggested a number of improvement plans and actions.

Documenting Urban and Accessibility Features

A number of urban features and accessibility means were documented at both levels of East RiverWalk area as shown in figure 1. Students from the research team were trained in observing and documenting the urban features of the building-fronts on both banks of the river, as well as the connections between the street (the upper level) and the river (the lower level). The documentation utilized a number of field visits for the systematic coding of each feature onto a separate map showing the existing location of each feature or element. Upon completion of coding all ten features, an icon representing each element was generated, and was later placed in 3-D computer-generated map of the area (Figure 2).

Generating a 3-D Virtual Environment (VE)

Following the documentation process of urban features, the research team identified six locations along the two banks of the river that were used to photograph different vistas. The pictures were then used to generate a 3-D VE using the following computer programs: ACAD, Rhino, Revit, and Photoshop. The virtual maps were regenerated in multiple set-ups, in which a single urban or accessibility element was excluded. The outcomes of these 3-D VE's were then presented to focus group participants.

Focus Groups

To examine the identified features and means of accessibility, independent focus groups were conducted with participants representing two types of users: 1) employees of businesses located in East RiverWalk commercial areas and local security personnel, and 2) visitors to the RiverWalk area. This selection was intended to track the views of local employees who have become accustomed to the setting, and the views of visitors who have recently experienced the setting for the first time. Discussions were conducted using a facilitation guide developed a priori by the research team to enable the team to compare a number of issues across the two groups. Focus group discussions addressed the following topics: the urban experience of

Figure 1: Graphical icons of urban and accessibility features. (Source: Authors).

Figure 2: 3-D map of the locations of identified urban and accessibility features. (Source: Authors).

pedestrians in the San Antonio RiverWalk area; perceptions regarding the visual clarity of access to the buildings and connectivity between the street level and the RiverWalk level; the impact of accessibility on both business owners and visitors; the role of the community and businesses in addressing wayfinding concerns; and plans suggested by participants to improve wayfinding and accessibility.

Focus group discussions, each of which lasted an hour, took place in March of 2010 and were moderated, audio-recorded, and transcribed by the research team which included graduate students from the department of Architecture at UTSA. The following are a number of

considerations for each group discussion:

First: Employees of the local businesses

Data gathered from this group discussion emphasized the identified variables of wayfinding and accessibility important in the RiverWalk area. However, staff members' familiarity with the setting was taken into account. In this focus group, the digital 3-D VE created in the first phase of this project were shown to the participants in order to compare visual barriers and wayfinding obstacles. Maps for the six identified vistas included were presented in two scenarios: 1) each vista included all of the features on it, and 2) each vista with the exclusion of one or two features. The discussion concluded with a number of areas of concern and suggested plans to eliminate the difficulties currently associated with wayfinding.

Second: Visitors to the waterfront area and hotels

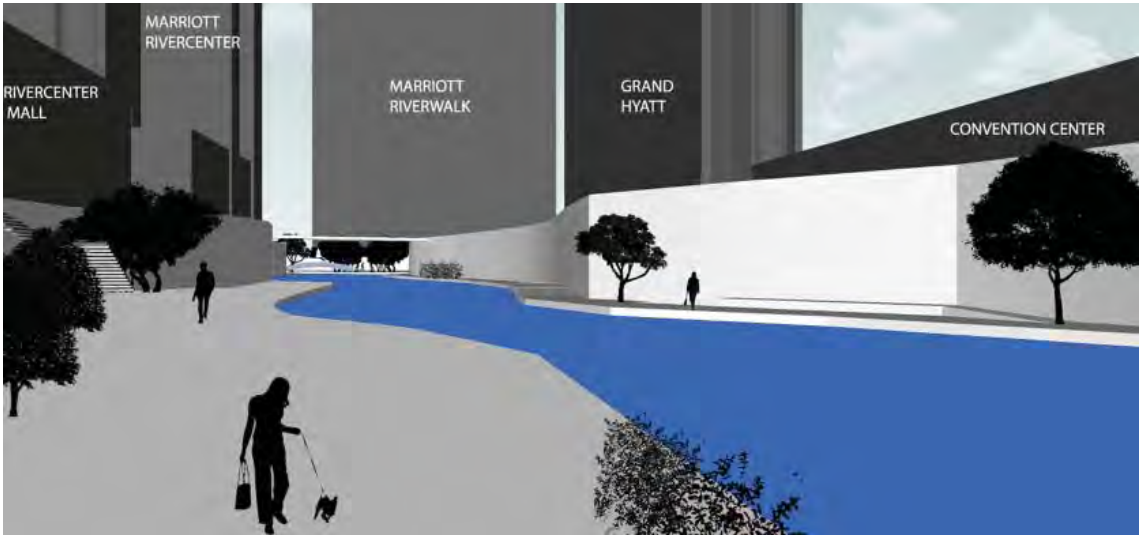
This focus group discussion provided data on the same variables investigated in the employees' discussion. Nevertheless, familiarity with the setting among this group's participants was only a minor factor due to the fact that all participants had only been to the RiverWalk area for a short time during recent visits. Throughout the discussion, the same digital 3-D VEs shown to employee participants were also shown to this group of participants (as shown in Figure 3). Discussion concluded with a number similar and yet different issues of concern and plans for enhancing wayfinding in, and accessibility to, the RiverWalk. Conclusions drawn from this discussion were compared with those gathered from the discussion with employees in order to establish the common themes and key issues that emerged among users of the RiverWalk area.

One limitation of this study design involves the use of qualitative methods, which provide rich, and in-depth information that is useful in understanding what and how people view a certain issue, and how they feel and behave. Nevertheless, due to the small number of groups and participants, qualitative findings are not capable of being generalized, though both the conclusions and the context can provide a rich depth of understanding.

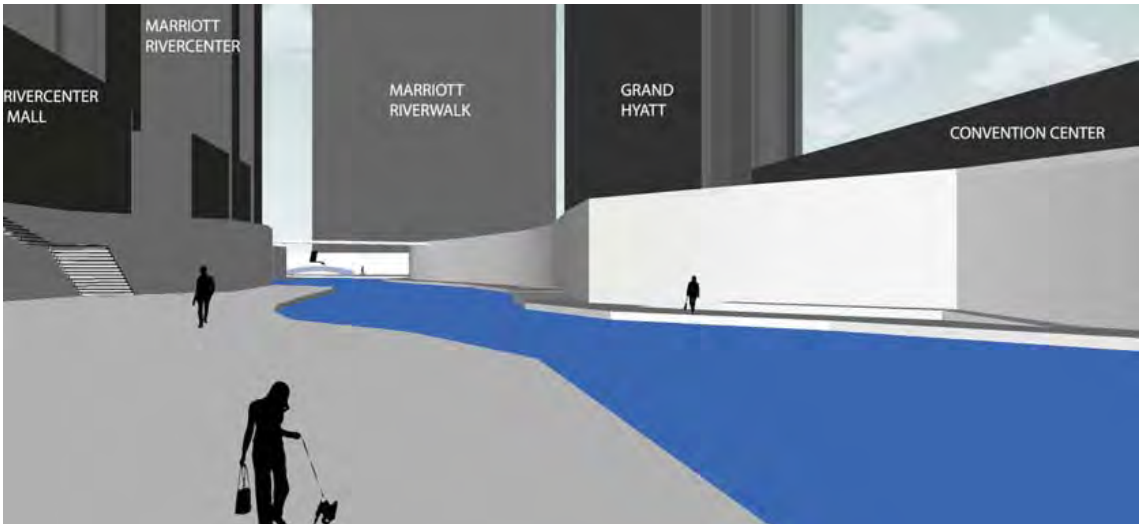
Analysis and Findings

Focus group discussions were organized around the themes and issues shown in Table 1. The themes which emerged from the focus group discussions spanned a range of issues involving the clarity of pedestrian wayfinding, as well as the ease of accessibility associated with each level and between both levels of the RiverWalk area. These issues include, but were not limited to, the ease of accessibility, the clarity of walkways and buildings, the impact on and roles of the community and local businesses, and a vision for further improvement. A number of challenges arose amid discussions involving community and businesses accountability for addressing concerns of accessibility and wayfinding, and adventurous experience of pedestrians. A special consideration was also made by the second group of participants regarding a lack of parking spaces in proximity to clear points of access to the RiverWalk level.

Discussions also stressed issues shared by the two groups, such as the ambiance of the urban features (bridges, trees and staircases), the apparent lack of readable signage, particularly on the RiverWalk level, the gap between staircases and ADA ramps and elevators, the



a.



b.

Figure 3: Virtual images of the Riverwalk level showing urban and accessibility features: a) with all features in; b) after removal of some features. (Source: Authors).

THEMES	KEY ISSUES
Ease of Accessibility	a. RiverWalk level b. Street level c. Connections between the two levels d. Parking
Walkways and Clarity of Buildings	a. Signage b. Aiding tools: Maps and personnel c. Safety considerations: day and time d. Ambiance
Impact and Roles	a. Community impact and role in addressing concerns b. Businesses impact and role in addressing concerns
Vision for Further Improvement	a. Signage b. Use of color c. Overlaying maps d. Walking vs. Parking e. Vertical accessibility f. Refining landscape g. Safety and services

Table 1: Themes and key issues emerged from focus group discussions (Source: Authors).

risk of the lack of safety precautions due to the limited width of pedestrian walkways, security concerns regarding an absence of lighting in some areas, and the need for community and business interference to address these issues with policy makers and planners. On the other hand, there were differences between the two groups' views towards a number of key issues such as railings on the riverbanks, refining the landscape, and the clarity of buildings/ hotel entrances.

Analysis of Themes and Key Issues

Participants in the focus groups were asked about the image that comes in to their minds when they think about the urban experience of the RiverWlak area. Participants shared a common view identifying that image as confusing, ambiguous, and lacking clarity. These responses were clearly distinct when each group interpreted the causes for that view. Employees' reflections addressed a functional standpoint including hazards and safety concerns of pedestrians, and the centralization of activities and entertainment areas in segregated zones along the river which weakens the experience of a continuous unified representation of all activities along the river bank. Another point was made by the visitors' group who identified the urban experience as an image composed of a number of tall buildings, the irregularity of forms and walkways, and the ambiguity of identifying destinations due to form and articulation of confined zones. Following this broad discussion, groups were asked a number of questions concerning East RiverWalk area in particular, which concluded with the following themes and key issues:

1) Ease of accessibility
All groups responded to questions about accessibility and ADA accessible routes/ facilities by stressing concerns regarding the availability and clarity of routes on the both street and RiverWalk levels. All groups agreed on the sizeable distance between street parking and access points on the street level leading to the RiverWalk, insufficient parking facilities (garages, metered street parking, and parking lots), a deficiency of readable signage for ADA-accessible entrances (ramps and elevators) due to improper use of size and color, particularly on the RiverWalk level, and only the minimum use of bridges connecting the two banks. Both groups also addressed the need for a Color-Coded Trail (CCT) at the RiverWalk level leading to major buildings, attractions, and facilities.

"…..Boston is much easier to get around because they have a T system. Mass-transit. They have color code…called the "freedom trail" (historic landmarks) they have a bricked walk way. It is on a map and the brick is colored….". Employee focus group participant, 2010,.

"….The issue is truly wayfinding and you are looking for a restaurant in point C and you are point A. color coding might help……. you are on the green or red line…..", Visitor focus group participant, 2010.

The employee group also addressed frequent concerns regarding the risks resulting from the hazardous planning of RiverWalk because of the tightness of sidewalks, which raises security concerns, especially due to the absence of railings on both banks. This became an issue that was later taken on by this group, in the form of a recommendation to increase security. On the other hand, the visitor group argued that any help that a railing might offer would also pose implications regarding seclusion and a sense of enclosure, which would be contrary to the current sense of openness and visibility.

Accessibility considerations shifted to other areas of concern when questions were raised regarding the street level. Discussants has an absolute consensus regarding the inadequacy of parking and a lack of direct connections between parking areas and the RiverWalk level, in addition to an inability of users to visualize access points to the RiverWalk level. Additionally, visitors were concerned about emergency access to the RiverWalk level, but not to the area hotels, because of the easy access offered from the street level to the hotels and the River Center mall. Visitors stressed the time that they wasted finding convenient parking due to either unavailability or the limitation on driving both ways down downtown streets. They also emphasized the unfriendliness of the street level area because of the intertwined vehicular and pedestrian routes, and suggested that the area should be claimed as a pedestrian-friendly zone through relocating vehicle routes around the parameter.

2) Walkways and building clarity
Discussion among participants in the two groups focused on unidentifiable and invisible activities at the RiverWalk level as perceived from the street. Participants stated that despite the visual clarity and identifiable buildings on the street level, as compared to the RiverWalk level, only hotels encompasses identifiable locations due to their size. On the other hand, the access points from the street to the RiverWalk level are unclear. Both groups also raised concerns regarding the ambiguity of RiverWalk paths and the invisibility of desired destinations, in addition to the absence of references between the two levels, and to invalid references to landmarks in the vicinity.

Participants in both groups also shared the same view as they regarded a question about visual obstructions contributing to ambiguous images. Participants perceived building forms and irregular planning grids as obstructive. They also distinguished a number of contributing factors such as density, lack of space, crowds, a difficulty in finding/observing tourist guides, and the tightness of walkways, particularly at the front of restaurants. Participants also shared the same reaction toward the moderator suggestion of the removal of previously identified urban features (i.e., trees, bridges, staircases, etc.), and they stressed the importance of the ambience and charm of the locale due to the presence of these features.

"……..I don't consider those things (bridges, trees, etc…) an obstacle. We need these things……..", Visitor focus group participant, 2010.

All group participants added that there is an extreme absence of useful signage, and an improper utilization of colors and sizing in current signs. In what was obviously a major concern, participants elaborated in response to questions concerning signage by stressing that there is not enough signage on both levels. However, the street level is at a more advanced stage when it came to wayfinding. Also, a lack of signage developed from problems ranging from an absence of signage for restrooms, primary destinations, attractions, locations of restaurants, and locations of access points (on both levels).

"……..If there were more signs, then maybe they would keep going instead of going back…..", Employee focus group participant, 2010.

In accordance with signage, participants also addressed the implementation of Location-Maps (LMs) as a helpful wayfinding tool. The visitor group thought that these maps, placed at identified locations along the river banks, would enhance the opportunities to find things and thus help visitors to be more adventurous. Participants also indicated that LMs are not an easy tool for everyone to read and use. A concern was therefore raised by employees group regarding the frustration visitors might experience as a result of being unsuccessful in finding desired places, an experience which might lead them give up and leave without finding the place they sought. Additionally, finding one's way to one of the area attractions, the River Center Mall, demonstrated a point of significant distinction in the ideas related by the two groups. Employees stressed that by not having signs, people often got lost, and because the visitors wouldn't have enough time to find the mall, sometimes they would give up. On the contrary, visitors did stress clarity in viewing the River Center Mall, due to its building mass. The following are some comments in their own words:

"Everyday complaints from visitors……..If there were more signs, then maybe they would keep going instead of going back….." Employee focus group participant, 2010.

"……The mall is pretty straightforward to find…...", Visitor focus group participant, 2010.

Participants also stressed their concerns regarding the safety of pedestrians, particularly on the RiverWalk level. Employees stated that individuals could get hurt or fall into the river, particulary at night, because of insufficient rail lighting. The concerns and frustrations of the participants were significant when they stated that sections in between the two ends of the

RiverWalk were more dangerous at night. They referred to the inadequacy of police patrols, people, and lighting under the bridges.

3) Impacts and roles
When asked about the impact on the community and businesses regarding issues of ambiguity and risks of inaccessible areas, participants from the two groups thought that the lack of clarity in the destinations and attractions would impact local business due to frustrations that might cause an early departure from the area without visitors reaching their desired destinations. Visitors thought that departures might reduce the number of customers for local businesses, and employees supported their view and stressed the wasted time experienced by visitors and tourists when trying to find various places. A subsequent question was addressed regarding the role of the community and businesses in addressing these concerns. Participants from both groups shared the same view that the local community and businesses should have a representative to address their concerns with the RiverWalk authority. They stated that if the community and business representatives stood up and said something, in the end they would benefit. They also believed that there should be an association of business owners, hotel managers, and residents that could formally address these different issues.

"I think they should take initiative and write the city, yeah," Employee focus group participant, 2010.

4) Vision for further improvement
Participants from both groups stressed the need for more utilization of signage at different locations, particularly on the RiverWalk level. They indicated that handicap-accessible spots, the location of restrooms, overall orientation, the locations of river boats and other major destination spots, and finally, staircases needed to be particularly addressed by signage which, in turn, needed to be more visible and larger. Not only signage was suggested by visitor groups, but also the use of identical sheds to highlight the locations of vertical circulation elements which, according to participants, would help identify places connecting the two levels. Additionally, participants perceived the use of LMs to be a successful and highly recommended tool that could either be provided in the form of handouts to visitors and tourists, and could be designed in a way that overlaid the upper (street level) and lower (RiverWalk) levels, such that they properly referenced each other.

Both groups also shared the same view regarding a number of contributions to an improvement plan: 1) inventing a color-coded trail on the sidewalks, particularly on the RiverWalk level (employees group compared such an invention to similar ones in hospitals and jails); 2) enhancing walkability by prioritizing pedestrians at the street level, and eliminating vehicle routes; and 3) increasing connections between the two river banks by adding more bridges (which was more of a concern to the visitor group). Employees suggested putting ramps and staircases in close proximity to one another, to eliminate visitors wasting their time and wandering about to find an accessible ramp. Another major point concerning safety was made by the employee group. Participants were very specific in suggesting adding a well-designed, matching railing along the river banks, and employing more rail lighting and pole lighting under the various bridges.

Conclusion

The intricacies of the San Antonio RiverWalk area encompass a number of elements affecting the richness of its ambiance and the magnet it is to millions of visitors every year. Representing a utilization of a virtual environment (VE) analysis and the incorporation of empirical research in urban design education, this study investigated the complexity of urban wayfinding and accessibility to the San Antonio RiverWalk area. The study analysis concluded with a number of recommendations for improving visual and graphic tools, stressing planning and design considerations, and incorporating the voice of the local community and area businesses (Figure 4). By employing the following considerations, East RiverWalk area will be recognized as a more livable and identifiable experience for pedestrians.

Visual and Graphic Tools
RiverWalk level: Policy makers should develop alternate aid tools – both visual and graphical - to eliminate ambiguities. a) Visual aids should include the use of color-coded trails (CCT) leading to major destinations and area attractions (i.e., hotels, theaters, etc.). Proposed trails should be designed as part of the sidewalk pavement pattern, and should be identifiable and readable; b) Current location maps (LMs) need to be replaced by clear 3-D maps relating

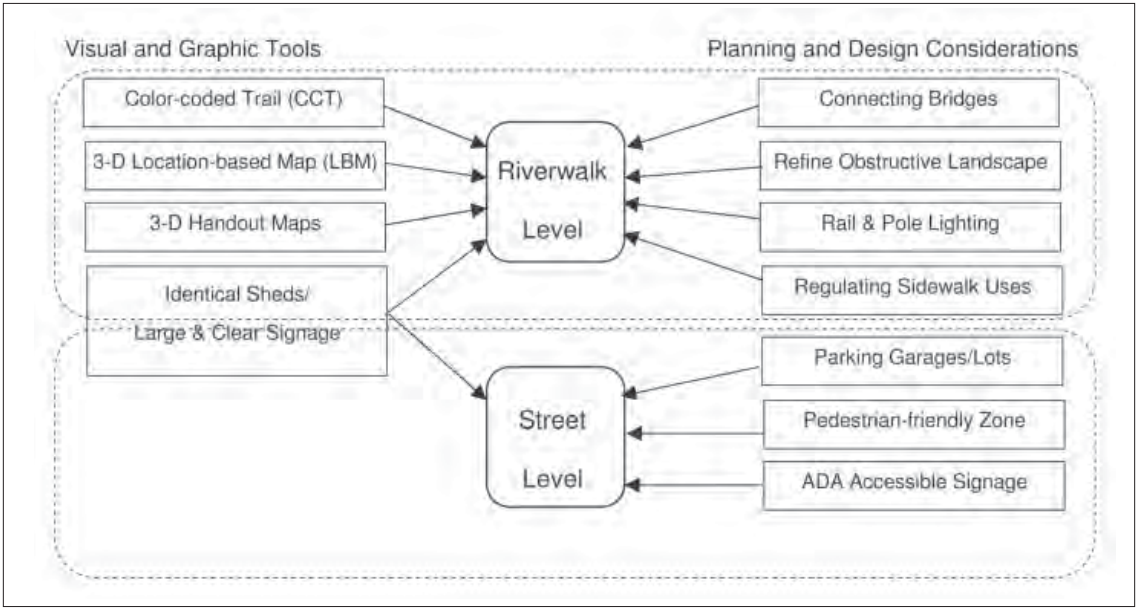


Figure 4: Interrelationships of factors improving wayfinding and accessibility. (Source: Authors).

to the RiverWalk level street level and referencing major area attractions and land marks; c) The implementation of larger and clearer signs for major destinations, orientation, and circulation elements, which also reference the street level; d) The distribution of 3-D maps to visitors and tourists, not only showing main attractions and landmarks, but also referencing major landmarks on the street level.

Street level: Attention should be paid to enhancing the connectivity between the street and RiverWalk levels by increasing the size and number of signs leading to main access points for the RiverWalk level, and the utilization of identical sheds or large signs, similar to those used for access to subway stations in large cities.

Planning and Design Considerations
As part of an improvement plan, policy makers should also implement the following planning and design decisions: a) Increasing parking garages and street parking, and at the same time, making pedestrian routes leading toward main access points to the RiverWalk level clearer by utilizing clearer signage; b) designating the area around the RiverWalk access points as a pedestrian-friendly zone by increasing pedestrian routes on the street level and relocating vehicular routes on the perimeter of this zone; c) adding more connecting bridges to enhance circulation between the two riverbanks; d) identifying locations of emergency and ADA-accessible areas by adding larger and brighter signs; and e) carefully refining a number of obstructive landscape elements to allow more visibility.

Safety Considerations
Improvement plans to the RiverWalk area on both levels should encompass a number of safety considerations, including adding rail and pole lighting, particularly for under the bridge areas, and enforcing regulations for RiverWalk restaurants to control their occupancy of pedestrian walkways, which will allow a more flexible circulation.

Local Community and Area Business
An advocacy group from business and community representative should be responsible for addressing concerns regarding the RiverWalk area, as well as engaged in decisions regarding prospective improvement plans for wayfinding and accessibility in the San Antonio RiverWalk area.

Acknowledgement

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HYBRID WAYS OF DOING: A MODEL FOR TEACHING PUBLIC SPACE

Gabrielle Bendiner-Viani and Elliott Maltby

Abstract

This paper addresses an exploratory practice undertaken by the authors in a co-taught class to hybridize theory, research and practice. This experiment in critical transdisciplinary design education took the form of a "critical studio + practice-based seminar on public space", two interlinked classes co-taught by landscape architect Elliott Maltby and environmental psychologist Gabrielle Bendiner-Viani at the Parsons, The New School for Design. This design process was grounded in the political and social context of the contested East River waterfront of New York City and valued both intensive study (using a range of social science and design methods) and a partnership with a local community organization, engaging with the politics, issues and human needs of a complex site.

The paper considers how we encouraged interdisciplinary collaboration and dialogue between teachers as well as between liberal arts and design students and developed strategies to overcome preconceived notions of traditional "studio" and "seminar" work. By exploring the challenges and adjustments made during the semester and the process of teaching this class, this paper addresses how we moved from a model of intertwining theory, research and practice, to a hybrid model of multiple ways of doing, a model particularly apt for teaching public space. Through examples developed for and during our course, the paper suggests practical ways of supporting this transdisciplinary hybrid model.

Keywords

Transdisciplinary, hybrid, public space, collaboration, urban design, urban research, seminar, design studio.

Introduction

One afternoon, the conversation in our class took a surprising turn. "I don't want to design anything. It just ruins places that are best left the way they are," one student burst out. A student across the room retorted, "Well, if you don't want to design anything, why are you in this class, anyway?"

The class joined in, debating the roles of design and research, the active making of place by designers and the accretion of place-making by users of a public space. What began as a tense exchange between two students developed into themes that we would encounter throughout the semester, and became a touchstone for thinking about the hybrid model we were trying to create. What were we trying to do in this class, anyway?

The class in question was the "Urban Public Space critical studio + practical seminar", one of the first double-class senior seminar/critical studios

Practices

at Parsons, The New School for Design, which we, Gabrielle Bendiner-Viani and Elliott Maltby, co-taught and developed in the Fall 2009. We were each charged with teaching one aspect of the class: Maltby, a landscape architect and urban designer, was charged with the studio. Bendiner-Viani, an environmental psychologist and photographer was charged with the seminar. Over the course of the semester, we learned that this distinction between different "ways of doing" did not always serve us well - and collaboration, negotiation, dialogue and exploring the challenges of hybridity became central to our thinking.

This paper explores the ways in which we developed a collaborative course, managed our own and our students' expectations, and navigated disciplinary differences and similarities. We examine how our original conception of an intertwined studio and seminar was challenged and refined over the semester: a dualistic pedagogical approach was transformed into a hybrid one that integrates multiple kinds of theory, research and practice. We propose that this model is one particularly suited to teaching and learning about public space.

About the Course : What is Theory? What is Practice?

This hands-on course was an interdisciplinary collaboration to develop a critical understanding of the complexities of the broad topic of urban public space. A central goal was for students to re-conceptualize the relationship between design, theory, and social science in this context, as well as to consider how different kinds of practices (active research and design) could engage with each other.

Originally framed as two co-requisite classes in back-to-back time-slots, we constructed the class to intertwine seminar and studio work, and realized from the start that this new model meant that we each, representing "seminar" or "studio" felt it important to overlap with each other, to truly co-teach, and to be there for both halves of the six-hour class. We structured these two intertwined classes to further come together through a careful analysis of one local site: the remnant/ liminal space defined by the FDR Drive south of the Manhattan Bridge, on Manhattan's Lower East Side.

Bringing complex perspectives to our particular site, the class addressed contemporary philosophical, theoretical, methodological, and design/ production issues related to 'public space' in New York City and beyond. We explored ways in which relationships between public space and cultural and civic concerns could be examined, imagined, and reframed. Site visits, readings of proposed plans and policy for the New York waterfront, and partnerships with several community organizations were crucial in grounding the class in real-world concerns and relevance.

Our theoretical readings considered the political context of defining the public; the psychological experience of self in public; embodied spaces and cultural spaces; critiques of control, fear and privatization in the public realm; loose space and informality in public space; and space and its representation. Throughout, design-based readings addressed design philosophies, critical examinations of urban design, public art and planning practitioners' work and processes, varying approaches to community based design, and case studies that unpacked the complex mechanisms involved in the implementation and

maintenance of public space. Students took turns leading weekly discussions based on these readings, exploring the breadth of experiences, functions, and morphologies of small urban public spaces.

Beyond theory, we began to challenge our students' conceptions of practice in the service of knowing, and changing, the public sphere. We introduced and encouraged a variety of methodological approaches to public space research at our East River waterfront site. These methodologies grew from environmental psychology and ethnographic models, including reading the site through trace observation, behavior mapping, participant observation, interviewing, and collaborative exploratory mapping. It was crucial that our students began to see and analyze the way human use shaped the site, and crucially, how the political, historical and physical reality of the site shaped usage.

We also taught methodologies that emerged from our shared language of art practices that appropriate social science and design methods to create engagements and interventions in the public sphere. For example, students were assigned to design small temporary interventions into our site as sources for research; reactions to these interventions were recorded, considered, and later informed the larger projects. These first forays into changing the space were crucial to our students being able to link the processes of research and design.

Why Public Space?

Public space was an ideal territory for our collaborative approach in a number of ways; the concept itself is a compelling hybrid of practice and theory. We explored public space as an embodied enactment of political philosophy, a site for civic discourse, an arena for cultural and individual expression, the built articulation of a city's values. With its origins in Habermas's notion of the public sphere, our working definition was shaped and stretched by an eclectic range of thinking that included, among many others, sociologist Erving Goffman's notion of the presentation of self and the "back stage", urban planner Kevin Lynch's sense of scale and imageability, and art historian Rosalyn Deustsche's writings on democracy and art in public.

While flexible and open to multiple interpretations, public space, as a physical entity and as a field of inquiry, is also a contested site where different agendas don't always align comfortably. Among other differing visions of the public realm, we examined the iconic clash between Jane Jacobs and Robert Moses and the more academic debate between Margeret Crawford and Michael Speaks. This complexity and occasional outright disagreement translated into an interesting opportunity to examine moments where the ideal of transdisciplinarity did and did not work. While we wondered if we should shape a coherent narrative, it was more instructive to reveal and examine those moments where theory and design were at odds. Drawing from a broad range of perspectives, we were able to carefully structure the readings so that there were both strong resonances and divergences within each module.

We often talked about public space as being a porous topic, of interest to and a point of departure for many disciplines, including our own complimentary ones. Relevant to students of all

stripes, public space also acted as an equalizer: the students had extensive practical experience with the topic, simply as urban residents. Thus were we able to draw on material specific to their respective disciplines, augmented and made tangible by examples from their daily lives, and their engagement with our East River site.

A critical element of the course, which formed a firm foundation from the start, was the use of a single site for all assignments. In the evolving feedback loop we strove to facilitate between seminar and studio work, our East River waterfront site provided source material for these linked strands. Traditional site analysis, in which the students were required to look at the site though a given lens, was layered with individually defined topics explored in written assignments. We required multiple visits, temporary site interventions, on site performances, mappings, and observation, all of which served as productive source materials for the papers and design. This returning to the site, the adjustments and refinements that new information required, produced a strongly iterative and layered process. Individual work and research were folded into the team designs, each exploring Grahame Shane's idea of "test beds of change.".

The specifics of our site, and in particular its present status, allowed us to carefully examine the multiple players and issues, making legible the public space themes we were exploring in class. While most studios tangle with real world issues, whether of site or program, we wanted to ensure that the students were engaged in an active New York City dialogue. Our stretch of the East River, north of the South Street Seaport, and much of it underneath the FDR Drive, is soon to be developed. While the exact details and full scope are still under consideration, Phase 1 (south of our site) of the latest conceptual design was being implemented as we began the course. In response, a neighborhood coalition of community groups, "O.U.R. Waterfront" generated an alternative "People's Plan". The Hester Street Collaborative, a local advocacy design group, presented the coalition's plan, along with the research and methodology behind it, to the class in September. The sense that the future of the site was not yet fixed resonated strongly with the students. In addition, we explored the site's history as a rich layering of productive ecosystems, active trade, manufacturing and food distribution. With the loss of these animating features and lack of city investment, cut off from the neighborhood by the elevated FDR, the site has become a compelling peripheral site, with a unique cast of urban actors and activities. Here was an evolving mix of politics, theory, and practice that make public space such an interesting and amenable topic.

Our goal to integrate practice and theory in public space, and in our site in particular, was problematized by a suspicion held by some of our liberal arts students that design was a shibboleth for gentrification. Given New York City's current trends in public space investment, this was an understandable concern. Our site could be construed as the shadow site for pristine spaces on Manhattan's West Side such as the newly completed High Line and the Hudson River Park. Our site's qualities of looseness and informality stood in stark contrast to the meticulous park detailing, sophisticated plantings, and visible policing in these parks along the western edge of the island. Hence, some of our students equated design with a sanitized and privatized city, undermining the viability of a robust public-

ness. Delving into these conceptualizations and challenges of real public spaces gave us an opportunity to broaden our group definition of design, moving beyond conventions of "high design" to reframe what constitutes a design agenda.

Collaboration

At the heart of this class were negotiations and dialogues between students and teachers from several disciplines. As teachers, when we began planning this class we had only recently met. Hence, the process of developing, and later teaching, was a way of getting to know each other, and it was imperative that we face head on the questions of collaboration from the first day. After a preliminary meeting, we headed to a large seminar room with a blackboard that ran the twenty feet of its length, to begin to develop the syllabus.

We began to write down the readings and ideas each of us wanted to include in the course on two groups of post-it notes, and this making visible of elements of collaboration would become a theme throughout the class. We considered ourselves charged with different kinds of readings: blue post-its were Bendiner-Viani's methodological and ethnographic readings and green post-its were Maltby's design readings. Yet, many of our readings overlapped - and sometimes we would find the same readings posted twice, on both green and blue post-its. This process made powerfully visible our own intersecting thinking, through our intersecting literatures. It made it clear that we could indeed collaborate on the class, showing us that we had often come to similar ideas via different routes. From this beginning negotiation, we continued to etool and negotiate over the semester.

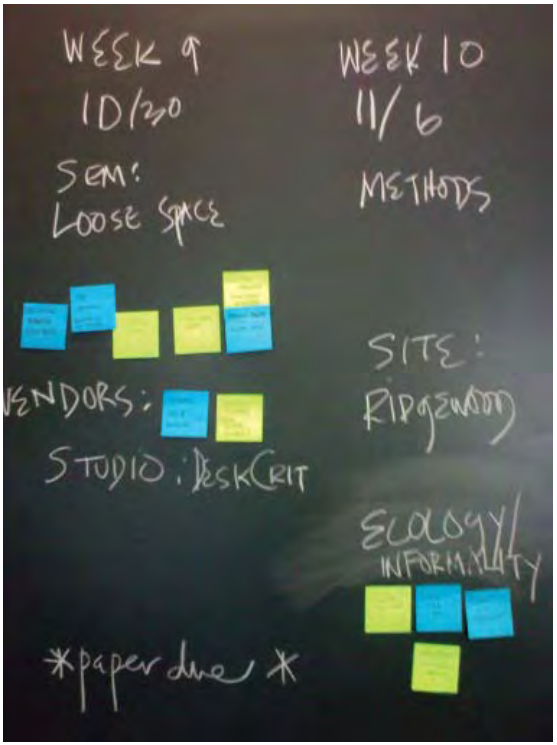

Figure 1: Physical remnants of the collaboration process (Source: Authors).

In addition to an interdisciplinary collaboration between two professors of admittedly hybrid and interdisciplinary practice, the course included students from both liberal arts and design backgrounds. Encouraging collaboration between students from these two backgrounds became a central goal of the course. We structured each design team to include three

students from a range of backgrounds, but we also considered this collaboration in other ways. One way we addressed this was through assignments that took different forms, in which all students had to take part, and which played on their different strengths. Hence, architecture students had to write papers, and economics majors had to draw plans, maps and diagrams. Students who worked with performance art had to consider the psychology of interpersonal distance, and students who wrote about urban policy had to develop Situationist maps of our site. In this way, they all modeled different skills for each other.

Intertwined Assignments

Over the course of the semester, students worked on many short-term elements of two intertwined long-term projects: both individual research projects (termed "seminar work" at the start of the semester), and team collaborative design projects (termed "studio work"). Both of these developed over time, through an iterative process, working at multiple scales and from multiple lenses, while integrating issues addressed in readings and discussions. As we thought it important to intertwine disciplines, theories and practices, we also valued intertwining opportunities for individual and group work.

The class was structured as three modules of three weeks each: People/Place, Control/ Privatization, and Looseness/ Informality, with a fourth day on representation. We strove to intertwine assignments so that each module had a "seminar" and a "studio" benchmark assignment, due in staggered weeks, with the hope that they would build on each other. This was not always the case, and necessitated some adjustments and our move toward a hybrid model, which we will discuss in the next sections. An example of the studio/seminar intertwining between first papers and mid-review follows.

In the first few weeks of the semester, each individual student developed a research question that they would hone throughout the semester. Students' questions ranged broadly, including: how to develop exploratory participatory methods for community research; interpersonal space in public; the role of the table as a catalyst for gathering; and the imageability of public space. In each process paper, students used the lens of the module's readings to address their chosen questions and our site. These papers could be a combination of image and text - though most students stuck with the more standard paper formats, a trend we later intervened to change.

As the class progressed, design teams were tasked with developing a broad design strategy, which examined Roger Sherman's notion of resilience, requiring the team's strategy to be flexible enough "to adapt to multiple contingencies or unforeseeable events." It was a group approach to testing, exploring and negotiating a joint philosophy of public space as manifested within a particular set of conditions. This joint philosophy arose from the issues that each student was addressing individually in their research questions and process papers. A later development was the outlining of three tactics that reinforced and explicated the group strategy.

We will endeavor to explain how we moved from this intertwining model to a more hybrid model and the one we propose for future work by considering our challenges and the adjustments we made in response over the course of the semester.

Challenges and Adjustments

Challenges

Studio work/seminar work duality

We had each previously taught both seminars and studios, and felt excited and well equipped to hybridize these course forms. That said, perhaps because one of us was designated the "studio professor" and the other the "seminar professor", to some extent we reproduced the outlines and expectations these terms carry. Over the semester we often pondered the best terminology for the course. At the outset we tried to suggest the linkage by calling the class a "critical studio + practical seminar", reinforcing the notion of intertwining of two linked elements. With hindsight, we feel that a name that emphasizes the link between theory and practice would be better, and would better present the course as a single entity.

In addition to our own expectations, the students also came to the course with preconceived notions about what these words would mean in relation to the work required. While we often talked about how the different elements should inform and support each other, a major challenge to the hybrid process was the students' sense that there was "seminar work" and "studio work", distinctions partially due to departmental requirements but also embedded in the course structure - the morning class called "the seminar" and the afternoon session, "the studio." We also unintentionally reinforced this schism by having discrete assignments with--what we had seen as a savvy strategy-alternating seminar and studio deadlines. Yet, this resulted in students setting aside the studio work during the weeks of seminar deadlines, and vice versa.

Time and skills

Expectations of time, types and means of production, and what was considered the work of "design" were a challenge. This was true particularly in regard to clarifying for students the range of practice that was a part of the new kind of design process we were helping them to build. We struggled with how best to use our six hours a week, which often barely seemed enough to incorporate reading, discussion, feedback and work on site, as well as hands-on work, and developing skills. In addition to many students needing hands-on guidance for practical work, teams had difficulty coordinating schedules out of class.

The question of how to best allocate time is certainly a familiar challenge, but a particular challenge was learning how to manage and build the skills of the highly diverse student group. We saw their sometimes divergent viewpoints and strengths as a boon to the class, but this also meant that we could neither assume that they all had the writing skills of a liberal arts student, or the facility with visual work of a design student. A solution we developed only toward the end of the class, within the design groups themselves, was to have students teach each other the skills in which they were expert. In future, this approach would be core to this kind of interdisciplinary class. One great benefit of this was that while many students were not experienced in traditional visual work, they were not afraid to hand-draw and be experimental, and these were often some of the most effective drawings in conveying concepts.

Adjustments Along the Way

As the course developed it became clear that we needed to reassess the typical trajectory of a

studio assignment, as well as the typical form of a seminar paper. Several kinds of adjustments were made. Firstly, we began to more tightly weave together, to really hybridize, the skills and form of "studio" work with those of "seminar" work. Hence, we developed several assignments that were for both studio and seminar, and explicitly brought drawing into the seminar projects and writing into the studio projects.

This began with requiring students to create a series of mappings in response to our readings on cartographies of public space: each student was required to visit our site and to create their own individual situationist map, paying close attention to their own experience of the site, and each design group then had to pool their observational resources to create a behavior map of the site. These two kinds of maps highlighted vastly different elements of the site, and also brought into relief the experience, negotiations, assumptions, and analysis of doing research alone as compared to as a group.

Secondly, writing became an inherent part of the design process. At the mid-review of the "studio" portion of the class, teams proposed a group "vision", which was comprised of an articulate, graphic narrative describing their process, including relevant site analysis, individual research and group interventions, which demonstrating how their strategy and tactics developed from observation and analysis. This presentation also incorporated each student's use of Walter Hood's "vision"method, using language to describe the impact of the team strategy and tactics on the site. Teams were required to present their tactics' spatial and socio-cultural impacts on the site - and drawings to demonstrate the ideas. This began to weave together both individual and group research into a presentation of design strategy, while also building writing into the "design" portion of the class. At the final review, writing was also an important element, as every presentation was required to begin with each team's statement of their definition of "public space."

Third, drawing became an inherent part of research, as we challenged students to give visual form to their research findings, and to diagram and visualize ideas, even as we had first used visual strategies ourselves to collaborate and plan the class. The third and final "process paper" was revamped as a series of three process diagrams that furthered each student's thinking for both their individual paper and their team's design. Multiple media were encouraged using layered photographs, collage, hand drawing, or computer-drawing to develop these diagrams. The three diagrams were: [1] using a base map to spatially diagram the existing conditions through the lens of their final paper topic [2] individually diagramming one portion of their team's design [3] a conceptual diagram of their final paper, visually showing their final thesis question and the kind of dynamics they were exploring, rather than solely using text.

Other adjustments incorporated highly directed on-site assignments and interventions, making group collaboration visible, and including multiple benchmarks. One such shift to make group negotiation visible took place online. While we began the class with required individual journals, over the course of the class these were transformed into design group blogs. These were required to include both individual notes as well as group conversations, and reinforced the hybrid class that was emerging - including both

images and text. These hybrid individual and collective productions became an effective way for the students to work together, once they embraced the form.

Moving from an Intertwined to a Hybrid Model

Site Intervention

Each class has its moments of cohesion and eureka, and for us, they occurred when our students, and even ourselves, engaged closely with our site, and when we began to truly see the hybridity of the class at work. At the end of the semester, the class agreed that when it had started to come together for them was through one of our adjusted assignments, an on-site intervention. This built from our methodological readings, and was tweaked through the lens of art practice. We had the students take as a starting point "Gotham Handbook," artist Sophie Calle's playful response to novelist Paul Auster's wry set of instructions for "improving a public space." Each team developed a single tactic, a simple activity to test and explore their strategy, which they implemented on the site the following week. Students documented their interventions with photos and note-taking, which they posted with written analyses on team blogs and presented in class. They considered how their experiences supported or challenged their design strategies, or what additional tactics they suggested. This moment, when students started to change the physical space of the site, and to grapple with the effects of those changes, even temporarily, was the first moment where research, design and observation were integrated into one iterative process and one temporal connection.

Learning from Final Work

At the end of the class, two further eureka moments emerged, as the hybridity of the project became strikingly clear. Both the final research presentations, and the following week's final design review were deeply instructive, though for different reasons.

During the individual final "seminar" presentations, when students finally saw each others' research, they saw how their individual thinking had been influencing their group projects all along. In these presentations and papers built from their earlier papers, readings responses and diagrams and using both primary sources and theoretical texts, we clearly saw how their individual theoretical ideas had gained focus through grounding in our site and their active research practice. In addition, we all saw how these ideas had grown through being challenged by the questions raised during the group design processes. The students also saw how the research they had each been pursuing helped to craft infinitely stronger arguments for the group design projects they had been working on together.

From these presentations it was clear how much each student had invested in their particular perspective on the site. We celebrated the fact that we had allowed the design projects to be driven by these individual interests, ensuring a rigor and engagement that may have been lacking had a more narrow program for the site been defined. At the end of the day of final seminar presentations, we were excited by the students' insights into the human experience of our site, and the way this resonated and supported the design decisions we had seen them making. We looked forward to their presentation to the following week, when they would use this work to

create their design narratives and rationales. We felt that they were set up to clearly show the way the two halves of the class had become one.

The following week, during the final review of the studio, another eureka moment emerged. While the projects were quite good overall, the productive relationship between the individual and team work evident the week before was absent. The review itself was a puzzling experience, both for us and the students. While the conversations within the student teams to determine project parameters had always been compelling, if occasionally contentious, this complexity was missing at the review. The breadth of their thinking, the 'thick' process we had cultivated, was flattened. Given clear instructions to narrate their process, as well describe their project, the omission was surprising. In retrospect, our sense is that the students edited work they deemed not 'final' enough, based on their sense of appropriate work for a studio review.

While two of the teams succeeded in representing a portion of their process, the critique was particularly problematic for one team who had developed a sophisticated set of linked elements. They had their core components at the mid-review, but had not yet determined how these pieces created an integrated narrative. We felt they had the most rigorous process of iteration, refining their designs to create a strong theoretical framework for the site as a whole. Like all the teams, their studio work was strongly informed by the work presented in their individual papers. While their project was a successful example of linking of theory and practice, this relationship was not well represented in the final review. They had left out a number of descriptive diagrams that explained the framework, and focused on the 'design' elements instead. The resultant dialogue centered on more traditional, though important, architectural concerns such as scale, materiality, and circulation. As such, the conversation didn't address how the project succeeded in embodying the intent of the hybrid class: through a collaborative process, this team's full work had indeed articulated a detailed, coherent theory of public space using interventions finely tuned to the particulars of the site.

Crucially missing from this final day was a structure that would allow a discussion of the projects in relation to each other. The range of interventions, research insights, theoretical perspectives and practical outcomes had been critical for the breadth and intensity of dialogue throughout the course. On that final day, we did not have time to examine how the teams' different strategies, taken together, successfully elucidated the ideals and realities of our site's public-ness. The studio review reinforced the need to redefine the final outcome and its presentation.

A Hybrid Conclusion

We faced some intriguing questions regarding a new model for the course's conclusion. How to ensure a comprehensive overview of the semester's work, and give that final presentation a cohesive focus? Did it make sense to retain distinct final presentations for individual work and team work? How to best use critics at different stages; what kind of insight was most beneficial during the process versus at the completion? How to support a robust discussion that explored both the internal logic of each project, and the various projects taken as a whole?

The strategy we have developed is a series of consciously collective productions to be woven into the class conclusion, comprised of a final day symposium and a class publication. The final day symposium, rather than a "presentation" or "review" does justice to the course's intent while also creating a better context for a vigorous and constructive discussion. In this revised model, students first present their research and team projects several weeks before the event, to garner practical criticism. Guest critics help clarify the conceptual frameworks, and assist in making appropriate editing decisions for the final presentation. At the symposium, teams present their process, their individual and team work, and show how these elements are related. Together, this hybrid presentation demonstrates each team's theory of public space through a set of practices and perspectives. In this model, professors moderate conversation between the students and guest critics, providing discussion points for each group, and examining themes relevant to all.

An additional element of this model, a class publication, would accompany the symposium and document all of the course work, including process materials, to highlight the relationship between the individual research and the team projects. We created a booklet of this kind once our semester was over, but this unifying step should be moved into the course itself, to make explicit the integrated nature of the work.

Moving forward with this kind of pedagogy, we see that our project was to take the best of the seminar and studio frameworks to create something new, a hybrid way of thinking and doing. The strength of bringing together these two kinds of pedagogy was not just teaching in tandem, but having the practices and processes of each work together and contribute to a whole. While we had originally imagined the studio and seminar sections of the class as informing each other, we now imagine this pedagogy of theory, research and practice as inextricable and simultaneous, a hybrid way of doing.

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DESIGN EDUCATION FOR ADAPTIVE REUSE

Özen Eyüce and Ahmet Eyüce

Abstract
Builtform is subject to various types of obsolences in the course of time. Among these functional obsolesences, taking place as an outcome of ever changing modes of production and consumption, are of crucial importance so far as their fate of existing urban fabric is concerned. Defunct buildings become derelict and often subject to demolition which amounts to the eradication of the collective memory. In this connection the process of adaptive reuse can be defined as the task of adjusting functionally obsolete buildings for new program requirements through building conversion. Adaptive reuse projects entail not only alterations within the boundaries of an existing building envolope but also radical changes/transformations in the space configuration so as to accomodate the new set of functional requirements. Therefore, the development of an architectural design scheme in the light of potentials offered and the constraints imposed by an existing architectural entity is essential. Although adaptive reuse projects require case specific approaches depending on the peculiarities of the original structure three main areas of concern can be discerned during the elaboration of the design scheme. These areas of concerns are the space configuration, tectonic aspects of the context within which the project will be realized. The paper addresses itself to the elucidation of these concern areas and the interrelations with the final scheme.

Keywords
Obselescence, adaptive reuse, space configuration, tectonics, context.

Introduction
Adaptive reuse in architecture denotes the process of building conversion so as to accomodate new functional requirements. Since the whole process is shaped within the possibilities of an already architectured structure the term adaptive reuse is labelled as 're-architecture' by Cantacuzino. The process involves, in the first place, the preparation of an architectural design project/scheme according the possibilities/potentialities offered and the constraints imposed by an existing buildingwhich is often of historical importance. And in the second place the necessary alterations/ conversions are totake place, generally, within the boundaries defined by the bilding envelope and in line with the new project. In some cases the process of adaptive reuse may exceed the boundaries of the existing structure, or it may even necessitate the construction of an annex building depending on the peculiarities of the project.

Practices

The idea of adaptive reuse of buildings in order to produce space for new functional requirements is neither something new or contemporary nor is it limited to architecture. It has been applied to almost all types of artefacts since centuries. It has been preferred to demolition and rebuilding in various parts of the world and a plethora of old and defunct structures have been adapted to other utilizations since time immemorial. There are numerous examples of military buildings adapted as schools; jails as luxury hotels; palaces as cultural buildings like museums and art galleries; theater scenes as palaces; and industrial buildings for almost all types of functional requirements.

Moreover, it goes without saying that adaptive reuse is not also an area of concern which is oriented to only to buildings with historical importance or to buildings with reach architectural features. The process adresses itself to all types of buildings and is conceived as a panacea for all types of obsolescences be it functional, economical or even physical. In other words the applicability of the process of adaptive reuse isclosely related with the obsolescences of buildings and economical feasibility of the project.

Built form is subject to mainly to three types of obsolescences namely: physical, functional and economical. Although building obsolescences are due to a variety of factors it can be generalized that they are all the natural outcome of the changing modes of ptoduction and consumption triggered primarily by the consequences of technological changes and transformations. Least hazardous among the three types of obsolescences is the physical one, in that, it can easily be remedied and put to its original state provided that the required funds are available. Whereas functional and economical obsolescences,more often than not occur in tandem, and are the main causes of derelictions and building demolitions.which in turn reflect themselves as the unavoidable transformations of land-use patterns; as the changes in the character of urban fabric; and most alarming of them all as the eradication of layers of history of most cities. On the other hand most building types known to have relatively shorter funtional lives compared to their physical durabilities become obsolete as a result of the transformations taking place in the urban land-use patterns. Among these industrial buildings and plants are in the forefront. Obsolescence, as far as adaptive reuse is concerned is important because it paves the way for adaptive reuse. Furthermore, the type of obsolescence gives valuable clues for the development of a conceptual framework of a design problem to be dealth with in the studio.

In addition to the above, it is accepted by one and all that built form plays the most vital role during the formation, accumulation, and dissemination of collective memory of a culture. Therefore heritage value of most historical buildings/settings prevail over their functional viability. This also holds true for the piece of land they occupy too. As it has been stated in the previous paragraph, the physical durability of the majority of historical buildins exceeds their functional life paving the way for economical obsolescence and eventually for demolition so as to make space for new building. In order to overcome these demolitions and prevent the dissapearence/loss of collective memory adaptive reuse is a viable strategy/approach to resort to.

Areas of Concern in the Design Studio

Among the several areas of concern an architectural design studio aimed at developing projects for adaptive reuse imlementations three main issues come to the forefront namely: the space configuration, building and tectonic properties and the context within which the development is taking place. These three area of concern will be elucidated in the following paragraphs in relation to adaptive reuse projects.

Space Configuration

Architecture is defined in the dictionary as: an "art or or science of building'. Whether an art or a science or even a practice, the main objective of architecture is the production of space for human activities, in that, space is the unavoidable requirement of man involving processes. Therefore, a revised definition of architecture can be formulated as: the art of building so as to produce space for human activities. Buildings help shape, define, house, shelter, divide or unite spaces.

Space, in architectural parlance, can best be defined as: a percieved portion of the physical environment which accomodates a set of activities. Or in other words, it is a percieved milieu within the perceptual boundaries of which human activities are performed The perception

Figure 1: Coexistence of Old and New Components in the Same Building: Museum of Rahmi Koç, İstanbul (Source: Authors).

Figure 2: Coexistence of Old and New Components in the Same Building: Museum of Rahmi Koç, İstanbul (Source: Authors).

of space is not to be limited with visual faculty only. All senses play important role in the formation of the architectural space. No space can exist in isolation as an independent entity. It has to have connection with at least one another space. In this regard buildings can be taken as amalgam of interrelated/interconnected spaces. "This idea can best be captured by Hillier's notion of configuration_a set of relationships among things all of which interdepend in an overall structure of some kind." Space configuration covers the totality of interspatial relationships/interactions. It is closely related with the indoor-outdoor interaction of spaces and their corresponding modes of enclosures and exposures.

The purpose of adaptive reuse projects is the utilization of an existing building for a new set of functional requirements. It is obvious that there is little chance for an existing building to conform to a new program. A new program and new functional requirements to be fulfilled within the boundaries of an existing building will, definitely, entail a new space ordering which in turn will necessitate substantial amount of changes/ transformations to take place in the space configuration of the original structure. At this point of the study there are two main points that one has to make an issue of debate. The first point is concerned with the new space configuration of the adapted building; the second is related

with clues that the existing configuration will dictate. Both points are also closely related with the morphological properties of the original building that will be taken up in the next part of this papper.

The above is the most crucial phase of the all adaptive reuse processes, in that, it has a determining role on the overall success of the whole project. In order to overcome this important phase of the process a morphological analysis/study of the original building is essential. "The morphological study is based on the notion of interrelatedness of parts, or the structural relationships of parts to other parts and to a whole." This phase is to be taken as a turning point of the whole sequence of an adaptive reuse design studio.

A new space configuration in accordance with the adaptive reuse project may involve not only the complete rearrangement of floor plans but also may dictate radical changes in floor heigts and circulation systems. Moreover, the proposed space configuration may well be based on a new mode of indoor-outdoor interraction pattern which in turn may necessitate the adoption of a totally differenbt concept of enclosure and exposures of the indoor spaces.

Building Aspects and Tectonic Properties

It is obvious that accomodating a new program according to a new space configuration in an existing structure will dictate a number of building alterations reflecting themselves on the architecture of the original building. The debate on the binary relation between form and function has always been on the agenda of architectural discourse. It has been claimed by many a scholars that there exists no proof of a direct relation between form and function. Although the propreity of the form to functional requirements is undebatable for good architecture it can be stated that no function dictates a specific building form. Similiarly no building type is limited to predetermined geometrical properties. That is to say that the form properties of buildings do not constitute sharp restrictions for adaptive reuse attempts.

Although most building types lend themselves for conversion to new uses, defunct industrial facilities have a special place in adaptive reuse implementations. Defunct industrial buildings like factories, warehouses, power plants, shipyards and etc., besides the surface area they occupy have large volumes enclosed by large wall surfaces. As it has been mentioned by Cantacuzino: "industrial buildings have large occupying volumes enclosed by brickwall, frequently whole city block." Industrial buildings are large span buildings, that is,their floor surfaces are not obstructed by structural elements. They also lend themselves suitable for additional slabs and mezzanine floors. Their external wall surfaces can be converted to a wide variety of solid-void organization schemes in line with the requirements of the adaptive reuse project design.

Not all adaptive reuse projects are so lucky as it is the case with industrial buildings. Industrtial buildings with their large enclosed volumes offer a wide variety of possibilities for reconfuguring the spatial organization of the original building. The opposit also holds true in some cases,that is, imposition of the space configuration of originaal structure through building limitations. A jail building or a school building converted to a hotel building with the limitations of their previous

space subdivision limitations are good exemples for this situation.

In architectural discourse the term 'tectonic' denotes the art of assembly of building parts. It points out the artful relations of the elements of form to each other and to the whole so as to achieve a system of order, balance and unity in an architectural ensemble. It also signifies, in architectural parlance, the artful continuity between form and construction; betweenconstruction and the structural system it is based on. Moreover, it is the reflection of the notion of space as a form of structure and construction.

In connection with the adaptive reuse projects the sensitivity to be shown to the tectonic properties of a piece of arcitecture is indispensible, in that, built form is the reflection of the social, cultural, and economical conditions of a culture or of an era to the physical environment. Built past is the symbol that embody collective values which includes patterns of thought of a society. The liaison between architectural tenets and systems of thoughts can best be preserved through buildings.

The vast majority of buildings subject to adaptive reuse are historically noteworthy buildings. Even the industrial buildings, notably those built during 19th Century, possess remarquable architectural features and tectonic excellences that the project designers must be sensitive to. This sensitivity includes primarily the determination of tectonic properties and also the atectonic features of the original structure. An important part of the message to be conveyed by the original building and genealogical clues may well be dormant in atectonic features. It is interesting to notice that in the majority of the industrial buildings, notably those built during Ottoman Era, the structural issues do not prevail over architectural concerns. On the contrary , majority of these buildings possess distinguishably rich stylistic ornamentations each of which conveying important messages about the past.

The preceeding paragraph clearly dictates that prior to the development of the main concept for an adaptive reuse project a careful reading an deciphering of not only of the space configuration of the original building but also of its architectural features is essential.

The handling of building tectonics as an area of concern of the design studio for adaptive reuse is largely a case specific issue,depending on the architectural properties and peculiarities of the buiding to be adapted. It also depends on the courses of action of the individual designer/design team. The debatable question to be answered here is: whether a new space configuration can be housed within the tectonic properties of an existing building or does it require copletely new tectonic properties.

One possible answer to the above stated question is to keep intact the tectonic properties of the existing building and to realized the spatial requirements of the new function with completely new materials and techniques independent of the original structure. This is something like one building inside the other, or in other words the new inside the old. One such design solution to adaptive reuse is seen in Rahmi Koç Industry Museum in Istanbul. In this project a 19th century Ottoman Shipyard and an old Ottoman Foundry have successfully been converted to an Industry Museum where the stone load bearing structual properties of two historical buildings are very well preserved and the new spatial requirements are

Figure 3: Museum of Rahmi Koç in Lengerhane (1613, Istanbul (Source: Authors).

solved with additional steel structural elements sensitively placed inside original buildings. In these project the old and new co-exist as representatives of two different architectural/cultural era.

Another possibility, which is valid for expecially for historically important buildings, is to abide by the constraints imposed by the original structure without resorting to major alterations. This can be interpreted as the exploitation of the potentials of the original building an tailoring the new space program accordingly.

Context as an Area of Concern in the Studio

The term 'context' comes etymologically from Latin 'contextus', meaning connection. Among the dictionary definitions the one which best relates with architectural discourse is stated as follows: "the interrelated conditions in which something exists or occurs." As it is implied by this definition the term 'context' is richer in meaning/coverage compared to 'environment' or 'surrounding'. The meaning of 'context' in architectural discourse expands over a vast area of interpretations ranging from a simple single feature to such interrelated conditions like social, cultural, economic,and environmental factors. Therefore, 'context' concerns itself not only with relationships between built forms and natural and man made environment but also with the determinant factors of these

relations.(social,cultural, economical and etc.,) It sometimes plays a very crucial role that it may become a parametrical detrminant of the design. Nevertheless, this importance is not in the list of priorities of most projects.This is best expressed by Mark Alan Hewitt who writes: "Despite theorethical turns towards contextualism during the past twenty years, most buildings still designed as singular, abstract objects, bearing tangentialand largely formal relationships to the surrounding environment."

Context does not only include tangibles like man made and natural elements. It also includes social and economical determinants which do not have physical presence but strongly felt as determinants of the context.

Concerning the existing built forrm the views of two scholars are of importance. According to Hewitt: "Major theories of design have been operated during much of the 20th century: the-so called stylistic unit theory, originally associated with Viollet le Duc in the Victorian period; and the dialectical modernist theory of disjunction, which stipulates absolute contrast (or at least clear distinction) between old and new. Both of these theories depend upon the reading of the historical piece as an object. The former (conjunctive theory) assumes that the building will be restored to a state of completeness which may never existed during its time. The latter (disjunctive theory) that it will be rendered complete and frozenas of the moment of the new intervention and will be set apart forever by the clear break between the parts"

Concerning the role of the context in the shaping of an adaptive reuse project the palipsest analogy resorted to by many ascholars in connection with refunctionning and rebuilding of the built environment is worth mentioning here. A palimpsest is: "a parchment or other surface on which writing has been applied over earier writing which has been erased " The term is derived from "Greeek 'palin': again+'pestos':rubbed smooth." An interpretation of the term which can be applied to the study of the built environments is as follows: "something reused or altered but still bearing visible traces of an earlier form." An extended usage of the term can be found in the following quotation from Wendy L. Butter who writes: "Several historians are beginning to use the term as a description of the way people experience times, that is, as a layering of present experiences over faded past. The palimpsest analogy for architecture is a powerfull tool to point out the importance of the built past for the collection of urban memories. As it has been expressed by Mark Crinson "urban memory ....commonly indicates the city as physical landscape and collection of objects and practices that enables recollectionof the past and that embody the past through traces of the city's sequentialbuilding and rebuilding." "

To ensure the continuity with the past, without discarding the requirements of the contemporary spatial standarts, is one of the most important aims of the adaptive reuse projects. Over and above, revitalization of defunct, dilapidated and derelict building stock will enhance the visual quality of the built past.

Conclusion

First of all it has to be stated that adaptive reuse, as a means to extend the life of defunct building gives a large array of architectural design possibilities. Since its field of operation is not

limited with historically important building it also gives the possibility of rearchitecture of derelict buildings. There exist neither a clearly stated design method nor established and accepted procedures as a source of guidance when approaching to the development of adaptive reuse projects. They are all case specific design problems so far as a studio task is concerned. In other words each design problem for adaptive reuse defines its own process of development .

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BIOMIMETICALLY CORRECT

Buthayna Eilouti

Abstract
A non-formalistic approach to architectural design processing that shifts focus from form to functional satisfaction, contextual fitting and environmental solutions is developed and described. It is based on an interdisciplinary application of concepts of biomimetics on design generation. The theoretical approach is applied as a project that is assigned for architectural design students in digital studio settings. The approach application results and findings are reported and discussed. Reflections about the approach as well as its associated project development and implementation seem to encourage the addition of biomimetics to architects' toolkit. As such, the framework may function as a template of innovative solutions and guidance for contextual integrity.

Keywords
Interactive design, design pedagogy, sustainable design, biomimetics, digital studio, BioTecture, contextual fitting.

Practices

Introduction and Research Aims
Epistemologically and methodologically, Biomimicry, where nature plays the role of ultimate teacher, represents an applied cross-disciplinary approach. In this approach, parallels are drawn between biology and other design-oriented disciplines such as engineering. As a result, natural organisms and man-made products are mapped to draw some attributes from the former to inform the latter. Upon mapping, nature can be imitated directly as a template or indirectly as a symbol. The term "Biomimicry" is basically developed from a concatenation of two words. These are: "bio" which means life and "mimesis" meaning imitation. In its study of nature, it analyzes living organisms for their models, behaviors, systems, morphologies, anatomies, components and processes and then uses analogical or metaphorical reasoning to imitate or take creative inspiration from them to generate sustainable and optimal solutions to human design problems. Biomimetics or biologically-inspired technology (Benyus, 1997) is most frequently used in scientific and engineering literature to indicate the process of applying biological principles that underlie

the morphology, structures and functionality of biological entities to manmade designs (Benyus, 1997). In this process, natural organisms are investigated to extract solutions from them to designated design problems and derive concepts through partial or holistic extrapolation from the former to the latter.

Research in the areas of Biomimicry and Biomimetics and their applications in engineering design is relatively new and increasingly growing (Knight, 2001; McDonough and Braungart, 2002; Reap et al, 2005; Rosemond and Anderson, 2003; Todd and Josephson, 1996; Todd, 2004).

There are many examples of Biomimetics applications. Some of these are photovoltaic cells that convert solar radiation into electricity; spidersilk that is used as building material (Wainwright et al, 1976), and fuel cells that power automobiles and release water instead of carbon dioxide. Although engineering applications of Biomimetics are increasingly growing, a much slower rate of knowledge networking between Biomimetics and architectural design is witnessed. While some examples exist in architecture (Hansell, 2005; Berkebile and McLennan, 2004; Doughty and Hammond, 2004; Knowles, 2006; Feuerstein, 2002), and mostly in the urban/environmental level (Hastrich, 2006; Kibert, 2006; Pedersen Zari and Storey, 2007); using Biomimetics as a point of departure to approach architectural design in ways other than formal analogy is still under researched. In this paper, a biomimetics-based design approach is proposed. The approach is discussed, developed and implemented in a real design studio to test its applicability.

The main research goal is to investigate the potentials of biomimetics as design generators. The main research objective is to develop a biomimetic-based approach as an alternative to conventional design approaches.

Biomimetics-Inspired Design (BID)

According to Benyus (1997), the major roles of nature in biomimicry can be summarized by a 3M framework. This includes the functionality of nature as a Model, a Measure and a Mentor. In the first, models of organism designs or processes are directly imitated or indirectly inspired to develop solutions. In the second, nature is used for evaluative purposes to compare manmade products to its standards and criteria. In the third, nature stands out as a source of learning from which design guidelines are deduced.

Parallel to Benyus' 3M definition of nature roles and including these roles within its structure, a 4M strategy is proposed in this paper. It describes the processes of bimimetics-based approach to architectural designing. The proposed strategy consists of four stages. These are:

1. To Manage the design point of departure, origin and destination relationships, subject of analysis and data extraction steps.

2. To Match a building design aspect with a correspondent living organism feature.

3. To Model the inspired solutions into a new design proposal by possibly using nature as a template for both the product and the process.

4. To conclude the first cycle of designing by Measuring its resultant design and comparing it to standards and performance criteria of nature.

By interweaving the cross-disciplinary framework of knowledge networking between biology and engineering design with the 4M strategy, it is

possible to define a biomimetics-inspired design (BID) approach to architectural designing (Fig 1). The proposed approach consists of four stages where the point of departure is managed in the first stage. The process may start from a building design problem, an organism or an engineering application in which biomimicry is used. Following the identification of the designated starting point, an end point is indicated. As a result, information from the origin point is investigated and extracted taking into consideration the desired destination point.

In the second stage, a living creature is mapped directly or indirectly to a building to explore potential sub-solutions or comprehensive solutions.

In the third stage, a solution as recommended by the first and second stages can be developed to model a design for the designated problem.

In the fourth stage, the proposed designs are assessed to test their strengths and weaknesses.

Within this approach and based on the management of the first stage, three methods to design buildings partially or holistically can be identified. The categorization of these methods depends mainly on the start and end points of the mimicry process. In other words, the role of biomimetics as a source of inspiration in which a living organism is used as a case study can form either the origin or destination of the mimicry process. The three methods are: 1) building-based design, 2) organism-based design and 3) application-based design.

In the first method, the process starts from a given building where a specific design problem is identified. As such, nature is used as a source of solutions for problems that initiate the process or that may emerge during the design process. Then, a designer searches for a creature that deals successfully with that problem. As a result, a solution from a creature or more is suggested to solve the pre-defined problem/s.

In the second, an organism forms a point of departure for designing. In this method, a living creature may be scrutinized for distinguished attributes, some of which may inspire a new design concept or solution.

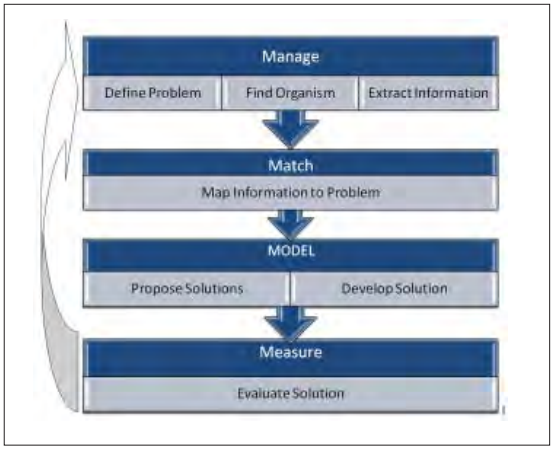

Figure 1: A Biomimetic approach to architectural designing (Source: Author).

In the third, the process starts from a middle point that represents an existing engineering application that can be adapted to match another design problem. A designer using this method does not start from a creature, nor from a given design. Instead, s/he finds an engineering or technology application that is already inspired by biology and modifies that application to fit

the building design problem at hand.

As illustrated in Fig 1, a combination of the 4M processing plan with the three proposed methods 6-step approach forms a matrix the columns of which identify three different methods of incorporating biomimetics into architectural designing. Three of these steps are listed in the first row of the matrix.

Building-Based Design

A designer, in this method, starts from a given building. For its design, s/he:

1. Identifies a specific design problem
2. Searches for an organism in a specific biome that exhibits a partial or total solution to the problem identified in the first step. This search may include more than one organism that share various aspects with the subject of designated design problem and a biome that share some aspects with the design context or environment
3. Extracts information from the selected organisms and biomes as needed
4. Maps step 3 to step 1: the extracted information to the design problem
5. Develops a design solution or propose potential alternatives
6. Evaluates the design product using criteria from the original organisms and biomes that are used for inspiration or imitation

Organism-Based Design

A designer in this method studies an organism and its relationships to its biome, and then draws partial solutions from the analysis, s/he:

1. Identifies an organism the features of which seem inspiring for a design solution
2. Extracts detailed information about the organism
3. Defines a design problem that seems relevant to the features defined in the first step and the information extracted in the second
4. Maps the extracted information in step 2 to the design problem identified in step 3
5. Develops a design solution as a result of the match between the organism's features and the building aspects
6. Evaluates the resultant design product using criteria from the original organisms that are used for inspiration or imitation in the first step

Application-Based Design

A designer in the application-based design method starts from an application that is inspired by organisms or natural systems and draws parallels between that application and buildings or design problems that share some aspects with it. In this method, a designer:

1. Finds an application that offers promising solutions to architectural design problems
2. Defines a design problem that seems relevant to the application identified in the first step
3. Extracts detailed information about the application and the solutions embedded in its design including the original organisms/biomes that inspire the application
4. Extrapolates the extracted information to the design problem
5. Develops a design solution from the match between the application aspects and the building desired attributes
6. Evaluates the design product using criteria from the application's successful accomplishments and from the original organism that are used for inspiration or imitation

The major task in the first three steps of each of the process of each method is to manage the source and destination of mimicry. Nature forms the endpoint in the first, startpoint in the second and midpoint in the third. The fourth step in the process is centered about matching resources from the origin to the destination as required by the design problem. The fifth involves modeling the inspired aspects into innovative design solutions. In the sixth, the concluded solution is measured to the original natural standards and criteria to evaluate its success in meeting the preset goals.

BID Implementation and Discussion

A Biomimetics-Based Adaptive Building

Using a "BioTecture" theme; where biology and architecture intersect and where organisms and buildings, and urban settings and biomes can be mapped; and using the aforementioned 4M-based approach to design, a design project is assigned. Its main subject is to design a self-sufficient adaptive house which addresses bio-inspired architecture. The project is designed for third year digital design studio in the College of Architecture and Design in Jordan University of Science and Technology (JUST). The design program is intended to challenge participants to design an autonomous and ecologically oriented dwelling unit. The house is required to be designed flexibly in order to be adaptive to climatic, inhabitants' changing needs and functional variations. The house design, as it addresses biomimetics as its major approach, is assumed to take its cues from living creatures which are typically tied harmoniously to their surrounding environments and as they take only the indispensable resources (energy, water, etc.), generate recyclable and degradable waste; and respond to growth and environmental changes dynamically. The main goal of this project is the development of an independent dwelling unit in which environmental responses, technological elements, sustainable solutions, flexible structures and kinetics are essential components of innovative architectural concepts. As such, the design is expected to integrate principles of kinetics, interactive and responsive architecture to visualize and model the motion-related aspects of the bio-house and its adaptations to the internal and external forces that may influence its design during its lifecycle.

Anthroposophic House Introductory Exercise

As an introductory exercise, participant students were asked to compare a house with a human in terms of the functionality of each element for each. The basic comparative list is illustrated in Figure 2. Students were encouraged to freely add to the list whatever they might come up with. They were also expected to continue the list, and explain graphically how one can improve the performance of a house by borrowing systems, functionality and behavior from humans and later from other creatures. Upon mapping features from humans to buildings, system functionality, structure and integration become easier to visualize and to translate into working models. As a next step, they were required to closely scrutinize a living creature other than humans for the inspiration of one or more of its systems, processes and environmental fit.

Levels of Biomimitics Information

The information embedded in each organism can be found in many levels as shown by the list in Fig 3. In this list, possible features that

can be concluded from an organism and its biome are analyzed using three levels. Each level is concerned with a layer of the design of an organism. The first includes aspects and properties of a creature as a whole unit. The second includes other features that focus on the relationships between an organism and its living community. The third level highlights systems and eco-solutions that can be concluded from relationships between an organism and its context/environment.

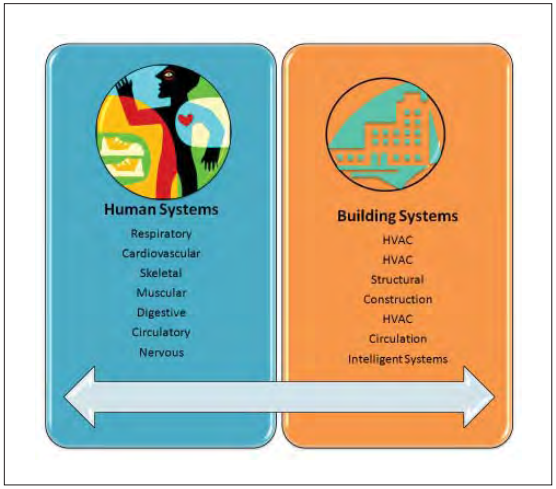

Figure 2: Mapping human to house systems (Source: Author).

Organism's features

The first layer emphasizes features of the organism itself. These include aspects such as:

• Formal attributes. These, in turn, include shape, color, volumetric treatment, transparency, rhythm
• Organization and hierarchy of parts and systems
• Structure, stability and gravity resistance
• Construction materials and process
• Mutation, growth and lifecycle
• Function and behavior
• Motion and aerodynamics
• Home-making. Examples include nest/web weaving, tunnel making, cell composition, and underground structures
• Morphology, anatomy, modularity and patterns
• Portability and mobility
• Self-assembly
• Encoding systems such as those in DNA structures or in genetic maps
• Flexibility and adaptation
• Healing, recovery, survival and maintenance
• Homeostasis that balances internal systems while external forces change
• Systems including: organ, digestive, circulatory, respiratory, skeletal, muscular, nervous, excretory, sensory and locomotive systems.

Organism-community relationships

The second layer highlights the organism's relationships to its community of similar organisms as well as other creatures that it may deal with. These include:

• Survival techniques
• Interaction with other creatures
• Trans-generation knowledge transfer and training
• Hierarchy of community members
• Group management and coordination
• Communication
• Collaboration and teamwork
• Self-protection
• Sensing, responding and interaction

• Risk management

Organism-environment relationship

The third layer brings to light issues of how an organism fits in its biome and environment. These include:

• Contextual fit
• Adjustment to change
• Response to climate by cooling, heating and ventilation solutions
• Response to context by, for example, camouflage, self-protection and self-cleaning
• Adaptation to ecosystems that include adjustment to various light or sound levels, shading, and self-illumination
• Shelter building
• Limited resource management such as adaptations to lack of water, light or food
• Waste management
• Input/output/process cycling
• Water and food distribution, saving and harvesting

A BID House Design

Using the three different 4M-based methods; and based on a premise that if design fields are related, and if some engineering innovative design solutions are derived successfully from biomietics and if biomietics can inform and inspire design products and processes; then new innovative architectural design solutions can be derived from the same source. Similarly, if biomietics was applied successfully to inspire machine inventions, and if houses can be considered, as Le Corbusier proposed, "machines for living in", then houses can be inspired by biomimitics to function and behave more efficiently. The components of this premise are illustrated in Figure 4. As Figure 4 demonstrates, the triangle represents the relationships between buildings,

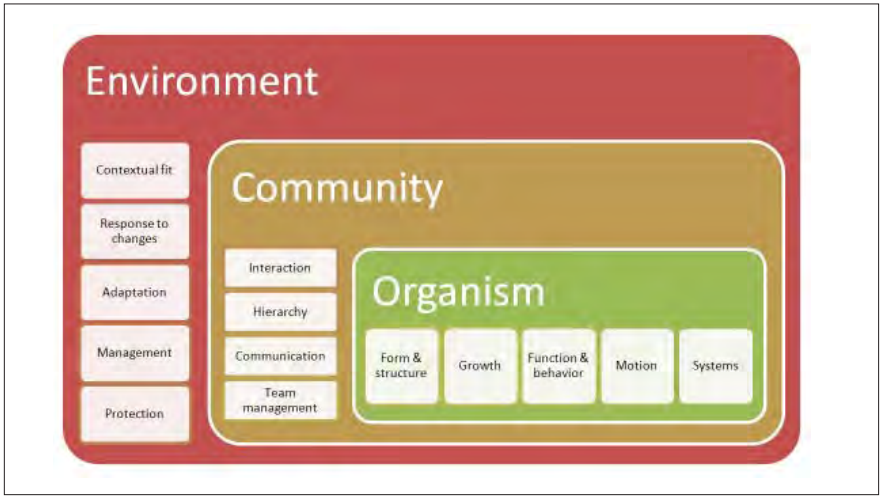

Figure 3: Levels of organism features (Source: Author).

biomes and machines. Within this triangle, the right-hand side represents the relationship between buildings and machines. In this regard, some theories proposed an analogy between buildings and machines. As mentioned earlier, one of these is Le Corbusier's proposal that a home is a machine for living. Similarly, many engineering design applications were derived from the analogy between living creatures and machines [e.g. Reed, 2006; Vogel, 2003). This relationship is represented by the base of the triangle. The third side of the triangle represents the part of application as well as research that still need exploration and implementation. The center of this research is the potential relationship between buildings and organisms. In this left-hand side of this triangle; which is the main concern of this paper (the shaded area); mimicry moves on different scales from physical imitation to abstract metaphors, from full imitation of creature into partial inspiration of some layer, from holistic solutions into aspectual ones, and from purely natural solutions into artificial ones. On all these scales, various levels of imitation can be found.

Project Application Examples

Examples of the biomimites-based approach applications in the BID project are illustrated in Figure 5.

(A) In this example, a house that fits ecologically in desert environment is designed. It applies a building-based design. Its design is inspired by camels for heat adaptation and lack of water survival. It is also inspired by ants for underground ventilation systems and structures.

B) Figure B demonstrates an organism -based

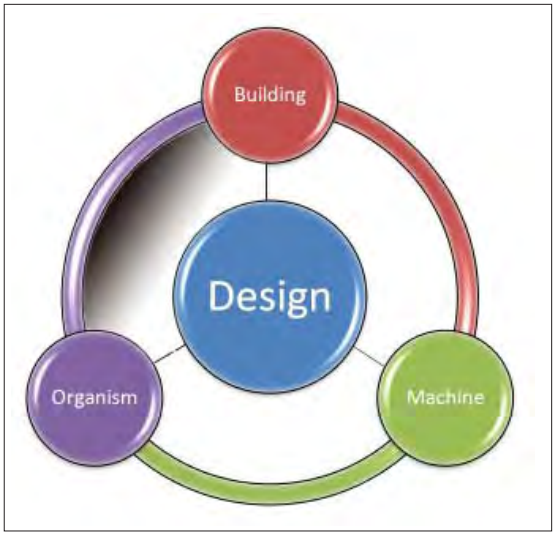

Figure 4: Organism-Building-Machine relationships (Source: Author).

method which is applied to study a beetle and learn from its form, materials and motion how to collect and save water and how to adjust roof shape to sun, wind and water changes.

C) Figure C shows an application-based approach that exhibits a flexible accordion-like structure. The structure borrows flexible expandable solution from snake's morphology and locomotive system, as applied in accordion and folded structures. The same mimicry was used to guarantee flexibility and growth in the house structure.

In these examples, the processes of 4M-based approaches as illustrated in Figure 1 were applied. The first two stages (manage and match) of the approach were conducted by teams of students.

The last two stages (model and measure) were mainly carried out individually.

The project development was enhanced by digital studio settings where motion-related aspects, kinetics of structures, simulation of organisms and their mimicked components, responses to stimuli, and representations of house mutations and lifecycle growth were emphasized, visualized and animated.

Reflections and Feedback

Feedback from participant students about this experimental project was measured by an anonymous structured questionnaire in addition to multiple informal discussions. The structured questionnaire was conducted after the conclusion of the project and after the end of semester it was assigned in to reduce subjectivity and concern of students. It was designed to examine various areas, aspects and phases of architectural design using different methods. As it tested participants' feedback to multiple aspects of the new biomimetics approaches, it compared the before and after attributes and contributions of the new approach with the previous conventional ones that were mostly based on trial/error process. The comparison was made on the three major phases of design: the pre-design reasoning phase, the design processing phase and the post-design evaluation phase. In all design phases, the participants significantly favored the biomimetics approach over the conventional ones in terms of its derivative, explorative and investigative powers. The questions asked and participants' responses are illustrated in Table 1.

The first column of the table represents the design phases. These include the pre-design, post-

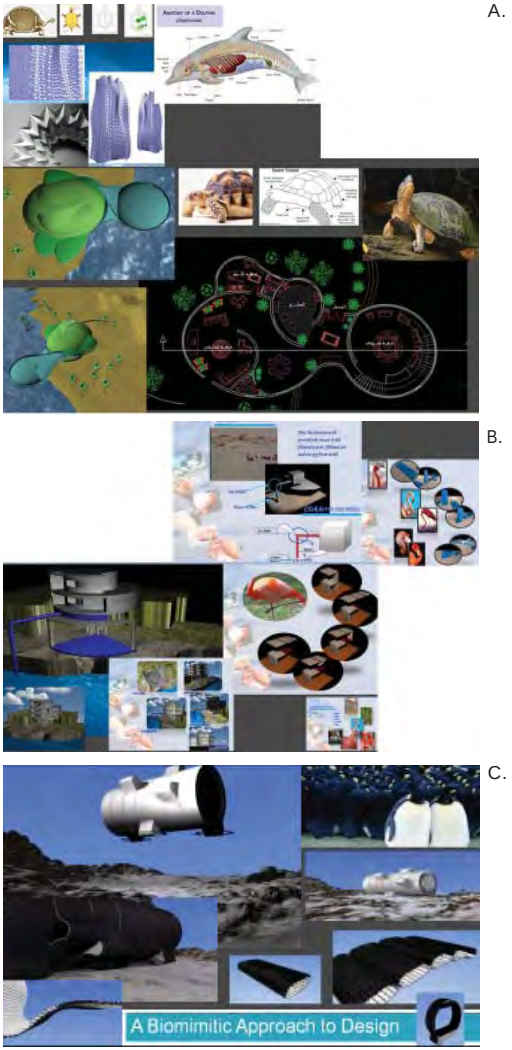

Figure 5: Biotecture project examples (Source: Author).
A: Building-based, B: Organism-based, C: Application-based

Design Stage	Design layer	Emphasis	Question No	Question	Conv. Approach	Bio. Approach
	Involvement	Challenge	1	I feel more challenged to work	6	8.96
		Enthusiasm	2	I feel more excited to design	6.34	8.56
	Innovation	Enhance creativity	3	The design problem develops my creativity	6.6	8.9
		Widen imagination	4	The design problem improves my imagination	6.08	9.08
		Concept generation	5	The design problem helps me generate new concepts	5.92	8.84
Design Processing	**Design Complexity**	Multi-layering of design	6	I discover new layers of design	5.32	8.68
		New design method	7	I develop new design methods	5.2	9.08
		Design process	8	I focus on design process more than product	5.3	8.12
		Understand building lifecycle	9	I realize that buildings have lifecycles like humans	3.16	8.88
		Influence of nature	10	I understand the influence of nature on design	5.16	9.28
		Significance of flexibility	11	I understand the importance of flexibility in design	5.48	9.12
		Motion contribution	12	I realize the role of motion in architecture	4.08	8.52
	Advancement	Futuristic	13	The design method will be dominant in future	4.88	9
		New horizon in architecture	14	This method opens new horizons in architecture	4.04	9.28
	Personalization	Customization	15	It helps me reflect my personality on design	7.2	7.12
		Character	16	It helps me add individual character to design	7.08	7.78
	Knowledge integration	Nature/architecture link	17	Helps me link natural solutions to architecture	4.68	9.56
		Link technology to architecture	18	Helps me link technology to architecture	5.18	9
		Link science to art	19	Helps me link science to art	5.36	8.96
Pre-Design	**Research**	Research integration	20	Makes me do lots of research	5.66	9.56
		Information role	21	Makes me realize the importance of information to design	6.34	9.48
	Presentation	Multi media	22	Encourages me to employ Multi Media to express my thoughts	5.48	9.08
		Time impact	23	Adds information about the impact of time on design	4.52	8.04
		CAD role	24	Employs CAD/animations to express new concepts	5.6	9.24
Post-Design	**Assessment**	Evaluation	25	Helps me evaluate my design	7.12	8.44

Table 1: Biotecture project feedback (Source: Author).

design and design processing. In the second column, the design aspect that underlies the derived solution is listed. In the third column, the approach contributions within each aspect are enumerated and questioned. The fourth column lists question numbers. These include a total of 25 questions. The first two (Q1, Q2) are concerned with the contribution of each method to the participant's involvement in the design problem. The next three questions (Q3-Q5) are centered about the contribution of the approach to the enhancement of innovation in design. The next seven (Q6-Q12) are concerned with tackling the design complexity by interpretation, understanding new layers, visualization and incorporation of new dimensions that are embedded in the design process such as motion and responsiveness. The next two (Q13-Q14) examine the futuristic attributes of the approaches in architecture.

The next two (Q15-Q16) highlight the elements of personalization in the approaches and whether they facilitate personal customization and character reflection. The next three (Q17-Q19) emphasize issues of knowledge integration and linkage between disciplines. Questions asked so far concern the design ontology and process itself. The next two (Q20-Q21) are mostly related to the pre-design research and reasoning phase. They question the significance of information and analysis to designing. The next three (Q22-Q24) inquire about the enhancement of new presentation techniques and employment of multi-media in idea expression. The last question (Q25) is related to the post-design phase. It highlights the contribution of each approach to improving the evaluative skills of the participants. The fifth column lists the questions asked. The sixth and seventh columns include the average score for the answers of each question/approach. While Q15 exhibits the least difference between the two approaches, Q9 demonstrates the highest, where the bio-based approach was thought of as helping significantly in understanding the lifecycle and mutations of buildings.

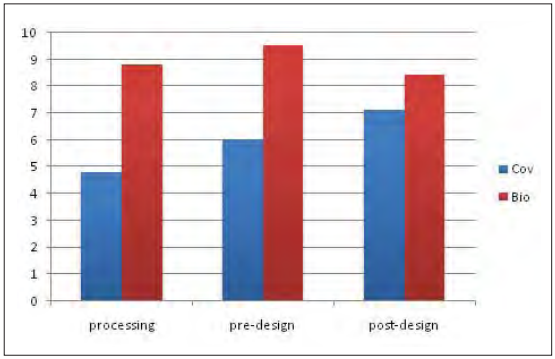

Figure 6: A comparison between conventional and BID approaches to design according to design phases (Source: Author).

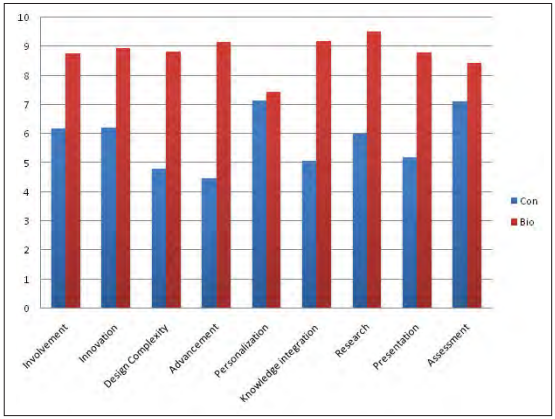

Figure 7: A comparison between conventional and BID approaches to design according to design aspects (Source: Author).

The comparison between the conventional and biomimetic approaches is illustrated in Figure 6 and Figure 7. The criteria of comparison included the aspects of:

1. How involved the student is in each approach: This aspect highlights the levels of challenge the participants feel, and the enthusiasm they work with.

2. The contribution of each approach to fostering innovation in design thinking: This questions how each approach helps to enhance creativity, enrich imagination and provide new concept generators.

3. The emphasis on design complexity: This category consists of seven questions about the multi-layered nature of design, the various design methods, the possible design processes, the life cycle of buildings, the impact of nature and environment on buildings, the consideration of flexibility in interior and exterior designs, and the influence of integrating motion into the design of building structures to accommodate different settings and scenarios.

4. The contribution of each approach to the advancement of design knowledge: This part examines the futuristic potentials of each approach whether it will continue to take place in future designing or will be replaced by another. It also prompts for the predictability of whether the questioned approach may open new horizons in architectural designing.

5. The level of individual personalization in each approach: This examines the extent to which the personality of designer can be reflected on design, and to which the individual character of each building can be expressed.

6. The networking dimension: This tests how each approach helps link different areas together to enrich design quality. It includes the linkage between: built environment and nature, technology and architecture, and art and sciences.

7. The integration of research into design: This questions the significance of data, information and knowledge to the design reasoning and processing. It consists of research significance as a prerequisite or as a co-requisite to design derivation.

8. The communication and presentation aspects: This tests how each approach encourages designers to employ multi-media techniques in order to express their ideas. It also tests the perception of the influence of time on design. Furthermore, it examines how each approach enhances the employment of animations and computer aids to visualize and communicate thoughts.

9. The enhancement of evaluative skills: This part examines if the given approach helps designers to evaluate their alternatives.

As illustrated in Table 1 and Figures 6 and 7, responses of the participants ranked the biomimetic approach higher than the conventional in all phases (Figure 6) and aspects (Figure 7). The exception was recorded for the personalization element of both approaches. In this regard, the role of the approaches in reflecting a designer's personal touches on the deigned product and on the addition of a character on the design seem almost similar in

both approaches. This aspect may represent one of the limitations of the bio-inspired approach that needs more development and research.

Conclusion

Using a cross-disciplinary framework for design knowledge networking combined with a 4-step strategy for design process management, a new approach to architectural design that uses new resources of inspiration and that is tailored to digital studio is developed, described, implemented, reflected on and discussed. The approach is represented as a biomimetic-inspired design (BID) project and is based on the application of principles of biomimetics on architectural design using various points of departure. Three various biomimetics-based methods are proposed, developed, discussed and tested in this paper. The approach implementation is described as a digital architectural design studio project. The BID project is concerned with the design of a self-sufficient adaptive house that changes its structures and configurations according to inhabitants' needs. The house is also supposed to respond to climatic changes, and to mutate in form and spatial organization during its lifecycle. Reflections and feedback about the approach and the project implementation are measured by structured questionnaire.

Findings about the project implementation suggest the success of this approach as an alternative to conventional design approaches. However, the new design approach has some limitations as its participants pointed out. One of these is that it limits expressing the designer's personality in the generated design.

Future extensions of this research include its implementation in design practice offices, and the automation of databases that are relevant to biosystems and that may be matched to artificial artifacts through computer-aided software. Such software may help in the external and internal referencing between entities and in the knowledge linkage and networking between data from different disciplines.

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THE ROLE OF INTERNATIONAL EXCHANGE PROGRAMS IN DESIGN EDUCATION: A CASE STUDY OF AN ARCHITECTURAL DESIGN COURSE IN JAPAN

Murat Dundar and Sinem Kultur

Abstract
The purpose of this paper is to discuss role of international exchange programs in design education based on experiences and outputs of the summer school course ICSA (Inter-Cultural Study of Architecture) held in Japan with the participation of Japanese and Turkish students for 50 days under the collaboration of Mukogawa Women's University (MWU, Japan) and Bahcesehir University (BSU, Turkey). After the introduction, chapter One will compare educational methods used in architectural design courses. Chapter Two will mainly provide general observations of ICSA in Japan summer school course. In chapter Three, contributions of international exchange programs to design education will be discussed in terms of two different approaches. Finally, chapter Four will outline the main arguments discussed in this paper.

Keywords
International exchange programs, inter-cultural, design education, architectural design studio.

Introduction
The purpose of this paper is to describe and discuss role of international exchange programs in design education based on experiences and outputs of the summer school course 'ICSA' (Inter-Cultural Study of Architecture) held in Japan with the participation of Japanese and Turkish students for fifty days under the collaboration of Mukogawa Women's University (MWU, Japan) and Bahcesehir University (BSU, Turkey).

Increasing efforts in expanding international study opportunities motivate us to think this matter as an integrated part of design education in the near future. For instance, UIA (International Union of Architects) wrote in the recommendations 2002 assembly that "...to facilitate international exchange, architects, researchers, and students" is among one of the two primary aims of UIA. Actually, in a different page of the same document, UIA explains the basis for this approach as follows: "architecture has always been international and cross-cultural by its very nature" (UIA XXII. General Assembly, 2002).

It is of great importance how to develop students'

Practices

creativity (Antoniades, 2008). Increasing students intercultural sensitivities by promoting appreciation of cultural difference is also one of the most important issues that should be thought as an integral part of architectural education. There are several researches on the impact of cultural diversity in architectural design in general and on architectural design education in particular (Ketizmen, 2006; Mazumdar, 1993). Design studios have always been in focus since they are the places where students spend most of their times in learning design methods (Shoshi & Oxman, 2000). Schon's book (1985) 'The Design Studio: an exploration of its traditions and potentials' is a pionerring attempt to explore the design methodolgy of architectural studio courses.

While there is a trend in current research activities to focus on education methods used in studio based courses, (Bar-Eli, & Oxman, 2000; Uluoglu, 1990; Ketizmen, 2002; Erol, 2006) the existing literature on the role of international activities in design education is too limited.

In this context, the international exchange program 'ICSA in Japan' is thought as an opportunity to discuss role of this kind of international activity in design education. There is another argument that has been put forward in an attempt to analyze and compare the methods of design education in studio courses in Japan and Turkey.

This paper is organized in four major chapters as follows: After the introduction, chapter One will compare educational methods used in studio-based design courses in different schools of architecture. Chapter Two will mainly provide general observations and comparative evaluations of ICSA in Japan summer school course. The first section of this chapter describes scope and objectives of the program, including an overview of education system held in Department of Architecture at MWU and basic steps of design process. The major observations and experiences drawn from this process will be presented in the following section with the aid of pictures and explanatory tables. Following that, in chapter Three contributions of international exchange programs to design education will be discussed in terms of two different approaches. Finally, chapter Four will outline the main arguments discussed in this paper, drawing them together to provide conclusions based on the outputs and experiences of the design course held in Japan.

Comparative Analysis of Architectural Design Studios

This chapter will compare educational methods used in studio-based design courses in different schools of architecture. These are some of the major issues that will be examined and compared in this chapter: structure of the curriculum, content of the syllabus, design topics, number of hours, formation of architectural-programs, project reviews, design critiques and examinations. This chapter of the paper is intended to provide guidelines for discussing, analyzing, comparing and evaluating various aspects of implemented methods in architectural design course education in several schools of architecture in Turkey.

By the term 'design studio,' we refer to the architectural design studio courses in which real-life architectural projects are thought—basic design studios are not discussed within the scope of this paper.

The design studio, "which is a place of

intellectualization, communication, transition, interaction, sharing and participation besides games and fun," is the most stimulating and experimental part of the architectural curriculum (Kahvecioglu, 2007, p. 17). Design studio course is generally based on the following pillars: studio critiques, lectures, fieldworks, workshops, sketch problems, interim juries and final juries. Design teaching practices in most schools of architecture in Turkey base on a revision/critique tradition that might be called the mix of "Ecole Des Beaux Arts" and "Bauhaus", which defines the process that respectively comprises functional analysis and then formal design reviews (Saglam, 2009). This approach, which can also be called as master-oriented studios, is still highly prevalent in studio courses in most schools of architecture in Turkey (Ciravoglu, 2001, p.18).

There are two types of architectural design studios in Turkey, which are called as horizontal design studios and vertical design studios—involving students from different grades working together. Although the most common type is the horizontal studio that involves students of the same grade, benefits of vertical studios are summarized by the instructors of those studios as follows: "Vertical design studios enabled students to achieve the objectives as being aware of different approaches; sharing knowledge and experiences, increasing competitive spirit, innovation and interaction among themselves" (Tokman et al., 2009).

Comparative analysis of architectural design studios in different schools of architecture in Turkey is presented in Table 1. The conclusions from this table are as follows:

1-) In terms of a comparison of the curriculums: each university has its own education method for architectural studio course—course hours, total number of course and the weight of it in the curriculum remarkably differ from each other. 2-) As can be seen from the third column of the table, there is no consensus on when to start the course of architectural design studio. The first studio course is given in different terms ranging from the first to the fifth. That is, total number of studio course differs according to the university (see the second column). 3-) Percentage of architectural studio courses ranges between about 19 and 31 percent. Besides, percentage of studio course hours ranges from 21 to 31 percent.

University	Total Number of Studio Courses	The Term of the First Studio Course	Credits of Studio Course	Percentage of Studio Course Credits	Total Number of Studio Course Hours	Graduation Credits	Percentage of Studio Course Hours
Bahcesehir University (BSU)	6	3	28	19,7	644	142	24,21
Yildiz Technical University (YTU)	7	2	42	23,33	784	180	25,33
Istanbul Technical University (ITU)	8	1	38	24,91	868	152,5	31,31
Middle East Technical University (METU)	6	3	48	29	1008	179	29,14
Mimar Sinan Fine Arts University	4	5	32	19,27	672	166	21,6
Karadeniz Technical University (KTU)	8	1	76 (ECTS*)	31	868	240 (ECTS)	31,63

* European Credits Transfer System.

Table 1: Comparative Analysis of Architectural Design Studios in Different Schools of Architecture in Turkey (The data is taken from the universities' curricula). (Source: Authors).

Although, this table, which is based on formal curriculums of those universities, implies that design teaching methods implemented in different schools of architecture in Turkey are characteristically different, there is something that remains stable and common is the method of instruction—the relationship between tutor and student. This situation has been pointed out by Ciravoglu that "design studio curriculum has a dual structure, one of which is a formal curriculum; and the other one is a hidden curriculum" (Ciravoglu, 2001).

According to Yurekli (1991), the reason lay behind a hidden curriculum, which is one of the great danger in the studio, is the master-apprentice (one-way) relationship. Master-apprentice relationship in design education has still its dominance in the education system of most schools of architecture throughout the world.

A survey consisting of two questionnaires was conducted by the studio instructors at Yildiz Technical University (YTU) in 2000 to evaluate the ideas of the students and the educational staff concerning the studios and workshops. According to the survey both teachers and students agree that the master-apprentice method should not be used in the studio. What is interesting here is that students' answers described the current method implemented by tutors as the contrary of this (Ciravoglu, 2001).

Design process in architectural studios in Turkey generally begins with analysis of existing situation of project area which consists of site analysis, functional analysis and contextual study. Sometimes a short term workshop is included to this part or the following this phase of the design process, which is generally completed in fourteen weeks. This information gathering session is approximately two to four weeks long, most of which are conducted as group activities so that students can work together to maximize their own and other's learning (Johnson & Stanne, 2007). Architectural-programming is also expected to be completed by the students during this initial period of time. Additionally, project topics of design studios are closely linked to the current problems of existing sites.

ICSA in Japan Summer Course

Chapter Two will mainly provide general observations and comparative evaluations of ICSA in Japan summer school course.

Scope of 'ICSA in Japan' Summer School

The first section of this chapter describes scope and objectives of the program, including, overview of education system held in Department of Architecture at Mukogawa Women's University and basic steps of design process.

ICSA (Inter-Cultural Study of Architecture) is the summer school course held in Japan with the participation of Japanese and Turkish students for fifty days under the collaboration of Mukogawa Women's University (MWU, Japan) and Bahcesehir University (BSU, Turkey).

The main objective of this course is to provide students with the opportunity to experience unfamiliar design process and to observe the role of 'cultural interaction' in the design studio education. This program also aims to create a greater awareness of significance of cultural background in design developing process.

MWU's curriculum satisfies the requirements of UIA/UNESCO charter for architectural education. Each design studio course, which occupies 50%

of all scheduled class hours, comprises three different design topics for one term, each one of which is completed in seven weeks in total. Principally, lectures are given in the mornings and design studios in the afternoon, which are conducted three times a week from 13:05 to 16:20 O'clock. In addition to this, regular field trips are organized for architectural students every Saturday in accordance with the concepts that they are studying in their studio classes. The weekly schedule of the third and fourth grade students of architecture can be seen in Table 2.

Grade	Day / Hours	Mon	Tue	Wed	Thu	Fri	Sat
Third Grade Students	09:00-10:30	General Education in Central Campus	English V	Building Materials	Building Systems I		
	10:45-12:15			Building Codes II	Architectural Design Theory IV		
	13:05-14:35	Architectural Design Studio III	Architectural Design Studio III	General Education in Central Campus	Practice in Building Materials	Architectural Design Studio III	Fieldwork III
	14:50-16:20						
	16:30-18:00						
Fourth Grade Students	09:00-10:30	General Education in Central Campus	English V	Building Construction III	Building Systems II	Building Structures IV	
	10:45-12:15						
	13:05-14:35	Architectural Design Studio V		Surveying	Architectural Design Studio V	Architectural Design Studio V	Fieldwork IV
	14:50-16:20						
	16:30-18:00						

Table 2: The Weekly Schedule of the Third and Fourth Grade Students (MWU, weekly schedule). (Source: Authors).

The changing role of studio-instructors in architectural design education is crucial since, as Kahvecioglu has pointed out, "The instructor was the key factor in the studio in fostering creativity by influencing students by, for instance, being tolerant, taking risks and being pro-active." (Kahvecioglu, 2007). At MWU, totally four supervisors, one of whom is part-time instructor, conducted the design studio courses and forty-four students attended the studio. Students of Bahcesehir University (Istanbul, Turkey) are assigned to the third and fourth grade architectural design studios in a manner so as to be four students for each.

Students are not assigned to a group or a tutor. Thus, they may get critique and comment of different instructors in the same class hours. This method is closely linked to the spatial characteristics of design studio. Student-space interactions in architectural-design studio spaces are significant for improving the success of design education. As can be seen in the results of a survey conducted in the Department of Architecture, Faculty of Engineering and Architecture at Gazi University, (Dinc, 2007) studio place is expected by the users to be specially designed only for this purpose.

At MWU each student has individual workstation providing a drafting desk (90cm by 180cm) that is equipped with computer, cabinet and all the necessary drawing tools (Figure 1) In addition to the scheduled times for design studio course, students of architecture at MWU are expected to be working in the studio during outside of regular school hours. A survey conducted by Dinc showed that having an individual unit in design studios, which can also be used after course hours, is one of the major requirement claimed by students (Dinc, 2007).

The most essential activity in design education

Figure 1: Studio's individual workstations. (Source: Authors).

Figure 2: Studio Critiques. (Source: Authors).

process is the 'desk crit'—a one-on-one critiquing session (Goldschmidt, 2002). For desk crits, an instructor visits students' individual workstations to review their work, while other students continue to study on their design work. At MWU, students are not obligated to get critique or comment on their works for each time of the course day.

Apart from the desk critiques, students are gathered to pay attention to the explanation delivered by instructors in the shape of question and answer sessions (Figure 2). During these sessions, which are kept short—between five to fifteen minutes in length—to maintain concentration, interest and enthusiasm, some students get to share their works, and the other students and instructors reviews what they did by asking them questions and making comments.

Another interesting observation about the architectural studio at MWU is that some instructors develop design proposals simultaneously with the students. This, especially, create an opportunity for the students to see how to start a design process. The design developing process of the studio at MWU can be summarized as follows:

Step 1: Gathering information about the design problem and the project site (This step includes daily field trip to the actual design spots—project sites, hearing the representatives of local administration and local community).

Step 2: Concept evolution and developing design proposals through sketching and model making. (2D and 3D drawings in 1/2500 scale for the fourth grade; 1/50 scale for the third grade.)

Step 3: Furthering the design through the more detailed model-making applications (scale: 1/200), technical drawings and 3D model practices.

Step 4: Final presentation (submission of the projects including technical drawings in various scale, site model, and renderings)

Each student prepared models in different scales at least for three times during the process (seven weeks in total).

Observations of ICSA in Japan Summer Course

The major observations and experiences drawn from this process will be presented in this section with the aid of pictures and explanatory tables. The names of the subsections, which will be examined in some detail, are as follows: Real-life Project-Topics, Programming and Conceptual Approach, The Role of Architectural Model in Design Process, Participation in Formal and Informal (non-curricular) Activities, Importance of Final Juries.

Project topics (design problems)

Architectural education at MWU mainly relies on concrete cases. Design topics are closely aligned with the requirements and the problems of modern society. Each design topic is offered with different emphasis in detail. The sites chosen for the project are determined to be related with the current problems of the local community.

Design topic of the third grade studio (Architectural Design Studio III) was to design a tension membrane structure covering the whole platform of Koshien Station, which is the main entrance of one of the most famous baseball stadium of Japan, to create an innovative, spectacular spatial effect in harmony with the built environment.

Fourth grade students (Architectural Design Studio V) were expected to design for the development of a waterfront area on a manmade island in Minami Ashiya, which was constructed in 1970s but had remained functionless for many years, in an urban scale as to meet expectations of local people and administration.

Both design topics are closely related to the current problems of Nishinomiya where the university is situated. Getting involved the representatives of local administration and technical experts from private or government sector in the process from the very beginning to the final jury does not only provide the necessary technical information, but it also keeps students interested and motivated to what they are doing.

Architectural programming and conceptual approach

The terminology of each topic that is to be used during the design process is clearly explained from the beginning. Outline of architectural programming in general was given at the beginning of the studio courses. Students are expected to concentrate on developing design concepts rather than creating proposals for an architectural programming. The formation process of architectural programming was supported with fieldworks, slide-show lectures and seminars given by the experts. All of these organizations are conducted to assist in defining mutual expectations and needs about the project topics. Furthermore, all these activities, which might be defined as extracurricular for most schools of architecture, are interlinked and organized at MWU as the fixed schedule of standard design course from the beginning.

As we have stated earlier, three design topics are studied in one term at MWU, each one of which has to be completed within a time period of seven weeks. This was really the primary concern for us prior to this summer school since our students were not accustomed to developing design proposals in such a short period of time. Design process in architectural studios in Turkey is generally completed in fourteen weeks, two to four weeks of which are devoted to the information gathering session to get students familiarized with the project topic.

The role of studying with architectural model in design process

Architectural model making is indispensable for a design studio in Japan. It is not regarded as just a presentation technique; but goes beyond it by using architectural model making as an integral part of the design process from the very beginning of the studio course.

In most countries including Turkey where students generally see 'building a model' as the requirement of their curriculum and they have no idea how to proceed. As a result, it is something that is left to be completed at the end of the process. The situation is contrary to this in Japan—after the announcement and explanation of project topic, the first thing is to make a physical model of project site in existing conditions. Moreover, this analyzing phase often goes beyond the boundaries of the country by making model of famous buildings or part of city settlements from an abroad in accordance with the project topics that they are studying in their studio. The process of making architectural model teaches the students to comprehend the three dimensional totality of the project—a building, a city, or a region.

The key design decisions made regarding the scope and objectives of the project are mainly based on a dynamic process of constantly making architectural study models in various scales ranging from 1:50 to 1:2500 (Figure 3).

Fourth grade students made several models of their designs respectively in the following scales: 1/2500, 1/1000 and 1/200; design decisions are continuously revised in different scales as the process is being developed.

Third grade students began their study by building a partial model of the train station in 1/50 scale. Since the main topic of the project was to design a tension membrane structure covering the whole platform of Koshien Station, design principles of membrane structures were

Figure 3: Working with physical models as part of the design process. (Source: Authors).

explained by the experts in a learning-by-doing approach, having students experience the process on their own models.

Based on the experiment in which the progress of architectural students in a traditional studio was compared to the digital studio (computer aided architectural design—CAAD), Bermudez (1997) claimed that progress of students in CAAD studio were found more successful in generating various solutions. However, in architectural design studios of Japan, making scale models are still the most effective and instant way of design developing method, in spite of the advances in CAAD applications.

Formal and informal (non-curricular) activities

The regular field trips are organized as an integral part of the curriculum for architectural students every Saturday in accordance with the concepts that they are studying in their studio classes (see Figure 4). Each field trip focuses on particular themes not necessarily directly related to the project topic.

It is often pointed out that architectural education should not be bordered to the classroom walls and the days of the school year. Pinhero (2009) reiterate this in a slightly different way when he concludes his article by claiming that architectural education should not be limited to the school curriculum. The importance of these kinds of informal activities has partly been discussed by several academicians in Turkey (Inceoglu, 1994; Gorgulu, 1994) but never thought as important to be an integral part of the formal curriculum and has remained as just 'non-curricular' activity that are realized by the efforts of volunteered instructors and students. Special emphasis is given to these fieldtrips at MWU as it can be understood from their curriculum in which fieldtrips are shown in the formal academic program (see Table 2).

The field trips cover variety of places such as buildings for technical purposes and construction sites; places of historical, cultural and religious significance. With these fieldworks, students

are intended to improve their understanding and perception of the built environment and architectural heritage (Figures 5 and 6).

Figure 4: Field Trip to a a Public Space. (Source: Authors).

Final juries

It is certain that the most important activity and the most instructive part of the studio courses is the 'final jury,' which are performed three times in a term as a final activity held at the end of each project topic. Attendance of visiting jury members from a variety of fields such as famous architects, senior managers of construction companies, representatives of local administration and technical experts are provided. The allotted time for each presentation is about fifteen minutes, which includes approximately five minutes for questions.

Another significant observation in regards to the jury is the presentation room that is specially designed for this usage. This room has a full range of audio-visual equipment and movable panels on which students hang their drawings. Image of architectural models are projected on a screen, so everybody in the room can easily observe the model from the same vintage point. Besides, using microphone by students and jury members to deliver speech and critique allow students to follow the jury from anywhere in the room (see Figure 7).

Figure 5: Field Trip to a a Historical-Natural Setting. (Source: Authors).

Figure 6: Field Trip to a a Modern Building. (Source: Authors).

Contributions of International Exchange Programs to Design Education

In chapter three contributions of international exchange programs to design education will be discussed in terms of two different approaches.

The Role of International Exchange Programs on Developing Design Education

The most easily recognizable effect of international cooperation in programs of exchange is that it leads to exchange of information, ideas, experiences about methods used in national educational traditions in design.

Also, as Wolfe wrote in 2002, those activities have "paradoxical consequences of globalization that also cause the process of innovation, creativity and social learning that are critical for success in the new era" (Wolfe, 2002). Kahvecioglu (2007) affirms this view when he claims that 'Experiences like this are a kind of a shock therapy that can change the students' views forever – which is the basic, if sometimes forgotten, purpose of all education'.

International activities allow instructors to observe, compare and contrast their teaching attitudes, methods of education and the performance of their students with that of students in other countries. Experiences like this will help instructors and administrators of the university to improve their education system.

Regarding students' benefits from these activities, the students get an opportunity to experience unfamiliar—different way of design approach in architectural design studios in which they participated or which they observed while they were studying.

The Role of International Exchange Programs on Tradition, Identity and Values

Another important expectation of the ICSA Exchange Program for the students was to create self-awareness about own tradition, identity and values.

The importance of valuing and respecting human diversity is gaining recognition in all parts of life including architecture as can be understood from the NAAB criteria term-13: "Human Diversity: Understanding of the diverse needs, values, behavioral norms, physical ability, and social and spatial patterns that characterize different cultures and individuals and the implication of this diversity for the societal roles and responsibilities of architects" (NAAB, 1998).

International exchange programs are the most effective ways of dealing with the problematic approaches such as universal design 'that advocates products and environments that accommodate all people, regardless of their abilities' (Steinfeld et al, 1995).

The role of these concepts—namely tradition, identity and values—in architectural education has been discussed in various papers, for instance see the book named as 'Architectural Education Today, Cross-Cultural Perspectives (Salama et al., 2002). What has not yet been discussed at length is the role of international activities in increasing students' sensitivity to their own and others' socio-cultural backgrounds and contexts.

These programs and their contents should be well organized and integrated to the architectural design studio. Students participating in these international activities inevitably observe differentiating approaches of their own from the others. In other words, this process led to the

awareness of their own unique characteristics such as culture, identity and tradition. Thus, we believe that the weight of international activities especially in the architectural design education should be increased. Besides, it is also necessary to consider how to relate these activities with the formal curriculum.

Conclusion

The conclusion of the study can be summarized as follows: In comparing design studio education of MWU with that of architectural schools in Turkey, in light of the observations presented in this paper, we suggest that criticism is not treated as a mere approach in the architectural design studio of MWU; besides, the emphasis is placed on the design process rather than on the final design product.

It is very satisfying that students, who used to take design studio course during fourteen weeks in Turkey, could discipline themselves to create unique design proposals within a very

Figure 7: Final jury involving Japanese and Turkish students(Source: Authors).

short period of time—seven weeks in total—in completely new conditions. It is our observation that getting students involved in the above mentioned activities such as fieldworks, lectures and seminars by the experts helped them to grasp the design problem and develop several conceptual proposals in a relatively short period of time. Moreover, experiencing the design process in the light of cross-cultural interactions is the main impetus that motivated students to keep up with the course assignments and deadlines.

By having students study three different design topics for each term, it is expected to develop students' conceptual thinking ability by experiencing as much different design topics as possible.

Students are not assigned to a group or a tutor in the design studio. Thus, they may get critique and comment of different instructors in the same class hours. This method of architectural studio instruction is likely to decrease the negative effects of master-apprentice (one-way) relationship that we have criticized in previous chapters.

It is certain that in order for international exchange programs to be more effective in the development of architectural design education, that the methods, roles and goals of those activities must be widely disseminated, discussed and implemented.

International cooperation in programs of exchange will not only lead to exchange of information, ideas, experiences about methods used in national educational traditions in design, but it will also lead to provide an opportunity for students to develop an understanding of acknowledging local-traditional values and cultural issues in different countries.

As a conclusion we believe that, after finishing this international exchange program (ICSA), the architectural students gained invaluable intercultural experience that helps them develop more flexible design approach and increased sensitivity to cultural values and perceptions.

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SYSTEMATIC DESIGNING IN ARCHITECTURAL EDUCATION: AN EXPERIENCE OF HOSPITAL DESIGN

Dicle Aydin and Mehmet Uysal

Abstract

Architectural design is defined as decision-making process. Design studios play an important role in experiencing this process and provide the competence of design to prospective architects. The instructors of architecture aim to compel the imagination of the students develop creative thinking, raising the awareness among students about their abilities. Furthermore, executives of the studios pay attention to delimitative elements in design in order to provide the competence of problem solving for students. Each experience in education period prepares the prospective architects for the social environment and the realities of the future. The aim of the study is to examine a practicing in architectural education. The general hospital project was carried out with 40 students and 4 project executives within the 2007-2008 academic year Spring Semester Studio-7 courses. The steps followed in the studio process were analyzed with the design problem of "hospital". Evaluations were performed on; the solution of functional-spatial organization, solutions about the activities of the users, convenience with the standards and regulations and prosperity-aesthetic notions in internal space. Prospective architects generally became successful in the design of hospital building with complex function. This experience raised awareness about access to information via thinking, provision of a new position for information in each concept.

Keywords

Design studio, hospital design, architectural education, systematic design process.

Introduction

Architectural design is defined as decision-making process encompassing problem solving, the choice among one of the alternatives for solution. Design studios play an important role in experiencing this process and provide the competence of design to prospective architects. According to Aydınlı (2001), teaching and learning processes complement each other in design studios and the role of the learning and teaching are constantly query. The design studios are a learning environment focused on the synthesis of theoretical knowledge and the problem solving. Furthermore, it is a social organization. The most determinative factor for social organization is the verbal and visual communication between the students and the executives of the studios. Studio experiences in architectural education occur from the simple to more a complex process.

Practices

As one's experience is enhanced and one gets closer to being involved in real life as a professional, the problems become more complicated in terms of enriching the design infrastructure. Thus, in the process of architectural education, considering the objectives of the instructors in the learning process, design problems gain importance. The design problem of "150-bed General Hospital Project" was assigned to Selcuk University (Turkey-Konya) Department of Architecture 4th grade students. Within the scope of this design problem, this study will explain how the objectives were determined in the studio process; analyze the acquisitions of the students; show the chosen examples of design products and analyze the characteristics of these examples. The General hospital project studio process was carried out with 40 students and 4 project executives within the 2007-2008 academic year Spring Semester Studio-7 course. This course is the penultimate project in the department of architecture at Selçuk University therefore, in the process of professional training for architecture, this course is important for preparing the student for design problems they can encounter later.

Design Studios in Architectural Education

In parallel to the process of realizing designs for application and utilization, architectural education, which encompasses design, has an important role in design education. According to Demirbaş and Demirkan (2007), "in design education, learning and teaching methods aim to balance the creative process with a critical awareness of more objective criteria in the development of a proposition". In addition, when concerning architectural design, in the process of forming the products, technical, functional, aesthetic, social and economic factors are the determinants. According to Kurt (2009), "design process can be defined as a process, which involves all activities, which can be performed by a designer from the beginning until locating the final solution. This procedure is full of repeated actions that lie between a problem definition and the solution of this problem. It is research and decision-making process and at the same time problem solving process". In this process, architectural study courses have an important role, architectural education is matched with studio education Since design studio is the combination of all other courses in architectural education (Bunch, 1993; Demirbas, 1997, 2001; Demirbas & Demirkan, 2000, 2003; Teymur, 1992, 1996; Uluoglu, 2000). "Architectural design studios are educational environments that professional education and art education is conducted jointly (Çıkış and Çil, 2009). Additionally, "these studios are premised on a particular kind of pedagogy defined as "learning by doing" and architectural curriculum has been based on "learning by doing" in the design studio" (Çıkış and Çil, 2009; Kurt, 2009) and similar practicing course. In this process, communication/interaction is an important part of learning. The design studio according to Şentürer (2004), is a communication-based, imaginary, intellectual and experiential environment where the individuals collectively perform design activities by exchanging views; where related knowledge and design experiences are attempted to be taught to the students. In the studio environment, there are various ways of communicating. "Performed as visual, verbal, tactile, written rich communication sometimes involves students working in groups, and so it is arguably rich in team working potential" (Nicol and Pilling , 2000). The task of instructor in this process is to effectively run and control the design studies. In junior semesters, education

programs are presented though the instructor, assessment and a limited number of students (10-12), however, towards the senior years as the design ability improves, the education programs involve jury system. In the juries, visual and verbal communication established between instructor-student(s) and students-students enhances the quality of designs, allow for the discussion of the unknown and create new horizons.

The instructors of architecture aim to compel the imagination of the students develop creative thinking, raising the awareness among students about their abilities. Furthermore, executives of the studios pay attention to delimitative elements in design in order to provide the competence of problem solving for students. Each experience in education period prepares the prospective architects for the social environment and the realities of the future.

In this context, over a complex design problem, the steps of analysis, synthesis and evaluation provide the students with successful results in the studio environment. Analysis, synthesis and assessment process were analyzed as systematic design steps by Salama (2005), while Lawson (2005) defined them as a general map for design. In this process, in the case of insoluble problems and the dialogue from instructor to students, student to student, the sharing enacted to produce solutions and eliminate deadlocks, the analyzes and observations on example areas gain importance. Somewhat According to Demirbaş and Demirkan (2003), design studio, the organization of necessary knowledge and ways of presenting this knowledge that is accessible to every student by design instructors are the important factors in the design studio at epistemological level. When the related design problem is a hospital in the analysis process, collecting information and determining the necessary information to solve the design problem gains importance in the appropriate progress of the studio process and determines the content of communication environment.

Hospital Design: A Studio Experience

Hospital as a Design Problem

Health-related buildings have been developed proportional to the development level of the societies from past to present. In the last fifty years, medical technological developments raised the level of architectural competence in such buildings and the buildings became more complex. The complexity results from the units, spaces related to these units, the abundance and diversity of the users and the quality of the medical technology (Aydın, 2009; Aydın, 2001). Hospital architecture requires a wide range of information background and coordinative work as a result of functional and technical problems, requirement of combination of architecture and engineering, the standards determined by the concerning ministry in the country. Attainments of studio experience are as follows considering the complexity of the design as a result of the function of the buildings: a) raising awareness about the legal and professional problems students may encounter in real life, b) analyzing the complex hospital building via users and functions, c) empowering the sophisticated thinking ability about spatial and functional organization, d) provision of spatial solutions of functions via information background (operation rooms, emergency etc.), e) determination of efficacy for related engineering branches about the design, f) having a full command

with systematic design process experience .

Architectural Design Studio: Process of Hospital Design

The steps followed in the studio process were analyzed with the design problem of "hospital". "Analysis, synthesis and evaluation" which are the sub-parts of the programming and design are cited as the sharing with the students. Delimitative and directive elements of physical environments are as follows: Turkish Republic The regulation for Private Hospitals determined by the Ministry of Health, regulation and standards about units (emergency, intensive care), principles about functional organization, spatial qualifications and the qualification of the units, the problems about "space" and analyses.

The curriculum lasted for 14 weeks. The discussions and sharing were conducted in the scope of the products. Studio process was realized as provision of design problem and design space, information collection via interviews and visual tools (examination on site and the provision of the examples via presentations), determination of spatial programming, analysis about the design (for design space and problem), design process (analysis, synthesis, evaluation). Figure 1 shows the actions of the students and instructors in design process in sub-parts of the programming and design processes (analysis, synthesis, evaluation)

Determination of Programming

The hospital was designed to be 20.917 m2 including circulation. The main areas included polyclinics, emergency, patient care units, operation room, intensive care unit, service spaces (laundry, kitchen and medical gas storage), managerial section and technical services (heating center). In the programming stage, to encourage the students to carry out research, motivate them and raise awareness, the concrete spatial program was formed in discussion with the students; the students were encouraged to undertake research for the program; they were accompanied in visits and they were supported in interviews. When the programming stage was completed, the students were able to find the answers to the following question: What will be designed? What will the functional, technical properties of the building/space be? What are the properties of design specific to a hospital?

In the analysis step in the design process, analyses were performed in relation to the design area. The analysis of the area effects the principal decisions in the design.

Characteristics of the Site Area

The design area is the centre of Konya city and area size is 10041 m2. There are residences and commercial units near the area. On the northeast axis of the site lies the main vehicle axis. Mass transport and main vehicle circulation flow on this route. In accessing the hospital, the movement of pedestrians and vehicles were analyzed; and in terms of function, the connections with the exterior space such as the emergency entrance, main hospital entrance, service entrance and morgue exit were analyzed in terms of pedestrian and vehicle flow. The direction of the site was analyzed considering hospital units. The direction of the units such as operation room, intensive care and laboratory are important in terms of utilization and commissioning. In addition, the dominant wind direction should be determined particularly for patient care units. In certain

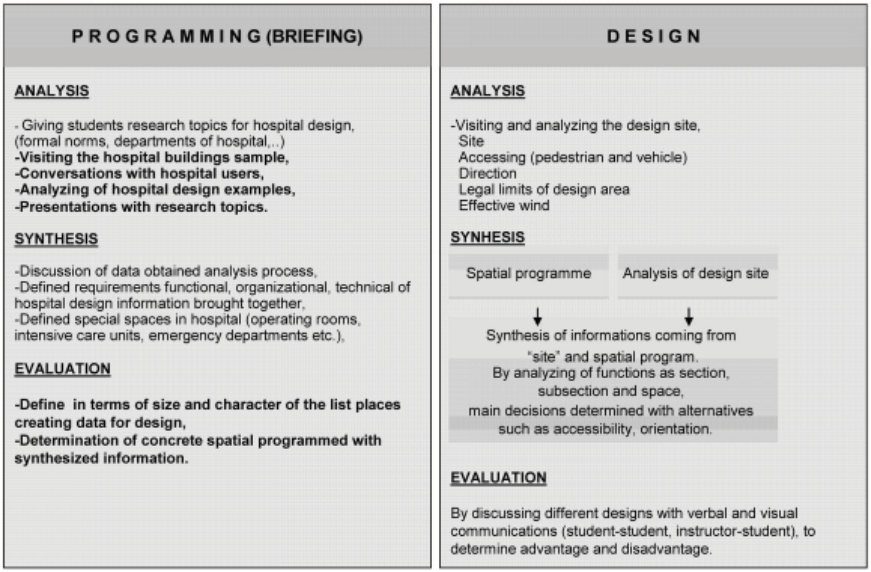

Figure 1: Steps of design and programming process in design studio. (Source: Authors).

climatic seasons, wind can cause problems in utilization. The building restrictions on the site were defined as "land area x 1/2" for the ground floor and "land area x 2.20" for the ground and upper floors. No limitation was specified for the building height. In the design, the distance from design area border to the main vehicle axis and other roads were important in defining the ground floor area.

At the stage of synthesis, the information collected for the spatial program and the analyses related with the land were integrated. Each student made their own analyses and presented them specifying their reasons for their analysis. In visual or oral presentations, positive and negative aspects were collectively discussed and the main decisions were taken. Thus, considering the site size, zoning status, dominant wind and the direction and the function of the building, synthesis process began. The fact that a hospital would be constructed on the chosen site required a rational discussion of the problems.

The evaluation process under the sub-parts of design process, involves the selection of the most advantageous alternatives from those suggested ones. When analyzed in terms of education, the evaluation process involves the evaluation of the designs by the students. Thus, the evaluation process involves analyzing and discussing the design products in a studio environment and talking about the rights and wrongs in line with the principles related to the design problem. In this process, the discussions between the studio executives in the studio environment lay the basis for enriching the

ideas of students concerning the design. The discussions allowed each student's project to present different views and determine possible alternatives Visual and oral criticisms of the projects enable the students to criticize their own work. Particularly, in the first weeks of the design, the students' solutions suggested for the hospital contained mistakes for example, (operating theatres, emergency rooms, the intensive care unit and the relationship between the sections Almost all the projects contained mistakes this required making the corrections and thus it was part of the learning process.. In such cases, visual and verbal explanatory information provided generally to the class by the project executives were effective. Thus, during the semester, studio course was supported with theoretical courses/ presentations based on the given design problem.

Parameters of hospital design problems for evaluation of students' projects;

—Solving functional – spatial organization (relationship between departments)
—Solutions relating to user action (entrances, accessible to departments)
—Conformity to the standards and legislation (size of space, especially operation room, intensive care and patient room)
—Richness indoor space – aesthetic (aesthetics concern, difference indoor space, especially waiting area and corridor, and façade)

Assessment through Examples of Student Projects

All of the students became successful and get through the next year. According to the grades of the students, medium, good and excellent grades were classified and excellent (12.5%; grade: 75 and above) and good (30%; grade: 65-74) design products were included to the study.

Successful and poor solutions in design are specified according to evolution criteria Standards for every student are showed in the tables (1-6) as different spaces. Aesthetic is to be given as an example of indoor space, façade and specific space. (See Appendix)

In architectural design education, design studios are the environments where how the design is taught and experienced. Prior to defining how design will be taught, what will be taught should be clearly determined. Each design experience provides the students with new acquisitions. In this context, the given design problem is important.

In Studio 7 prospective architects generally became successful in the design of hospital building with complex function. This experience raised awareness about access to information via thinking, provision of a new position for information in each concept.

In addition to the given design problem, the students acquired the ability to understand and deal with the problems, and solving the complexity in the spatial organization and functional relationships. In the design stage, the students found it difficult to solve some problems such as the functioning of the operating theatre and the relationships between the units. The problems were solved by in situ examinations, interviews with the users and the presentations of the project executives. Thus, in cases of deadlock, where the students were unable to produce solutions, leading the students contributed to the progress of the designs. In the

studio process, information exchange supported communication, which led the students to trust the instructor and created self-motivation in students with the feeling "I can do it". The fear of unknown in the students was overcome with positive communication.

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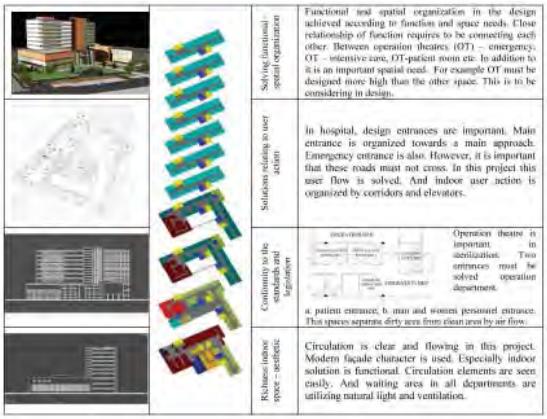
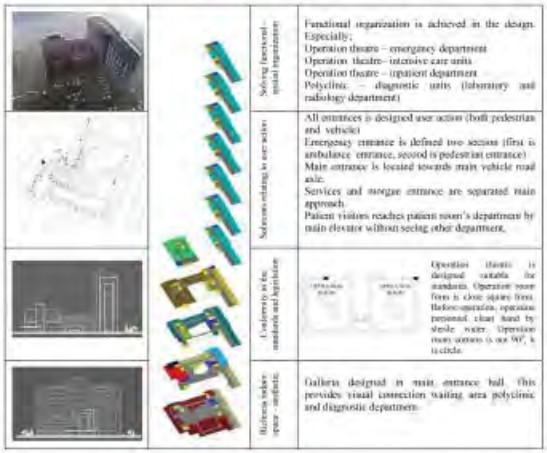


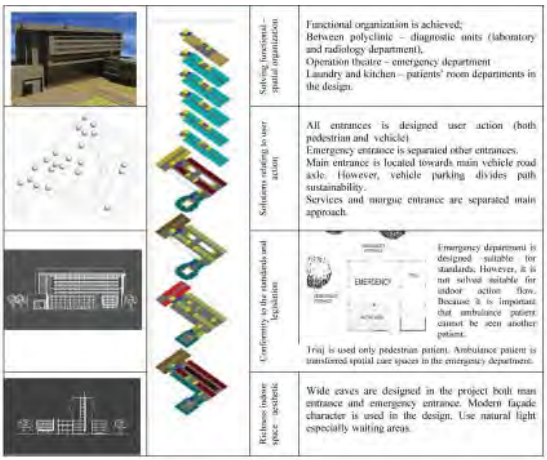
Solving functional – spatial organization	Functional and spatial organization in the design achieved according to function and space needs. Close relationship of function requires to be connecting each other. Between operation theatres (OT) – emergency, OT – intensive care, OT-patient room etc. In addition to it is an important spatial need. For example OT must be designed more high than the other space. This is to be considering in design.
Solutions relating to user action	In hospital, design entrances are important. Main entrance is organized towards a main approach. Emergency entrance is also. However, it is important that these roads must not cross. In this project this user flow is solved. And indoor user action is organized by corridors and elevators.
Conformity to the standards and legislation	Operation theatre is important in sterilization. Two entrances must be solved operation department. a. patient entrance, b. man and women personnel entrance. This spaces separate dirty area from clean area by air flow.
Richness indoor space – aesthetic	Circulation is clear and flowing in this project. Modern façade character is used. Especially indoor solution is functional. Circulation elements are seen easily. And waiting area in all departments are utilizing natural light and ventilation.

Table 1: Example 1 (student name Nihan Bulbul).
(Source: Authors).



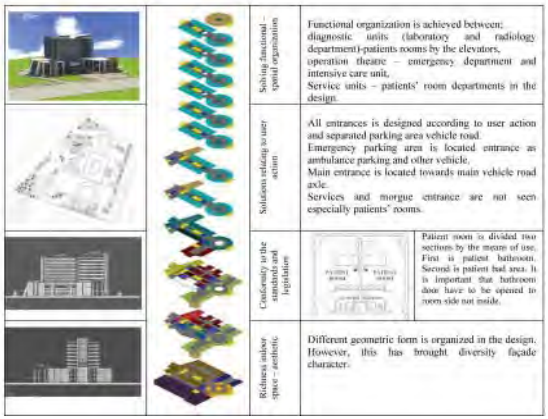
Solving functional – spatial organization	Functional organization is achieved in the design. Especially; Operation theatre – emergency department Operation theatre– intensive care units Operation theatre – inpatient department Polyclinic – diagnostic units (laboratory and radiology department)
Solutions relating to user action	All entrances is designed user action (both pedestrian and vehicle) Emergency entrance is defined two sections (first is ambulance entrance, second is pedestrian entrance) Main entrance is located towards main vehicle road axle. Services and morgue entrance are separated main approach. Patient visitors reaches patient room's department by main elevator without seeing other department.
Conformity to the standards and legislation	Operation theatre is designed suitable for standards. Operation room form is close square form. Before operation, operation personnel clean hand by sterile water. Operation room corners is not 90°, is circle.
Richness indoor space – aesthetic	Galleria designed in main entrance hall. This provides visual connection waiting area polyclinic and diagnostic department.

Table 2: Example 2 (student name Selim Yolcu).
(Source: Authors).



Solving functional – spatial organization	Functional organization is achieved; Between polyclinic – diagnostic units (laboratory and radiology department), Operation theatre – emergency department Laundry and kitchen – patients' room departments in the design.
Solutions relating to user action	All entrances is designed user action (both pedestrian and vehicle) Emergency entrance is separated other entrances. Main entrance is located towards main vehicle road axle. However, vehicle parking divides path sustainability. Services and morgue entrance are separated main approach.
Conformity to the standards and legislation	Emergency department is designed suitable for standards. However, it is not solved suitable for indoor action flow. Because it is important that ambulance patient cannot be seen another patient. Triaj is used only pedestrian patient. Ambulance patient is transferred spatial care spaces in the emergency department.
Richness indoor space – aesthetic	Wide eaves are designed in the project both main entrance and emergency entrance. Modern façade character is used in the design. Use natural light especially waiting areas.

Table 3: Example 3 (student name Musab Keskin).
(Source: Authors).



Solving functional – spatial organization	Functional organization is achieved between; diagnostic units (laboratory and radiology department)-patients rooms by the elevators, operation theatre – emergency department and intensive care unit, Service units – patients' room departments in the design.
Solutions relating to user action	All entrances is designed according to user action and separated parking area vehicle road. Emergency parking area is located entrance as ambulance parking and other vehicle. Main entrance is located towards main vehicle road axle. Services and morgue entrance are not seen especially patients' rooms.
Conformity to the standards and legislation	Patient room is divided two sections by the means of use. First is patient bathroom. Second is patient bed area. It is important that bathroom door have to be opened in room side not inside.
Richness indoor space – aesthetic	Different geometric form is organized in the design. However, this has brought diversity façade character.

Table 4: Example 4 (student name Fırat Polatdemir).
(Source: Authors).

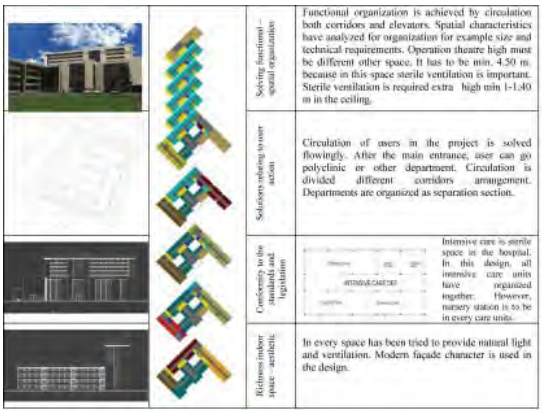


Table 5: Example 5 (student name Büşra Karagözoglu). (Source: Authors).

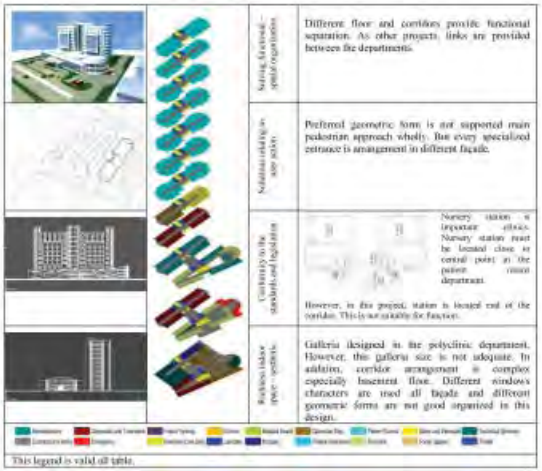


Table 6: Example 6 (student name Mucahit Ozcan). (Source: Authors).

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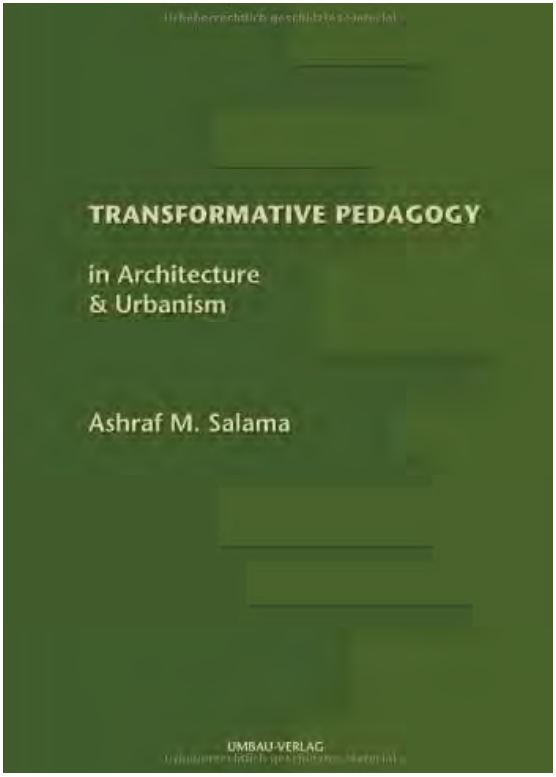
Special Volume: *Design Education: Explorations and Prospects for a Better Built Environment*
Ashraf M. Salama and Michael J. Crosbie (editors)

REVIEW OF ASHRAF SALAMA's BOOK: TRANSFORMATIVE PEDAGOGY IN ARCHITECTURE AND URBANISM

Publisher: UMBAU VERLAG, Paperback: 208 pages including illustrations,
Solingen, Germany 2009 ISBN 978-3937954-042

Amira Elnokaly



This is rather an interesting book on pedagogy in architectural and urban education by Ashraf M. Salama. Transformative Pedagogy in Architecture and Urbanism represents a new cycle of pedagogical debate on architecture and urbanism, setting the stage for debating future visions of transformative pedagogy and its impact on design education.

The ritualistic aspects of design education criticized in this book is culled from a wide spectrum of issues Salama has explored in his teaching and writing over a period of two decades. In the preface of the book, Professor Henry Sanoff, Distinguished Professor Emeritus of Architecture, North Carolina State University, NC, USA, describes Salama's book as "…an important book because it probes into the motivations of design educators by placing a mirror before them and allows for a critical examination of the design studio. Dr. Salama paves the way for design educators to openly discuss and debate the delivery system of architectural education and its impact on the future role of the architect…".

Review

AMIRA ELNOKALY, University of Lincoln, United Kingdom

Salama's Transformative Pedagogy in Architecture and Urbanism discusses balancing the creative act required for creating responsive environments and the social and environmental responsibilities that should be embedded in this act. This engaging book reviews the understanding of knowledge and the way in which it is produced and utilized, what the components of such knowledge are, and what are the learning processes and social practices that can be used to transmit it.

Being an architecture design educator myself I totally agree with Prof. Nikos A. Salingaros who presented the foreword for Dr. Salama's book stating that Salama's insights and experience is valuable for world architecture. Reading through the book, I can retain how extremely useful this book can be for architectural educators, students, as well as administrators worldwide. They can use this book to review and hopefully adapt and rethink today's architecture, which is defined by the fashion of the moment and start to seriously consider constraints imposed by culture, climate and materials. The work presented in this book can be used to optimistically adapt the present educational systems towards satisfying those requirements. When I first read Prof. Salingaros's preface, I noted that this is a must read book especially where he states, "…Contemporary architectural academia, however, is worried that the authority of science could impose absolute restraints on form, thus ending design creativity as we know it. That is a misconception. Science has much to teach architecture, and gives the average designer the ability to invent forms beyond the limits of current knowledge… these new technologies have never been applied in a way so as to break out of the confining boundaries of the institution, class, or teacher's limitations."

The book boldly reviews the typical tutor's subjective hidden agendas within architectural education and more precisely the design studio teaching. It challenges some of today's architecture studios that are dominated by subjective, elitist, ideological, and master-apprentice models that aggrandize invention over innovation and radical individualism over collaborative processes and societal needs.

Transformative Pedagogy in Architecture and Urbanism is divided into five chapters, presenting a wide range of innovative and practical methodologies for teaching architectural and urban design. It tracks the roots of architectural education and offers several contrasting ideas and strategies of design teaching practices. These chapters feature •A New Theory for Transformative Pedagogy in Architecture and Urbanism; •The Architect, the Profession, and Society; •The Conventional Approach to Studio Teaching Practice; •Against the Conventional Studio Pedagogy; •Empowering Transformative Pedagogy: A Knowledge-Based Architectural and Urban Design Studio.

Transformative Pedagogy in Architecture and Urbanism by Ashraf M. Salama is a requisite working resource for studio tutors and lecturers and all those concerned with design education. It is also an excellent resource for policy makers or students of those disciplines.

Having read both editions of this book, I can conclude that it is a classical piece. In this latest contribution, Salama has successfully managed to keep it up to date, which is not easy in today's fast changing world. Presenting different models, cases, and experiments, the book calls for expanding the knowledge base in the architectural design studio. It proposes a spectrum of supporting techniques that can be

regarded as a new paradigm in teaching design while delineating the shift and the transition of design pedagogy that is needed toward responsive architectural and urban education.

The introduction to this book, A New Round of Pedagogical Discourse in Architecture and Urbanism, starts with a conspicuous quote of Thomas Fisher, "To remain silent about the values represented in what we do, either out of mistaken belief that professionals must remain ethically neutral or out of romantic dismissal of all normative values, is to eliminate one of the main reasons for the profession's very existence." (Thomas Fisher, 2006: 30). This is an inspiring quote that Salama has decided to start his book with, and reflects upon the content, myths and discourses articulated, adopted, and presented in this book.

In Chapter 1, A New Theory for Transformative Pedagogy in Architecture and Urbanism, Salama starts by debating the reasons behind the introduction of a new theory and answers the question Why Introduce a New Theory? This chapter is divided into a number of sections where Salama scrutinizes the current policies on studio culture. He also presents some alarming figures on studio teaching practices later in the chapter. Extracting conclusions from these discussions, he takes us into the negative impacts of the current culture of architectural education and the shift in studio culture from the mechanistic pedagogy to the systemic. He concludes this interesting chapter that is full of challenge with strategic accommodation of the theory presented at the beginning of his book.

Chapter 2, The Architect, the Profession, and Society, starts with shedding the light on the significant changes that occurred to the architectural profession during the past thirty years, in response to the change in the environmental needs of society resulting from population growth, increased urbanization, and advanced technology, the emergence of aging societies, and environmental concerns. Salama avows to present a new view of the role of the architect in society in order to be able to define the impact of this role on the needs of architectural education and design studio teaching practices. He follows this interesting debate depicting the architects' view of the profession, and how and in what ways they have changed since the 1980s. He then presents some interesting studies of mainstream and star architects. Before he ends the chapter, he offers a review of post occupancy evaluation and user participation as important paradigms that should be included in the education process of architecture and urbanism.

In Chapter 3, Salama discusses The Conventional Approach to Studio Teaching Practice its Roots, Origin, Evolution and its Educational System. This is followed by a detailed analysis of the conventional approach to studio teaching where he disputes the Impacts of and Challenges to the Conventional Approach. He then presents a holistic world-class survey of architectural design teaching practices, policies and admissions. He concludes by regional explorations of Africa and the Middle East sustainability issues in the curriculum and the required content of knowledge. A thorough investigation of the impact of international paradigmatic trends on Arab architectural education is also presented to highlight contextual particularities of education and pedagogy in that part of the world.

AMIRA ELNOKALY, University of Lincoln, United Kingdom

Against the Conventional Studio Pedagogy, Chapter 4 examines the variations in design teaching practices. Salama made his main objective in this chapter to identity different teaching styles that can provide insights toward the teaching methods of the conventional studios. He puts emphasis on several revolutionary models that have been developed and employed by different studio instructors worldwide, who attempt to expand the role of the architect to be more responsive to the environmental needs of contemporary societies, which emerged as a reaction to the dominance of the conventional approach to studio teaching. This chapter is structured in three sections. The first offers a systematic critical analysis of ten models of teaching architectural design described in terms of how each model views architectural and urban design as a mental, physical, and professional activity; how they employ a specific studio process, and how they adopt and adapt different modes of teaching and learning. The second section discusses these models highlighting commonalities and differences shaping studio processes and teaching and learning styles. The third section articulates and discusses Salama's personal reactions to the conventional studio teaching pedagogy by introducing a process oriented design studio teaching model.

The last chapter of this book Chapter 5, Empowering Transformative Pedagogy: A Knowledge-Based Architectural and Urban Design Studio, presents a summary of issues discussed in the book. It provides a critical synthesis of design studio pedagogy and articulates an approach for expanding design studio contents, methods, and outcomes. The approach aims at empowering transformative pedagogy in architecture and urbanism by establishing several constituents, scenarios, and techniques that help integrate an architect's creativity and his/her social responsibility by bridging the gap between research/knowledge and design. Salama's work emphasizes that the discourse on transformative pedagogy in architecture and urbanism asserts that the mission of a school of architecture or an urban design program should foster an environment that encourages exploration and critical thinking. The discussion throughout this chapter asserts that inquiry and investigation are now viewed as activities central to studio pedagogy in architecture design and urbanism, as a consequence advocating the true integration of research into teaching and knowledge into design.

Undoubtedly this is rather a proficient book, an original and genuine effort that addresses academics, practitioners, graduate students, and professional associations that make decisions about education. As a new round of pedagogical dialogue on architecture and urbanism, it resets the stage for debating aspects, rituals, and future visions of transformative pedagogy and their impact on design professions. While capturing the body of knowledge required for seeking this new form of pedagogy, the book introduces student-centered educational processes based on actual experiences that could ultimately transform this knowledge into guiding pedagogical principles and teaching practices toward a more responsive pedagogy in architecture and urbanism. I strongly recommend this book to my educator colleagues and students worldwide.