CHAPTER 4
Learning in the Metaverse

ISTE STANDARDS ADDRESSED

The content of this chapter aligns with the following standards and indicators:

ISTE STUDENT STANDARDS

1.1.d Empowered Learner

1.2.a, 1.2.d Digital Citizen

1.7.d Global Collaborator

ISTE EDUCATOR STANDARDS

2.2.a, 2.2.b Leader

2.3.c Citizen

ISTE EDUCATION LEADER STANDARDS

3.1.d Equity and Citizenship Advocate

3.3.d Empowering Leader

3.4.c Systems Designer

What Is the Metaverse, and How Does It Work?

Blending many emerging technologies, the metaverse is "a simulated digital environment that uses augmented reality (AR), virtual reality (VR), and blockchain, along with concepts from social media, to create spaces for rich user interaction mimicking the real world" (XR Today, 2022). Relying on Web 3.0 (Chapter 5) and AI (Chapter 1), it will use NFTs in its virtual economy and has the potential to lead to transformative change in many areas, including a "revolution in education" (99 InfoSystems, 2023).

The concept of the metaverse is not as new as you might think, however. In 1992, science-fiction author Neal Stephenson coined the term in his novel *Snow Crash* (Ravenscraft, 2023), which features the main characters logging into a virtual reality version of their world and interacting as *avatars* (digital personas); and Ernest Cline's 2011 novel *Ready Player One* (and the 2018 film based on it) did much to popularize the idea.

You can imagine the metaverse as similar to a multiplayer, online role-playing game, such as Final Fantasy or Fortnite, or a world-building game, such as Roblox or Minecraft. These can be considered more like meta-platforms, as part of the metaverse ecosystem (Patel, 2024). Instead of being part of an evolving story in a fantasy world, however, your digital counterpart (avatar) could go about ordinary business in an environment similar to real life, having "in person" meetings with distant colleagues, "sitting in" on an out-of-state university class, and the like. Today, virtual spaces such as the Second Life platform simulate the metaverse concept—and have for some time.

In 2012, for example, I attended a meeting of the ISTE Games and Sims Network, which was held in Second Life. I had no idea what to expect as I logged in, but when I entered the beautifully decorated living room setting, I understood the potential of the metaverse. I was surrounded by avatars that represented my friends and even spoke with their voices. While we played a game and talked, I almost forgot we were logged in from three separate states and two different countries—it felt so real.

Different than meeting through Zoom, Google Meet, Microsoft Teams, or other conferencing platforms, meeting in the metaverse creates a more realistic experience that enhances social presence and interaction. While participants are in the same "space" in all of these, the metaverse's use of augmented and virtual reality enhances the feeling of social presence and being in close proximity to other participants, even those from far-flung parts of the world. It frees participants from the separate environments of their video-feed boxes and gathers them in a shared digital environment.

Accessibility, Acceptance, and Avatars

The metaverse promotes accessibility as well. When travel is challenging due to geographical location, cost, or physical reasons, the metaverse provides an inclusive place for more people to gather, collaborate, and communicate. For learning, it can create more ways for learners to access education, beyond just attending classes (or even a whole school) remotely. Imagine having conversations with famous historical figures who are re-created using AI (Chapter 1) in the metaverse space, or visiting museums, art galleries, or impossible-to-reach places (the past, the inside of a volcano). For friends, family, or co-workers, the metaverse is a space to connect and engage in learning, working, and socializing in a way that is different from and more engaging than traditional methods. This is the essence of what the metaverse is, except that the activities possible go beyond short meetings or gatherings with friends and potentially transform how people live, learn, and work.

In early 2023, for example, the World Economic Forum made plans to leverage the metaverse to bring leaders together in the "Global Collaboration Village," a virtual space that would look like the real physical meeting location in Switzerland (Chow, 2023). In this metaverse space, which was built with Microsoft Mesh (an in-development immersive upgrade of Teams), they felt that meetings would be more consistent and accessible for people attending from around the world, which would enable more frequent meetings. It would also provide a space where people could share their work and showcase projects in a more immersive fashion. For example, people who work with environmental issues, such as the restoration of coral reefs, could create simulations to reflect methods and progress (Chow, 2023).

WEF executive chairman Klaus Schwab felt that the benefit of the metaverse is that these virtual meetings would be a way to build "more rapport, trust, and ideation" with people from around the world in comparison with the use of meeting tools like Zoom (Chow, 2023). Understanding that people may be a bit hesitant to work in these spaces and there would be a learning curve with the metaverse, he believed that the use of the metaverse for meetings was going to become a more common practice, especially when trying to create international collaboration (Chow, 2023).

As of 2024, more than 600 million users worldwide were interacting in the metaverse, of which 80% were under the age of sixteen (Hryziuk, 2024). Because people are represented by avatars in the metaverse, many students feel they are more accepted by others there. According to *Forbes*, research supports this (ter Weijde, 2022):

- 80% of consumers find the metaverse is a more inclusive place.
- 63% had no idea they had been in the metaverse all this time. (For example, Roblox players may not realize that the game is similar to being in the metaverse.)

- 85% like that they can change their appearance to meet their preferences.
- 79% say their friends in the metaverse are more accepting. The use of avatars means acceptance is based not on appearance but on who they are.

In the metaverse, people can make purchases, hold meetings, own land, buy and sell real estate, and even buy clothing for their avatars. The metaverse has its own virtual economy for these transactions, and it is projected to have quite a substantial impact on the real-world economy. According to McKinsey & Company, the metaverse could generate up to $5 trillion by 2030. In 2020, the metaverse market had a value of $46 billion, and several organizations predict it could increase to upwards of $12 trillion (Wise, 2024). Students will need financial literacy support to understand the concept of money and finances in the metaverse. Understanding blockchain technology (Chapter 2) and NFTs (Chapter 3) will be essential, so students can be prepared for carrying out transactions and exchanging information in the metaverse.

TECH INSIGHTS
FUTURE OF AR AND VR IN OUR CLASSROOMS

By Jaime Donally, founder of ARVRinEDU, founder of #GlobalMakerDay, and former teacher

Future classrooms will not be restricted by walls but will be portals to ancient civilizations, distant planets, and the inner workings of the human body. With the help of augmented reality (AR) and virtual reality (VR) technologies, students don't just learn about history or science; they experience it. As these technologies mature, guiding students through this new frontier is essential.

Imagine a history lesson in which students wear AR glasses to witness the construction of the Great Wall of China. In biology class, a VR headset transports students inside the human heart, where they can observe the rush of blood through the valves. These experiences, once only imagined, are now memorable encounters that enhance comprehension and retention.

The potential extends beyond individual experiences. The concept of the metaverse as an interconnected virtual space promises to redefine classroom interaction, moving us one step closer to the impossible. Language barriers begin to crumble as real-time translation becomes seamless, opening doors to global education opportunities that were previously unimaginable.

The future of education in the metaverse appears promising, offering immersive learning experiences beyond traditional classroom constraints and creating a truly meaningful and exciting educational journey.

RECAP: KEY FEATURES OF THE METAVERSE

- **Immersive experiences:** Users can interact with the virtual world through headsets, glasses, or other devices, creating a greater sense of social presence and interaction.
- **Avatars and personalization:** Users can create and customize their digital avatars to represent themselves or to take on another persona within the metaverse.
- **Social interaction and activities:** Users can connect and interact with others in the metaverse and participate in virtual events, games, and experiences, such as learning, working, and leisure activities.
- **Economic potential:** The metaverse could potentially create new economic opportunities, with the capability for business owners or entrepreneurs to run a business from any location and sell virtual goods or provide services using digital currencies.
- **Advantages for learners:** The metaverse could offer opportunities to build vital collaboration and communication skills, as well as enable students to make global connections. Students may be the ones designing these spaces for educational or business use in the future, so the more they explore and build their knowledge now, the better. We want to shift our learners from being consumers to becoming creators and innovators.

Augmented, Virtual, and More Realities

To more fully grasp the concept of the metaverse, you need to understand some of its key components, such as augmented, extended, mixed, and virtual reality. *Augmented* reality (AR) is an overlay of digital objects or information in the real world. *Virtual* reality (VR) is immersive and enables the simulation of activities or experiences that may otherwise be impossible. *Mixed* reality (MR) blends the real and virtual worlds, which enables the user to interact with a digital object in the real physical space. *Extended* reality (XR) is the combination of each of these and offers greater immersion and interactivity. The three pillars that facilitate the metaverse are augmented reality, virtual reality, and 3D visualization (Patel, 2024). Understanding each of these realities and how they work will help you understand how the metaverse operates and what its use might look like for your students' future lives and work.

Applications in Education

Metaverse-based learning offers the potential to open more opportunities for students to reach deeper than traditional, physical classrooms allow. It offers a "safe platform for hands-on activities like science experiments, AI-driven avatars, and virtual tutors" that provide for more personalized learning experiences for students and can assist with meeting their specific interests and needs

(Misha, 2023). Through the metaverse, students can have access to and immerse themselves in a variety of learning experiences and environments beyond those offered by their local schools and communities. For example, Harvard University created a VR experience that enables students to explore the molecular structure of proteins (Qin et al., 2020).

EDUCATOR STORY
BRINGING THE BROWSER TO REALITY

By Heather Brantley, CTE web and digital communications teacher, Pine Tree Junior High School, Longview, Texas

To prepare students for their future, I am always educating myself with the newest technology tools and resources. One important tool that I use in my classroom is augmented reality (AR). AR allows students to be immersed in settings and experiences that are not normal to the classroom. Due to limited budgets in schools, students often miss out on great learning experiences. For example, traveling to a specific location might be dangerous or costly. With AR, that barrier is reduced and, ideally, removed.

In my classroom, I use Merge EDU, McGraw Hill AR, and Kai's Clan to provide AR experiences. Students can manipulate and explore objects in detail, rather than view them in a simple video or photo. This allows for critical thinking and in-depth discussions about details that are normally missed. Plus, I find students remember the details of the experience better and see how it is applicable to their lives.

Augmented and virtual reality platforms like CoSpaces Edu empower students to not only consume content but also create their own AR and VR experiences, which can simulate being in the metaverse. With CoSpaces Edu, students can design 3D objects and scenes that can be projected onto a Merge Cube, which helps make abstract concepts tangible and interactive. This creative process not only enhances their understanding of subjects but also fosters critical thinking, problem-solving skills, and technological literacy. The ability to share these AR creations through the CoSpaces app on tablets and smartphones adds another layer of engagement. Students can showcase their work to peers, teachers, and even a broader audience, receiving instant feedback and encouragement. This collaborative aspect of AR learning promotes a sense of community and shared learning within the classroom. It also allows students to take ownership of their educational journey, tailoring their projects to their interests and learning styles, which can lead to deeper and more meaningful learning experiences.

Teachers, too, can benefit from the metaverse. For example, Beata Mirecka-Jakubowska, the founder and CEO of Intercultural Education Consulting Group, summed up her experience using UNIVERSE (a virtual campus for online learning from ViewSonic; **FIGURE 4.1**) at EDUtech Asia conference by saying, "It blew me away. I could walk between student groups and hear all the conversations. I could stop and talk but still hear other groups in the background. It was totally different from [video conferencing]" (Misha, 2023). To see the increased student engagement and interactions in the virtual learning environment, especially from students who were typically reluctant, was a game changer for her. Mirecka-Jakubowska encourages educators to "embrace the changes and embrace the challenges . . . embrace new technology and improve upon it to enhance learning" (Misha, 2023). ViewSonic's video *Discover a Metaverse Built for Education* offers a peek at UNIVERSE.

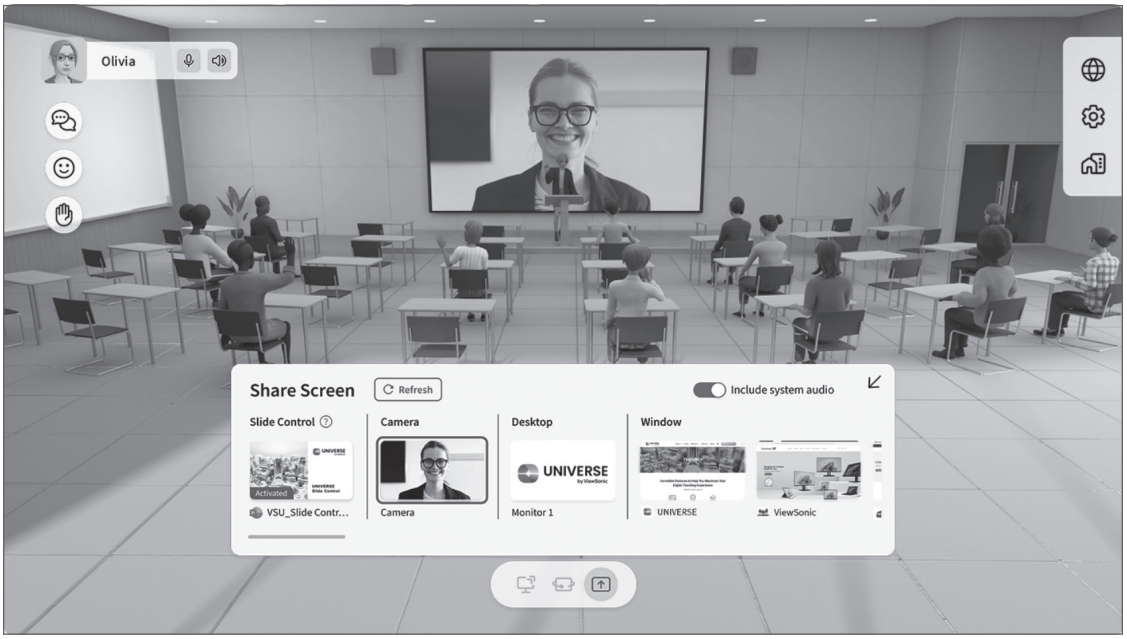

FIGURE 4.1
Sample image of a virtual classroom created in UNIVERSE

Taylor Shead, the founder of the learning platform Stemuli, embraces metaverse technology as well. In the "Metaverse of Learning" episode of the *Getting Smart* podcast, she discussed how the metaverse can create an opportunity for "increased equity and access in learning environments" (McClennen, 2022). Think about students who want to study a specific major that is offered only at distant or cost-prohibitive institutions of learning or about students with physical limitations that impede attending a university in person. The metaverse and rise of *metaversities* could be the answer.

The Rise of Metaversities

Over the past few years, post-secondary institutions have been using the metaverse to design learning experiences for students around the world. In June of 2022, for example, Stanford University unveiled the first virtual reality (VR) metaverse learning experience for students. The class was offered fully in VR, and students were provided headsets and used the platform Engage VR to enter the metaverse. More than 250 students took two courses and spent 3,500 hours learning together in the metaverse. Beyond learning about VR and the content of the course, part of their experience was engaging in a guided meditation in outer space (IBL News, 2022). In 2023, a cohort of schools including Morehouse College, New Mexico State University, Alabama A&M University, Loyola Marymount University, and several others throughout the United States partnered with VictoryXR and Meta to enable students to attend classes in virtual reality using Meta Quest 2 headsets (Paykamian, 2023).

At some universities, a professor can have a digital twin who is engaging with students in the metaverse space as well as in the physical classroom space (Schroeder, 2022). I had a chance to see this firsthand in the fall of 2023 when I attended the virtual ribbon cutting ceremony that the Paul Merage School of Business at the University of California, Irvine (UCI), held to debut their metaverse design. The physical school was replicated identically in the virtual space. Students who were learning at a distance could hear the same sounds and see the same environment as their on-site classmates, helping them feel more connected as they navigated their avatar around campus, entered classrooms, and interacted with classmates and professors. While many higher education institutions offer online learning, both synchronous and asynchronous, there is generally not the same level of social presence and connections with classmates and teachers as there is in the metaverse.

That same fall, Parker University, which focuses on healthcare, partnered with VictoryXR to create a realistic 3D environment based on its Dallas campus. Hundreds of 3D photos were taken of both building exterior and interior student spaces. Students can choose to take courses in the metaversity by wearing VR headsets or simply joining via a desktop computer. In addition to partnering with more than fifty higher education institutions internationally to create digital twin campuses (VictoryXR, 2024), VictoryXR also has its own metaversity campus. Based on the ENGAGE platform and called VictoryXR Academy, it offers more than sixty virtual reality classrooms (Murray, 2023).

In November 2024, Houston Community College leaders set a goal to take all students "into the metaverse" by the fall of 2025 (Dunlap, 2024). Chancellor Margaret Ford Fisher stated that AR and VR will be used in each of the nearly 100 programs that the college offers. The college wants to "establish itself as a pioneer of the use of artificial intelligence (AI), augmented reality (AR), and virtual reality (VR)" (Dunlap, 2024).

These examples show how through the metaverse, students can explore and be more immersed in what they are learning and thus be more engaged. Beyond learning with their peers, students (and teachers) can connect with classrooms around the world. By changing the permissions that are set in the gathering space, teachers can better control student interactions in the metaverse. The expense of tuition, room, board, and travel can limit access to higher education for some students, but the metaverse might offer a more budget-friendly option, thereby creating opportunities for students who might not pursue a degree otherwise. From the learning institution's perspective, the metaverse can also resolve such challenges as class sizes too large to convene in a physical space, not having enough local enrollment to run a course, or lack of materials due to budgets. By creating these environments in the virtual world, we can amplify the variety of opportunities for students.

For these reasons and more, a recent MarketsandMarkets report predicted that the use of metaverse technology in education will increase over the next couple of years, with an estimated growth from $3.9 billion to $19.3 billion in the global market predicted by 2028 (News Staff, 2024).

TECH INSIGHTS
TRANSFORMING EDUCATION IN THE METAVERSE AND 3D IMMERSIVE WORLDS

By Marcos Navas, teacherpreneur

In the realm of education, the rise of 3D immersive worlds and the metaverse presents a paradigm shift, offering boundless opportunities for innovative teaching and learning experiences. These virtual environments transcend traditional classroom boundaries, providing students with immersive, interactive spaces to explore, collaborate, and create.

Within these 3D immersive worlds, educators can design engaging learning environments tailored to diverse instructional objectives and student needs. From virtual classrooms and laboratories to historical reconstructions and simulated experiments, the possibilities are endless. Students can embark on immersive journeys, interacting with digital artifacts, engaging in collaborative projects, and experiencing hands-on learning like never before. Imagine how meaningful their learning experience would be!

The metaverse fosters social interaction and community building, which can then enable students to connect with peers, mentors, and experts from around the world. Through virtual events, conferences, and exhibitions, students can showcase their work, participate in cultural exchanges, and gain exposure to diverse perspectives. By harnessing the power of 3D immersive worlds, educators can ignite curiosity, inspire creativity, and cultivate essential skills in their students.

As the metaverse continues to evolve, its integration into education holds tremendous promise for transforming the educational landscape, bridging geographical divides, and democratizing access to high-quality learning experiences for all learners. Embracing 3D immersive worlds in education empowers educators to redefine the boundaries of traditional pedagogy, unlocking new dimensions of learning and discovery.

Moving into the Metaverse

A variety of platforms are available to engage with and create metaverse experiences. In an effort to provide a more immersive experience and closer connection among participants than what is experienced using Microsoft Teams, Microsoft developed a mixed reality platform called Mesh. With Mesh, you can engage in 3D experiences using a laptop without any other special equipment. For a fully immersive experience, you can use a Meta Quest headset (Microsoft, 2024c). Ready-to-use immersive, 3D experiences in Mesh are available, or you can create custom experiences with Microsoft's Mesh toolkit. For educators holding meetings with their PLCs, district meetings, or state-level meetings, the metaverse offers a unique way to interact with far-flung colleagues and a greater feeling of proximity. Educators can design their avatars and potentially experience a greater feeling of social presence online. Using a tool like Mesh could also increase opportunities for learning that may otherwise be limited due to financial or geographical constraints.

Another safe and secure virtual learning environment is ENGAGE. With this platform, educators can use whiteboard spaces, share their screens, and combine various types of media (360-degree videos, 2D and 3D content, music) in the virtual learning experiences. Because ENGAGE is also AI-enhanced, you can use AI-controlled avatars that students can then interact with verbally for role-play scenarios. Using the platform's library of 3D models and immersive learning locations, you can even create learning experiences that adapt to each student's needs in a more meaningful and personalized way. With ENGAGE, students can explore famous historical locations, take part in a simulation, explore a career, try an interactive lesson, and take advantage of many other possibilities to enhance and transform learning. Similar to Mesh, ENGAGE does not require the use of a headset, which increases accessibility for students and schools looking to create these immersive spaces for learning (ENGAGE, 2024).

A third option for schools is Prisms, a spatial learning platform where students can work on math and science problems or explore community issues in a simulation. Prisms offers libraries of curricula focused on math and science for Grades 7–11 and has plans to expand the modules to humanities and to create more math experiences for earlier grades (Prisms, 2024).

Preparing Students for the Future

Microsoft Mesh, ENGAGE, Prisms, and VictoryXR are just a few of the platforms available that give a glimpse at the future of education and work—but will they and the metaverse in general evolve into the rich environment predictions promise? If they do, how can we prepare our students for their future? That future may involve collaborating with colleagues through the metaverse or obtaining the job they want may depend on knowing how to safely and responsibly interact in the metaverse. Companies may shift to creating virtual spaces rather than renting large physical offices to save costs, or they may hire employees globally because of the ability to work in the metaverse.

Talking with your students about these metaverse issues and more is a simple and necessary first step to preparing them for their future. The eighth-grade students in my STEAM emerging technologies course always have lots of questions—and interesting perspectives. I like to use *Ready Player One* (either the book or the movie) as a discussion starter. The novel is set in a dystopian future where people live in a virtual world called the Oasis. The people live, work, and interact as avatars, which is a good analogy for the metaverse.

Showing the video *Mark Zuckerberg Explains the Metaverse at Facebook Connect 2021* is another good conversation starter. When I showed the video to my students, some of them also found Zuckerberg's vision on the metaverse a bit unnerving, conceptually, thinking about the differences and benefits of carrying out certain activities in the physical space compared to the metaverse. They had a lot of questions—and I did too! A few good follow-up videos that show simulated metaverse environments are:

- *The Future of Advanced Technology | Metaverse Insights with Philip Rosedale*
- *How China Is Using Artificial Intelligence in Classrooms*
- *I Spent 24 Hours Trapped in the Metaverse*
- *Is the Metaverse Actually the Future?*
- *The Metaverse in 2024*
- *This Is How #Walmart Envisions Shopping in the #Metaverse*
- *Understanding the Metaverse Through Young Eyes*

Some of them can be slightly disturbing, but they have led to great conversations in my classes about benefits and *drawbacks* of the technology. Let's take a closer look at a few. (For links to all of them, scan the QR code at the end of the chapter.)

Walmart Shopping in the Metaverse

Before I showed the video *This Is How #Walmart Envisions Shopping in the #Metaverse*, I previewed only parts of it. I decided I wanted to experience it as my students did, so I could relate better. The video shows a shopper, represented only by gloves and a cart, moving about a virtual store to purchase groceries and other items (**FIGURE 4.2**). At varying points, a Walmart employee avatar pops up to provide information and recommendations (**FIGURE 4.3**). A notification from the shopper's refrigerator (connected by the Internet of Things) also appears.

The video was interesting, for sure, and led to a great many discussions with my students questioning, doubting, and expressing concern about so many parts of it. They were slightly disturbed and slightly confused by what they saw. They questioned what the real benefits were of using technology to see into your refrigerator and "talking" to it about whether you needed an item. They also were fascinated about how a Walmart Auto Care Center could keep you informed about your vehicle repairs while you shop in the metaverse store. After seeing the video at least six times, I still have questions, too. I am still a bit unnerved by what I saw but can see the benefits of it as well. The key is finding how to best leverage this technology to benefit us, personally and professionally.

FIGURE 4.2
A shopper making purchases at Walmart in the metaverse

FIGURE 4.3
A Walmart avatar assisting the shopper and suggesting other purchases

24 Hours in the Metaverse

The video *I Spent 24 Hours Trapped in the Metaverse* chronicles *Wall Street Journal* columnist Joanna Stern's 2021 attempt to spend an entire day wearing a VR headset while interacting in the metaverse. Whether you share the whole video or a shortened version of it with your students, it will lead to fantastic discussions. I often begin by telling my students that I'm a fan of the Oculus headset and love playing Beat Saber and other games, but I still get tired of having the headset on for a long period of time. How long could you realistically and safely wear one, I then ask. The idea of wearing a headset for 24 hours can be daunting. Ask your students what kind of impact they think doing so might have—and see where the conversation leads.

AI in Classrooms in China

Years ago, I showed my classes the video *How China Is Using Artificial Intelligence in Classrooms*. It depicts students wearing sensor-filled headbands for extended periods in school; the headbands gather data about their attentiveness and concentration. During the video, students talk about the

physical, emotional, and mental impact of being monitored in this way and their knowledge of educators, parents, and even anonymous third parties having access to the data. This video also led to engaging discussions in my class about the benefits and concerns with this type of technology and what it provides to educators—and others who have access to the data.

Be a Devil's Advocate

During your conversations, remind your students that the companies that developed the games or metaverse platforms they access are probably collecting information—just like developers and corporations do when you visit a website. Discuss how that impacts their enjoyment of the experience and their comfort in the headset. I think the answer comes down to figuring out what works best for each of us, as an individual user, to take advantage of these technologies and make them work for us, whether personally or professionally. Don't hesitate to play devil's advocate. We want students to be curious but cautious, considering the benefits and concerns the metaverse brings.

While on one side, in the metaverse people will be able to interact, make purchases, work, and engage in leisure activities just as they can in the real world, they are represented by an avatar. Having this alter persona may make people feel more comfortable interacting with others and build confidence in the process. However, on the other side, being surrounded by so much visual stimulation, the uncertainty of whom we are interacting with and whether they are who they say they are also makes you think carefully about the benefits and drawbacks of the metaverse space.

Cautions and Security Considerations

The use of AI, AR, and VR within the metaverse can lead to very beneficial experiences in learning and for personal use. However, it is critical that we provide learning opportunities for all students in our schools so they can understand the potential negative impacts and how to stay safe in these spaces. Students must have opportunities to learn how to interact in these spaces and how to leverage the technology for good. Being proactive and focusing on the potential risks involved in engaging in work and learning in the metaverse is important.

Privacy and Pattern Tracking

Safeguarding our privacy and the privacy of students is critical. With all the technology we now use in our work, we need to know what happens with the information we share. Every website must

have information related to their privacy policies and whether they are in compliance with relevant laws such as COPPA and FERPA, for example. I have often said that users of a platform should not need to go on a scavenger hunt to find out what is happening to the information they provide to a site. Questions to keep in mind when exploring a new website or trying a platform, especially those that create a metaverse experience: What information is being accessed and exchanged? Are we being observed by an organization that we are possibly not even aware of? The answers to these and other questions can help us negotiate metaverse platforms safely and guide our students to engage in safe and responsible use of these technologies now and in the future.

Before diving into a metaverse platform and exploring in virtual reality, remember to carefully read the details that explain how your information may be used in order to avoid risks to your privacy and any data that may be obtained and stored for extended periods of time. AI can be used to analyze all of our online interactions, extracting data and identifying patterns in our activities, behaviors, and more. It can do this whether we want it to or not once we agree to the terms of service. I can't stress enough how important it is to read the fine print. As an attorney, I emphasize the importance of not signing an agreement or signing up for a service like a virtual reality app, for example, without closely reading the terms of use. The reality is that many people simply agree without reading the fine print and then are shocked at what has been done or could be done with their information. Always evaluate the terms of use and protect your information and the information of those you are working with. Model this behavior for your students and remind them to follow this important cybersecurity practice themselves. (See Chapter 6 for more tips.)

Remember that although we can control our actions and interactions in these immersive spaces, we cannot control the environment we are engaging in. That environment is controlled by a third party, which makes the use of these spaces a bit concerning. Imagine walking through the metaverse and looking around in different spaces, traveling to different locations, and interacting with others. While doing this, you are being tracked, possibly analyzed to see where you look, how you interact, what you say, and more. Just like with any other app and website, developers of these new platforms track user patterns—some to enhance the experience for us and some to leverage our data for their gain. Privacy protections are in place, but these are not total guarantees of safety.

When we think about the movements that we might take in these virtual worlds, we are moving in the spaces as an avatar. Within that space, the platform we are using is able to track our movements, our gestures, our posture, even the speed at which we move. It tracks where we, through our avatars, look. There are even more ways that it can track and analyze us and our activities, especially with the use of AI. All of this may be a bit unsettling; however, consider that surveillance cameras track us in the real world—from traffic cameras to shoplifting monitors to security cameras in airports and public buildings.

On an average day, when you leave your house and go to work or perhaps stop at the store, send emails or text messages, or look something up online, all of these things can be tracked to learn about you. Looking something up on Google or using GPS, you and your activities are being tracked. It's just that in the real world, we have a little more control, at least I think, in the actions that we take and what people see or learn from those actions, whereas in the metaverse, platforms track us in many different ways and we are not always aware of what information is being collected about us and who has access to that information.

There are headsets that can track facial expressions and use this to analyze emotions, for example. Also, depending on the system used, the motions that we make with our eyes, the way that we stand, and our overall body posture in general can provide additional and potentially personal information. While it helps to provide a more real and authentic immersive experience for the user, it's also kind of scary that we have technology that is capable of learning so many things about us and our preferences, just by slight interactions in an immersive world. Although you may feel that you are hidden behind your avatar in the metaverse, you have still entered personally identifiable information (PII) that can be used by the platform provider and potentially shared with third parties, without your knowledge. So, we have to carefully evaluate what information is being obtained from us, how we are being tracked, and what is happening with any data collected from our immersive experiences.

Accessibility and SEL Concerns

Beyond the potential benefits, we also need to consider any challenges that might be faced if companies, schools, and organizations decide to move forward with the metaverse. Enrolling in a school in the metaverse would enable students to learn from anywhere, which is beneficial; however, there are also some negatives. We have to think about things such as accessibility, privacy, and security, as well as how this environment will impact the development of socialization skills. For students with audio or visual impairments, this type of learning environment may not provide the necessary accommodations. If the goal of the metaverse is to promote greater accessibility and equity, then these are critical areas where companies and individuals need to focus their efforts in designing their virtual worlds. We want to ensure that everyone has access to explore these technologies.

When it comes to social-emotional learning (SEL), building relationships is essential for personal growth and for future success in the workplace. We have to question whether or how much existing in the metaverse will limit our interactions with others and whether it will negatively impact

social awareness and relationship building. While there are still benefits to being able to interact with others in the metaverse, it's also important to develop these skills in person. Whether we are in school or at work, we have to know how to interact with others and collaborate in the same physical space. If we exist completely in isolation by engaging in all aspects of life in the metaverse, what will the long-term impact of that be on us and on those who we interact with? And if the use of VR headsets becomes more common, what are the long-term health effects of this? (These make great questions in a classroom discussion, as well.) One important lesson we learned during the time we had to make shifts between virtual and hybrid learning and the necessary reliance on technology is that we need to find balance and focus on well-being when it comes to technology and our dependency on it.

I asked my students for their thoughts and they had some of these same concerns. While some thought that it would be "cool" to be able to learn, work, buy things, and explore in the metaverse, other students did say that it could serve to further isolate people from one another. One student said, "You would just be by yourself, it's not the same, even if you are talking to someone in that space."

These are just some of the things to consider before we see greater buy-in and belief in the potential of the metaverse. There are some problems that need to be resolved first (Eisikovits, 2022). In a virtual world, we have to be mindful of issues like cyberbullying. Cyberbullying is not something new, but in the metaverse space, it goes to another level. Again, there are possibilities and responsibilities and we have to do our best to gather as much knowledge as we can so that we can guide and support our students.

Environmental Impact and Sustainability

Another concern about technology is its impact or potential impact on the environment. From a sustainability perspective, for example, what is the impact of the energy consumed by cloud computing? Creating and using metaverse spaces at an increased level will require a significant increase in electricity to maintain them, as well as all the technologies used within them. With enhanced and rapidly advancing technology, devices will need to undergo continuous updates to stay current with the demands that the metaverse would create. Although this leads to increased spending on new devices, which benefits businesses, it also leads to an increase number of devices that need to be disposed of, which could be a detriment to the environment if proper methods for disposing of computers and other electronics are not followed. These issues are a great way to involve students in some research to learn about the energy used and its impact, and they can be asked to present potential solutions. It is also a good topic for a debate in class to get students thinking at a higher level and collaborating.

RECAP: CHALLENGES AND CONCERNS OF THE METAVERSE

- **Accessibility and inclusivity:** To be of benefit, the metaverse needs to be accessible to everyone. For people with disabilities or learners who have diverse needs and backgrounds, it is essential that options be available for everyone to fully experience the metaverse functionalities.
- **Technical limitations:** Current technology may not yet be able to fully support and maintain a truly immersive metaverse experience. We have augmented and virtual reality tools, but we need to also consider the cost of these tools and to conduct ongoing audits to check that they are sustainable for the metaverse experience being created.
- **Privacy and security risks:** As with all technology, user data and privacy need to be protected in the virtual world. Security measures need to be carefully thought out and implemented to prevent cybercrime such as identity theft and data breaches, in addition to more serious crimes committed against people when in the metaverse (see Chapter 6 for more detail on these issues).
- **Ethical considerations:** The potential impact of the metaverse on mental health, social interaction, and addiction requires careful consideration and the creation of frameworks to use for guidance. The use of technologies such as AR and VR, especially in the space of the metaverse, can become addictive or lead to a decrease in socialization skills. Finding balance and avoiding overreliance are important considerations to be mindful of one's well-being.

Cybersecurity in the Metaverse

With the easy ability the metaverse offers to exchange information, including personal data, it is more important than ever to have guidelines and safeguards in place so that students and educators know how to protect themselves in these spaces. Data breaches can happen, unleashing a cyberattack that wreaks havoc on a school network or personal network. These events can lead to identity theft, financial losses, long-lasting effects to one's mental state, and even damage to one's reputation. Identity theft and creating a persona that appears to be the real person are not new problems; they have plagued social media users for years. On Facebook and Instagram, duplicate accounts often are set up for fraudulent reasons and bogus friend requests come through with real-looking profiles. The account may have the same name, photos, and similar posts as a legitimate user, and only close evaluation reveals the clues that mark it is a fake—additional numbers in the username, odd questions it sends through Messenger, or strange requests being made. Many people have experienced the frustration of someone gaining access to their social media account, mistakenly opening a phishing email, or clicking a link that leads to malware. The effects can be long-lasting on the individual and those in contact with the individual. Now imagine trying to identify a fake avatar or deceptive metaverse account—and fending off its requests in near real time.

With the increased reliance on the internet for work, learning, and personal use and the subsequent increase in cyberattacks, it comes as no surprise that cybersecurity is a top in-demand career. For a deeper discussion of the risks, the skills our students need to protect themselves (or prepare for a career to protect others), and how to evaluate the security of digital spaces, see Chapter 6.

TECH INSIGHTS
THE VIRTUAL BEYOND

By Vriti Saraf, co-founder of Ed3 DAO (ed3dao.com), founder of k20 Educators (k20educators.com), and former teacher and school administrator

At the Fast Company Innovation Festival in New York City, I explored the potential of VR technology for the future of education, work, and life itself, with Meta's vice president of Americas. We imagined a world like *The Magic School Bus*, where students could dive into the human body as a cell or simulate the past for a history lesson, or wander through the universe.

This virtual concept isn't new; video games have teased it for years. But the pandemic's push toward remote work, giving rise to build-your-own 2D and 3D VR spaces, truly opened the doors to real-life Miss Frizzles. I've seen it firsthand: lessons on human anatomy where students are rotating a beating heart 360 degrees, learning French by teleporting to a café in Paris to order a baguette, and global convenings where educators choose their own learning adventure as an avatar at the base of a mountain modeled after the Swiss Alps.

So, why does VR feel so revolutionary? What is its potential?

Across the spectrum of fully immersive (wearing VR goggles), semi-immersive (sitting in a vibrating, fake racecar at an arcade), and non-immersive (controlling an avatar on your computer) experiences, VR can have a profound impact on the human psyche. For me, it boils down to two frameworks.

The why is guided by a framework I developed called E4D. VR is impactful because of four Es: the virtual *Environment*, avatar *Emotions*, human *Embodiment*, and learning *Enrichment*. These four elements or *Dimensions* can alter the way people see reality, even momentarily, to make learning deeply immersive and personal. So, imagine an avatar who is confident, creative, and curious, simulating public speaking or making new friends, for a student who is hesitant to take those risks in real life.

Stanford's Jeremy Bailenson adds the what layer with his DICE framework. Virtual spaces should be used when a learning experience is: too *Dangerous* (experiencing war), *Impossible* (going back in time), *Counterproductive* (inhaling carbon monoxide), or too *Expensive* (traveling abroad).

As my session at Fast Company wrapped up, the discussion took an unexpected turn that provoked the 500-member audience and Meta's PR officers to verbally gasp. We were asked: "If you could experience anything in a virtual world that may not yet be possible, what would it be?"

The other panelists gave lovely answers about travel and simulating flight, but my mind raced with the endless possibilities of virtual worlds, culminating in an answer that initially shocked but ultimately led to a profound discussion: experiencing "death" through VR. This exploration wasn't about morbidity but about understanding and pushing the limits of empathy and comprehension. What are we unable to do in real life that could change how we think? Could we experience out-of-body simulations with the help of artificial intelligence? Could we stretch the learning experience beyond standards and lessons into deep recognition of the human condition?

Where we go next will chart the course of future generations' learning experiences, challenging us to envision a world where the possible becomes probable, and the learning journey transcends the confines of the physical world.

TECH INSIGHTS
SUPPORTING NEURODIVERSITY WITH IMMERSIVE VIRTUAL LEARNING ENVIRONMENTS

By Jessica Barberry, MEd, PMP, edtech professional with National Geographic Learning; and former special education teacher, school leader, and virtual world builder

Immersive digital learning spaces reduce inequity by opening the door of differentiation for all learners if educators have the imagination to build them and the opportunity to try. Virtual world experiences are real-world experiences, valuable to student learning and development. Often, new frontiers in education that hold the promise of help are first populated by venture capitalists, large corporations, and, if we're honest, entities that may not have the best interest of teachers and students in mind. This is why it's important to bring as many curious educators, education leaders, and forward thinkers into the conversation of virtual spaces for learning. Here are some tips to help you begin your journey.

- **You try it first.** 64% of students with disabilities from ages six to twenty-one spend at least 80% of their time educated in general education classrooms (U.S. Department of Education, National Center for Education Statistics, 2021). Odds are, if you are in the K–12 ed sector, you have a co-teacher or teaching team who guide your practice. So, enter a template space together and explore with them. There are a few free options like Gather Town, ZEP, and FrameVR, depending on your environment's technology capabilities. As you do, remember that virtual worlds offer inherent opportunities for student collaboration and high rates of feedback. Bonus: This is considered a high-leverage teaching practice that fast-tracks student learning gains. As you explore with your colleagues, envision concepts or content that have been a challenge to teach and consider how a virtual space could make these complex skills explicit, collaborative, and fun.
- **Pick your pedagogy.** Already co-teaching? Remember that effective co-teaching involves small group learning with each teacher leading at the same time while also affording independent collaboration between students. Consider templates or create maps to facilitate this practice. Using the Gradual Release of Responsibility model? Utilizing a virtual environment during the We Do phase allows teachers, other students, and technology to provide corrective feedback and models of success immediately and at high rates within an engaging environment.
- **Use virtual environments to your advantage.** While a wrench can be a hammer and might get the job done, it won't do it well. What does this mean? Pick your virtual environments wisely. It is a *tool*. Your aim is to provide as many practice turns and feedback as possible. When used intentionally and with structured pedagogy, your virtual environment will lead to student growth. When used as an afterthought, it may initially boost engagement but ultimately lead to student disappointment. Without a small amount of pre-planning, it will be easy for teaching to slide back into a passive "sit and get" learning model that virtual worlds promise to avoid.
- **Brainstorm simple community guidelines for working in your new virtual spaces.** Keep them short, positive, and focused on the types of behaviors students can engage in to be successful. Ensure all teachers on your team are ready to pre-teach these to students before expecting them to perform in these spaces. Once this instruction has taken place, ensure teachers are comfortable allowing students many opportunities to practice these skills with teacher feedback and support. National Geographic Learning recommends posting guidelines somewhere inside the space and referring to them frequently as activities progress. Be sure to point out students or collaborative groups who are following them and specifically state how they are able to do so. When students require correction, do so privately by engaging a private space tile effect (specific to Gather Town) or have a designated "private" area where conversations of this nature take place.

- **With these guardrails in place, invite students.** Remember the wonder of your first experience in a video game or digital space? You were there for fun and had the freedom to explore with zero stakes. Give this gift to your students. Many of them are socializing together in gaming environments and have been since they could hold a controller or type (and maybe you have, too). Expect some students to be hungry for more collaborative activities and expect some to need additional guidance. This is why it is recommended that students spend a class period inside a map that offers areas for each experience level; a quiet space, a space to socialize, and a challenge space that requires collaboration.

ENVIRONMENTAL DESIGN

Immersive virtual learning environments are a golden opportunity for students with learning needs. When a student has an Individualized Educational Plan (IEP) or a 504 plan, specially designed instruction (think academic and social supports) is put in place to support access to general education content and grade-level standards. Often, specially designed instruction is delivered by an adult to a student that can, over time, lead to overreliance on adults to learn. By marrying technology and design, immersive virtual learning spaces can prompt, guide, or remind students, in place of adults. These spaces naturally encourage student autonomy by sparking wonder and curiosity. Additionally, they invite collaboration and can help students who were once unwilling to interact with others to work together positively instead. When these environments are designed intentionally, you can use technology to provide learning support that reduces learned helplessness and frees teachers to closely supervise and support positive student collaboration, practice turns, and feedback, which is the point. Good instruction in any setting is not about what teachers do but what students do.

So, let's take a look at what students should be doing. Successful learning environments feature high levels of student engagement, access to flexible student working groups, and high levels of student success. In order to consistently build learning spaces that check these boxes, I recommend you find as many ways as you can to place control of your classroom spaces into the hands of your students. This is a tall order if you work with students who are legally required to be in your classroom (as most K–12 students are). Inside immersive virtual learning environments, collaborative interactions can be better controlled by students than in real life. For example, there is less emphasis on eye contact. This allows collaboration to occur more frequently and with a greater sense of comfort when compared to in-person learning. While working within an avatar-based environment, it's easy for teachers to monitor participation by observing avatar movement and monitoring audio channels in private learning spaces. This practice eliminates the well-documented fatigue that accompanies video calls as reliance on a working camera is reduced or eliminated. Once our

school team adopted a camera-optional approach, we found all students were requesting to use cameras more often. While these choices were small, we noticed more instances of powerful learning, higher rates of engagement, and requests for more opportunities to learn in these spaces. Everyone wanted to be involved.

As educators embark on this journey, it's crucial to recognize the potential pitfalls and ensure that these virtual spaces are designed with the best interests of teachers and students in mind. Rather than being solely driven by venture capitalists or large corporations, it's essential to involve educators, education leaders, and forward thinkers in the conversation to ensure that these environments are pedagogically sound and serve the needs of learners effectively. Ultimately, the goal of integrating immersive digital learning spaces into education is not just to enhance what teachers do but also to empower and engage students in meaningful learning activities. By placing control of these spaces into the hands of students and embracing innovative approaches to teaching and learning, educators can create environments where all learners thrive and succeed.

Lessons You Can Use

To get started in your classroom, I recommend at first having a discussion about what students already know about the metaverse. Ask whether they think they have been in the metaverse and if so, how? Expand the discussion by showing some of the videos and then shifting the conversation about learning in the metaverse to focus on working in the metaverse. Here are some guiding questions or topics to consider:

- How is working in the metaverse defined?
- Is our information truly protected?
- Are there procedures in place for dealing with potential crimes that can happen in the metaverse, and what are some examples?
- What are the crimes that can occur and be recognized in the metaverse?

Note that there may be no "right" answers to these questions: Legal teams are just starting to deal with issues that have come up regarding crimes or potential crimes occurring in the metaverse. For more information and links to the videos suggested in the lessons that follow, scan the QR code at the end of the chapter.

Lesson Plan 4.1: Introduction to the Metaverse (Grades 4-8)

Subject: Computer Science, Technology
Duration: 90 minutes

Objectives

- Students will understand the concept of the metaverse and its key components (AR, VR, avatars).
- Students will explore and discuss how the metaverse can be used in education and the world of work.

Materials

- Projector and video(s) about the metaverse (*Mark Zuckerberg Explains the Metaverse* or one of the others recommended in this chapter)
- Paper and pencils for students to write notes, questions, or a reflection
- Set of notecards with a metaverse use written on each (education, entertainment, social interactions and hobbies, travel, work)

1. Introduction (15 minutes)

Warm-Up Discussion: Begin class with a short discussion with students. For example, ask students, "Have you heard of the metaverse?" "What do you know about the metaverse?" "Have you ever used VR or AR technology?"

Teacher Explanation: Define key terms (metaverse, VR, AR, avatars) and explain the role of avatars in virtual spaces.

2. Video and Discussion (15 minutes)

Show one of the videos to introduce the concept of the metaverse. After the video, ask students to consider how the metaverse could change the way we learn and work.

3. Metaverse in Different Sectors (20 minutes)

Group Activity: Divide students into small groups, and have each group randomly select a card that lists a potential use of the metaverse. Give each group time to find information about how the metaverse could enhance their selected activity, as well as possible concerns. After they've had a chance brainstorm ideas, ask them to share their findings.

4. Create Your Own Metaverse Space (30 minutes)

Individual or Group Activity: Ask students to come up with an idea for a metaverse space. What type of space would it be, what activities could people engage in, and what would they do to ensure

safety and privacy? Have students then create a mockup of the space, present the idea to the class, or write about it.

5. Reflection and Wrap-Up (10 minutes)

Ask students to share something new they learned, as well as additional questions or concerns they thought of during the lesson.

Assessments

- Participation in group discussion
- Completion of individual activity
- Presentation or written description of the metaverse design

Lesson Plan 4.2: Exploring the Metaverse for the Future of Work (Grades 9–12)

Subject: Computer Science, Technology, Enrichment
Duration: 50–60 minutes

Objectives

- Students will understand the metaverse and its capabilities.
- Students will explore how the metaverse prepares students for future work environments.
- Students will discuss safety, ethics, and the potential challenges in the metaverse.

Materials

- Projector or interactive whiteboard
- Access to videos such as *The Metaverse Explained and What Comes Next* or *Exploring the Metaverse: The Future of the Internet*
- Laptops or tablets
- Metaverse platform (age appropriate)

1. Introduction (10 minutes)

Warm-Up Discussion: Begin with questions: "What do you know about the metaverse?" and "Have you experienced any interactions in the metaverse?"

Teacher Explanation: Review key terms: metaverse, AR, VR, avatars, blockchain technology, and NFTs.

2. Video and Discussion (10 minutes)

To spark conversation, show videos, such as *What Does It Look Like Working in the Metaverse? The Future Is Now*, *Exploring the Metaverse: The Future of the Internet,* or *Discover the Future of Education in the Metaverse*. Discuss key points from the videos, and ask students to identify differences between the real-world learning and work compared to immersive learning in the metaverse.

3. Applications in the World (15 minutes)

Group activity: Divide students into groups. Assign each group to explore a sector of work or learning where the metaverse is applied. You can find examples in the virtual labs available through Labster, engage in simulations via ENGAGE, or even use educational tools like Roblox's learning platform. (When choosing a platform, be sure to check age appropriateness and compliance with applicable privacy laws.) Give groups time to find information, then have each group present to the class about how the availability of these tools impacts learning and work now, potential impacts in the future, and potential concerns such as accessibility and data privacy.

4. Interactive Design Task (10 minutes)

Ask students to outline their vision of a classroom or work environment in the metaverse. What features would it have? How would they ensure user safety and ethical standards? What other considerations do they need to think about? Encourage creativity and a focus on collaboration and inclusivity.

5. Reflection and Wrap-Up (10 minutes)

Conclude with a class discussion on what students learned, their questions, and thoughts on whether the metaverse's promises align with educational needs. Introduce concepts like balancing physical and virtual interactions to prevent isolation and maintain social skills.

Assessments

- Group presentations and participation
- Student notes and reflections
- Design task submission

Extensions

Explore platforms such as Avanti's World for immersive science experiences or Prisms for math and science simulations. With these platforms, students can visualize concepts in a more immersive way or engage in interactive simulations and experiments. Have students discuss the benefits of these technologies and if there are any ethical concerns.

Discuss the environmental impact of large-scale metaverse adoption. For example, students could research the amount of energy required to run a virtual world and propose solutions. Another option is for students to learn about the impact of the metaverse on the digital carbon footprint.

Lesson Plan 4.3: Ethical Considerations in the Metaverse (Grades 6-12)

Subject: Any
Duration: 50 minutes

Objective

Students will critically examine ethical concerns surrounding the use of the metaverse, including privacy and security.

Materials

- Ethical dilemma scenarios
- Worksheet for reflection

1. Introduction (10 minutes)

Ask students what concerns they have about interacting in virtual spaces. Introduce the concept of digital citizenship and privacy in the metaverse.

2. Scenario Discussion (20 minutes)

Present students with various scenarios related to privacy and security in the metaverse (data collection, avatar identity theft). Divide the class into small groups, and have students discuss potential solutions and responses to each dilemma.

3. Class Discussion (15 minutes)

Facilitate a class discussion on the ethical use of the metaverse and how students can protect their privacy.

4. Reflection and Wrap-Up (5 minutes)

End with the reflection question: "How can we ensure our safety and privacy when interacting in the metaverse?"

Assessments

- Participation in class discussion
- Research conducted to respond to the reflection question

Resources to Learn More

To learn more about the platforms available and some ideas for creating a virtual learning space, see the following list. Each website offers examples of spaces and some offer libraries of activities to do in these spaces. Scan the QR code at the end of the chapter for more details.

- **Edverse:** This education metaverse offers a variety of options for virtual learning. You can create classrooms for online classes, personalized courses, extracurricular activities, and even for parent-teacher meetings or professional development.
- **Engage:** Specializing in AI, VR, and the metaverse, this development company offers a library of educational content that provides immersive learning experiences for students in grades K–12.
- **Microsoft Mesh:** Microsoft offers Mesh as a platform to create an immersive meeting or learning space. While it is primarily used in higher ed and in the workforce, educators can set up integration with Microsoft Teams, explore the platform to learn about its features, and ultimately use it to help students understand and experience the metaverse to prepare them for future careers.
- **Prisms VR:** This immersive learning platform provides opportunities for students to explore math and science concepts via virtual simulations.
- **ZEP:** This metaverse platform enables you to create your own metaverse space or select from a library of spaces, including a school classroom and campus.

Key Takeaways

Although we must continue to be mindful of challenges and concerns when engaging in a metaverse experience, the technology offers many potential benefits. Immersive and likely impossible learning opportunities, such as traveling and exploring, working closely with peers from around the world, and providing an education to someone who otherwise would be unable to attain it are just a few of the benefits the metaverse holds for the field of education. To best prepare all students, we must provide opportunities to work with the technology and continue to learn with and from our students. (*2.1.c Learner, 2.4.b Collaborator*)

In the world of work, the metaverse promises the ability to work remotely yet feel more connected to colleagues, as well as to obtain work in a completely different geographical area without the need for travel. For fun or education, the metaverse offers the potential to attend a concert, lecture, game, or movie no matter how distant it is from our homes or classrooms. (*1.7.d Global Collaborator*)

At the same time, students need to understand how to engage in these spaces and take part in these experiences in safe, ethical, and responsible ways, as well as how to protect their personal data. (*2.3.c Citizen, 1.1.d Empowered Learner, 1.2.a and 1.2.d Digital Citizen*)

There are so many possibilities, and we are just at the beginning of what will likely become an even bigger means of learning and working in the future.

Questions for Reflection

After reading this chapter, take a moment to reflect on what we have covered:

- What are some of the benefits of learning in the metaverse that you see for students in your own classroom?
- What are the biggest challenges with getting started with the metaverse, and what ideas could you share to help other educators?
- How does the metaverse help with promoting accessibility, especially for students who may face financial or geographical barriers or physical limitations?
- How can a space such as the metaverse be used to foster global awareness and promote collaboration in learning?

Connect and Share

Scan the QR code to access helpful resources related to the content discussed in this chapter. Have an idea to share? Connect with me on X @Rdene915, or post a message on LinkedIn.

tinyurl.com/WhatTheTechBook