

CHAPTER 1

Changing Education with Mobile Learning

We cannot always build the future for our youth, but we can build our youth for the future.

—Franklin Delano Roosevelt

In our ever-changing marketplace, today's students are being educated, largely, for jobs that haven't yet been invented. Technology is being created and updated at a frenetic pace, and growing more pervasive and useful with each stride. As schools face dwindling resources and higher stakes than ever, does mobile technology hold the key to improving the educational system and reengaging students? Mobile technology offers a plethora of features and benefits that enable it to break the educational system wide open, engaging students in new ways and making educational experiences more meaningful, if schools can effectively utilize structured, integrated approaches for implementation of this new technology.

This interest in smartphones, tablets, and laptops is a major opportunity to present new and exciting educational experiences. To what extent are schools capitalizing on this, though? And how often are they getting in their own way in reaching students? One teacher notes with frustration that her school has several iPad carts that teachers are encouraged to use, but cellphones are banned categorically. “There are certain times we might be doing a lesson and someone asks a question and I think ‘This’d be a great time to all get out our devices and look something up,’ but we can’t use cellphones and have to reserve our iPad carts in advance, so the moment passes. It’s frustrating because almost all of the kids have phones and their parents are paying for data plans anyway, but we can’t use them.”¹ In effect, schools with policies like these end up ignoring the technology and the skillset necessary to effectively use it in learning and life, leaving students not fully prepared for the real world.

In another school, eighth-grade teachers have access to iPads the school has purchased and encourages them to use in their classrooms. Teachers are excited to have the devices, but don’t really know what to use them for, and they often sit unused. When asked what she uses them for, one teacher suggested they can be used as calculators. Clearly handing a device to a teacher with no guidance or training is not a way to make the best use of this expensive, Internet-connected device.

Stories like these, of school policy being dictated to teachers and ineffective mobile technology use, are, sadly, not difficult to find. Policies that categorically ban certain devices that are used in everyday life are lazy, failing to see the possibilities that they have to change and improve pedagogy. However, schools realize boundaries and acceptable uses of mobile technology need to be clearly defined, but they may not know where to begin. Rather than reimagining education and figuring out how to integrate modern technology to effectively reach students, administrators too often ignore and put up walls against new technologies. We present these stories not to discourage or say that there are simply too many hurdles and poor implementations of mobile technology. We offer these examples to illustrate the widespread misunderstandings about mobile learning and our need to address some key challenges.

Ignoring mobile learning because of potential distraction or misuse results in missed opportunities for teaching tomorrow's citizens how to find and use a seemingly limitless source of information at their fingertips. Mobile technology offers a huge opportunity to revolutionize education and learning, if knowledgeable, creative, and open-minded teachers and administrators embrace it.

A BRIEF HISTORY OF EDUCATIONAL TECHNOLOGY: WHAT WILL REVOLUTIONIZE THE SYSTEM?

A new classroom tool promises to improve student learning and enable a more enriching learning experience. In a video promoting this tool, a student is seen answering questions in class at his own pace, and receiving immediate feedback to know if he was wrong or right. An expert notes some benefits of this tool: "There is also a motivating effect. The student is free of uncertainty or anxiety about his success or failure. His work is pleasurable. He does not have to force himself to study ... it generates a high level of interest and enthusiasm." This expert notes that technology could enable students to cover more than two times the information when compared to traditional classroom techniques.

B.F. Skinner gave this forecast on the potential for technology to revolutionize learning and classroom procedures in 1954.² His teaching machine sounds strikingly similar to predictions today on how mobile technology can revolutionize classroom learning for students, though these were based on Skinner's teaching machine, a clunky early computing machine that offered students a new way to learn independently using targeted, self-paced lessons. Similar predictions have since been made about personal computers, netbooks, and other technologies. So, the question is, why were those predictions wrong in 1954, and subsequently, and why are they different with mobile learning?

While mobile technology offers a distinct difference from other technology, technology itself is hardly a stranger to the educational setting. Computers have been in the classroom and have been promising to revolutionize education for decades, though they haven't changed education much. It's fair to say that while Skinner's teaching machine

was novel, it didn't do as much as he imagined it would to shake up the traditional and inefficient classroom structure.

Over the past half century, as computers developed and became smaller, more efficient, and easier to use, they increasingly found their way into the classroom. This technology has changed the experience in schools, as well, as noted in Figure 1.1. Computers have been in

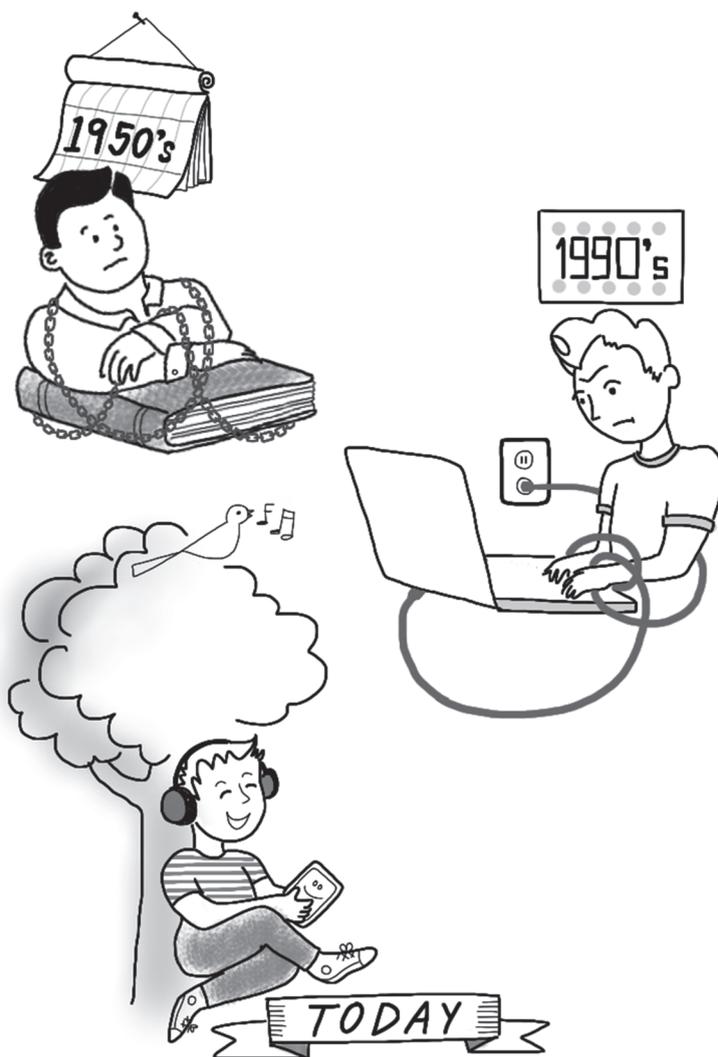


Figure 1.1 Educational Technology Over Time

schools since the 1960s: first to store student data and eventually, for student use. This changed in the early 1980s with the Apple II. Before the Apple II, large mainframe computers had some presence in schools, though they were not very widespread.³ The first affordable and widely adopted personal computer was the Apple II, which also happened to be a watershed moment for personal computer technology. It offered a computer for everyone, not just the hobbyists and folks who wanted a computer to tinker with. The Apple II was ready to run for anyone, and it was widely adopted by educational markets (which were also heavily marketed to⁴). By the mid-1980s, the Apple II was the predominant computer in K–12 settings.⁵ In the 1980s, much of the curriculum surrounding computers in the classroom related to teaching how computers worked (programming languages, for instance) or for games (i.e., *Oregon Trail*) and less on using them to perform other nontechnical educational functions.

By 1990, most classrooms across the United States had access to computers in some way, and their use in augmenting and supporting classroom instruction grew as the 1990s went on. These systems provided a self-paced learning experience for each user; however each learning experience followed a set trajectory that offered the same help, the same questions and answers, and the same path. In short, there was no customization to the learning, only an individualized pacing. There was often instant feedback, so it did offer many benefits to old systems, though the true potential for an intelligent learning system was not reached.⁶ Computers used CD-ROM disks, and with the growth and release of new Microsoft products throughout the 1990s (Windows 95, Windows 98, most notably) and the maturation of the software and hardware industries, computers became commonplace in the classroom.⁷ Technological initiatives at the time focused on connecting classrooms to the still very new Internet. As the World Wide Web grew to show its use in homes and offices across America, government initiatives channeled funds to get classrooms wired and students online, as well as to give students technological literacy skills.⁸

Desktop computers, laptops, and netbooks were the most prevalent technologies utilized by schools until early 2010 when Apple released the iPad, which created a new category for mobile devices: the tablet computer. Featuring touchscreen technology, increased

portability, Wi-Fi, and an intuitive user interface, the iPad presented a major game-changer for digital learning. Soon after, competing tablets emerged on the Android operating system. Slowly, the tablet stole market share from netbooks, and in early 2013, Acer and Asus, the top two netbook producers, officially phased out production of their netbooks, effectively ending the netbook market.⁹

Computers, and subsequently tablets, began as novelties and eventually went on to create entire markets and ways of functioning that are hard to imagine living without. Have they changed education in the same, fundamental way? Are they being used to enhance instruction and change the way we learn for the better, or are they just another tool in the same old pedagogy? Looking at the past 60 years of computer technology and education, we see a recurring pattern: The belief followed each advance and breakout technology that it would solve all educational problems.¹⁰ Obviously, these promises were not met. While computers have definitely been incorporated into existing structures, their impact hasn't been as great as it has been on other sectors, nor as great as we expect mobile technology to be.¹¹ The benefits that mobile learning enables—personalized, on the go, and novel learning environments—offer a chance to revolutionize the education system. As Bill Gates noted in 2009, “The world of education is the sector of the economy so far the least changed by technology. Ten years from now, that won't be the case.”¹² We're entering a new era for technology and education and mobile technologies. We believe mobile technology with smart implementation and progressive school policies can lead the way.

MOBILE LEARNING: REACHING KIDS TODAY

At Research Triangle High School, a charter school in Durham, North Carolina, the ninth graders are in English class. The BYOD (bring your own device) setup and flipped classroom structure requires that the students watch a lesson the night before, and use their tablet or laptop to supplement the discussion or project that is occurring in the classroom. When you walk in the room, it feels different. It certainly isn't the typical classroom we imagine with desks in a row and students sitting, looking to the teacher with their hands in the air. Indeed, beside

that image, it might even feel as if no one is paying attention, as everyone is illuminated by a screen, and no one is watching the teacher. This perception is quickly shattered, however, when the teacher surveys the students to gauge understanding, and it's obvious that they are all paying attention, all are on task. Beyond that, the use of certain mobile devices (this school prohibits cellphones for classroom use) enables and even encourages students to multitask, collaborate, and teach each other—all skills professionals practice daily in the modern workplace. This school, like many across the country, is embracing the mobile technologies that exist, working with them instead of against them, and giving their students a real-world education rather than clinging to previous paradigms of education and learning.¹³

Mobile technologies offer a new paradigm in connectivity, communication, and collaboration in our everyday lives. For education, these are huge opportunities to provide an experience that is relevant and engaging. Using technology in the classroom is not a new idea at all. Computers, laptops, and netbooks have all been added to classroom settings with the hopes of revolutionizing education, promising vast improvements to student outcomes. These technologies, largely, have left education unchanged and in a continual state of need for improvement. All of these technologies can be thought of like crayons, says James Paul Gee, a thought leader in games and learning: “They are just tools that can make and do good things (e.g., art) or make a mess (e.g., crayon all over the walls).”¹⁴ It matters tremendously not only that they be added to the educational process, but that the educational process shift to incorporate new capabilities.

Ultimately, when considering the value of mobile learning initiatives in education, it is most important to consider what is best and most valuable for the students. What initiatives will provide them with the education that sets them up for a lifetime of success? What technologies engage them and help them learn most effectively? Today's students are fundamentally different from those who came before them. Christened as *digital natives* by educational writer Marc Prensky in 2001, “today's students are no longer the people our educational system was designed to teach.”¹⁵ If anything, the advent of mobile devices has only served to further solidify these digital natives' different needs and expectations when approaching education.

Mobile learning offers a novel approach to reach them—it offers flexibility in when the learning takes place, personalized content, and teaches relevant skills for the future. It has the potential to create a generation of learners who see the world as their classroom.

Tablets and smartphones have dramatically altered the technology landscape, and transformed the way we as a society communicate and access information.¹⁶ In the workplace and in homes, these technologies have been incorporated and used to change and increase the efficiency of everyday activities, but traditional schools are still relatively resistant to or untouched by these iconoclastic technologies.¹⁷ As schools continue to negotiate acceptable usage, boundaries, and bans with students and parents over mobile devices, many opportunities for educational innovation may be missed.

WHAT IS MOBILE LEARNING?

For the purposes of this book, we believe mobile learning has little to do with the physical devices themselves. Rather, mobile learning is the experience and opportunity *afforded* by the evolution of educational technologies. It is anywhere, anytime learning enabled by instant, on-demand access to a personalized world filled with the tools and resources we prefer for creating our own knowledge, satisfying our curiosities, collaborating with others, and cultivating experiences otherwise unattainable. Mobile learning implies adapting and building upon the latest advances in mobile technology, redefining the responsibilities of teachers and students, and blurring the lines between formal and informal learning. It embodies and facilitates the understanding of what it means to be a lifelong learner and what it takes to thrive in today's workplace. So, while we do talk about technology in this book, it's essential to understand that *mobile learning* is something different than *mobile devices*. It is the outcome that these technologies enable through creative and appropriate use.

At the time of writing this book, the fruition of mobile learning is made possible by the proliferation of portable, Internet-enabled devices. Portability assumes it is a device that can be easily accessed on the go, making this definition not simply any device that can access

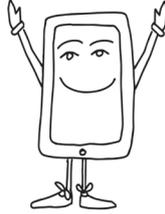
the Internet. It also requires Internet capability that allows the user to access new content on demand (rather than only what the device holds). In our discussions surrounding how mobile learning can impact education and pedagogy, we primarily discuss tablets, smartphones, and small personal media players. We also discuss Chrome books and laptops to some extent because there are big areas of overlap in pedagogy and implementation strategy. Tablets and smartphones offer substantial differences and benefits, including making mobile learning more accessible and affordable in schools than their predecessors.

BENEFITS AND CHALLENGES OF MOBILE LEARNING

Mobile learning is not a panacea for all the problems that plague our education system; we don't suggest that by simply handing out iPads one can expect increases in student achievement and enthusiasm for learning. Just like the personal computers that came before them, mobile devices hold tremendous potential to change the way students learn and our expectations of what should happen within the classroom walls. The ability of tablets and other mobile technologies to shake up the current status quo of the educational system and improve it is dependent on the pedagogy in which they are woven. It depends on teachers' open minds, creativity, and preparation to integrate them in the curriculum; school budgets and culture to allow for devices in the hands of students; and continued innovation in how devices are used so they remain effective. Further, success also requires banishing the assumption that digital natives, adept though they are with technology, know how to use mobile devices for educational purposes without training. Just like their teachers, administrators, and parents, students require guidance on how to learn with this new educational technology.

There are many benefits and challenges with mobile learning, and many are associated with different learning environments. For instance, a 1:1 mobile environment both addresses and introduces different concerns than a classroom with a mobile-device cart. We dive deeper into these learning environments, their related pedagogies, and how mobile devices affect them in Chapters 4 and 6.

Benefits of Mobile Learning



- + Ability to learn on the go
- + Reach underserved children and schools
- + Improve higher-order thinking skills
- + Support alternative learning environments
- + Enable personalized learning
- + Motivate Students

Figure 1.2 Benefits of Mobile Learning

Benefits

Mobile learning offers many benefits and opportunities to reach students in different ways and to improve and personalize the education they're receiving, as shown in Figure 1.2.

The first major benefit is the ability to learn on the go. Traditionally, sitting in a classroom between the hours of 8 a.m. and 3 p.m. is where and when we expect students to learn. Increasingly, however, learning isn't limited to a predetermined location or time. Learning can occur anytime and anywhere with mobile devices. In reality, given the prevalence of smartphones among adults, this facet of mobile technology for K–12 simply brings the children to the place where adults are, meaning the educational paradigm children experience more closely mirrors

the working paradigm. The ever-increasing rate of smartphone usage is truly indicative of the changing norms of our culture in the ways we “communicate, access information, connect with peers and colleagues, learn and even socialize.”¹⁸ Educational experiences are meant to prepare students for real life, and as such, should reflect the realities of the modern world.¹⁹ Smartphones and Internet-enabled mobile devices are pervasive in our culture, and education shouldn’t ignore this fact.

Mobile learning also is a potential way to reach underserved children and schools. Mobile technology, when compared to other technology initiatives, provides a relatively lower cost per student for a high powered and durable technology. Tablets are often less expensive than computers, so when the inevitable upgrades and technology improvements come along, updating the technology for an entire classroom (or school) is less cumbersome. Indeed, this technological cycle has been a primary reason for resistance to including newer technologies as they come along; the budget for technology easily gets maxed out on maintaining current, secure computers in schools. Mobile devices offer a different financial and technological model altogether, one that is much easier to maintain under tight budgets. Many device manufacturers provide low-cost or even included maintenance plans to insure the continued functioning of the devices. To aid the acquisition of mobile devices many states (such as Indiana²⁰) have led the way by redefining what a textbook is and what funds allocated for textbooks can be used for (i.e., purchasing mobile devices). Mobile devices provide excellent, state of the art technology for a relatively affordable price.

Additionally, mobile devices offer substantial power in taking learning opportunities outside of the four walls of the classroom. Virtual museums, online classes, and simulated experiences all come standard with a mobile device and the Internet. Especially for low-wealth school districts or lower-income students, mobile technology could truly level the playing field.

Mobile learning provides a medium that improves higher-order thinking skills. The Partnership for 21st Century Skills has defined four key skills for students to master in school: critical thinking and problem solving, communication, collaboration, and creativity and innovation.²¹ The features of mobile learning inherently foster these

complex skillsets in students. The ability to easily share information with others, creatively utilize a wide variety of resources and critically evaluate the veracity and value of sources are just a few examples of the activities implicit to everyday use of mobile technology in education. Higher-order thinking skills and mobile learning are explored further in Chapter 5.

Many schools are offering alternative learning environments, such as flipped classrooms or blended learning environments, which allow teachers to use class time more efficiently and even cover more material, among other things. Mobile devices offer tremendous opportunities for facilitating and enhancing these setups. There are, of course, still many ways that mobile learning can enhance the traditional classroom setup as well and improve pedagogy. This concept will be discussed in Chapter 3.

Mobile devices, especially in a 1:1 setup, better enable personalized learning to thrive. Personalized learning environments enable teachers to more easily target which students are struggling with which concepts and assign coursework and homework accordingly. Mobile technology makes this process more seamless, enabling effective implementation and tracking of student growth. Further, if the students have their own devices (or always use the same device in the classroom), it is possible to easily track student data. This provides a rich data set to add to the student record for future reference and research. Mobile data and learning analytics will be discussed in Chapter 10.

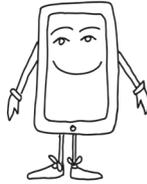
And finally, mobile learning provides a new way to motivate students by providing high levels of engagement and novelty, personalization, and autonomy. The ability to constantly use new apps and find new ways to use the device keeps it fresh and interesting for students. The use of cellphones and mobile devices is high among children, and there is value in meeting students where they are rather than limiting them to older learning methods when they clearly have an aptitude and passion for newer technologies. Allowing and encouraging mobile use for academic purposes gives new meaning and excitement to lessons. Julie Stern, a middle school teacher, says, “The kids are pushing mobile (learning.) Some things you can get away with not doing every day but it’s hard to get away with not doing mobile once you’ve given the kids a taste of it.”²²

Challenges

Mobile learning comes with its share of difficulties. Sometimes, even despite the excitement and array of benefits, the challenges facing schools are difficult to overcome. It's our hope that this book provides strategies in addressing these common obstacles, as well as arguments against philosophical oppositions to mobile learning for education. The most common challenges mobile learning faces are listed in Figure 1.3.

One hurdle that mobile learning initiatives can face is the differentiated access to devices and Internet across different audiences. Availability and cost of broadband in schools and homes can be a big hurdle for smaller and low-wealth school districts, presenting a huge disparity among students from different economic backgrounds. Federal and

Challenges of Mobile Learning



- + Differentiated access to devices and Internet
- + Use must be monitored
- + Prevailing attitudes and prejudices against using technology for instruction
- + Limiting physical attributes
- + Mobile devices are shared among a group
- + Way in which the devices are implemented impacts the effectiveness of them

Figure 1.3 Challenges of Mobile Learning

state programs are closing the gap to some extent, like the ConnectED initiative that aims to get high speed Internet into 99 percent of schools by 2017. While use of mobile devices offers the chance to level the playing field for underprivileged districts, having wide access to the Internet in school and at home is essential to taking advantage of the many benefits of these devices. Implicit in the challenge of differentiated access is the cost factor, and we acknowledge that a tablet is more expensive than a textbook, and some schools just might not be able to afford them. Though recent studies have shown that the falling costs of electronics has led to higher levels of device ownership among lower income and minority families, there is still a notable (if closing) gap.²³

When mobile devices are used by students in classrooms or at home, their use must be monitored in some way. While mobile devices can be used for academic enrichment, the opportunity also exists for them to be used for distraction or unethical behavior. There are also health concerns stemming from increased screen time and privacy concerns about students or the device, itself, oversharing personal information. Certainly, these concerns could also be made for adults using mobile devices, and teaching responsible use and digital literacy should become part of any lesson involving mobile technology and children. Schools will need to develop an Acceptable Use Policy (AUP) and think about which sites should be limited. While allowing mobile devices in school will undoubtedly open the school up to increased liability, it is possible to mitigate this risk by teaching responsible use and creating a disciplinary framework to enforce it. This is certainly preferable to, as is often the case, letting the risk of liability lead to overly restrictive policies.²⁴ A discussion of data privacy and digital citizenship is given in Chapter 15.

There are many prevailing attitudes and prejudices against using technology for instruction, and the system remains structured in a way that reinforces traditional educational methods. Effectively incorporating mobile technologies into K–12 education means abandoning some of these traditional structures, and many stakeholders are resistant to this huge cultural shift.²⁵ While there are many studies and anecdotal support for the power of mobile learning, there is no accepted theory of mobile learning and, hence, some disagreement among educators, administrators, and legislators on the actual value of the paradigm.

Sometimes these attitudes are reflected in laws prohibiting the use of mobile technologies (including cellphones) in the classroom categorically. In 2006, New York City Mayor Michael Bloomberg enacted a citywide ban on cellphones in the city's public schools, saying they were "a distraction in school and could be used to cheat on exams."²⁶ Similar bans and severe limitations exist all over the country. It's worth considering: Is this an effective restriction? In a recent study, more than 95 percent of surveyed students admitted to using their cellphones for texting, emailing, social networking, and browsing the Internet during class.²⁷ The class time that is wasted arguing with students and enforcing rules could be better spent capitalizing on the benefits and opportunities (including teaching responsible use) of what is possible with appropriate device use. Schools in Forsyth County, Georgia reported less in-class texting and off-task behavior on cellphones when the devices were used in their BYOD classrooms for schoolwork.²⁸ Breaking through these philosophical barriers requires strong leadership and professional development to ensure mobile learning is possible for each school.

While mobile phones and tablets offer many benefits over computers and laptops, there are some limiting physical attributes that make them more difficult to use. For instance, most tablets don't come with a keyboard, making typing more difficult. Typing on a smaller interface, such as a smartphone or iPod Touch, is even more challenging. However, while this sort of limitation might be a major hurdle for some groups, digital natives seem to see it as less of a challenge than the adults who teach them. The need for a device with a physical keyboard, for instance, is usually a preference of the administrator who orders the devices rather than from complaints by students that they're tired of using touch-only devices to type.

In some educational situations where mobile devices are shared among a group, the functionality and benefits are impacted. Often a cart of mobile devices will be provided for the school to share rather than a 1:1 arrangement simply because of budgetary considerations. In this scenario, using them can be more difficult and less engaging.²⁹ There are many ways that enable student data to be transferred across devices, particularly by storing data and work in the cloud and offering logins for apps. While it's been shown that mobile learning is

optimal when students have their own devices and can fully integrate their preferences and resources,³⁰ having access to shared devices is not going to nullify all of the benefits of mobile learning. In a device-sharing arrangement, however, the lack of ubiquity—the access to devices anytime in the classroom—does compromise some of the benefits of mobile learning. For instance, if teachers want to use *Evernote* to demonstrate digital note taking one day, but don't have the mobile devices the next day, it's hard to have a coherent process, let alone derive educational value from the lesson. Are the kids to print out their notes? Visit them on the cloud? Just wait until they have the devices again? When mobile devices are shared across classrooms or schools, some of the potential for the device to offer personalized and instant access is necessarily lost. While this challenge is worth noting, as it has impacts on how apps are developed and used, we also note that having *some* access to mobile technology is certainly better than none.

And finally, the way in which the devices are implemented impacts the effectiveness of them. Mobile devices shouldn't simply be added to existing curricula and used in place of an old tool—they should be used to change the way lessons are structured to engage students in new ways. In essence, teachers should first make a mobile-learning plan, then get devices; not get devices and subsequently fold them into normal instructional methods. Using the devices in innovative ways will make it so schools can sustain the wow factor that technology currently brings to classrooms over the long term. Though we don't know how students will react to these devices as they become more commonplace, we do know that continually refreshing content and activities will keep the devices shiny and new even after several years of use.

HOW TO MAKE MOBILE LEARNING WORK

While mobile learning indisputably holds promise to change education and give students a better, more valuable experience, the way it is implemented in schools makes a huge difference. In fact, strong implementation is the deciding factor for mobile learning, insofar as a bad implementation can stop a mobile learning program dead in the water. In this book, the programs we discuss and the best practices we share

are all contingent on mobile learning initiatives with strong support, progressive policies, and smart implementation.

The main criterion for a successful mobile learning program is to open the entire system up to the change. By this we mean, administrators can't simply say, "Here's a tablet!" and assume education will change in any fundamental way. Systemic changes need to occur to facilitate the new devices and learning structures, teachers and users need to be educated on new possibilities and paradigms in learning, and boundaries pushed. These systemic changes can facilitate a more relevant and engaging learning experience for today's students.

Professional Development

Teachers and administrators must have or obtain the requisite skills to incorporate mobile devices and technology into their teaching. One theme we discuss in Section 1 is the fallacy that since students are proficient with mobile devices, they're automatically able to use them to learn. Indeed, learning to use mobile devices for education is an adjustment for students, and it will be for teachers as well. Finding good apps, enhancing lessons rather than retrofitting old lessons with an app, and ways to be prepared if the mobile device fails you are all important skills for the mobile teacher. It cannot be assumed that adapting to a mobile classroom will be easy or understood by all teachers, and professional development can provide educators with the means to effectively use this technology. Professional learning communities within the school or online are great resources for teachers looking for mobile learning support and discussions.

Use Data to Personalize Learning

Mobile devices offer tremendous opportunities to harvest data on student usage and knowledge, which can drive smarter decisions and personalized learning plans, among other things. A smart mobile learning strategy will take advantage of this information and use it to enhance the educational process. The flexibility offered with a device enables students to explore content at their own pace, dive deeper into what is most interesting, and reward their curiosity with instant answers.

Based on what engages them most, apps can suggest similar resources, or frame other lessons in terms of what he or she liked in the past. In a 1:1 environment, a student's classwork is even more useful, as it can remain on the device over an extended period of time for reference and analysis. A mobile classroom can also enable instant data collection. For instance, the *Socrative* app enables teachers to poll students during the lesson and instantly gauge understanding on a certain topic.

Change Instruction

While using mobile devices does not require a teacher to completely abandon the way he or she runs a classroom, it may require creative changes in how apps and devices are incorporated to strengthen certain lessons or activities, and creative use of apps (such as app stacking). Reimagining lessons is also necessary; adding an app as an afterthought is not the best way to take advantage of the technology, nor is simply using devices for content delivery. In the end, it's essential to remember that pedagogy still matters and technology won't replace good teachers, ever. Adding new and engaging technology to the classroom is a learning experience for all parties and often gives rise to more teachable moments and opportunities to learn together. Tricia Hudacek, a reading specialist and teacher reflected on her experience using iPads with her students: "If there are problems, oftentimes the class as a whole can figure it out. This provides awesome teachable moments."³¹ Good teachers will be able to see the potential in mobile learning and adapt their classroom structure accordingly.

Flexible Policies

While some schools and school districts have quickly, perhaps without much careful consideration of the consequences, moved in the direction of bans and censorship, we advocate creating more lenient policies to support a mobile learning plan—policies that more closely resemble real-world usage. Digital citizenship is a key skill today's students will need when they graduate, and teaching them how to participate in social media responsibly, how to evaluate information found online, how to search using appropriate criteria and act in a respectful way

online are all skills that need to be cultivated. Teaching these skills as part of an integrated mobile learning curriculum rather than completely restricting use of certain sites, apps, or devices is important.

It's also important for schools to update and provide well-thought-out policies regarding student privacy. There must be a balance between protecting student data and enabling student data use by entitled individuals to enhance the learning process. Privacy is a significant, and largely uncharted, area that is central to mobile learning. We discuss it at length in Chapter 15.

Good Apps

Finally, a strong mobile learning plan cannot function without good apps to scaffold the lessons. Teachers must figure out how to locate good content and tools, and how to incorporate them into curriculum and lesson plans. Similarly, app developers must focus on addressing the needs of the audience and tailoring app development to the educational market. The best educational apps present necessary information in a fresh way and are in tune with schools' needs. In essence, developing a quality educational app is not just making a textbook into an ebook, and it's also not using all the available functions on the mobile device just because they're there. Good educational apps, like all parts of mobile learning, require a sense of balance to make them appropriately interactive and impactful. We offer many examples of good educational apps and their classroom uses in APPendix A.

CONCLUSION

The skills that used to be demanded of children upon the completion of school were good handwriting, math fluency, and reading literacy, with education's focus being on creating a consistent product: a similarly prepared student.³² The skills required today are less concrete, and entail more critical reading and evaluation of material and the ability to seek answers effectively using the technology available to them at any given time.³³ Mobile devices offer a tremendous opportunity to make education more engaging and relevant to the next generation

of learners. Digital natives don't want to have to power down during school—they want to use the technology to make their experience more relevant.³⁴

The key for successfully channeling the mobile learning revolution will not simply be about digitizing current educational systems. The real appeal will be allowing people to choose their own paths, leverage their talents, and pursue subjects of interest. Mobile learning has huge business potential, but the most exciting and rewarding aspect of these solutions is that students of any age or background might have the chance to pursue knowledge that is meaningful and relevant to them. Integrating technology, and specifically mobile technology, early and often prepares students for the new reality.

NOTES

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