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THE EMERITUS FOUNDATION

1614 20th Street, N.W., Washington, D.C. 20009 ■ (202) 232-0863

INFORMATION PACKET

The Feedback Is Good

Given the young ages of the children involved in this pilot program, the true test of the program's success—how many of the children become stimulated to pursue scientific or technical fields as career choices—will be a long time in coming. But other signs are more immediately obvious: the interest taken by the children in the science and mathematics curricula of their schools, their enthusiasm for the Emeritus program, their general attitude toward learning. Through interviews with classroom teachers and the children themselves, data is compiled to measure the impact of the program on the students. At the same time, the value of the program to the participating emeritus scientists and engineers is similarly measured. Do the participants find the program stimulating, worthwhile and fun?

The Emeritus Scientists, Mathematicians and Engineers Program

The Emeritus Foundation is a Washington-based non-profit organization that develops programs of community service for retired professionals. The Foundation has run programs for emeritus social workers and emeritus accountants, among others. One of the Foundation's programs, the Emeritus Teachers Project, which brings retired teachers back into the classroom to tutor children who are having trouble learning to read, has been operating in the District of Columbia public school system for ten years.

For More Information

If you are interested in participating in the program, or if you want more information, call the project director, Dr. Harold I. Sharlin, at (202) 966-2122, or write to:

The Emeritus Foundation
1614 20th Street, N.W.
Washington, D.C. 20009



THE EMERITUS FOUNDATION
1614 20th Street, N.W.
Washington, D.C. 20009
(202) 966-2122

THE EMERITUS SCIENTISTS MATHEMATICIANS AND ENGINEERS PROGRAM



The Emeritus Foundation



The Emeritus Program Fills a Need

The Washington, D.C. area is home to many of the nation's leading government and private scientific laboratories. At the same time public school students in the District of Columbia regularly fail to live up to early indications of scientific and mathematical talent. The purpose of the Emeritus Scientists, Mathematicians and Engineers Program is to bring retired scientists, mathematicians and engineers into the classroom to introduce D.C. school children to career opportunities in scientific and technical fields.

The Potential is Great

Statistics show that D.C. public school students place well above the national average in mathematics and science in the third grade—the 64th percentile in mathematics and the 60th percentile in science—but drop down rapidly thereafter. Eleventh graders test at the 39th percentile in both subjects.

Motivation to pursue scientific and mathematical subjects is often lacking because of the limited exposure of many of these children to career possibilities in scientific and technical fields. By creating opportunities for D.C. school children to see for themselves, at an early age, the wide variety of working-day activities in which scientists, engineers and technically-trained people are involved, the program aims to stimulate them to learn the mathematical and scientific skills needed to pursue careers in these fields.

Professionals are Ready and Willing

Many people who have had long and distinguished careers in scientific fields find that retirement has brought an unaccustomed surplus of free time. Through participation in the Emeritus Scientists, Mathematicians and Engineers Program, these scientists and engineers have an opportunity to use their skills and experience to stimulate young people to follow career paths like their own.

The Schools Are Enthusiastic

The Emeritus Scientists, Mathematicians and Engineers program has the full and enthusiastic backing of the District of Columbia Public School System, from the Superintendent and principals to the classroom teachers. In its first year of operation—the 1989-1990 school year—7 emeritus scientists and engineers worked with children from the fourth through the eighth grades in two schools in Northeast Washington, Bunker Hill Elementary and Taft Junior High. Since then the program has expanded to schools throughout the District, from far Northwest to Anacostia in the Southeast, involving a large and growing cadre of emeritus scientists and engineers. The program hopes eventually to reach every school in the District and to expand to other schools in the Washington Metropolitan area and across the nation.

What makes the program so successful is the sustained involvement of individual scientists and engineers with particular classrooms. The students and the classroom teacher get to know the scientist or engineer, learn about his or her career and field of specialty, and visit a facility where that kind of work is being done. Simple hands-on experiments in the classroom are related to large-scale scientific and industrial enterprises. For example an electrical engineer shows fourth graders how electricity can be generated using magnets and wires, and then takes the class to an electric generating station. A nuclear physicist shows his sixth grade students how to read x-rays

and takes the class to the nuclear medicine facility of a local hospital. An aeronautical engineer suspends paper planes built by his fifth graders in a makeshift wind tunnel made with a table fan and then takes the class to the Goddard Space Center. The students, and their classroom teacher, get to see how the scientific and mathematical skills they are learning are used by working scientists and engineers in their everyday activities.

The Program Design Works

Each emeritus scientist and engineer commits to at least one "unit" of the program. A unit consists of six class hours, typically one class hour each week over a six week period. During a unit the scientist or engineer works with a particular class in one of the participating schools. He or she will plan the program with the classroom teacher and will meet with the students at least once each week. At the end of the unit the scientist or engineer will arrange a field trip for the entire class to an appropriate laboratory or facility, often the one at which the scientist or engineer worked. On the completion of a unit, the emeritus scientist or engineer may sign up for another unit at the same or a different school. Most of the scientists and engineers, having experienced the excitement of sharing their skills and experiences with eager young students, are ready to take on another round.

Careful Preparation is the Key

All participating emeritus scientists and engineers take part in an orientation session to acquaint them with the developmental level of the children they will be working with and the scientific and mathematical skills the children have already learned. They then meet with the classroom teacher and the science or mathematics resource teacher to plan their presentation so that their effort will dovetail with the school's established curriculum. Participating schools have a wide range of existing scientific and mathematical learning programs that the Emeritus program supplements rather than replaces.

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The Emeritus Scientists, Mathematicians and Engineers Program



A Guide for Prospective Emeriti



The Emeritus Foundation

Seniorlines

Information for our senior customers

Vol. 3, No. 1

Spring 1990

Fostering a Unique Partnership: The Emeritus Foundation

Quietly, the class of fourth, fifth and sixth graders from Bunker Hill Elementary School in Northeast Washington filed into the conference room at Pepco's Chalk Point Generating Station. Their attentive, curious faces sparkled with excitement about the impending tour of the power plant in southern Prince George's County.

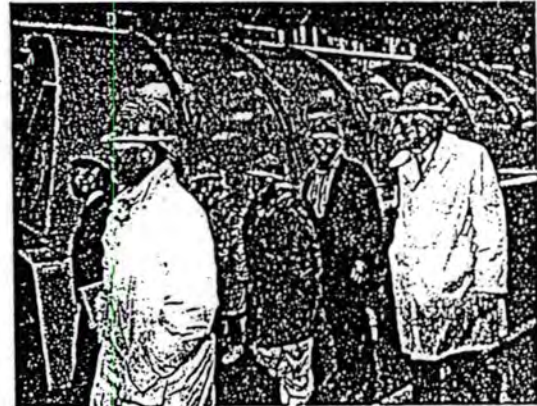
But among the group, one older face beamed just as brightly, unable to contain his child-like pleasure over this group of students and the learning they were about to experience.

Retired engineer Harold Sharlin is pleased every time he visits with these students. And his feelings spill over into his voice when he talks about his connection to these students through his pet project, the Emeritus Scientists, Mathematicians and Engineers Program.

Begun in 1988, this project recruits retired engineers and scientists willing to volunteer and forge partnerships with local schools so that school-children receive greater exposure to the wonders of the world of science. (See box for more details.) Each week every volunteer works with as many classes as he or she can, teaching students that science can be fun. Some of the volunteers take their students on field trips, as was the case this winter's day at Chalk Point.

As they took their seats in the plant's conference room, the group was greeted by Ed Seyfried, Pepco's training and safety supervisor, and Donnie Williams, manager of training and safety. Seyfried talked for a few minutes about the plant.

"Do you know how much electricity this plant generates?" he asked the students. "Two thousand forty-five megawatts. That's enough power to light



Students and Sharlin get a first-hand glimpse at one of Pepco's generators. This turbine is one of four Pepco has at its Chalk Point power plant.

1 million light bulbs. That's an awful lot. Anybody care to guess how many games of Nintendo [a children's video game] that equals?" The children laughed. If there had been any doubt before then, at that point Seyfried knew he had their interest.

After talking about the different functions of the plant, and briefly describing its layout, the children eagerly put on their hardhats and safety glasses.

"I feel like a construction worker," said one boy, adjusting his hat.

"No, you look like an engineer," countered Sharlin.

Their first stop outdoors was a look at what the plant workers call the Dravo (dray-vo), or the conveyor belt that transports the coal from the coal yard into the plant. As the group paused, a train fresh from a new coal delivery slowly chugged past, its conductor offering a friendly wave.

The group went inside one of the plant's four cooling towers, where water used to create the steam that turns Pepco's electric generating turbines is cooled to normal temperature before being reused by the plant. The spray from the cooling water was constant, and the sound of pulsing water could be heard. "Man, it sure is loud in here," one girl exclaimed.

Seyfried's next stop for the students was inside one of the plant's smoke stacks, which was not operating at the time.

"They'll like this," predicted a grinning Sharlin, as he helped open the heavy door to the stack.

As the group peered up toward the top of the stack, the children remarked about its great height. "I can't believe it's so high," said one.

Now in the Control Room, Seyfried told the stu-



Harold Sharlin, project director of the Emeritus Scientists, Mathematicians and Engineers Program, helps a student from D.C.'s Bunker Hill Elementary School adjust his hat for a tour of Pepco's Chalk Point Generating Station.

"See this television screen?" he asked them, pointing to a screen in the center of the wall. "That's how we can see the fire in the boiler."

"You remember — the boiler is what heats the water that turns the generator," added Sharlin.

"How do you get a camera in there when it's so hot?" all the children wanted to know.

"We have special tubes that the camera rests inside of that protect it from the heat," explained Seyfried.

Williams pointed out the special red phone that the control room has to the dispatchers at Pepco's control center. The dispatchers monitor and direct the flow of electricity and match the supply of power with demand. They tell the operators at Chalk Point how much power is needed from the Chalk Point units.

"It's kind of like the red phone that President Bush has to the Pentagon," Williams offered.

The final part of the walking tour required wearing ear plugs, which delighted the children. Sharlin patiently demonstrated how to insert the devices for a few of the boys, and the group strolled off to see a boiler and generator in action.

Because of the great noise, the children's comments were few, but their faces easily communicated their excitement about seeing in person the equipment they had heard so much about from Sharlin.

Back in the conference room, Seyfried and Williams talked about some of the jobs at the plant, such as coal and ash operators. "They handle the coal from the time it arrives at the plant and make sure it gets into the building properly. They also handle disposal of the coal ash," said Seyfried.

"You could be an engineer, like Carlos here," said Williams, pointing to one of the plant engineers who came along on the tour. "Like Dr. Sharlin has probably told you, there are many different kinds of engineers — mechanical, electrical. Carlos is a mechanical engineer. We have a lot of engineers at Pepco."

The tour came to a finish after the children asked a few more questions, and they heartily thanked Seyfried and Williams for the experience.

"That was neat," one girl said as they tramped out to the schoolbus. "I wonder if we can come back someday."

Sharlin, project director of the program that brought the children there, quietly smiled. Perhaps he was hoping she would come back some day — as an engineer. ■

The Emeritus Scientists, Mathematicians and Engineers Program, in the words of its director, is "helping students connect their schoolwork with professionalism."

That's the mission of this Washington-based non-profit project that brings retired engineers into District of Columbia public schools in order to positively affect schoolchildren's attitudes and perceptions about science.

According to Harold Sharlin, project director, the difference between the project's educational focus and that of others is the direct contact its volunteers have with children. "We're in with them in the classroom, teaching the students ourselves," he stresses. "It's so much more effective than just providing the teacher with some literature," because the volunteers actually teach the class, usually twice a week for a few hours at a time.

Currently, the project is associated with four District public schools. They are: Bunker Hill Elementary, Taft Junior High School, John Eaton Elementary, and Hearst Elementary schools. Sharlin dreams of expanding the program city-wide someday, but lacks enough volunteers to meet present demand.

If you are a retired engineer, or know someone who is and who might be interested, call Dr. Sharlin at 202/966-2122. He'd be glad to bring you on board. ■

AFCEA EDUCATIONAL FOUNDATION

RAdm. W. J. Holland, Jr., USN (Ret.), President
AFCEA Educational Foundation
Phyllis R. Lau, Administrator, Scholarships and Awards Program



Dr. Stephen J. Andriole, a George Mason Institute professor of information technology, is the 1990 AFCEA Educational Foundation Award winner.

The AFCEA Educational Foundation Award

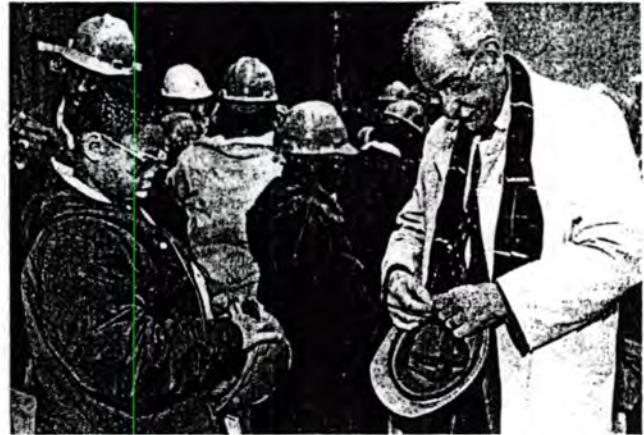
Dr. Stephen J. Andriole, a noted authority and pioneer in the application of computers to command, control, communications, computers and intelligence, was presented the 1990 AFCEA Educational Foundation Award for Distinguished Service to Education at the AFCEA International Convention and Exposition in June. Currently a George Mason Institute professor of information technology, Dr. Andriole has served as chairman of the department of information systems and systems engineering at George Mason University, Fairfax, Virginia. He also has been a course coordinator and instructor in AFCEA's Professional Development Center for a number of years.

For nearly 20 years, Dr. Andriole has participated in all phases of the systems analysis, design and development process, especially the application of advanced information technology. He has served as the director of the Defense Advanced Research Projects Agency's (DARPA's) cybernetics technology office, and while at the agency, he oversaw research in applied artificial intelligence, decision aids and support systems for command and control, intelligent computer-assisted instruction, data base management and advanced man-machine interface technology.

Dr. Andriole has authored, co-authored, edited and co-edited more than 20 books and numerous articles, book chapters and technical reports. He recently has completed a new book for AFCEA International Press, *Information System Design Principles for the 90s: Getting It Right!*.

Scientific Education Program

An effort in Washington, D.C., the Emeritus Scientists, Mathematicians and Engineers (ESME) program, brings retired scientists, mathematicians and engineers into the classrooms to introduce school children to career opportunities in scientific and technical fields. The Washington, D.C., area is home to many of the nation's leading government and private scientific laboratories, but at the



Dr. Harold I. Sharlin (r), founder and director of the Emeritus Scientists, Mathematicians and Engineers program, helps Shawn Davis (l) of Bunker Hill Elementary School, Washington, D.C., adjust his hard hat during a tour of Potomac Electric Power Company's Chalk Point Generating Station.

same time, public school students in Washington, D.C., regularly fail to live up to early indications of scientific and mathematical talent. The ESME program, created and headed by Dr. Harold I. Sharlin, project director, started at two public schools in Washington in September 1989 and expanded to four this year.

The ESME program's emeritus professionals volunteer to forge partnerships between schools and scientific laboratories to improve education in science and technology. Each participating professional commits to at least one unit (six weeks), during which each works with a particular class in an area of scientific specialization. The volunteer meets with the students in the classroom for at least two hours each week and arranges a field visit to an appropriate laboratory, so that the students have an opportunity to see professional people using scientific instruments and mathematical skills to solve complex problems. The emeritus scientists and engineers are the guides during these visits, and they act as mentors to individual students who express further interest in particular areas.

Anyone interested in participating in the ESME program or getting more information may call Dr. Harold I. Sharlin, at (202) 966-2122, or write to The Emeritus Foundation, 1614 20th Street, N.W., Washington, D.C. 20009.

The AFCEA Educational Foundation is a nonprofit educational organization under Section 501(c)(3) of the Internal Revenue Code of 1954. All donated funds are used for scholarships and awards; none pay for administrative or operating costs of the program. Send your contributions to The AFCEA Educational Foundation, 4400 Fair Lakes Court, Fairfax, Virginia 22033-3899.

ASEE PRISM

January 1992

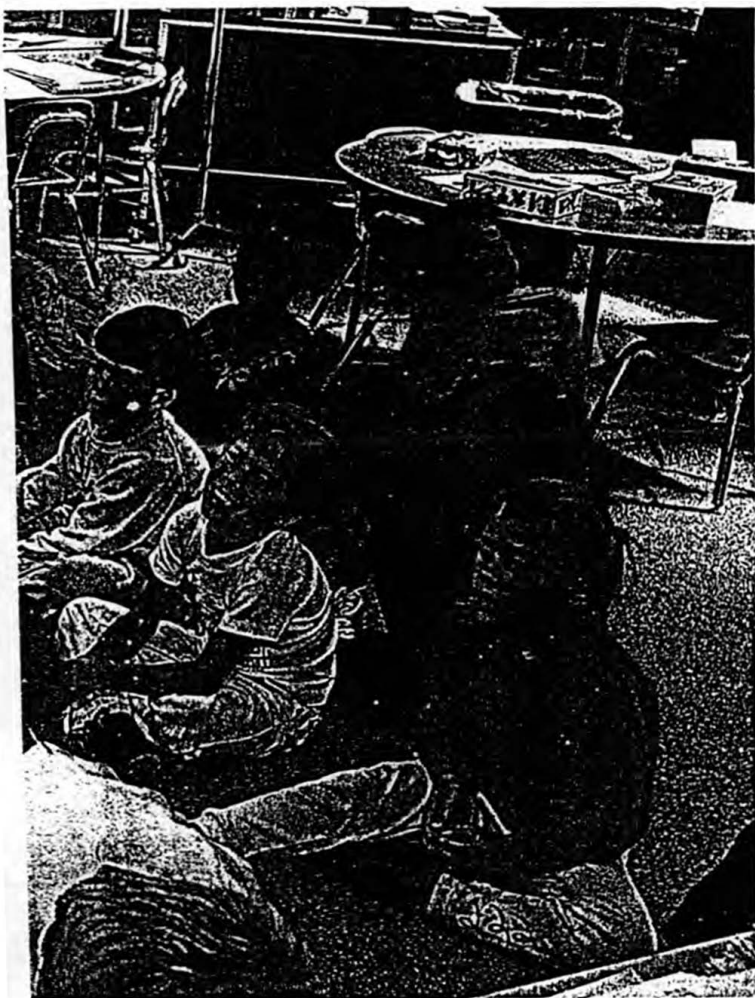
Precollege: Getting Involved
Primary

*Bringing science
and mathematics
into the primary
grades is not
mere child's play.*



Far From Elementary

By Jeff Meade



Dick Crouse, a retired electrical engineer and former Marine pilot who once flew Panther fighter jets, is winging his way through unfamiliar territory. After 40 years with General Electric, where he helped NASA manage its Landsat program, the big engineer is sitting on a little chair, surrounded by wide-eyed first graders. All are asking perfectly sensible and yet wholly exasperating questions.

"If the Earth is going around so fast, how come we don't feel it?"

"What makes a tornado turn?"

"How do fireworks work?"

Crouse is spending an afternoon at the John Eaton School in Washington, D.C., as a volunteer from Emeritus Scientists, Mathematicians and Engineers (*see box, next page*). The emeritus program is one response to a growing

concern over the state of precollege science and mathematics instruction. This concern has given rise to many efforts, large and small, to bolster the curriculum.

In a few instances, engineers are taking matters into their own hands. The fledgling Engineers for Education, for example, hopes to enlist the aid of 100,000 engineers across the country to work as mentors in the classroom. Engineering and science societies have not been idle in the battle against math and science ignorance, and a number of them have endorsed the Engineering for Education program. One of the most ambitious efforts to put engineers in elementary schools is *A World in Motion*, a nationwide program of the Society for Automotive Engineers that teams working engineers—from corporate sponsors—with teachers in the classroom. The American Association for the Advancement of Science launched a long-term math and science curriculum revision effort—Project 2061—whose goal is a completely revamped education system. Other associations, the Institute of Electrical and Electronics Engineers and the American Electronics Association among them, are working

on aspects of the problem.

Few major corporations have not become involved. Kodak, IBM, and Digital, among many others, have launched local and national efforts. The Rockwell Corporation has established an educational joint venture with the California State University system to provide teaching certification for retired Rockwell engineers. On a government level, the National Science Foundation and the Energy Department are shouldering much of the responsibility and receiving much of the funding for federal math and science education initiatives.

As helpful as the many programs are, efforts to improve math and science in the elementary schools have been scattered. This is worrisome for engineering, which looks to today's primary and secondary school students for its very future. It is equally troubling to a nation that hopes its students will gain the global lead in science and math achievement by the year 2000.

From kindergarten through sixth grade, children still retain much of the wonder with which they were equipped when they came into the world. But they lose it fast. According

ABCs of Electricity



"Remember four words," Dick Crouse solemnly intones. "Pressure. Electron. Wave. Magnetism."

Several small heads in Margaret Delorme's first grade class (above) at the John Eaton School nod up and down. Though the oldest of the bunch is all of seven years old, they are about to receive their first comprehensive lesson on the nature of electricity.

Crouse gives each one a pebble. The children stare at the smooth little stones in their hands, as if presented with a great treasure. "Now let's turn on our imaginations," he instructs. "Let's pretend the stone is an electron. Now this half of the class, move your electron up and down slowly. Now, this side of the class, move yours up and down faster." There are giggles, and more than a few clicks, as stray electrons bounce into each other.

For Dick Crouse, it is only the second of what he expects will be six visits to the John Eaton School. But already, the soft-spoken man in the black-framed glasses is a hit. One of the kids calls him "Grandpa." He is not displeased.

That warm interplay is precisely what Harold Sharlin had in mind when, in 1988, he started the Emeritus Scientists, Mathematicians and Engineers Program. The organization is an offshoot of the long-established Emeritus Foundation, which provides retired professionals in other fields—such as accounting and social work—to the Washington, D.C., public schools. An electrical engineer and an historian who has taught the history of science and technology at Iowa State University, Sharlin now works as a consultant. Long concerned

about declining math and science test scores in the public schools, he came up with the idea of putting his years of experience into the classroom.

Sharlin began recruiting mathematicians, engineers, and scientists—some retired, some not—and in September 1989, the program started in two public schools in Washington's troubled northeast region. Volunteers team up with willing teachers, who offer suggestions on what kind of lessons might be most appropriate.

Some of those volunteers have impressive credentials. Yet in spite of all their experience, going into a classroom is a bit daunting for most. Sharlin recalls the worry in the voice of Dr. Samuel Zweifel, former personal physician to Henry Kissinger, when he learned he was soon to teach third graders. "He said, 'Harold, what do I tell them? What do I say?' I tell the volunteers to be themselves, to draw on their experience. I urge them to be autobiographical. They are all living examples of what those kids can do."

This year, the program is in six public schools, and Sharlin hopes to recruit more volunteers—and raise more money—to branch out. Among the early corporate supporters was the General Electric Foundation, which contributed \$29,000 for a portable environmental science lab.

It's all a lot of work, but, says Sharlin, the stakes are high. Everything is riding on the ability of this generation of children to learn and put to use all the tools that science and technology have to offer. "It's like I tell my students," he says. "Do you want to spend your lives working at McDonald's? Or McDonnell Douglas?"

to a national survey conducted for the National Science Foundation, interest in science drops about 10 percent between third and eleventh grades. Students' interest in math drops 45 percent between the two grades.

Black and Hispanic students are tar-

less likely than whites to like science and mathematics, at all levels. And although girls start out about even with boys in their interest in science and math, by grade 7, the NSF survey reports, their interest is waning. The reasons for these drops are many: teacher training and

commitment, availability of materials, the historical emphasis on rote learning, and a lack of commitment on the part of the states.

Science receives relatively little attention in elementary schools, and 27 minutes a day, on average, is devoted to

North Carolina researcher Iris Weiss, author of the *Science and Mathematics Education Briefing Book* published by Horizon Research. Part of the problem, Weiss suggests, is that teachers don't know how to teach these subjects. Another problem, she adds, is far more simple: Batteries, electric motors, microscopes, and dissecting kits all cost money. "Every science teacher I have ever known has always bought equipment out of pocket," she says.

Not all science "equipment" is expensive, notes Cindy Greenwood, an electrical engineer and assistant professor of computer technology at Nashville State Technical Institute. As a volunteer in her daughter's school, she taught preschoolers about the difference between solids, liquids, and gases by placing an ice cube on a hot plate. "In elementary school, kids don't need to be exposed to expensive equipment, as long as they can do hands-on stuff," Greenwood says.

Math could be taught in much the same way, but it usually isn't. Elementary school teachers devote about 43 minutes a day to math, Iris Weiss says. However, most teachers are teaching arithmetic, and little more. "Most don't teach up to the standards of the National Council of Teachers of Mathematics."

Those standards, as applied to kindergarten through grade four, would take children well beyond simple arithmetic and into such concepts as estimation, geometry and spatial sense, measurement, and statistics and probability. They also emphasize the use of "manipulatives"—blocks, beads, and other objects—and real-life problems.

Computers are also recommended as useful tools, but the use of these devices is spotty. "Virtually every school in the country has at least some computers for some purposes," says Linda Roberts, a project director at the Office of Technology Assessment. However, "there is an awful lot of variation on how widely available they are and what they're used for," she says. "In many cases, schools are using the new equipment but in inefficient ways."

Finally, even if teachers would like to teach more science, or to teach math-

ematics more completely, there usually is little incentive for them to do so.

Wilma Snell, a preschool teacher who developed an elementary school engineering science kit in conjunction with the Southern Illinois University at Edwardsville engineering school, says her home state requires 29 minutes of science instruction a day. "I've found that kids were doing well to get 29 minutes a week."

With a \$10,000 grant from the university, and the endorsement of the engineering and education schools, she, her husband, Luke, chairman and professor of construction, and Robert Williams, a professor of science education, worked on the kits with a team of students at SIUE. The kits lead students through a number of mathematical and scientific exercises, culminating in the construction of various projects, such as a clay arch, wooden replicas of Indian dwellings, wooden trusses, and concrete beams. So far, a public school sixth grade, two public gifted classes, and a private school class have used the kits.

For Luke Snell, the marriage of engineering and education makes intuitive sense. Engineers have a lot to offer schoolchildren, he says, but they aren't always comfortable with that age group. On the other hand, schoolteachers are wonderfully skilled in dealing with children, but wary of math and science. Each profession has something to offer the other.

From Snell's perspective, the earlier the intervention, the better. While most of his personal experience with the elementary school program has been in the fifth and sixth grades, he recently took a simplified version of the engineering kit into a second grade class. "The children were very, very responsive. They had many good questions."

Snell finds that curiosity gratifying, and he wishes more engineering faculty could share the experience. The current system of academic rewards does not recognize this kind of activity as important, he says, though he sees that attitude beginning to change. But there is another reason why engineers may be scared off: The needs are enormous. "The problem is so vast and so broad that I could soon

be involved in research that takes me miles away from concrete and construction into the more technical areas of education," Snell says. "That may or may not be a good thing."

Lewis Branscomb is Albert Pratt Public Service Professor in the John F. Kennedy School of Government and former chairman of the Carnegie Commission on Science, Technology, and Government (see *Hill Highlights*, page 13). He says he was amazed to hear a story recently about a fourth grade class that was confronted with an odd mathematical problem.

"The problem goes like this," he says. "There is a flock of 125 sheep, and they are watched over by five shepherds and one shepherd. How old is the shepherd? Three-quarters of the fourth graders gave a numerical solution. That kind of experience can be verified over and over."

In spite of such stories, Branscomb believes the problem of elementary math and science can be solved. "One of the things engineering professionals can do is to participate, or make sure their society strongly supports efforts to work on curriculum and teaching materials development," he says. "The second thing, particularly among academics, is to take an active interest in how elementary school teachers are trained."

To that end, Branscomb recommends that engineering schools offer their knowledge and assistance to education schools. Of course, engineers will first need to know more about the problems teachers face. "Go to the schools of education. Ask them to put on seminars for the engineering faculty to give them a deeper understanding of kindergarten through sixth grade," he says.

Finally, like Dick Crouse, they can move beyond concern and into the classroom itself. Crouse believes strongly that an involved professional can make a profound difference. He chose a career in engineering in large part because of a Westinghouse demonstration he saw in his school back in 1946.

Jeff Meade is senior writer/editor of ASEE PRISM.

PRIME TIMES

Quarterly member magazine of NARCUP, Inc.

Also featuring PrimeLine Bulletin

Intergenerational Volunteering

Bringing younger and older people together has generated immense benefits for both—in schools, nursing homes, daycare, and community centers across the country.

After 25 years of teaching graduate science courses at the university level, Professor Harold Sharlin was nervous. He was about to face the most dreaded class of all, and his hands were sweaty and shaking. Professor Sharlin, who holds a Ph.D. in the history of science and technology, was armed with lecture notes, laboratory equipment, and printed handouts. But would they be enough, or would the class demand more? The professor swallowed, took a deep breath, opened the door, and prepared to do battle with the nemesis of many a teacher: 27 bored fourth graders.

Dr. Sharlin, as "his" kids call him, is director of the Emeritus Scientists, Mathematicians and Engineers Program, in Washington, D.C. And although he holds many professional and honorary titles, as a retiree his favorite is "intergenerational volunteer," or IgV.

Although Sharlin is an emeritus professor, IgVs come from all walks of life and educational backgrounds. They are retirees who have amassed a lifetime of experience, with skills ranging from knitting and lace-making to music, reading, and science. They are amateurs and professionals, musicians, homemakers, and storytellers; they provide a patient ear for children's woes and wise, gentle counsel for distraught teenagers. They help build students' language skills with Scrabble games, cuddle first graders as they stumble through reading books, and share parenting skills with pregnant 14-year-olds. They take their paychecks in hugs and shy gratitude—and the deposits go straight to the heart.

There is a need for these IgVs as never before. Educators and volunteer coordinators point to an upcoming crisis that may tear apart the fabric of this country—one that could be averted with the help of America's talented, experienced retirees. That threat comes from a lack of classroom exposure to the sciences, a lack of teacher time to work

Kris Aaron is a freelance writer from Cambridge, Wisconsin.

by Kris Aaron

with individual students who are having problems with the basics of math and reading, and a lack of parental involvement in families where single mothers or even both parents must hold two jobs to keep the family together. The potential crisis of undereducated and neglected children is also due in part to the loss of intergenerational contact that comes from children unintentionally being deprived of close bonding with grandparents—most of whom live hundreds or even thousands of miles away.

Few history books can compare with a real-life first-person account of what happened at Pearl Harbor or in the Pacific Theater during World War II, or the impact of FDR's New Deal on small farmers. Few professionals can teach parenting skills to pregnant, low-income teenagers with the volunteer compassion that evolves into shared confidences and secrets sometimes kept for more than 50 years. And solutions to the problems and challenges at the end of this century may be found not in political machinations but in the invaluable tradition, lore, and strength passed down from generation to generation.

"This kind of volunteering is a big step away from the old 'warm body' approach: stuff envelopes, answer phones—'it doesn't matter what your skills are because you're retired,'" says Ronald J. Manheimer, director of the North Carolina Center for Creative Retirement, Asheville. Through its affiliation with the University of North Carolina, the center encourages retirees not only to further their own education but to pass on their knowledge to the young.

"This is the first generation ever of retirees with the time, money, and health to be productive," Manheimer says. "These people have a strong sense of

"Once a connection has been made, the adult volunteers let the kids do the talking about their problems and then point out choices or teach them how to identify family values."

civic responsibility; life's been good to them and they want to give something back. They're probably the first affluent generation in their family, and they're looking at 15 to 20 more years of healthy retirement. They want to stay involved."

This involvement often means working with the most vulnerable segment of population: children—who suffer the most from poverty, child and substance abuse, and teen pregnancies. And it's the volunteers themselves who create and design the programs to address these issues.

"We have a data base of more than 550 people available to serve in a wide variety of roles," Manheimer explains. "We match their degrees, experience, and interests with specific community needs and projects. Many retirees tell me that this is the first time they've been asked to volunteer using their particular talents and backgrounds!"

Part of the need for IgVs is a result of America's age-segregated society. Prior to the Industrial Revolution, the typical family had as many as four generations under one roof; there was always an older adult in the role of "wisdomkeeper" or "elder" who counseled children and adolescents. "The focus on the nuclear family may be a basic error that we're just now starting to pay for," says Carol Tice. "Unless kids have ongoing contact with seniors, they perceive them as sickly, ugly, weak, cranky...with disrespect."

Tice is an intergenerational specialist for Lifespan Resources, Inc., Ann Arbor, Michigan. She is a witness to the hidden economic and age-related segregation that isolate older Americans not only from children but from each other. "A lot of the programming provided for seniors is peer contact, where they interact only with each other," Tice explains. "Plus, the economic segregation of clubs and retirement communities closes out many of the older low-income people. With this group, a tremendous amount of their energy goes just to meeting basic needs. Most of their relationships are with the professionals who are paid to work with them, which creates a feeling of isolation. When they get into the role of volunteering with kids, they report feelings of great abundance and largesse."

Tice tells the story of an elderly American Indian tribal leader who had been in a nursing home for several years. Although the man could understand English, he seldom spoke, remaining aloof from the staff and other residents. When Lifespan Resources put out a call for volunteers to work in the public school system, the tribal leader chose to assist with an art class. There, he and eight-year-old Rodney, a youngster with behavior problems, began to bond. Rodney and the Indian elder were fascinated with each other and began making a drum together. As they worked, the old gentleman began speaking to Rodney, whose behavior gradually became more acceptable to the rest of the school.

"This happens over and over again," Tice says. "We continually have people recommended to us by their doctors or social workers because they're depressed or isolated. We have volunteer-staffed centers in the schools where the kids can come with games, books, or academic work; it's almost like a large kitchen in a house where an extended family lives."

Tice's volunteers also put in long hours with at-risk adolescents: youngsters who are having problems in school or with violence in the home or are victims of drug abuse. Here, volunteers listen, guide, and mentor but, as Tice says, never tell their troubled companions what to do.

"Bonding doesn't happen automatically; often, they simply share space at first," she explains. "Once a connection has been made, the adult volunteers let the kids do the talking about their problems and then point out choices or teach them how to identify family values."

While most older volunteers came from a generation where attending school was a privilege and a mark of status, their young "protégés" often consider education something that is being forced on them against their will. With teachers burdened by multiple demands, often a surrogate "grandparent" is the only thing standing between a bewildered, resentful youngster and lifelong failure.

"Scientists and engineers will tell you that talking to an eleventh grader who has not kept up in math is cruel and unusual punishment," says Sharlin. "Math skills—starting with basic multiplication and on past integral calculus—depend on building blocks. It's critical that the kids have these 'blocks' firmly in place in the elementary grades."

For Sharlin's university-trained volunteers, the difficulty of translating such esoterica as Newtonian mechanics to a sixth-grade level can be intimidating. "One of our volunteers, Roy Osborn, was a

retired chemical engineer who had worked on rocket motors and blown his left hand off in a lab accident," Sharlin says. "The kids were fascinated by him, even though he was very recalcitrant about the whole project and not at all eager to talk to a roomful of grade-schoolers. Well, we convinced Roy to teach a series of six science classes that included experiments and demonstrations. Roy called me right after the first class and said, 'One kid hugged and kissed me, Harold! I just melted!'"

"He put in a total of 18 classroom hours plus preparation, planning, and field trips, before becoming very ill," Sharlin adds. "After he came home from the ICU ward at the hospital he wanted to go right back in the classroom, but I took one look at him and knew he was still too sick, so I took the kids on the field trip they'd been planning. Roy died a few days later, and I'm not sure the kids ever got over missing him. We named our outstanding volunteer award the Roy Osborn Award, after a cantankerous old guy who became one of our best volunteers."

IgVs do more than interact with kids, however. Norman Earle, a retired biologist working with the Center for Creative Retirement, helps schools develop science curriculums, scrounges lab equipment for pathetically understocked classrooms, and reviews science textbooks—discovering multiple errors and mistakes in the process. "Norm is involving other retired scientists in making science more interesting and accessible to kids," Manheimer explains, "and they in turn involve their friends and neighbors."

"Here in Asheville, we have a high school student from Kuwait whose English is very poor. One of our retired volunteers speaks Arabic and is helping the student learn our language and history. And a physicist volunteer has been conducting Student Achievement Test (SAT) preparatory classes at a local high school. His six students have had their SAT scores go up by 90 points!"

But to insecure youngsters, sometimes self-image is as important as academic skills. Linda Deafenbaugh, coordinator for a program called Generations Together at the University of Pittsburgh, tells of one volunteer who had been a vaudeville tap dancer. "This individual works two days each week teaching middle school kids the basics of tap. For him, it's a way to pass on the purity of his art—not the glitz, but the sense of a time in history when talent was all," she says. "We have one woman who has traveled extensively and speaks four languages. She volunteers in a rural school with no language program, teaching kids languages



and sharing her slides, collections, and oral history of the countries where she's been."

Many older volunteers are shocked by what they perceive as a lack of discipline and respect in the schools. "These programs present unique problems and challenges," says Manheimer. "Different generations have different behavior expectations, and it's new to them to hear kids talking back and acting out. We make sure our volunteers are fully aware of what they're up against and how to cope with it."

"But we've also had retirees tell us they either knew kids like that or were just like that themselves years ago. We've got some pretty rough, streetwise characters in the program. Some of these people grew up in rough neighborhoods and aren't afraid of difficult situations. One of our guys is a retired plumber who slept in muddy trenches in Burma for two years during World War II. Nothing fazes him!"

Nothing, perhaps, except society's traditional view of retirement. "We're not tired and we're damn well not ready to sit back and take it easy," says one volunteer in her mid 70s who works as a nursing home activities coordinator and preschool teacher's assistant. "We've spent most of our lives getting an education and earning a living. Now that we no longer have to worry about a paycheck and job responsibilities, we can put that energy back into the community, where it's so desperately needed."

As Harold Sharlin says, "Part of the success of intergenerational volunteer programs is that we're with the kids for an hour or so, we have a good time, and then we can walk out and let the teacher worry about them! We work as a team with the teachers, but because we're not there all day we're able to give and get the very best efforts."

"After explaining some highly technical theories to a group of fifth graders, I got a letter from one of them that made my day, the kind of thing only a grandparent would understand," Sharlin says. "The youngster wrote, 'I really enjoyed your class. I'm sorry I fell asleep, but when I was awake, I really liked it!'"

It's this combination of humor, honesty, and appreciation that works so well between the older and younger generations, bringing them closer together, with benefits for both.

RESOURCES

International Service Corps
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 Dr. Harold Sharlin, Director
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Generations Together
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 191 University Place
 Pittsburgh, PA 15260
 (412) 624-7461

Arizpaca Resources, Inc.
 1000 N. University Ave.
 Mesa, AZ 85201
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North Carolina Center for
 Creative Retirement
 The University of North
 Carolina/Asheville
 One University Heights
 Asheville, NC 28806-9989
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Volunteers of America Inc.
 2815 N. Causeway Blvd.
 Metairie, LA 70002
 (800) 656-2297



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Generation Bridge

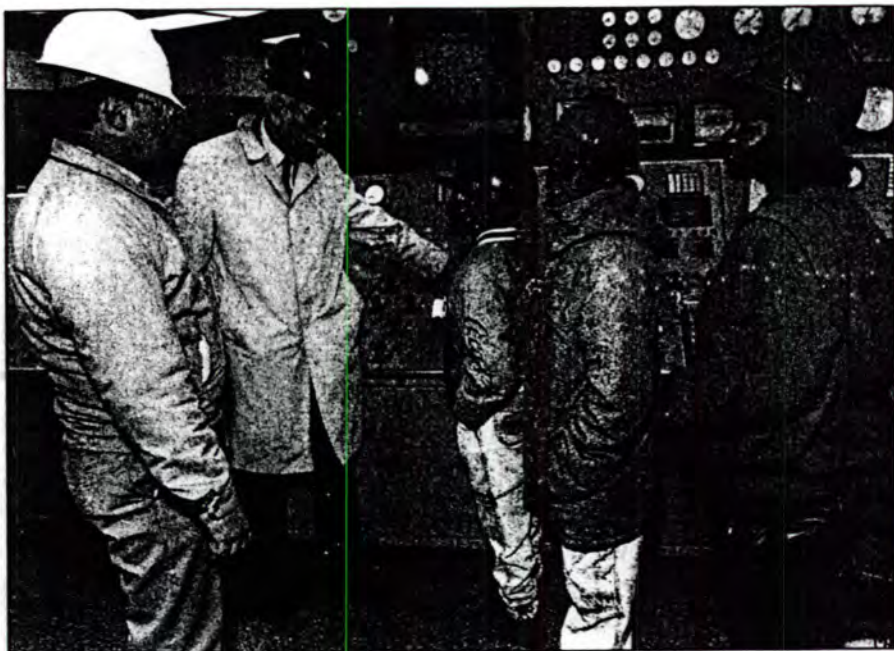
■ John had long dreamed of becoming a basketball star. It was one career filled with talented black men. After playing with some wire, a battery, bells, and light bulbs, though, the 10-year-old has decided to be an engineer.

"At least he knows there are other options," laughs Harold Sharlin, director of the Emeritus Scientists, Mathematicians, and Engineers Program. The volunteer project, which operates in the District of Columbia metropolitan area, links retired scientists, mathematicians, and engineers with public schools, exposing inner-city children—the younger the better—to a host of exciting science careers.

"Early contact is extraordinarily important," says Sharlin, who is an electrical engineer and education consultant. "Kids can see scientists as real people. They can be scientists if they work hard. Particularly in the D.C. area, we're surrounded by technical agencies and businesses. . . . Kids don't have to work at McDonald's or be professional football or basketball players."

Besides opening vistas for children, Sharlin's project responds to perceptions that the United States needs more technically trained people. According to the American Association of Engineering Education (ASEE), the United States already employs more engineers than lawyers, doctors, or even elementary school teachers. Moreover, the profession and demand are growing, says Donald Strong, a consultant to the ASEE.

Other programs exist to link retired professionals with curious young minds. For 12 years, retired teachers in the District of Columbia have provided tutoring help in reading and basic math to six inner-city schools, while social workers evaluate programs in various United Way agencies throughout the District. Programs in Florida, Arizona, California, and



Texas steer retired lawyers into legal services offices for the benefit of low-income clients.

In 1989-90, the Emeritus program's first year of classroom experience, six engineers and scientists and one physician started working in Bunker Hill Elementary and Taft Junior High. Both District of Columbia schools are predominantly black, in student body and staff. Both draw children from middle-income and lower-income families. And both inspire high achievement from their pupils. Taft was recognized as a "school of distinction" in the D.C. system for its students' academic achievements and its broad array of advanced curricula. By mid-year, the program had doubled the number of instructors and added two more schools, Phoebe Hearst Elementary and John Eaton Elementary.

The outcome? "The children were thrilled," says Clotile Knight, a fifth-grade teacher at John Eaton. Sharlin introduced her class to the concepts of electricity and helped children conduct simple versions of Faraday's and Oersted's experiments. At the end of the unit, the class toured a utility com-

pany power plant. "They were able to relate all the things that he taught them to the plant," recalls Knight. "And several children wanted to be engineers."

Older and Wiser

The backbone of the Emeritus program is a six-week unit, capped by a field trip to a lab, museum, plant, or agency. Emeritus instructors spend at least one hour in the classroom each week, and they collaborate with teachers to design relevant—and understandable—curricula.

This can be challenging. In fact, claims William J. Condell, "It's hard!" Previously the director of physics at the Office of Naval Research, Condell notes that it takes careful preparation "if you're accustomed to expressing yourself in calculus and then have to . . . bring it down to the simplest, most transpar-

ent level." Condell explored lens equations and Newtonian mechanics with sixth graders who "really understood quite a bit." But, he adds, he spends as much time preparing for these classes as he did for lectures at George Washington University.

Emeritus participants agree that the hard work is rewarded. Before he retired from the State Department, Samuel Zweifel was Henry Kissinger's personal doctor. Now he delights at the enthusiasm of the fourth and sixth graders in his health classes. "It's really nice to be with these youngsters and know that they wanted me to be there. They were extremely attentive—always raising their hands, wanting to participate. They were excited about everything." Zweifel uses his own transformation from Kansas farmboy to State Department physician to inspire the children.

Sharlin sees the program as a necessary supplement to established science and math studies, in part because some teachers seem uncomfortable with science and steer clear of it. For example, in one school, he observed that a kit crammed with batteries, compasses, and other simple science equipment had never been touched. "But we're old enough that teachers aren't afraid to ask us things," says Sharlin.

Sharlin's goal is to reach into every elementary school in the area, and he'd like to see the program replicated in other cities. "There are a lot of people out there with real talent, who want to do something for children. I can't tell you how many scientists and engineers the program will help inspire 20 years from now, but I know we have an influence."

Still, after two semesters in the schools, Sharlin has a confession: "I don't want teachers to leave the classroom when I'm leading the class. I'm terrified of fourth graders." ■

CHRISTINA M. NICHOLS, a free-lance writer based in Washington, D.C., specializes in the environment and energy.

20 March 1990

MEMORANDUM

From: Harold Sharlin, Project Director

To: Participants and interested observers of the EMERITUS SCIENTISTS
MATHEMATICIANS AND ENGINEERS (ESME) project

Subject: Progress report on ESME project.

I. Overview

We have begun in two new schools, John Eaton Elementary and Phoebe Hearst Elementary in northwest Washington. Four new Emeriti were recruited with prospects of three or four more in the Spring 1990.

The project director was on an all day panel at the AAAS meeting in New Orleans.

Discussions are in progress with two other organizations for cooperative ventures.

An article about ESME appeared in the IEEE *Scanner* and another article will appear in March in *Senior Lines* a PEPCO publication for customers over 60.

The ESME project received its first grant from Chevron.

II. Schools

A. John Eaton and Phoebe Hearst Elementary Schools

Ms. Patricia Greer, Principal of John Eaton and Phoebe Hearst Elementary schools asked ESME if a project could be started in those two schools. Preliminary discussions were held on 20 November 1989 and on 8 January 1990 Larry Mirel and Harold Sharlin met with the teachers from these schools and explained the process whereby profiles of the emeriti were to be circulated and teachers were to choose the person or persons they wanted to work with.

On 12 February 1990 three new emeriti, David Shapiro, William Condell and Samuel Zweifel, along with two veteran emeriti, Paul Torda and Harold Sharlin met with the Eaton and Hearst teachers for paring off and the first planning session.

William Condell (physics) was paired with Julie Jacobsen who teaches 5th and 6th grade at Hearst. Condell has developed a series of hands-on experiments and class discussions. He sent Ms. Jacobsen a list of vocabulary words that he planned to use to determine if the words were understandable to the class and to allow Ms. Jacobsen time to review the words before Condell met with them. The first discussion was on lenses. Condell purchased some lenses and donated them to the school. In class the students derived the Gauss equation. Next Condell talked about plate tectonics and used a special puzzles that illustrated the location and motion of the plates

The second meeting was on holograms and light. To come are classes on astronomy, light and Newton's three laws.

Paul Torda (aeronautical engineering) was also paired with Julie Jacobsen at Hearst. Torda plans to talk about flight, earthquakes, the Blue Flame which set a land speed record, submarines and waste disposal.

Samuel Zweifel (medicine) was paired with Margaret Ellis (6th grade Eaton) and Kelly Halligan (4th grade Eaton). Zweifel has met with the classes four times as of 16 March and he plans seven meetings in all with a field trip to Children's hospital.

David Shapiro (mechanical engineering) has met with Mary Ebel's 4th grade class at Hearst and the discussion was on "What I have done" as an engineer. Shapiro has worked out a schedule with Ms. Ebel that includes sessions on missiles, space and alternative energy sources. He will take them on a field trip to Contel where the students will be able to have hands on experience with some demonstration equipment.

Harold Sharlin (electrical engineering) was paired with two teachers, Jacqueline Clarke and Clotile Knight both 5th grade teachers at Eaton. He has been meeting with each class, one on Tuesdays and other on Wednesdays. Eaton has a good supply of electrical apparatus and Sharlin has been using their batteries, wire, sockets, compasses and magnets. The students have been setting up electrical circuits and magnetic experiments in groups at their desks. They have duplicated Oersted's 1820 experiment in electromagnetism and Faraday's 1831 experiment in electromagnetic induction. Field trips to PEPCO's Chalk Point generating station are scheduled for April.

B. Bunker Hill Elementary and Taft Junior High

Seth Shulman (physicist) spent four class hours with Mrs. Mary Perry's 6th grade class. The topic was radiation. Shulman had the class study X-ray pictures and had the children identify the object in the picture. Another day the class worked with a Geiger counter and tested objects for radiation. Each day had some other hands-on project and included using a prism to divide sunlight. For a field trip the class went to the Nuclear Medicine Department at Providence Hospital.

Harold Sharlin (electrical engineering) had a stint with Patricia Young's special class of 4th, 5th and 6th graders. He showed the children how to experiment with magnets, batteries, compasses and electric bells. The bells were a huge success. The principles of electromagnetism and electromagnetic induction were demonstrated and related to the workings of an electric generator. The class field trip was to PEPCO's Chalk Point Generating plant where a PEPCO photographer followed the group around taking pictures for PEPCO's *Senior Lines* newsletter.

Howard Fawcett (chemical engineering) also met with Mrs. Perry's 6th grade class. Fawcett found ideas for his hands-on demonstrations a set of books produced through a joint venture of the American Chemical Society and the American Physical Society. There were five meetings during which Fawcett showed the class how to experiment with echoes.

Margaret Cooper (geologist) has worked with Mrs. Emma Holbrook's 5th grade class. The California earthquake was a perfect opening for discussing causes and detection of quakes along with the analytical work of geophysicists, seismologists, engineering and structural geologists. Cooper was asked how she became a geologist and that led to discussion of related careers in

science. Another session was on rocks and minerals with samples of minerals from the Museum of Natural History. Cooper showed slides of construction of the Alaska oil pipeline and talked about her work on the project. A geologist from the Museum of Natural History came to the classroom to do a hands-on session with sample of rocks and minerals that he brought along. A field trip to the U.S. Geological Survey headquarters at Reston, Virginia is planned.

III. Outside Activities

A. Harold Sharlin ESME Project Director, was part of an all day workshop on "Senior Scientists and Engineers as Volunteers," at the annual meeting of the American Association for the Advancement of Science (AAAS) in New Orleans on 19 February 1990. Sharlin gave a paper in the morning session. He was among eight presenters for the morning and afternoon sessions. The response was good and several contacts were made including the Chamber of Commerce at Huntsville, Alabama and the Elfun Society from General Electric.

B. We are exploring the possibility of cooperation with The I have a Dream Foundation in Washington.

C. Articles:

1. *The Scanner* published by The National Capital Area Council of The Institute of Electrical and Electronic Engineers carried a story about ESME in the March 1990 issue.
2. *Senior Lines* published by PEPCO will carry a piece on ESME in its Spring 1990 issue.
3. The Educational Foundation newsletter of the Armed Forces Communications and Electronics Association (AFCEA) will report on ESME in a forthcoming issue.

IV. Funding

A. the GOOD NEWS is that Chevron Corporation was the first organization to provide a grant for ESME.

B. Applications are in for grants from the Cafritz Foundation, PEPCO and IBM.

C. Letters have been sent to the major corporations in the Washington area.

D. The Department of Education announcement for support of science and technology education in grade schools will be out in May 1990 and we intend to apply for a grant.

V. Continuing

A. Goal of ESME is for each elementary school class to have two units per year, that is, to have two different emeriti meet with each class in every school where ESME is involved so that the relationship is an ongoing one with children K through 6th. The four to six hour unit allows the class to become familiar with an emeritus and for that impression to be a lasting one. To motivate children to continue studying their math and science the exposure must be over time and that means seeing and doing science with an emeritus person twice a year all through elementary school.

B. Sharlin met with Mrs. Preston, Principal of Bunker Hill Elementary, on 12 March 1990. Mrs. Preston is much pleased with the program and reported enthusiastic response by her teachers. She repeated earlier argument that the ESME must stay with her children through all the grades. Sharlin agreed. Mrs. Preston polled the teachers and seven of them want another emeritus unit in the Spring of this year. Teachers want repeat appearances

of those who have already been at Bunker Hill plus new emeriti.

C. Recruiting is a demanding and continuing task. Locating those few who are able and eager requires much phoning and mailing. Senior Science and Engineers (SSE) program has offered to continue cooperating with ESME. Most of present emeriti recruited through SSE of the American Association for the Advancement of Science (AAAS). They have agreed to supply 20 more names which translate into about seven or eight emeriti recruits. Although all emeriti report a positive experience there is a need for a continuing new supply of names because of emeriti becoming unavailable due to moving out of the area, going to Florida or to see grandchildren and the press of consulting business.

D. Needs include more organization, at least a parttime secretary, more meetings with emeriti, orientation and review for teachers and emeriti, a booklet of guidelines for emeriti and teachers and all those things that an ongoing active program must have so we must have.....

E. Funding: Prospects are good and soon the cash will flow. The program is a continuing one and the source of funds must be continuous.

15807 Wayne Avenue
Laurel, MD 20707
April 15, 1991

Ms. Turner's Fourth Grade Class
Bunker Hill Elementary School
14th and Michigan Avenue, N.E.
Washington, DC 20017

Dear Class:

You are a wonderful class and I have thought about you often since our last meeting together. You are so friendly and polite, and your interest in working with me and in talking with me about topics in Science and Engineering has given me a very warm feeling. I miss being with you.

Mrs. Heydt and I want to thank you for the cards you prepared for us in which you sent us congratulations and good wishes for our wedding and our new life together. You did an excellent, artistic and creative job in preparing those cards, and the wishes were warm and sincere indeed. I can tell you that Mrs. Heydt and I have looked at all your cards several times, and we get such a good feeling each time we read them. As you can imagine, our days have been quite busy before, during and after our wedding on February 16th. But our life together has been a very happy one. Mrs. Heydt goes to work in Washington every day, and I have been dividing my time between a Science class for 6th graders at Cook Elementary School in Washington and computer training for 6th graders at my local elementary school in West Laurel, Maryland.

I want you to know also that I have read and appreciated all your letters to me regarding our sessions on Science and the work of an Engineer. I know that many of you probably will not go into Engineering or Science as a career. But I hope that all of you now have a better understanding of what an Engineer does and are aware that the work of an Engineer benefits our world and the people in it. Finally, you have heard me say how much fun engineering work is for me and how many opportunities there are to work in different fields and to be creative. Of course, the work is not easy (nothing worthwhile is easy) but that is not a problem when the work also is fun.

So, thank you again for your wonderful cards and letters. Keep up the good work, always be curious, and try do do your best at whatever you do. I'm proud of you. And I think you have an excellent teacher in Ms. Turner. Perhaps Mrs. Heydt and I will have the opportunity to meet with all of you again.

Sincerely,

Howard Heydt

THOMAS L. LINDSAY • 1324 COLVIN FOREST DRIVE • VIENNA, VIRGINIA 22180

TELEPHONE (703) 759-2177

Dr. Harold I Sharlin
The Emeritus Foundation
1614 20th Street, NW
Washington, DC 20009

7 March 1991

Dear Dr. Sharlin,

This is a brief report on my activities in the Emeritus program this past semester.

From October 1990 through January 1991 I provided five science sessions to a third grade class at Bunker Hill Elementary School. The teacher was Mrs. Josie Meeks.

I had decided that I would cover primarily topics in Aviation and Space. For the first session, I talked about the wide variety of uses for airplanes, and illustrated this with color slides of many different types of planes (I brought my own 35mm projector). I had made the slides by photographing illustrations in magazines and books, a very simple and inexpensive process. I showed pictures, for example, of commercial transports of all sizes, cargo planes, a water bomber for fighting forest fires, sport planes, bombers, fighters, etc. I showed pictures of the Wright Brothers' first airplane, and then pointed out the similarity between it and the new Beechcraft "STARSHIP" executive transport (both have a forward mounted stabilizer, aft wing and two pusher propellers). I showed them a World War II Grumman Avenger, and talked about President Bush's service as a Navy pilot. And other examples of this sort.

I had been told that the students would want to know something about me, so I also showed them a dozen or so slides from my own files, showing them some airplanes and pilots and aircraft carrier operations (from the 50s and 60s). All this was enthusiastically received. I encouraged them to ask questions, and they asked so many it was impossible to answer them all. For the second class I borrowed a film (actually a videotape) from the Virginia Department of Aviation called "How Airplanes Fly". This was a pretty good film, about 15 minutes long, with some very basic information, and some scenes of a Cessna 150 in flight. Before showing the film, I drew a Cessna 150 on the blackboard and we talked about the names of the parts of the plane (they knew most of them). When I ran the film, some students were quite interested, while others were clearly bored. Answering questions finished up the hour.

The third session I devoted to electricity. I brought with me light bulbs, sockets, batteries, wires, etc. and asked Mrs. Meeks to organize the class into groups. Each group (seven groups of four students) assembled this little kit - they did this very quickly, no

trouble for them at all. I then talked at the board about electricity, trying to make points like, a complete circuit was necessary; electricity in the home was potentially a danger, etc. I tried to explain electricity in terms of electrons, which led me to try to explain atoms. In this I was not successful. Either I did not present it very well, or the concept of atoms is too advanced for the third grade.

The subject for the fourth session was Space and Satellites. The format was much like the first session. I showed color slides of different kinds of satellites and talked about what they were used for, such as communications, weather forecasting, exploring space). Some slides I had photocopied and others I bought at the Air and Space Museum. I led a discussion by asking the class what they thought it was like to be in space (cold or warm? What's weightlessness like? etc.) They were quite knowledgeable about space. I had obtained a videotape from NASA, but it was not only fuzzy, it was also boring, so I did not use it. In the last session, I tried to teach them about binary numbers. I explained (not in great detail, of course) the origins of our common decimal numbering system, and we went through an exercise to illustrate position notation. I gave each student a little bag of beans - about 25 beans in each bag - and had them count the beans onto a piece of paper that had been marked out with columns (ones, tens, hundreds) so that they ended up with two piles in the tens column, five beans in the ones...counting piles produced the number, 25. They did this without much trouble, but I was not certain that they saw the purpose to it. I then talked about binary numbers, how this is the preferred counting system for computers because only two symbols are used. Then I had them count the same beans over again onto another piece of paper marked off in binary columns (1, 2, 4, 8, 16, 32...). Counting piles this time produced the number 11001 in binary, equivalent to 25 in decimal.

Then we got out the battery and light bulb kits from session 3. I set up several groups in the class and had them send flashing light messages around the room from one group to the next, first in decimal, then in binary, hoping to make the point that binary messages were faster and less prone to error. This they did with great enthusiasm, but the lesson I intended was obscured by the general confusion and excitement of playing the game. This exercise could work, I think, but it would require that more time be spent on organization and practicing sending messages.

I had planned a field trip to the visitors center at NASA Goddard, but there were difficulties. On the first day I scheduled it, all the buses were required for something else; the second time, weather delayed the opening of school; and the third time, Goddard had

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cancelled tours for an indefinite period as a precaution against possible terrorist activity. I understand Goddard has resumed tours, and I plan to try again shortly.

Lessons learned:

-Third graders like slide shows with discussion.

-Videotapes are less satisfactory, probably because there is less opportunity for interaction.

-The students ask innumerable questions, some of them really off the wall (Why do airplanes crash? Do the pilots fall asleep? Do airplanes really disappear in the Bermuda Triangle?..) They also like to talk about their own experiences if they relate to the subject, or even if they don't relate to the subject. This sort of thing can take up much of the class if you allow it.

-It is very difficult to contact the teacher through the school. Messages just don't get delivered. Best to contact the teacher at home.

In sum, Dr. Sharlin, I greatly enjoyed the experience of meeting with the class, and I regret that the conflicts with my job make it impractical for me to continue. I believe that what you are doing in the Emeritus Program is very important.

Sincerely,

Tom Lindsay

January 19, 1991

TO: Dr. Harold I. Sharlin
FROM: Roy T. Osborne
SUBJECT: How The Author Carried Out His Part Of The Emeritus Program

I did my part of the subject program with Mrs Braxton's fourth grade class at the Bunker Hill School in NE Washington. At the first session, I just talked with them in general. I told them that I was sure their teacher had not told them what my purpose was for being there and that I was not going to tell them immediately. I asked them to try to figure it out for themselves. I then asked them what they wanted to be when they grew up. I got answers anywhere from professional basket ball players to one kid who insisted he wanted to be a lion tamer. I told them that so far in school they were being given certain tools and were being taught how to use them. I likened it to a group who was going to a school to learn how to be a carpenter. But there is always one who thinks he knows it all and quits school before it is finished. He tells himself that he is an expert at building dog houses and decides to strike out on his own and do just that. Sadly after he has burned all his bridges behind himself he finds that there is just no demand for dog houses. So I concluded that they should all stay in school and learn better how to use the tools, the tools being A B C --- X Y Z and 1 2 3 4 5 6 7 8 9 0.

In the second session, I presented the names of numerous scientific professions that they might consider and gave them brief run downs on what each profession dealt with. Of course both children and teacher had questions as we proceeded which I endeavored to answer.

In the third session I took in a number of chemicals which I have and did a few little demonstrations where adding one clear solution to another caused a color change. I also demonstrated the electrolysis of sodium chloride to form chlorine and sodium. The sodium of course reacted with water to form sodium hydroxide whose presence was detected with phenolphthalein. I also brought a full size periodic table I have to help explain the various elements. On the black board, I illustrated how various atoms react by losing or gaining electrons. By this time most of the kids had pretty well figured out why I was there. They and Mrs Braxton all seemed to be really enjoying our sessions.

In the fourth session I brought in equipment and demonstrated how to determine the density of an object by determining its volume by water displacement.

The fifth session involved setting up a demonstration of paper chromatography. I wanted to use plain old blue ink which one used to be able to buy. It is no longer available so the demonstration did not work

(over)

In the sixth and last session, I talked about rockets. I have about 28 years experience in rockets. I discussed the difference between liquid and solid propellant rockets. I explained and diagramed just what caused the explosion that destroyed the Challenger Space Shuttle. Because of the on-going thing in the Gulf there were questions about such things as what made nerve gas work. We talked at the end about many subject of interest to them. I have a field trip all set up for them on Feb 22 to Biospherics in Beltsville Md.

Before I left I talked with another teacher at the school who said she would love to have me talk to her class after the present Emeritus man has finished. So I will be embarking on a second six week endeavor Thank you for giving me this opportunity to work in my field with young people. I really enjoy the work and trust that it is having the desired results.

Dr. Harold Sharlin
2831 Northhampton Street N.W.
Washington, D.C.
20015-1110

Dear Harold:

This letter is intended to give you a summary of my experiences to date of ~~assisting~~ in the sixth grade at the Hearst Elementary School, 37th and Tilden Streets, N.W., Washington, D.C., under Ms. Julie Jacobsen.

So far I have met with the class three times:

1 March, 1990

7 March, 1990

22 March, 1990.

The first class meeting was preceded by a meeting with Ms. Jacobsen on 20 February, 1990 to discuss topics to cover and her plans for the curriculum. Before each meeting with the class Ms. Jacobsen and I discussed the topics for me to cover on the telephone. After each class meeting Ms. Jacobsen and I would discuss perceived reactions to the meeting.

Before each class meeting I sent Ms. Jacobsen an outline of the material I planned to cover and a vocabulary of words which might be used during the talk. She went over the vocabularies with the class prior to the class meeting. She told me that having the vocabularies was very useful.

The first class meeting, 1 march, was on lenses. The vocabulary and outline are enclosed. We actually derived the Gauss lens equation in class. We ended the class by a demonstration of image formation with a simple apparatus I purchased from Edmund Scientific and donated to the school.

The second class meeting, 7 March, we discussed holography. Even though we built on the idea of waves and rays introduced in

the first class, it was not possible, and perhaps not advisable, to go deeply into coherence theory. So the presentation was more descriptive than quantitative. I introduced some history and used a holographic demonstration which I have. The students seemed to like seeing the holograms. I also did some calculations of optical frequencies, periods, etc. These necessitated the use of exponents, a topic I expanded on at the third meeting.

Most of the third meeting, 22 March, concerned methods of calculations in physical problems. My notes are enclosed. I outlined methods used for making calculations including dimensional checking and unit checking. This was quite a bit to cover, but Ms. Jacobsen can use the material to augment her regular teaching if she so wishes. Before the class meeting I sent copies of Newton's three laws and law of gravitation to Ms. Jacobsen. These were given to the students. We had only a little time to introduce Newton's laws, but will expand on them at the next class. Each student, after checking with Ms. Jacobsen, was given a "Jumping quarter" (from Edmund Scientific) to illustrate the conservation of energy. How these quarters work will be explained in the next class.

In the next class meeting, as said above, we will cover Newton's laws and discuss gravity. We will apply these ideas to both the earth and other planets. The next class meeting will be the 5th of April.

Perhaps you would like to know some of my impressions and thoughts concerning my experiences thus far. We have covered quite a bit of material, but it has all been good physics. I suspect that four or so students have comprehended everything---remembering is something else. For those students who may not have a scientific inclination, I have referred to historical incidents and personal stories that should lead to some sort of scientific feeling. The class has been very attentive and seems particularly appreciative of not being "Talked down to". There have been good questions from the students. Working with Ms. Jacobsen has been a rewarding experience. She is hard working and dedicated. She has a high level

of interest, and she has appreciated, and may well use, additional materials I have given her on scientific experiments and background. These materials have usually been taken from scientific journals to which I subscribe. Ms. Jacobsen seems to be integrating my talks into her regular class work by agreeing on the topics to be covered and by using the vocabularies to prepare the students for the talks.

The feedback I have received has been mainly from Ms. Jacobsen, and it has been favorable. We may be doing some good.

Sincerely,

W.J. Condell
4511 Gretna Street
Bethesda, Md. 20814

24 March. 1990

18 TAFT JUNIOR HIGH SCHOOL, N.E.
and Perry Streets,
Washington, D.C. 20018

14 February 1990

Dr. Harold Sharlin
The Emeritus Foundation
1614 20th Streets, N.W.
Washington, D.C. 20009

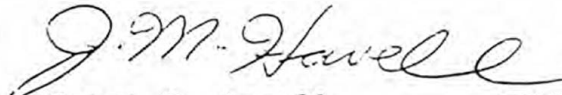
Dear Dr. Sharlin:

It is deeply appreciated that the Emeritus Foundation members are giving support to Taft's students in an ongoing matter.

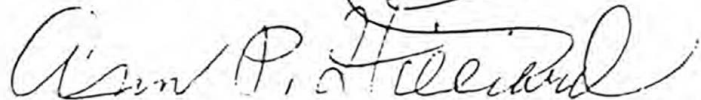
Frequently, the students talk about the interesting and exciting experiences that they receive from the Foundation members in science and mathematics and would like to have the members spend more time with them.

Again, we thank you for offering your time and expertise to the students at Taft. We anticipate your continued support in our instructional program for the future.

Sincerely,



James M. Howell
Principal



Ann P. Hilliard
Assistant Principal

AH/gm



**DISTRICT OF COLUMBIA PUBLIC SCHOOLS
OFFICE OF THE SUPERINTENDENT**

PRESIDENTIAL BUILDING
415 12TH STREET, N.W.
WASHINGTON, D.C. 20004

SUPERINTENDENT

(202) 724-4222

November 3, 1989

Dr. Harold Issadore Sharlin
2832 Northhampton Street, N.W.
Washington, D.C. 20015-1110

Dear Dr. Sharlin:

I have reviewed with interest the prospectus describing "The Emeritus Scientists, Mathematicians and Engineers Program." I certainly subscribe to the program's intent to stimulate school children to learn the mathematical and scientific skills needed to pursue careers in these fields by creating opportunities for them to see for themselves, at an early age, the wide variety of working-day activities in which scientists, engineers and technically-trained people are involved. Its purpose addresses a critical need in the District of Columbia Public Schools.

Be assured that I endorse the program and, to the extent possible, will assist you in your efforts to implement the program at the school level. Please feel free to contact Dr. Robert Carlson to determine how best that assistance can be provided.

Sincerely,

A handwritten signature in cursive script that reads "Andrew E. Jenkins III".

Andrew E. Jenkins III
Superintendent of Schools
Chief State School Officer