

Introduction

PUBLIC SCHOOLS IN THE UNITED STATES have made major investments in digital learning over the past two decades, with proponents touting its promise for increasing equitable access to enhanced learning opportunities for all students, while simultaneously lowering costs. *Digital learning*—using a digital platform such as computer, netbook, or handheld device as an integral and consistent part of an instructional delivery strategy—is often marketed and embraced for its potential to offer innovative, more personalized instructional opportunities.¹ Educational technology vendors market their tools’ potential to customize content and provide teachers with real-time data on student performance that supports the personalization of learning. It is also often argued that students need to acquire technological skills or proficiencies to succeed in today’s labor market, and the federal government accordingly provides resources for educational technology purchases and requires states to set aside funds for procuring technology, with the objective of closing the “digital divide.”

Equity concerns persist, however, regarding the quality of digital devices, as well as internet access and connectivity for public school students.² There is also a growing consensus that the thorniest challenges schools and educators face in integrating educational technology are not about the tools themselves but rather how digital learning interacts

with the systemic social, economic, racial, and historical patterns of inequity in education, or what Gloria Ladson-Billings calls the “educational debt” that has accumulated over centuries of American history.³ In addressing the role of educational technology in promoting equity, Mark Warschauer argues that the term *digital divide* is misleading, in that it implies that investments in hardware and connectivity are key to the success of educational interventions that aim to reduce educational and social inequities with technology.⁴ In 1994, only 3 percent of US classrooms had computers, while a decade later, that number had risen to 94 percent.⁵ By 2019, 98 percent of classrooms had computers and 87 percent of teachers said they were using digital learning more than once per week; yet as we describe in this book, the quality of learning experiences provided through educational technology remains highly variable.⁶ In fact, the question of whether equitable, high-quality digital learning is present in US schools—and what is needed to ensure that it is—has become ever more urgent. This question motivated us to partner with two large urban school districts over the past ten years to tease out the factors that facilitate or impede high-quality digital learning over time, especially in low-resource settings serving high proportions of historically disadvantaged students, where pressure to close opportunity and achievement gaps remains particularly high.⁷

The evidence and stories from the front line of digital learning contained in this book come from our in-depth study of the implementation of digital learning over time in these two diverse, low-resource school districts. The first, Dallas Independent School District (DISD), is a large, high-poverty urban school district in Texas that serves a community where 90 percent of all students are identified as economically disadvantaged. The vast majority of students in DISD are students of color with, fewer than 5 percent identifying as white, and around half are classified as English language learners (ELLs). In the second district, Milwaukee Public Schools (MPS), more than 80 percent of enrolled students receive free or reduced-price lunch, and a little over half identify as Black and more than a quarter identify as Hispanic. Wisconsin was identified in 2019 as among the most segregated states in America, with

one of the widest achievement gaps in academic performance indicators between Black and white students in the nation.⁸ We hence do not make any claims about the national representativeness of these school districts or the populations of students that they are engaging in digital learning. Rather, we chose these two districts because they exemplify common profiles of low-resource, urban educational settings in the US that are implementing digital learning initiatives, and also because they are not necessarily the contexts envisaged by educational technology developers and vendors when digital tools are created and marketed to the K–12 education sector. Indeed, over multiple years and across these two research sites, we have observed the “good, the bad, and the ugly” of educational technology integration.

In this book, we frequently draw on these observations as we distinguish the roles of not only technological and pedagogical factors, but also the social, economic, racial, and historical factors embedded in our education systems that influence the equity and effectiveness of digital learning initiatives. We also highlight places of promise where schools, districts, and states leverage digital tools to improve opportunities and outcomes for youth.

With the subsidization of technology purchases through the federal E-Rate program (the Schools and Libraries Program of the Universal Service Fund) and Title I funds, in combination with the eager partnership of the private sector to supply the vast K–12 market, digital learning will continue to be a growing component of compulsory public schooling.⁹ Ensuring that students realize the potential benefits of digital learning, however, is a complex and often under-resourced endeavor for public schools. The evidence to date shows enormous variability in how digital learning is rolled out, accessed, and supported both during and outside of the regular school day, which harbors the potential to exacerbate rather than reduce inequities in learning opportunities.¹⁰ In reality, the integration of digital learning into K–12 education has encountered as many missteps as it has successes, with both “high drama” failures in implementation—such as the 2013 iPad scandal in Los Angeles Unified School District—and “under the radar” disappointments (e.g., digital

platforms that once held promise collecting dust on classroom shelves).¹¹ How schools anticipate and face these challenges has important implications for all students' learning. Stakes are particularly high in schools serving historically disadvantaged students, where inequitable access to quality educational opportunities (or the education debt) has had long-standing impacts.

About This Book

The purpose of this book is to shine light on concerns about equity in digital learning and the factors instrumental in reducing socioeconomic and racial opportunity gaps at district, school, classroom, and individual student levels in K–12 education. In Richard Milner's definition, *equity* means "providing students with what they need to succeed, regardless of their racial, ethnic, cultural or socioeconomic background," not merely equal resources.¹² A district or school with many low-income, high-need students may require more resources to implement the same digital learning initiatives equitably, rather than a comparable level of funding or personnel resources (proportionate to the number of pupils) as a more affluent district. In our research and throughout this book, we thus focus on three dimensions of digital learning initiatives that can have profound implications for how digital learning affects equity in educational opportunities and educational quality:

- *Who* in public elementary and secondary schools is directed to use digital learning tools and for what purpose (e.g., regular or supplemental education)
- *How* digital learning is implemented at school and classroom levels, including the infrastructure, environment, and supports provided to teachers and students and how it changes their role and engagement in the educational process
- *What* educational content is accessed through digital learning tools, including in blended forms (i.e., technology-assisted or -delivered instruction provided in combination with some synchronous or live instructor involvement)

Digital learning initiatives may be broad-based, with the objective of integrating digital tools into blended, core classroom instruction or supplementing classroom instruction with student-directed options for deepening and bolstering learning in creative or customized ways. At the same time, within this context of broad digital initiatives, schools and/or students also are often targeted for particular types of digital instructional opportunities to meet specific educational goals or needs. For example, DISD first introduced a districtwide, 1:1 technology pilot initiative in 2014 that sought to provide access to one laptop for each student in under-resourced K–12 classrooms. In the following year, DISD refocused the initiative on higher-poverty *elementary* schools serving larger subpopulations of ELLs and shifted to lower-cost tablets. Then in 2016, DISD refined its targeting approach again to invite school participation in the 1:1 tablet initiative based on school feeder patterns, with the goal to facilitate greater cross-school collaboration and consistent learning opportunities for students entering the same middle school in subsequent years.

MPS has likewise pursued multiple approaches to targeting and integrating digital learning in the district, while consistently prioritizing students who are falling behind in their academic progress to receive these opportunities. MPS offers online tutoring, typically outside the regular school day, for elementary school students. Students in grades 6–12 have an online instructional program that provides “data-driven differentiated instruction” in mathematics and reading to supplement regular classroom instruction. High school students are offered online courses both during and outside the school day, a program that now accounts for approximately 20 percent of all secondary course credits earned within the district. In both districts, students from low-income settings with specific educational needs—ELLs in DISD and students performing below grade average or failing courses in MPS—are given precedence for digital learning opportunities with the hope that the alternative formats, settings, and opportunities for greater personalization of content and/or pace will improve their learning and achievement trajectories and ultimately help to close racial and economic achievement gaps.

Consequently, differential access to quality learning experiences between digital and traditional classroom instruction could have profound implications for equity. For example, DISD teachers often created activity stations or group activities with tablets that allowed them to spend more intensive instructional time with smaller groups of students. In theory, this strategy would enable instructors to more effectively target and meet the needs of diverse groups of learners.¹³ Depending on how it is implemented, however, this more individualized approach can also contribute to unequal access to the instructor's time and high-quality learning experiences; for example, we observed the majority of students in one classroom off-task or playing games on their tablets for most of the class period while the teacher worked with a handful of students at the front of the classroom.

There are many other ways in which the implementation of digital learning can perpetuate inequities. In MPS, for example, high school students are normally assigned to online courses after failing a course in a traditional classroom or being removed for behavioral problems or special educational needs. Given that online courses typically take place in an online learning lab rather than a regular classroom, this represents a form of *ability grouping*, in which students are segregated according to their academic performance. Research shows that ability grouping can exacerbate negative stereotypes and increase gaps between high- and low-achieving students.¹⁴ In one stark example, MPS students traveled by bus to take online courses in a school with superior educational resources, only to be grouped in a basement classroom with a student-teacher ratio exceeding 40:1. In both this example and the DISD example above, the approach used to target or engage students in digital instruction also increased inequities in access to live instructional support.

How digital learning is implemented has implications for equity as well. Implementing a digital learning initiative in public schools is a complex and taxing endeavor, even in districts that are financially strong, with schools and teachers who are well equipped technically and supported professionally for the rollout of new digital tools, instructional models, and procedures for their administration and monitor-

ing. Effectively carrying out the major tasks of technology integration (inside and outside of the classroom) requires the investment of valuable resources and instructional time. District staff and educators also face new challenges associated with coordinating and building capacity across district, school, classroom, and student levels of enactment and use. In low-resource educational settings—which often struggle with inadequate funding and supports and serve disproportionately high-need student populations—the typical challenges to technology integration are greatly magnified.

For example, one of the most widely acknowledged benefits of introducing digital learning in K–12 educational settings is the opportunity to deliver more personalized instruction, particularly with blended learning models that integrate substantial live interaction. Adapting the content and logistics of instruction (i.e., pace, order, location, and lesson material) for individual student needs can be especially beneficial for students with learning disabilities or those who may need additional academic support in specific content areas.¹⁵ However, digital educational tools for personalizing and supporting learning cannot simply be deployed with same models of classroom organization and traditional instructional approaches. A review of research on instructional technologies and their effectiveness found that many school districts do not have adequate resources or supports for expanding blended learning models, and the predominant model for delivering all or most instruction in these districts offers little or no face-to-face interaction.¹⁶ Furthermore, research finds that “drill and practice” on lower-order skills dominates the interactions of low-income and black students with digital tools.¹⁷ Studies have also found that schools in low-income settings are more likely to experience turnover among teaching, administrative, and technology support staff, and that even when teachers in these schools have confidence in the available technology mode, they are more constrained by their environments (e.g., higher student-teacher ratios) and competing resource demands in implementing blended instruction.¹⁸

Accordingly, if live instruction in traditional learning settings is replaced with poorer-quality digital instruction, inequalities could be

worsened, particularly for the disproportionately low-income, high-need students we see directed to digital learning. We observed many instances of digital instruction in MPS and DISD where most of the communication between students and instructors (or instructional resources) was occurring asynchronously, or where few students had access to consistent, constructive interactions with teachers and educational content in instructional spaces. In high school credit-recovery classrooms, our research and that of others find that teachers' roles are frequently confined to addressing classroom management and troubleshooting technology access issues, with limited capacity for instructional support.¹⁹

In addition to equity concerns about how digital learning is targeted and implemented in public schools, there also are important questions about the content accessed through digital platforms and applications, which is typically designed by private vendors for standardized delivery to the "modal student." As such, it offers few options for adapting it to local context, values, cultural norms, and the student's special needs.²⁰ The outsourcing of the entire curriculum and instructional delivery in online course-taking is part of a larger trend toward the privatization of education to third-party vendors, particularly for marginalized and historically underserved students.²¹ This raises the question of whether the curricular content and its delivery primarily by asynchronous, online instructors creates *authentic work* for students—that is, work that allows them to solve new and interesting questions, dive deeply into a single topic, apply content to situations outside of school, and communicate ideas with others.²² Research shows that students who are given opportunities to create their own meaning, relate course material to their own lives, and develop higher-order skills are more likely to invest greater effort and stay engaged in learning.²³

The curricular standardization imposed by online courses is less likely to be moderated or adapted in low-resource settings through strategies such as blended learning, which are more costly to implement. For the diverse student bodies served by large urban school districts, the consequence is often online courses that do not correspond to the academic and personal realities of students' lives, which lie outside the

white, middle-class norms of American society that disproportionately shape online course content. Without live instructors to adapt content to local contexts, online courses may intensify the encroachment of dominant values, norms, and expectations into schooling, potentially exacerbating the alienation of students from lower-income and minoritized populations.²⁴

In sum, as districts and educators increasingly devote scarce resources and instructional time to implementing digital learning, the stakes of digital learning initiatives that overtly prioritize historically underserved student populations in large urban public schools are too high to allow educators to ignore these major equity concerns. In this book, we rigorously pursue these questions of how of digital learning changes—for better or for worse—student educational experiences and outcomes, and particularly, equity in access to quality educational content and learning opportunities. We also marshal evidence on concrete strategies that districts, schools and instructional staff can adopt to realize the promise of digital learning, even within contexts of constrained resources and high-need student populations.

Who This Book Is For

As noted above, the purpose of this book is to illuminate—with rigorous analysis of participation and outcomes, and vivid descriptions of classroom instruction—the district-, school-, classroom-, and student-level factors that support or impede the equitable and effective implementation of digital learning in K–12 public schools and describe what equity should or could look like in practice at each of these levels. It also identifies and encourages the leveraging of specific strategies and practices at these various levels that hold the most promise for reducing inequities in educational opportunities and improving student outcomes. We expect that the important lessons distilled from this work will be useful to key stakeholders of digital learning in the following ways:

- State education and local agencies and policy makers that design educational technology initiatives and purchase technology will

gain a better understanding of the importance of supporting technology integration, keeping a sustained focus on implementation, and the implications for making more efficient and effective use of their limited resources toward promoting equitable student learning and outcomes.

- School leaders, district staff, and educators with responsibility for integrating educational technology to support student learning will use the information and insights to guide improvements to their own programs.
- Vendors working with education leaders and staff to enact the potential of digital tools for increasing learning will continually identify ways that they can better support educators and students in using technology and more fully realizing its potential.
- Researchers studying digital learning will learn about new opportunities for collecting and using data generated in digital learning and strengthening their methods of inquiry and analysis.

How This Book Is Organized

While some readers may enjoy reading the book from beginning to end, others may wish to read chapter 1 and then the chapter(s) most relevant to their level of expertise—district, school, classroom, or student level. Chapter 1 describes the landscape of digital learning in education and what is driving its adoption in public schools, including federal and state government funding and requirements geared toward increasing district- and school-level investments in digital learning (and reducing the digital divide); private-sector vendors that market their products to state and local educational agencies; and district- and school-level initiatives that target digital learning toward educationally and economically disadvantaged students. Within this discussion, we give particular consideration to the rationale behind targeting educational technology to low-resource settings.

The success of digital learning initiatives can be derailed in the first steps of purchasing digital tools and planning for their rollout if decisions are ill informed. Chapter 2 highlights key issues and insights for state and

local educational agencies (school districts) when they first contemplate investing in digital tools, including the type of technology, the scale at which to roll it out, the infrastructure and capacity needed, and the contractual relationship with the technology vendor. This includes potential trade-offs between “high-tech” tools that may be better aligned with best practices in curriculum and instruction versus lower-cost options with differing infrastructure and capacity requirements for their integration in schools and classrooms. We also discuss the importance of bridging potentially divergent interests of the purchasing agent and vendor, planners and implementers at the district and school levels, and the users (teachers and students) in the classroom regarding expectations for technology integration and support in their implementation. Lastly, we draw on our study findings to formulate tips and guidance for states and districts in supporting the lift-off, rollout, and success of digital learning initiatives.

Chapter 3 discusses strategies for successful technology integration at the school and classroom levels. Research on school effectiveness consistently identifies the vital role of teachers in improving student learning, and technology-enhanced instruction is no exception. At the same time, the introduction of digital learning alters the integral role of the instructor—and often where instruction takes place as well—generating new instructor capacity demands and needs. This chapter extends typical discussions of professional development design and technical support delivery for teachers by focusing on the unique challenges and opportunities presented by digital learning in low-resource contexts with historically underserved student populations. We describe common instructional models and illustrate different teacher approaches to addressing recurring implementation challenges. We show how teachers’ experience and beliefs about the capacity of digital tools to help meet instructional goals influence the intensity of technology use and student achievement. Lastly, we present examples demonstrating the extent to which (and how) digital learning can be adapted to meet the needs of distinct student populations and discuss opportunities for redefining the student-teacher relationship through technology to reduce inequities in student learning and outcomes.

Chapter 4 takes a closer look at who is being directed to digital learning at district and school levels, as well as how student engagement is fostered for historically marginalized students. Digital learning is an ever-expanding element of instructional programming for students, with many initiatives targeting students who are falling behind academically or at risk of not completing their secondary education. Of concern, however, are the documented disparities in how, and for what purposes, digital tools are used by students of varying racial backgrounds, socioeconomic status, and levels of academic readiness and the resulting potential for differential access to quality learning experiences that could also have profound implications for equity. Theory informs us that individuals and their social settings shape both their understanding and use of digital tools in a dynamic process through recurring interactions, and that educational technology may not always be used as intended. This chapter looks in depth at student engagement and identifies factors that limit or promote it within digital learning, as well as how those factors contribute to (or detract from) *digital citizenship*—students’ actual use of digital tools compared with their intended uses. We also consider how the educational content accessed through digital tools might influence student engagement and their quality of learning experiences.

Chapter 5 highlights the potential for digital learning to be leveraged in changing students’ academic trajectories. A core educational goal across state, district, school, classroom, and student levels is to use digital learning to increase student learning, achievement, and educational attainment. However, it is possible to increase attainment (e.g., of course credits or degrees) without necessarily increasing learning or achievement; and it is also possible to increase measured achievement on standardized tests without increasing learning. We take advantage of the longitudinal nature of our study to examine student educational outcomes over time and explore how access to and engagement in digital learning at different ages, grades, and in environments influences students’ educational and postsecondary outcomes. We also highlight strategies for implementing digital learning that contribute to better

educational outcomes and that are more (or less) effective for subgroups of students with special educational needs. Additionally, we point to student subgroups that may be left behind in terms of their educational progress and identify examples of policy and programmatic changes that could prevent these students from losing ground.

Digital learning initiatives can be effective, but it takes planning, monitoring, assessment, revamping, and refinement over time to understand and cultivate the key conditions under which they work best. In chapter 6, we summarize the concrete ways that state and local educational agencies, teachers, and others in educational settings can act on the evidence presented throughout this book to increase the effectiveness of digital learning. More specifically, we describe the levers these stakeholders have for implementing many of the strategies and promising practices that we identified for improving the implementation and outcomes of digital learning initiatives. We also describe the infrastructure we jointly created to build capacity at the district, school, and classroom levels to facilitate more productive monitoring of digital learning and retooling of approaches for its integration in various educational settings. Four key tools that we created for use by educators can be found in the appendixes included at the back of the book.

Integrating digital learning is complex and challenging work, and there is no one playbook that will work for all educational entities in increasing equity in opportunities, student learning, and educational achievement. We hope that by pointing to tools and resources for district and school leaders/staff and instructors who are looking for support in their technology integration efforts, we can collectively better ensure that digital learning access and use is equitable and promotes the ultimate goal—quality educational opportunities and outcomes for all students.