Table of Contents

Introduction
Framing the Challenge

Let's face it: most schools struggle with their technology integration efforts. They ardently believe that they need to utilize digital devices and online environments in their classrooms. They have attempted to invest in the digital tools that they think are necessary for student success in the 21st century. And yet most are failing to realize the hopes and dreams that accompanied their technological purchases. In almost every school, administrators, teachers, parents, and especially students will tell you that—with the exception of a few isolated pockets of innovation—digital technologies are not really transforming the learning experience.

Education researchers and commentators have noted for many years how most learning technologies lack impact. Stanford professor Larry Cuban (2001) chronicles his skepticism regarding digital learning tools in publications spanning a decade and a half, most famously in his book *Oversold and Underused: Computers in the Classroom*. He notes that educators continue to do the same things that they always have done in their classrooms, only with more expensive digital devices. Because teachers typically implement learning technologies as "add-ons to solve deep and abiding problems in . . . schools," they "remain a band-aid promising solutions to ill-framed problems" (Cuban, 2016).

The popular press and national news media are awash with headlines that echo this skepticism regarding the power of learning technologies. *The Atlantic*, for example, asks whether classrooms should ban smartphones (Barnwell, 2016). Similarly, a feature story in *The Washington Post* argues that smart students shouldn't use laptops in their classes (Guo, 2016). Writers and reporters for *The New York Times* (Richtel, 2010), PBS (Oppenheimer, 2010), and National Public Radio (Hamilton, 2008) all express concern about the negative impact of technology on our thinking, attempting to dispel the notion that humans can multitask. Andreas Schleicher, education director for the Organisation for Economic Co-operation and Development (OECD), states that technology "is doing more harm than

good" (Bagshaw, 2016). Even Clay Shirky (2014), one of America's most noted internet experts, asks his students to put their laptops away during class, a request that Dan Rockmore (2014) echoes in *The New Yorker*.

Techno-skepticism isn't confined to the domain of education. Numerous technology critics routinely express their concern about the negative impacts of the digital world on our daily lives. For example, Andrew Keen's (2007) *The Cult of the Amateur* was an alleged "wake-up call" to the "freewheeling, narcissistic atmosphere that pervades the Web" (back cover). Mark Bauerlein (2008), author of *The Dumbest Generation*, states that the digital age is stupefying young Americans and jeopardizing our future. Technologist Jaron Lanier (2010) argues that technology is shaping us rather than the other way around. Michael Bugeja (2005) claims that *interpersonal divides* occur when people spend too much time in virtual rather than "real" communities. Sherry Turkle (2011) contends that our relentless digital connection is actually leading to new forms of solitude. Nicholas Carr (2010) posits that the internet is eroding our ability to engage in deep and creative thought. These examples only scratch the surface; the list is seemingly endless. Humans are adept at manufacturing anxieties and fears—both real and perceived—whenever seismic changes are afoot.

And yet, despite all of the anxious hand-wringing and reflexive teeth-gnashing, most of us also seem to understand quite deeply that these new digital tools and environments bring us great power. If they didn't, they wouldn't have pervaded our homes and offices so quickly. They wouldn't have infiltrated our attention and our energy and our enthusiasm. There must be something there, right?

The Benefits of Technology

Of course there is. We now have the ability to communicate almost instantaneously with people all over the planet. We can learn anytime, anywhere, from anyone, about anything we want. We are able to create content, reach others, and collaborate in ways that were previously unimaginable to noncorporate or nongovernment entities. We can access almost all of human knowledge through the small mobile devices that we carry in our pockets and purses. The power that we have as learners and teachers these days would have been inconceivable to our ancestors just a couple of generations ago. To say that mobile phones, laptops, tablets, apps, virtual and augmented reality, interactive games and simulations, adaptive learning systems, online websites, multimedia feeds, and other digital environments have little to no place in education is ludicrous. There is no better way to cement schools' irrelevance than to ignore the digital transformations that are reshaping the rest of society.

The key, then, is to figure out how to use these digital tools and to use them well. Instead of arguing that they should be banned or kept from our students, educators and parents should be determining how students should use them and for what purposes. Our thoughtful intentionality can shape our students' learning in positive ways. If the primary criticism of technology integration is that schools will continue to see limited impacts from their digital learning investments until they change, then the solution is to rethink learning and teaching and schooling, not to ignore or ban our powerful technologies.

About This Book

In this book, we describe our approach to this challenge and model how we are working with teachers, administrators, instructional coaches, and technology integrationists to transform digital learning opportunities for students. The main driver of our efforts, and this book, is the 4 Shifts Protocol, a discussion tool that we developed to help educators better integrate technology into their classrooms.

Chapter 1 offers a review of current frameworks and their advantages and disadvantages. In chapter 2, we introduce the 4 Shifts Protocol as a potential solution to the complex challenges of classroom technology integration. The next two chapters illustrate how to use the 4 Shifts Protocol to redesign lessons and units for elementary schools (chapter 3) and middle and high schools (chapter 4). Chapter 5 provides two examples of how to design lessons and units from scratch using the protocol. In chapter 6, we conclude with valuable tips and strategies for using the 4 Shifts Protocol and close with an epilogue that invites you, the reader, to engage with us further.

Chapter 1
Seeking a New Approach

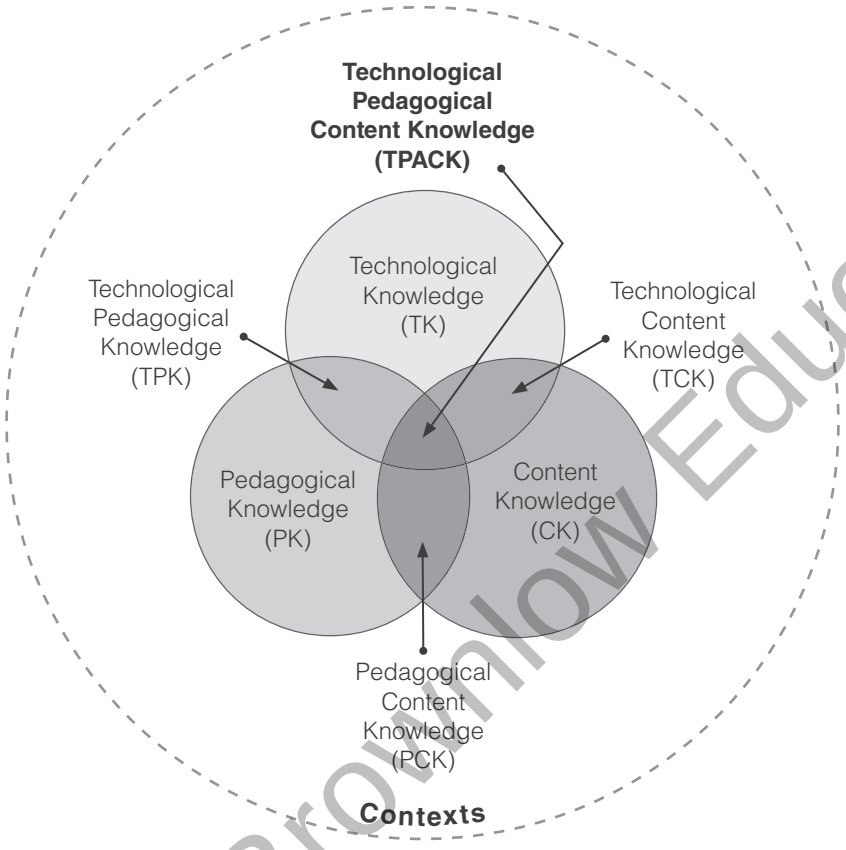
The ongoing criticisms of educators' current technology integration practices are deadly accurate. Although most schools have a lot of technology, they rarely use it well. As a result, they usually find that their technology-related efforts aren't paying off as they had hoped, leaving them open to understandable and easily anticipated questions about time, energy, and financial cost. There is a *lot* of replicative use—doing the same things that educators used to do in analog classrooms, only with more expensive tools—and many schools and educators are using technology simply for technology's sake. Until schools can get beyond basic replication with the digital devices that they've purchased, they are never going to satisfy the questions and concerns of their parents, communities, and outside critics.

Educators need better resources in order to move toward more transformative technology environments in which students and teachers use digital tools to actually do things that they couldn't previously do in analog learning spaces. In this chapter, we review several conceptual models that are worth understanding, but they also are insufficient for most school systems.

Current Frameworks

Instructional technology professors in colleges and universities primarily use the Technological Pedagogical Content Knowledge (TPACK) framework (figure 1.1, page 6).

TPACK evolved from professor Lee Shulman's (1986, 1987) work regarding *pedagogical content knowledge* which, in a nutshell, says that effective teachers live at the intersection of content knowledge (CK) and pedagogical knowledge (PK).



Source: *Koehler, 2012. Image reproduced by permission of the publisher, © 2012 by tpack.org.*

Figure 1.1: Technological Pedagogical Content Knowledge framework.

In other words, they know their stuff, can teach it well, and understand how to live at the nexus of those two domains.

Punya Mishra and Matthew J. Koehler (2006) add a third domain to Shulman's framework: technological knowledge (TK). They posit that technology tools are separate from both content and traditional pedagogy and add a new dimension to classroom teaching that is worth mastering. Digital learning tools require teachers to consider new content and pedagogy intersections as they pull those tools into their day-to-day instruction. That made sense to most people, and instructional technology faculty have been conducting research using the TPACK framework ever since (see for example Archambault & Barnett, 2016; Kessler et al., 2017).

Although TPACK is the darling of the postsecondary crowd, the Substitution Augmentation Modification Redefinition (SAMR) framework (Puentedura, 2006) is dominant in most elementary and secondary schools. The SAMR

framework looks like a ladder with four rungs. Substitution sits at the bottom with Augmentation and then Modification above it. Redefinition is at the top. The definitions of each are as follows.

- **Substitution:** Technology acts as a direct tool substitute, with no functional change.
- **Augmentation:** Technology acts as a direct tool substitute, with functional improvement.
- **Modification:** Technology allows for significant task redesign.
- **Redefinition:** Technology allows for the creation of new tasks, previously inconceivable.

The lower two rungs illustrate how technology can *enhance* our work while the upper two rungs depict how technology can *transform* our work. The basic idea of SAMR is that, over time, our technology integration efforts should move beyond substitution (that is, replication, or doing the same things we did in analog environments) and toward redefinition (that is, transformation, or doing things differently than we could in analog environments). That's an easy idea to understand—and a worthy goal—and educators have been trying for years now to integrate SAMR into their technology integration thinking and professional development.

The Replacement, Amplification, and Transformation (RAT) framework appeared in 2006 a few months before SAMR. Joan Hughes, Ruth Thomas, and Cassandra Scharber (2006) postulate three categories that preservice teachers could use to increase their critical decision-making regarding technology integration. The RAT framework is similar to the SAMR framework but collapses SAMR's middle two categories (augmentation and modification) into one (amplification). Here are some basic definitions for each category.

- **Replacement:** Technology serves as a different (digital) means to the same instructional practices.
- **Amplification:** Technology increases efficiency, effectiveness, and productivity of the same instructional practices.
- **Transformation:** Technology invents new instruction, learning, or curricula.

Again, the idea is that we want students and teachers to get beyond Replacement-level technology integration (that is, replication) and move toward Transformation, at least in some of their learning and teaching practices.

The Arizona and Florida Technology Integration Matrices (Arizona K12 Center, 2012; Florida Center for Instructional Technology, 2011) take a slightly different approach. Both models place technology integration within the context

of categories of use. For instance, both models say that technology usage should be active, collaborative, constructive, authentic, and goal directed. Here are the definitions from the Florida matrix.

- **Active:** Students are actively engaged in using technology as a tool rather than passively receiving information from the technology.
- **Collaborative:** Students use technology tools to collaborate with others rather than working individually at all times.
- **Constructive:** Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.
- **Authentic:** Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.
- **Goal directed:** Students use technology tools to set goals, plan activities, monitor progress, and evaluate results rather than simply completing assignments without reflection.

For each of the five definitions, teachers can be at five different levels of technology integration: (1) Entry, (2) Adoption, (3) Adaptation, (4) Infusion, or (5) Transformation. These five levels are similar to the SAMR framework's four levels or the RAT framework's three levels. The matrices help a teacher understand that her technology integration for a given activity may be strong in one area (for example, active technology use) while simultaneously low in another (for example, authentic technology use).

All of these frameworks are useful as basic mental models. We like the idea embedded in nearly all of them that teachers should be moving toward transformation rather than replication, which addresses the primary concerns of Cuban (2016) and many others (for example, Bauerlein, 2008; Carr, 2010; Schleicher, cited in Bagshaw, 2016). We like the fact that the RAT framework collapses the often-confusing middle two categories of SAMR (Augmentation and Modification) into one simple category (Amplification). We like Florida's and Arizona's understanding that educators can be at differing levels—even for the same technology-infused activity—depending on which outcomes we're examining (Arizona K12 Center, 2012; Florida Center for Instructional Technology, 2011). And we like TPACK's emphasis on integrating and thinking about the intersections of all three of the domains of content, pedagogy, and technology. All of this makes sense to us.

What we have found to be difficult, however, is implementing these frameworks in practice. While they are useful mental models, *they don't usually help educators know what to do differently*. Take SAMR, for instance. If a mentor or outside

observer says to a teacher, "You know, I think that lesson you just facilitated is at the Augmentation level and you should try to move it toward Redefinition," the framework doesn't help that teacher very much in knowing what to change instructionally, particularly since SAMR is a technology usage continuum, not a learning continuum (that is, an instructional activity can be high on the SAMR continuum but still be low-level learning). Similarly, without a whole lot of analysis and conversation—the quality of which will be highly variable across schools and districts—it is usually fairly difficult for teachers to recognize in which TPACK intersections their technology integration practices may be (and, probably more importantly, in which intersections they're not).

Limitations of Current Frameworks

In our work with classroom teachers, we have noticed that they find many of these frameworks to be judgmental in the sense that they feel inferior or criticized if their technology integration is not frequently or always at the transformation level. They feel explicit pressure from instructional technology coaches or administrators to move toward transformation—which is indeed necessary in many instances—but these leaders accompany it with very little guidance on what to do differently in order to make desired shifts happen. In other words, if teachers already knew what to change, most of them probably would be doing it already. The overlay of a framework that teachers see as vague but judgmental doesn't make the task instructionally easier and frequently makes it psychologically harder. Exhortations to do something different or better don't help teachers if they don't have the know-how to do so.

Finally, and probably most important, the shorthand definitions that accompany each element within the frameworks aren't sufficiently clear to identify where in the frameworks educators should situate a particular lesson, unit, or activity. The middle two levels of SAMR are often muddled, for example, and a quick internet search will illustrate that people have wildly divergent beliefs about how they interpret SAMR; they equate it with Bloom's taxonomy (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956), a swimming pool, types of coffee, moving from a canoe to a submarine, and other metaphors. In our own workshops, we have witnessed several different groups of technology integrationists place the same technology-infused lesson into all four of the SAMR levels. Technology integrationists are supposed to be experts in this area, both familiar with the SAMR framework and tasked with implementing it within their schools and districts. And even they can't agree on where to place a lesson. While the value may be in the discussion rather than in the exact placement of the learning and teaching activity, we are very empathetic