

Digital Leadership

Changing Paradigms for Changing Times

Second Edition

Eric Sheneringer

Foreword by Sugata Mitra

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A Day in the Life of a Digital Leader

Since 2009 I have been a digital leader. Each day as a principal, my day began like any other. I would arrive at school, greet the administrative assistants, and then boot up my computer. For the next couple of minutes, I put the finishing touches on the staff e-mail message of the day. This is the point at which things might be a bit different for me when compared to other administrators.

As I worked on the daily e-mail, my Twitter stream was also visible through an application called TweetDeck. I browsed the many tweets from members of my Personal Learning Network (PLN) to look for resources to include in the e-mail to my staff. Typically, I would find free web-based tools that my staff could integrate into their lessons to review prior learning, check for understanding, or provide digital closure. These tools were also curated in Diigo, a social bookmarking site, and in Pinterest for my staff and me to refer to when needed. I then quickly finished up my e-mail, sent it off, and again browsed my Twitter and Flipboard streams to catch up on the latest developments in education.

My next morning tasks consisted of updating announcements for students on a Google Doc that they could access on the school website. Once these were finished, I posted the link on our school's Twitter and Facebook pages, and a notification was sent out through our official school app the NMHS students helped to develop. Prior to homeroom beginning, I updated all of the school social media accounts to keep stakeholders abreast of the latest developments and news related to the school.

The day finally began around 8:00 AM. Armed with my smartphone and tablet, I would proceed to walk the halls, observing classes and conducting walk-throughs. My admin team and I conducted numerous walks a day, and information was collected using a Google Form and then later reflected upon, so teachers could receive timely, non-evaluative feedback related to improving pedagogy. I also conducted one to two formal observations a day using a digital platform from McREL. After each observation, teachers uploaded artifacts related to pedagogy and school culture for review, feedback, and an eventual discussion on how to grow and improve.

As you can see, the majority of my time during the school day was spent in classrooms. I used this time to not only evaluate instruction, but to also look for opportunities to consistently share student work and accomplishments using social media tools such as Twitter, Instagram, YouTube, and Facebook. I loved to capture innovative lessons and projects that my teachers had implemented, where technology was used in a purposeful way aligned to deeper thinking and relevant application. It was quite common to see teachers using web-based response tools to have students text in their answers to a do-now question. There was nothing more exciting than seeing students using their mobile learning devices to answer questions, engage in vibrant discussion, and collaborate on digital projects. This not only enhanced the learning experience but also prepared my students better for the real world, where digital devices are essential tools in many professions.

I eventually would pop back into my office to attend to the usual management tasks that often consume school leaders. However, time was always allocated to peruse through and comment on articles that my digital journalism students posted regularly on *The Lance*, the school's official newspaper, which was available only in digital format. I usually learned about this as they posted updates on the Twitter page that was created for the class in order to report stories in real time and promote their work.

During lunch, my administrative team and I would take turns supervising in order to free up teachers so that they could use the time to learn and grow professionally. As we were a Bring Your Own Device (BYOD) school, students were seen freely using their devices to socialize, complete assignments, conduct research, or organize their day. I seized the opportunity regularly to get Minecraft tips for my son, but also to catch up on completing observation write-ups

using either my laptop or tablet. Thanks to our school's Wi-Fi and mobile charging stations, I could work seamlessly anywhere in the building. Working in the presence of my students was an added bonus.

The afternoon was usually composed of the same tasks and instructional duties as the morning. As I travelled the halls, I peeked into classrooms and would see students using their mobile learning devices to take pictures of notes the teacher had placed on the board, create learning artifacts, and collaborate on assignments. As the student day ended, I worked to make sure every managerial task had been completed. I then used the next couple of hours to blog about the great things I saw during the day and catch up on the chatter in social media spaces to acquire resources for my teachers and improve professional practice.

I was a digital leader, connected not only to my school, but also to a global network of educators that had evolved into my most treasured resource. This network consisted of tens of thousands of educators from six different continents. As a building leader in a small school, I was able to attend to and complete every major job task, such as observations, walk-throughs, new standard alignment, curriculum revisions, preparing for new teacher evaluations, budgeting, master scheduling, meetings, and other managerial issues. What distinguished me from most other school principals, though, was that I had learned to integrate a variety of digital tools and strategies to enhance all the facets of how I led. Digital leadership was not an add-on, but a complement to everything that I did as a principal and what I now do as a thought leader in the education space. It is not a time sap, either; instead, it is a different way of leading that is richer, more effective, more efficient, and better informed.

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How the Learning Landscape Has Changed

1

Today's kids are born digital—born into a media-rich, networked world of infinite possibilities. But their digital lifestyle is about more than just cool gadgets; it's about engagement, self-directed learning, creativity, and empowerment.

—Edutopia (2012)

THE FOURTH INDUSTRIAL REVOLUTION

Change isn't coming, it's already on our doorstep. Do you like change? If you do, then living in the present is an exhilarating experience. For those who don't, buckle up, as we are only going to see unprecedented innovation at exponential rates involving technology. You can't run or hide from it. The revolution, or evolution depending on your respective lens, of our world will transform everything as we know it. We must adapt, but more important, prepare our learners for a bold new world that is totally unpredictable. Welcome to the fourth Industrial Revolution.

In *Learning Transformed*, Tom Murray and I looked in detail at the disruptive changes we are all seeing currently, and also those that are yet to come. Here is an excerpt:

Today's pace of technological change is staggering, and the speed of current breakthroughs has no historical precedent. Consumers may seem well-versed with the latest personal gadgets, yet growth in artificial intelligence (AI), robotics, autonomous vehicles, the internet of things (IoT), and nanotechnology remains hardly known except to technology gurus who live and breathe ones and zeros. The coming interplay of such technologies from both physical and virtual worlds will make the once unthinkable, possible.

We believe that we are in the first few days of the next Industrial Revolution and that the coming age will systematically shift the way we live, work, and connect to and with one another. It will affect the very essence of the way humans experience the world. Although the 2000s brought with them significant change in how we utilize technology to interact with the world around us, the coming transformational change will be unlike anything mankind has ever experienced (Schwab, 2016).

The Fourth Industrial Revolution, toward which we are facing as a society, is still in its infancy but growing exponentially. Advances in technology are disrupting almost every industry and in almost every country. No longer do natural or political borders significantly reduce the acceleration of change.

Today, we are taking our first steps into the Fourth Industrial Revolution, created by the fusion of technologies that overlap physical, biological, and digital ecosystems. Known to some as Industry 4.0, these possibilities have been defined as “the next phase in the digitization of the manufacturing sector, driven by four disruptions: the astonishing rise in data volumes, computational power, and connectivity; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction such as touch interfaces and augmented-reality systems; and improvements in transferring digital instructions to the physical world, such as advanced robotics and 3-D printing” (Baur & Wee, 2015). Such systems of automation enable intelligence to monitor the physical world, replicate it virtually, and make decisions about the process moving forward. In essence, machines now have the ability to think, problem solve, and make critical decisions. In this era, the notion of big data and data analytics will drive decision-making. (2017, pp. 16–17)

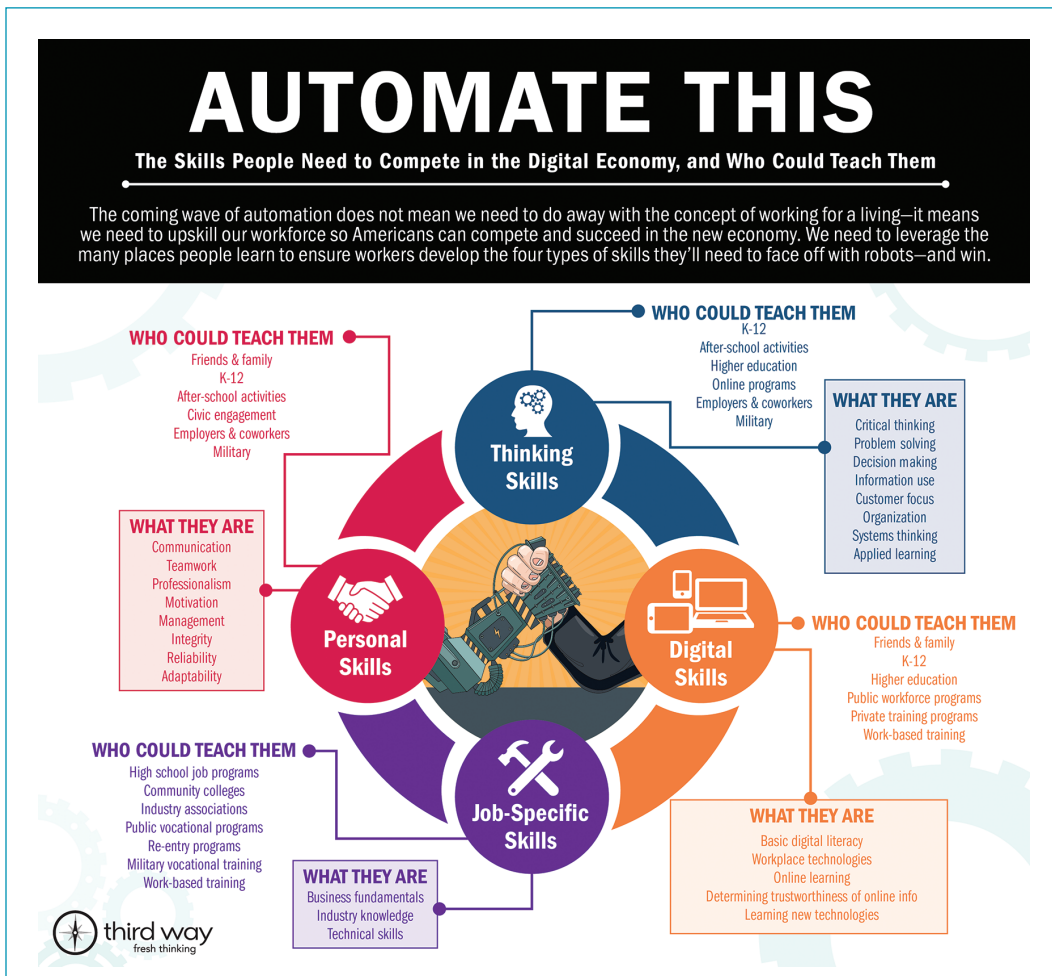
To prepare learners for success during the fourth, or even fifth, Industrial Revolution, the notion of education has to change at scale. If all of the change we are seeing has taught us one major lesson, it is that schools must prepare kids to do anything, not something. Having current and future generations go through the motions and “do” school just won’t cut it. Just because it worked for us as adults, does not mean it works—or even serves—well for our learners. The transition to the fourth Industrial Revolution does not spell doom and gloom for society as we know it. The idea here is to be proactive, not reactive, and to understand where opportunities lie for growth and improvement in education systems across the globe.

Figure 1.1 provides insight on what students need to compete in an automated world.

TECHNOLOGY AND SOCIETY

Societal shifts involving technology are beginning to have a profound impact on teaching, infrastructure, resources, stakeholder relations, and our learners. The opportunities include greater access to rich, multimedia content; the increasing use of online courses that offer classes not otherwise available; the widespread availability of

Figure 1.1 Automate This



Source: Third Way (2018)

mobile computing devices that can access the internet; the expanding role of social networking tools for learning and professional growth; and the growing interest in the power of digital games for more personalized learning (*Education Week*, 2016). For our learners, a big part of their world is now online in some way. Understanding these shifts is key to developing a culture of learning that best meets the needs of our students while showing value to stakeholders.

There is a growing trend when it comes to people's use of technology, and that is use continues to increase exponentially. All one has to do is take a peek at the data sets, publications, and fact sheets

compiled annually by the Pew Research Center (www.pewinternet.org/) to see not only the latest use, but also historical trends. The proliferation of technology and ease of access has resulted in changes to behavior. A study conducted by Andreu Casero-Ripollés (2012) found that young people's news consumption was oriented toward new media, especially social networks, while newspaper readership among young people declined. Wi-Fi is a staple in the industrialized world, and over time will be the new normal for even some of the world's most rural and isolated areas. Kids will enter a workforce that is influenced by new technologies. To be successful in a changing economy, students must learn to think algorithmically and computationally, and to solve problems with varying levels of abstraction (Jacob & Warschauer, 2018).

It is apparent that the majority of our students, stakeholders, teachers, and administrators are engaged in online spaces and have ample means to access the internet. Within this space, they are creating, communicating, collaborating, and discussing. This is occurring on and across a variety of sites and through the use of both mainstream and emerging tools. People from all walks of life find value in the amount of time spent using technology to connect with friends, read digital content, play video games, and create their own unique content. It is hard to deny the high level of engagement and interactivity that is taking place, all of which supports the outcomes that schools claim they want to enhance. This is the world into which our students are born and within which all members of society are immersed. The conversation needs to shift from one that focuses on digital natives and immigrants to one that looks at the fact that technology now permeates virtually every facet of society. As technology and the world continue to evolve, learners will continue to adapt. There is no time like the present for schools to follow suit and embrace change.

The statistics and facts that are continually shared by the Pew Research Center paint a general picture of society's increasing use, reliance, and infatuation with the internet and other technologies. Access to information in real time has become the standard, spearheaded by the continuous rise and evolution of social media sites. With the proliferation of evolved mobile technology, cheaper devices, and advances in wireless connectivity, it can be assumed that the majority of the world will be connected sooner than we think. With this information in hand, it is best to be proactive

rather than reactive. Will your learners be adequately prepared for a world that is now almost impossible to predict based on exponential advances in technology? If not, then what are you willing to do to get your classroom, school, district, or organization moving in a better direction?

Society has a craving for accessing the internet for a variety of purposes and now possesses the means to connect in many ways. In response to these shifts, some educational leaders have begun to recognize that the current structure and function of institutions of learning are not in tune with the real world that is continuously advancing beyond the walls of schools. Finally, conversations are taking place on how schools and leaders can take advantage of the phenomena associated with this digital-age renaissance. Once sparsely connected, schools now invest in wireless networks that connect throughout buildings to the internet. Having the infrastructure in place is one thing; using it to advance learning and enhance other facets of leadership is another. Schools can no longer be wary of venturing into the world of social networking during school hours. We now have a generation of learners who are comfortable with and enthusiastic about using digital tools to collaborate and participate as creators rather than consumers. The calling now for all educational systems and leaders is to empower students to learn in powerful and meaningful ways like never before.

Change at scale has progressed at a snail's pace as a result of fear, lack of initiative, unwillingness to change, or not knowing where to begin. This has led to a natural disconnect in many cases between schools and those they serve—our learners. The longer this disconnect continues, the more meaningless and irrelevant our schools become to our students, who yearn for—and quite frankly deserve—more from the education they receive. It is time to transform schools into vibrant learning communities that are connected and allow access to numerous avenues that can unleash the creativity of our learners. This will increase engagement and, ultimately, achievement. By understanding how reliant all stakeholders are on the internet, leaders can develop strategies to better communicate information, enhance public relations, collaborate with other practitioners, discover opportunities to improve school culture, and be open to a nonstop pathway of new, innovative ideas.

The internet is not the only thing that continues to change. The advancement of existing technologies as well as the introduction of

new tools has created a rich market for schools to utilize. Schools adopt educational technology to

- increase student engagement.
- improve learning (i.e., achieve higher standardized test scores).
- improve the economic viability of students (i.e., increase students' abilities to succeed in new work environments through teaming, technology fluency, and high productivity).
- close the digital divide (i.e., increase technology literacy in all students).
- increase relevance and real-world application of academics.
- build twenty-first century skills (e.g., critical thinking, sound reasoning, global awareness, communication skills, information and visual literacy, scientific reasoning, productivity, and creativity). (Lemke, Coughlin, & Reifsneider, 2009)

There seems to be no shortage of technology tools that are being used to increase student engagement, access and manage information, foster creativity, assess and curate content, and aid in conceptual mastery. Whether it is the result of societal pressures, marketing techniques, or a shift in vision, educational technology has become more prevalent in schools. Some schools have been adept at keeping up with those changes, while many others are falling far behind, creating a digital divide based largely on the quality of the educational technology they use, rather than just simple access to the internet (Herold, 2016). How this technology is ultimately used and its relative effectiveness in improving teaching, learning, and leadership will be discussed later in this book.

Desktops and laptops have long been considered the standard when it comes to educational technology in schools. As these devices have evolved, their prices have dropped, making them much more attainable within school budgets. Laptops today are 99% cheaper than they were in 1980. No wonder many schools are adopting devices at a feverish pace. Many computer suppliers have instituted lease programs, which make their products even more attractive in difficult economic times. It goes without saying that we will only continue to see price drops in not only computers, but other types of technologies as advances continue.

In addition to computers, there are many common educational technologies that are being utilized in schools today and have begun

to reshape pedagogy, conceptual mastery, and professional learning, as well as content consumption and creation. The choices for school leaders can be overwhelming, and with tight budgets, sound decisions need to be made to ensure that any purchase makes the most sense to improve learning. Let's take a look at some common technology investments schools make. It is important to understand though that over time tools will evolve, and some will be phased out. The key here is to focus on why a certain piece of technology is a sound investment and how it will improve student learning.

Interactive Whiteboards (IWBs) and Displays

Some of us remember the days of the overhead projector as the gold standard for presenting information during direct instruction. The invention of the IWB not only replaced this dated piece of technology but provided an interactive experience in the classroom for both teachers and students. The appeal of IWBs lies in the opportunity for use of dynamic, interactive images, animations, video, and text of a size visible to an entire classroom (Lemke, Coughlin, & Reifsneider, 2009). Advances in software packages that come with a typical IWB purchase have made the device even more appealing. Educators can now access interactive lessons from the web or create their own, share content with colleagues near and far, and utilize integrated student response technology to facilitate a more connected learning experience for kids.

Research has found that IWBs and other display technology can have a positive impact on learning. Haystead and Marzano (2009) conducted 85 studies in 50 different schools and found large percentage gains in student achievement under the following conditions: The teacher had 10 or more years of teaching experience, had used the IWB for two years or more, had used the IWB 75%–80% of the time in the classroom, and had possessed high confidence in using the technology. Overall though, when it comes to the real benefit of IWBs in the classroom, it is what the learner, not the teacher, does with the device as a means to better understand concepts. It is important that any piece of display technology does not become a glorified direct instruction or presentation tool.

Tablets

Tablets are an attractive option for schools, as they are more portable than laptops, which makes them very attractive centerpieces

for 1:1 initiatives or station rotation models in blended learning environments. Tablets are a powerful educational tool, because they provide access to informational tools for creative learning and productivity, and they can be used for research. Tay (2016) conducted a three-year study in an all-girls' secondary school where the iPad was piloted by half the school. Empirical data through lesson observation was triangulated with perception surveys and group interviews of both teachers and students. The study found that the use of iPads was associated with more learner engagement and collaboration. It also found that iPad-using students, particularly those in the lowest and highest ability groups, performed better than their non-iPad-using peers in comparable groups on year-end examinations. Other studies have also found that tablets improve learning when utilized as a component of project-based learning and when used to support students in an inclusive setting (Cheu-Jey, 2015; Maich & Hall, 2016).

Recent advances in digital publishing have resulted in many traditional textbooks now being available on tablet devices for a fraction of their paper-published cost. In addition, schools have the ability to replace the overpriced textbook, which is still a crutch in many schools across the world. For example, students and educators can access iTunes U for free and access entire courses of educational content for K–12 schools. Apple has dominated the tablet market with its iPad, which launched in 2010. Even with the iPad's dominance, the tablet market has become saturated with stiff competition from Android tablets such as those manufactured by a variety of companies. As of 2019, the Apple App Store supports over 2 million apps for the iPad, while the Android Marketplace allows users to choose from 3.8 million apps.

Document Cameras

These devices are very similar to their ancestor, the overhead projector. Document cameras are connected to a projector in order to display the image of anything put underneath the camera. What makes these devices more dynamic is their ability to record both video and sound, a useful feature that allows teachers to capture lessons and notes to make available to their students through a website or to create flipped lessons. Students can even use them to display their work or thinking to an entire class. They are cost-effective, small, and portable. Some models even use wireless technology, so they don't have to be hardwired to a projector.

Chromebooks

Google developed this one-of-a-kind device that contains no operating system or hard drive. When the computer boots up, it connects directly to the internet, and the entire process takes around 10 seconds. Chromebooks are cheap and easy to manage, making them popular with budget-constrained schools with limited tech-support staff. With Wi-Fi now common in schools across the globe and in homes, an internet-dependent device has become practical for students (Jesdanun, 2017). Many models cost hundreds of dollars less than typical laptops and popular tablets. Users can create a free Google profile and log on to any Chromebook to access their G Suite, favorite websites, or the web-based applications that they have added to their account. There is even functionality offline through certain apps that don't require an internet connection.

All of the factors above have made the Chromebook a logical choice by schools as the device for 1:1 rollouts. Price and management aside, these programs have been found to lead to academic benefits among learners. Zheng, Warschauer, Lin, & Chang (2016) conducted a meta-analysis of 15 years' worth of research studies on K-12 schools where students were given a computing device. Using statistical techniques to analyze already-completed studies, they found that 1:1 laptop programs on average had a statistically significant positive impact on student test scores in English/language arts, writing, math, and science as well as providing a modest boost to twenty-first century skill attainment.

Mirroring Devices

These devices mirror exactly what is on digital devices such as laptops, smartphones, and tablets without the hassle of wires. Apple TV has the ability to mirror the screen from any Apple device to a projector or television. The Apple TV device is connected directly to either an HDMI projector or HDMI port on a television. Once the mirroring setting is enabled on any Apple device, the image appears on the television or projector screen. Many schools have now begun purchasing and using an Apple TV, HDMI projector, and iPad to create a wireless IWB. Best of all, this setup costs a great deal less than a mounted IWB but maintains all of the benefits of this technology. Apple TV is not your only option. Chromecast from Google allows screen mirroring on Android devices of web pages from any type of computer.

Augmented and Virtual Reality

Both augmented reality (AR) and virtual reality (VR) have the unique ability to alter our perception of the world and in turn provide our learners with enhanced ways to understand concepts. AR is where real life is modified and enhanced by computer-generated sights and sounds. A great example that many of us can relate to is Pokémon Go. A review of existing research by Saidin, Abd Halim, and Yahaya (2015) found that AR has been shown to have good potential in making the learning process more active, effective, and meaningful. This is because its advanced technology enables users to interact with virtual and real-time applications and brings the natural experiences to the user. In the context of education, it allows students to be immersed in realistic experiences, thus increasing relevance and allowing for deeper understanding.

VR on the other hand invites users into an artificial world that consists of images and sounds that are affected by the actions of a student who is experiencing it. The learning environment is provided through the use of a headset viewing device, including high-quality units such as the Oculus Rift for around \$500 or the cheap Google Cardboard that runs between \$10 and \$15. All one has to do with the latter is insert a smartphone that has compatible apps downloaded, most of which are free, such as Google Expeditions. Schools are using VR for virtual field trips, content creation, distance learning, improved collaboration, game-based learning, and investigating certain concepts in more detail.

There has been a consistent rise in the use of VR content to enhance teaching and learning in 3-D environments. From specialized projectors to visual learning solutions, content providers are continuing to build upon their products to immerse students in virtual learning environments where they not only see, but hear and feel as well. These technologies are having a positive impact on learning. JTM Concepts of Rock Island, Illinois, began collecting data on the educational impact of its 3-D content in 2003. The results were impressive. Data showed that students who observed the 3-D simulations made a big jump from their prelesson to postlesson test scores while outperforming control groups who received traditional instruction (Gordon, 2010). A smaller study showed that students who observed the 3-D lesson improved an average of 32% from pretest to posttest, with substantial gains in every subgroup. A meta-analysis conducted by Merchant, Goetz, Cifuentes, Keeney-Kennicutt, and Davis (2014)

found that VR-based instruction was effective in improving learning outcome gains.

Cloud Computing

This term refers to any hosted service that can be accessed over the internet. Many schools have invested in virtual servers, which are much more cost-effective than traditional ones. For schools and administrators, using the “cloud” has become a more effective and efficient way of managing documents, projects, and general information, as they can all be stored virtually and accessed anywhere. This has resulted in the adoption of either Google’s suite of free tools or of Microsoft’s Office 365 by many schools and educators alike. As cost-effective and enticing as cloud computing is, many schools fear losing control of private student information, especially in the United States.

The Family Educational Rights and Privacy Act (FERPA) (20 USC §1232g; 34 CFR Part 99) is a federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. FERPA does not offer much guidance for schools on the selection and maintenance of cloud providers and the resulting relationships. The good news for school leaders, though, is that nothing in FERPA prevents schools from using cloud-based services, and schools across the country have embraced these solutions. When contracting any cloud-computing solution, it must be clear that the party to whom the information is disclosed will not disclose the information to any other party without the prior consent of the parent or eligible student. If this condition is not met, it is a violation of FERPA.

COPPA, the Children’s Online Privacy and Protection Act (15 U.S.C. §§ 6501–6506), deals with how websites, apps, and other online operators collect data and personal information from kids under the age of 13. Schools can grant COPPA consent in cases where a tool is used solely for an educational purpose. When consent on behalf of parents can be determined, schools should also ensure they are in compliance with COPPA by thoroughly vetting products and providing appropriate information to parents. Information should include the names of sites or services the school has consented to on behalf of parents as well as information about those sites and services’ information-sharing and security practices.

If you are based in a country other than the United States, be sure to reference your country's specific privacy laws as they relate to protecting the identity of students when using digital tools in schools.

Web-Based Tools

Within the cloud are many applications commonly referred to as web tools. Many of these tools are free and work to promote essential competencies such as collaboration, communication, creativity, entrepreneurship, and global awareness. Tools are always coming, going, or evolving. Thus, it is pointless to list specific favorites. The trick to finding the best tools to support your needs and those of your students is to learn about them in digital spaces. Social media tools such as Twitter, blogs, and digital discussion forums have become widely accepted as means to grow professionally. The only downside of web applications is that they are generally grouped together with mainstream social media sites such as Facebook and YouTube. As a result, many schools in the United States block them and prohibit access, feeling that their use is a violation of the Child Internet Protection Act (CIPA) (20 U.S.C. §§ 6801, 6777, 9134 [2003]; 47 U.S.C. § 254 [2003]). Congress enacted CIPA in 2000 to address concerns over children accessing inappropriate content over the internet. The Federal Communications Commission (FCC, 2011) provides details that schools need to know about CIPA:

Schools must certify that they have an Internet safety policy that includes technology protection measures. The protection measures must block or filter Internet access to pictures that are: (a) obscene; (b) child pornography; or (c) harmful to minors (for computers that are accessed by minors). Before adopting this Internet safety policy, schools and libraries must provide reasonable notice and hold at least one public hearing or meeting to address the proposal.

So why are the majority of schools blocking these amazing tools? School leaders are well aware of CIPA but are misinformed when it comes to access to web-based digital applications. All that CIPA requires in order for schools to be eligible to receive e-Rate funding is that inappropriate websites are blocked. In a 2011 interview, the Department of Education's director of education technology, Karen Cator, explained that accessing YouTube and similar social media sites is not a violation of CIPA, and web-based tools do not have

to be blocked for teachers (Barseghian, 2011). The takeaway here is that leaders must become advocates for the use of web applications in schools, working with all stakeholders to create an environment focusing on responsible use. They need to be active in creating and sustaining a safe online environment for students and acceptable use policies (AUPs) that address misuse, and also ensuring that adequate supervision is provided at all times.

As in the case with student identity, if you are based in a country other than the United States, be sure to reference your country's specific laws as they relate to keeping students safe when using digital tools in schools.

Mobile Technology

As mentioned earlier in this chapter, mobile technology (i.e., mobile phones, tablets, e-readers) continues to explode into the marketplace and into homes. This trend has not gone unnoticed in the education world. Schools and leaders in many areas have seen the value in purchasing mobile technology for 1:1 initiatives, while others are opting for more cost-effective programs that utilize the technology that students already own. These latter initiatives are commonly referred to as either Bring Your Own Device (BYOD) or Bring Your Own Technology (BYOT) programs. Regardless of the acronym, digital-rich environments are created as leaders begin to rethink existing policies that prohibited access to sites that have educational value and prevented use of student-owned devices that can be leveraged for learning. Mobile learning devices hold great potential, since they can be used by a variety of stakeholder groups for assessment, content curation, research, organization, collaboration on projects, classroom walk-throughs, and observations. As discussed previously in this chapter, research by Zheng et al. (2016) found that mobile learning has led to improved student learning outcomes.

Video Conferencing

As the internet has evolved, so has video-conferencing technology. Long past are the days when this tool was only available to schools in affluent areas or through sparse grants. All one now needs is a webcam-enabled device (i.e., desktop, laptop, tablet, or smartphone), an internet connection, and either a program or an app (e.g., Skype, FaceTime, Adobe Connect, Google Hangouts, Zoom) to create a video feed. Schools now have the means to

conduct virtual field trips, connect with authors, and collaborate with colleagues from across the globe. Using tools like Facebook and YouTube Live, schools can not only broadcast live events, but can even archive the footage for viewing at a later time.

Open Education Resources (OER)

These resources, commonly referred to as OER, are accessible for free on the internet. They consist of openly licensed text, media, and other digital resources that can be used to support and enhance teaching, learning, and assessment. Some OER assets can even be used for research purposes. OER Commons (www.oercommons.org) is a great place to start. It is a public digital library of open educational resources where you can explore, create, and collaborate with educators around the world to improve curriculum. Here you can access lesson plans and projects aligned to specific content areas, standards, and education levels.

One of the major recent advancements in educational technology has been the availability of OER content and entire courses from some of the nation's most prestigious universities and professors free of charge. The movement began with the Massachusetts Institute of Technology (MIT), which believed that making OpenCourseWare (OCW) available would enhance human learning worldwide by providing a web of knowledge (Vest, 2004). Harvard, Yale, Stanford, and the University of Michigan are just a sample of some of the universities offering access to their courses online through massive open online courses (MOOCs).

OCW is composed of content in the form of university lectures, notes, and assignments, with little emphasis on cohesiveness. MOOCs, on the other hand, are structured around lengthy courses aligned to online learning. In this setting, lectures are scheduled by professors or facilitators with associated deadlines, assignments, assessments, and community engagement. The accessibility and quality of OCW hold the promise of providing students and educators with more personalized learning options that can cater to diverse needs. If you or your students ever want to access some amazing, free learning opportunities, then check out either Coursera (www.coursera.org) or edX (www.edx.org), where OCW courses are curated.

Virtual Schooling

Also known as cyberschooling or distance learning, this is a service that schools can invest in, available to students anywhere at

any time. Traditional schools can increase their current course catalogues by hundreds of new courses that cater to student interest. Key characteristics of virtual schools include credit attainment to complement studies at a local campus, and ability of students to work at their own pace; instruction is available year-round, courses are taught by highly qualified teachers, and there is a wide range of courses available that are updated frequently (Kelly, McCain, & Jukes, 2009).

Electronic delivery provided by a virtual school can occur using synchronous communication, in which class members all participate at the same time, or asynchronous communication, where participants are separated by time (Mielke, 1999). In a synchronous course, students meet with a live instructor at set times. The content is delivered using videoconference technology, and students submit their assignments to the instructor when due. In an asynchronous course, students can access the learning materials at times convenient for them, but all work and assignments are due within a specified period of time. As in a synchronous course, assignments are sent to a certified teacher. Virtual schooling offers students considerable benefits, including convenience of time and place (LeLoup & Ponterio, 2000). Popular providers include the Virtual High School (vhslearning.org/) and the Florida Virtual School (www.flvs.net/Pages/default.aspx), which are accessible all over the world.

Gaming

Long thought only to be a distraction, research has a different story about gaming in education. James Gee (2007) derived a set of 36 learning principles from his study of the complex, self-directed learning each player undertakes as he or she encounters and masters a new game. He suggests that adherence to these principles could transform learning in schools both for teachers and faculty and, most important, for students. Steve Johnson (2006) found that video games, from *Tetris* to *The Sims* to *Grand Theft Auto*, raised IQ scores and developed cognitive abilities, skills that even books can't foster. In a study of more than 500 second graders, Wexler et al. (2016) found that math and reading scores on school-administered tests increased significantly more in children who used a brain-training game during the school year than in children in control classes. The effect on math achievement scores was greater than what has been reported for 1:1 tutoring, and the effect

on reading scores was greater than what has been reported for summer reading programs.

Some innovative schools have begun to seize the opportunity with educational gaming by investing in popular game consoles such as Nintendo Wii and Microsoft's Xbox. Both of these systems can be used to support tactile and kinesthetic learning styles. This is significant, as research shows that students learn more quickly and easily with instruction across multiple modalities or through a variety of media (Lemke, 2008). Many researchers continue to build upon these studies and continue to find positive impacts of gaming on learning (IGI Global & Information Resources Management Association, 2018). One of the hottest games has been *Minecraft* (minecraft.net), a world-building game that some educators have embraced to teach physics, geography, and the English language. Another exciting tool is VR Quest, where students can design 3-D virtual reality games aligned to standards. To learn more, visit www.vrquest.net.

A NEW LEARNER

Our students have changed radically. Today's students are no longer the people our educational system was designed to teach.

—Mark Prensky (2001, p. 1)

The world has changed, as have the learners that schools are responsible for educating. They may be referred to as the iGeneration, Millennials, or Generation Y. Whether we like it or not, students today are immersed in an environment rich in digital media and tools. These tools have become status symbols, means of communication, and digital-age organizers. Many people would agree they have also become a student's nerve center, because so much of a student's life is now influenced by the tools of the age. The attraction ultimately begins at a young and innocent age. All one has to do is observe a toddler with an iPad or a slightly older child building a virtual world in *Minecraft* or immersed in *Fortnite*. Observe enough, and it is tough to deny how technology sparks curiosity, ignites ingenuity, and fosters collaboration.

Students are engaged in their digital worlds, and they are learning without us. It has become a much more active process due to that

ease of accessing information on the internet and a wide range of tools that support constructivist learning. Students are constructing meaning through the use of technology in ways that are relevant, meaningful, and fun.

Leaders of schools need to acknowledge that learners today are “wired” differently as a result of the experiential learning that is taking place outside of school. The learning styles of the active, digital learner conflict with traditional teaching styles and preferences. How can we possibly meet the needs of these unique learners if our practices are suited for a time that has long since passed? Ian Jukes, Ted McCain, and Lee Crockett (2010) provide the following characteristics of learners today and the resulting disconnects that they are experiencing in schools:

- Digital learners prefer to access information quickly from multiple media sources, but many educators prefer slow and controlled release of information from limited sources.
- Digital learners prefer parallel processing and multitasking, but many educators prefer linear processing and single tasks or limited multitasking.
- Digital learners prefer random access to hyperlinked multimedia information, but many educators prefer to provide information linearly, logically, and sequentially.
- Digital learners prefer to learn “just in time,” but many educators prefer to teach “just in case.”
- Digital learners prefer instant gratification and immediate rewards, but many educators prefer deferred gratification and delayed rewards.
- Digital learners prefer to network simultaneously with others, but many educators prefer students to work independently before they network and interact.
- Digital learners prefer processing pictures, sounds, color, and video before text, but many educators prefer to provide text before picture, sound, and video.
- Digital learners prefer learning that is relevant, active, instantly useful, and fun, but many educators feel compelled to teach memorization of the content in the curriculum guide.

The learners that we now embrace in our schools grew up with laptops instead of books. They use keyboards more than they do pens.

Students today want to know things all of the time. In their world, they can use numerous digital tools to learn whatever they want, any time and from anywhere. These students have been raised in a technology-rich environment, they accept that this environment is the norm, and they have grown up surrounded by digital devices that they regularly use to interact with other people and the outside world (Prensky, 2001). They are what many refer to as Millennials or active learners.

As a result of the growing disconnect between their world and the world where they are supposed to receive a formal education, many students are bored with the classroom. The environment outside of school is more engaging, relevant, and meaningful. They routinely communicate with friends, see faces, hear voices, create works of art, and engage in conversations with other learners on the other side of the school world. *Their* world is drastically different from that of the schools they attend and the educators tasked with teaching them. The active learner often seeks knowledge online rather than using a textbook and has little tolerance for delays. This makes it important for educators to provide feedback to their queries. For many active learners, the idea of constructing knowledge within a social community has a great deal of appeal (Skiba & Baron, 2006).

Society has created these active learners that schools need to keep up with, not the other way around. They crave choices and want to be connected. Their connections mean everything. When they discover something they like, they are excited to share it with their friends using digital devices and social media tools. This is how they want their educational experience to be. Active learners want to learn collaboratively and to apply what they have learned through creative pathways. They prefer learning on their own time and on their own terms and want to be involved in real-life issues that matter to them. They want to use their personal devices to take notes or, better yet, take pictures of teacher notes using a cell phone. At New Milford High School in New Jersey, this became widely accepted by both students and teachers. The traditional way of doing things does not have the same impact it once did. We as educators need to think about our own behaviors in the digital age and work to apply them for the betterment of learners of all ages.

It is important to understand that, even though today's active learners have grown up with technology, it does not always follow that they know how to use it effectively for learning. This is the

responsibility of schools. We are tasked with preparing students for success in a world that is becoming more dependent on technology, a world that is also in need of a workforce that can think critically, solve real-world problems, and function entrepreneurially.

SUMMARY

Leaders need to be aware of the changing educational landscape inherent in the fourth Industrial Revolution (and eventually in the fifth one), which includes societal shifts in technology use, advances in educational technology, and a new type of learner. Acknowledging and beginning to understand these changes are the first steps to developing a vision and strategic plan for creating a learning culture that provides access to tools that support the development of critical competencies, celebrates success, supports innovation, and inspires students to learn and ultimately achieve. Digital leadership can and should begin here. If we discount the shifts occurring outside our walls and fail to embrace what learners today need and expect, we will never develop the capacity to anticipate needed changes that will transform school culture for the better.

GUIDING QUESTIONS

1. How has your district, school, or classroom changed to align with societal shifts? Where is improvement warranted? If change has been slow, where will you begin?
2. In what ways are you preparing your learners for the fourth Industrial Revolution (and eventually the fifth one)? Where are the opportunities for growth?
3. What types of technology have been adopted in your school or district? Has it been successful in improving learning outcomes? Why or why not?
4. How have you been responsive to the needs of learners today?