Breaking With the Past:

Embracing Digital Transformation in Education

Jean-Claude Brizard | April 2023

Digital Promise
Accelerating Innovation in Education

Table of Contents

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Acknowledgements

About the Author

Jean-Claude Brizard is president and CEO of Digital Promise, a global, nonpartisan, nonprofit organization focused on accelerating innovation in education. He is former senior advisor and deputy director in US Programs at the Bill and Melinda Gates Foundation where he focused on PK-16 education across five communities in four states. He also led several strategies to help close the racial and economic achievement gaps in Washington state's educational system as well as support the growth and sustainability of the state's public charter school sector.

He is the former chief executive of Chicago Public Schools. Prior to his appointment in Chicago, he was superintendent of schools for the Rochester City School District in New York. Under Mr. Brizard's leadership, both Chicago Public Schools and the Rochester City School District saw substantial improvements in student performance. Mr. Brizard's experience also includes a 21-year career as an educator and administrator with the New York City Department of Education. He served as a regional superintendent, supervising more than 100 schools in the Brooklyn borough, and he also served as the system's executive director for its 400 secondary schools. He is a fellow of the Broad Center, a fellow of the Pahara-Aspen Institute, and a member of the Aspen Institute Global Leadership Network.

The Digital Transformation of Teaching and Learning:

An Example from Talladega County, Alabama

East-central Alabama's Talladega County is well-known for the Talladega Superspeedway. Memorialized in the title of Will Ferrell's hit comedy Talladega Nights, the speedway hosts some of the nation's most exciting NASCAR events and produces the highest race speeds of any track on the NASCAR circuit.

Its pioneering school district, however, has put Talladega County on the map as well.

Talladega County Schools (TCBOE) spans 760 square miles and serves about 7,000 learners, 71 percent of whom receive free and reduced-priced meals. It also is a member of the League of Innovative Schools, a network of forward-looking school districts that have declared their commitment to improving and advancing equitable outcomes for students through innovative solutions, including those powered by the smart use of learning technologies.

TCBOE has been more than a willing partner. Over the past 15 years, it has engineered one of the nation's most remarkable digital transformations of teaching and learning to date.

In 2008, the more than lackluster results produced by its traditional teacher-centered approach to instruction fueled a two-year TCBOE effort to research what was working in successful schools across the country. According to Suzanne Lacey, who began her superintendency that year, site visits to these schools revealed common threads among them: (1) the incorporation of project-based learning (PBL) pedagogies that feature authentic real-world experiences and performance-based assessments to engage students in 21st century skill development, and (2) the smart and powerful integration of digital technologies into those pedagogies.

In 2009, TCBOE began to pilot what it had learned at a single high school, Winterboro. The district repurposed maintenance and textbook funds to ensure every student had a device. It tore down walls to create collaborative learning spaces for 60 students. It built-out the electrical and broadband capacity of those spaces to accommodate 60 devices. And it budgeted dollars for professional learning to develop teachers' digital skills and help them adopt PBL practices.

As what proved to be a successful pilot transitioned to scaling across the district, professional learning became the cornerstone of TCBOE's transformation. The district hired a coordinator for instructional technology and permanently replaced resource

Talladega County
Schools (TCBOE)

7,000
Learners

71%
Receive free and
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meals
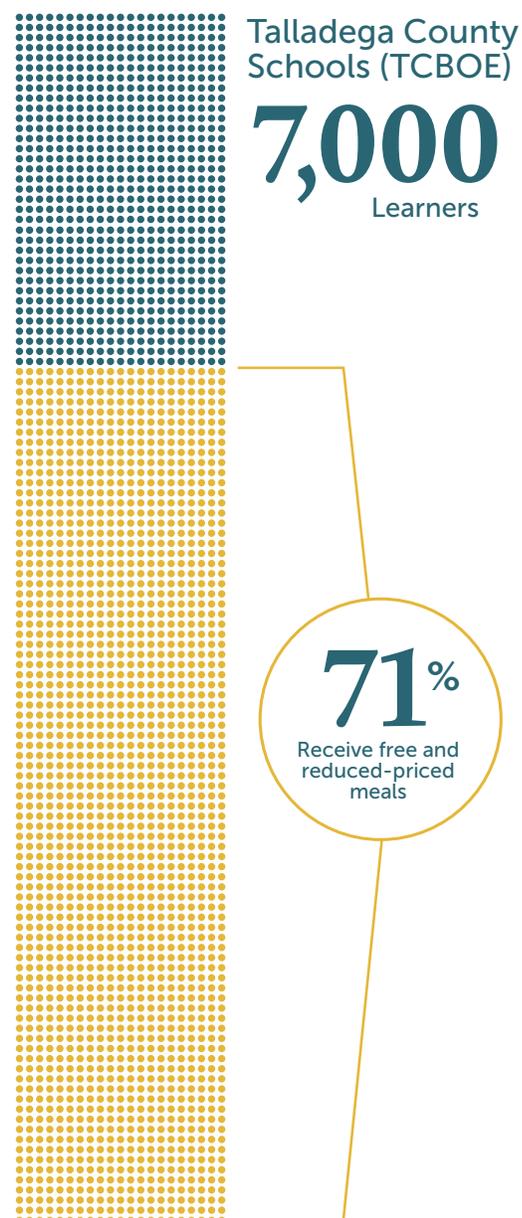
teachers—who were largely tasked with reviewing lesson plans—with digital learning specialists (DLSs). The DLSs provide teachers with just-in-time support to help them apply digital technologies to PBL activities. They also lead other professional learning activities, such as long-term professional learning communities.

More than a decade after the Winterboro pilot began, learner-centered pedagogy supported by technology is now the standard across TCBOE's 17 schools. The district uses a learning management system, Google Classroom, to help teachers differentiate instruction and content across project teams. Anchored on the platform is i-Ready, an online program powered by artificial intelligence (AI) that assesses student skills and knowledge in reading and math and provides each learner with personalized lessons they complete at their own pace—but with the intention of stretching students who are behind to 18 months of growth each year.

Lacey says that i-Ready is important but only supplemental to the learning activities teachers design and that technology enables. Within these activities, TCBOE learners develop competencies measured by college and career readiness rubrics by blogging; recording podcasts; creating and revising wikis, multimedia presentations, sophisticated animations, and well-designed publications; participating in online chats and other forums; engaging in computer-aided design; and more.

> ## Learning is authentic and engaging in TCBOE
>
> TCBOE learners apply their digital skills to challenges that are meaningful to them and that make a difference in their communities. Examples of learners having a broad impact are many. Among them, Lacey reports, is a project undertaken by learners at Munford Middle School. It resulted in Alabama changing its Uniform Anatomical Gift Act. The Act now requires state law enforcement to promote organ donation through the driver's license application and renewal process. Munford learners conceived of the project with their teacher to honor classmate Angelynn Luckado, who died of complications from a heart and lung transplant. Alabama now calls the Act "Angelynn and Courtney's Law."

2022
93%
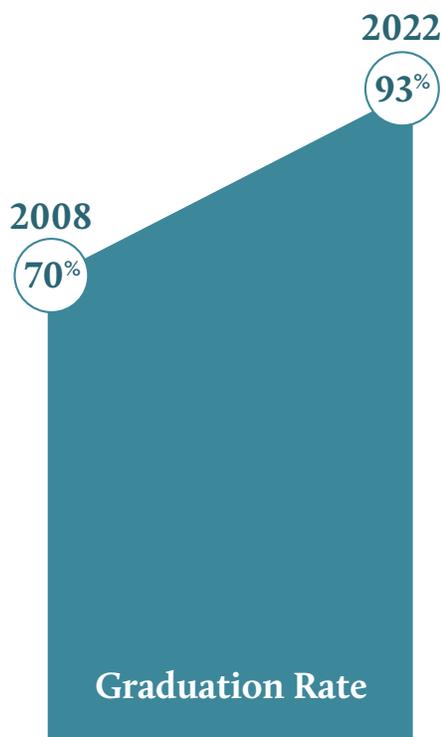
2008
70%

Graduation Rate

Achievement is up since the district transitioned to PBL. The graduation rate that was a shade above 70 percent in 2008 now stands at 93 percent. At Winterboro, that rate was 100 percent by the end of the 2018–19 school year. And Lacey was Alabama's 2022 superintendent of the year. She couldn't have achieved the honor, she says, if she had not empowered TCBOE's teachers as professionals capable of designing powerful and authentic learning activities enabled by their now skilled use of digital technologies.

TCBOE has digitally transformed itself.

Our nation's learners are depending on their local schools and school districts to do the same. We need the digital transformation of teaching and learning at scale across the United States.

Why We Need the Digital Transformation of Teaching and Learning

"If it ain't broke, break it" is a phrase most used in business. It suggests that if companies are not willing to innovate, not willing to imagine what future consumers will want and need, soon they will be out of business. Without the innovators willing to break their own business models, systems, and products, we would still be locked into landlines, rotary telephones, and phone booths for communication; physical stores to meet all our shopping needs; a handful of television networks for viewing commercial-interrupted movies, sitcoms, and series; and personal advertisements printed in newspapers for those inclined to look for a date or a lifelong partner on a commercial platform. Digital technologies have transformed entire industries and enterprises, from transportation to agriculture, from communications to commerce, from banking to entertainment to dating and romance.

Education? Not so much.

Though K-12 education is a complex social enterprise and not a business and learning not a product, still elementary and secondary education need to join the community of enterprises that have digitally transformed themselves to far better serve their clients, customers, and, in this case, their learners. We believe digital transformation can and will pull K-12 education into new and more effective constructs for classroom learning and the systems that support it **and** ensure that schools are prepared the next time a natural disaster or health crisis disrupts in-person learning.

First, the digital transformation of teaching and learning can pull us at greater scale into more effective learner-centered frameworks.

Most of the nation's current K-12 learners are locked into the one-size-fits-all approach to teaching and learning that their parents, grandparents, and great-grandparents (and, until recently, TCBOE students) were—with expectations that all learners grasp content and develop skills at the same pace, using the same materials, covering the same content, subject to the same grade-level assessments, all in ultimate pursuit of the time-based Carnegie Unit that since 1906 has been the single most animating force behind K-12 education. The results speak for themselves: intolerable overall learner proficiency rates and even more intolerable learning gaps across race and class. Fortunately, digital technologies employed effectively by skilled educators now enable at greater scale constructs for K-12 education that learning sciences tell us are more effective: those that are more personalized and focused on the demonstration of competencies, rather than the acquisition of seat time.

Second, the digital transformation of teaching and learning can provide schools with the means to more effectively and perhaps finally address historic inequities in educational opportunity and close learning gaps.

But there's a catch. For at least a decade, many among us have thought that the current availability of high-speed internet—now accessible in almost every American school—and the advent of new and powerful educational technologies would be great levelers of educational inequities. The reality, however, is that they most benefit more affluent, privileged, English-proficient, non-remedial and white populations of learners. The challenge ahead of us, therefore, is to much more intentionally and coherently harness the power of technology for learners who have been historically and systematically excluded. As this publication will show, there are large and small districts in the United States meeting this challenge.

> ## "I don't know how we get to equity without edtech."
>
> *– Amber Oliver, Managing Director, Robin Hood Learning + Technology Fund*

Photo by Allison Shelley for EDUimages

Third, the digital transformation of teaching and learning will better prepare us for future disruptions.

The COVID-19 pandemic left us flat-footed. It exposed how inadequately prepared we were to deliver high-quality instruction to students in the digital age, especially for historically and systematically excluded populations of learners. Although school closures and emergency remote learning adversely impacted the academic performance of students across racial and socio-economic groups, its negative impact was disproportionate for K-12 learners of color and those experiencing poverty.

There is no guarantee that future disruptions caused by new life-threatening, easily transmissible pathogens, or natural disasters will not result in school closures in individual communities, regions, or the entire country again. They already are. We are doomed to repeat the educational havoc COVID-19 wrought unless teachers and learners are able to hit the ground running the next time their schools are closed because of a flood, fire, or health crisis.

Finally, the digital transformation of teaching and learning can pull systems and the educational ecosystem into new constructs.

Teaching and learning have always transpired within the context of systems and a broader ecosystem. These systems (at district and state levels) and the ecosystem (made up of edtech development, teacher preparation, and public policy, for instance) are in many respects still engineered for the century-old approach to education. One of the new constructs for which this publication argues, for example, is the replacement of two-dimensional transcripts of student learning (that for a century have used the Carnegie Unit as their foundation) with those that are digitized, more comprehensive, competency-based, and controlled and owned by learners themselves.

The good news is that many in the for-profit and non-profit sectors and in schools are hard at work pulling us into these new frameworks. In some ways, that work is beginning to cohere, but we are far away from scaling the digital transformation all learners need, especially those historically and systemically excluded from opportunity.

Digital Promise's belief that digital transformation must be the rule and not the exception across the country is the animating force for this publication. It looks forward to the future when we will have harnessed the power of technology in a coherent and scaffolded way to solve longstanding challenges created by the traditional approach to education in the United States, including its inability to deliver equitable opportunities and outcomes generation after generation.

The nation's learners can't wait for many more tomorrows to come and go without a broad national commitment to breaking the outmoded framework for American education and replacing it with frameworks that are more learner-centered, personalized, and effective. Digital technologies applied skillfully to teaching and learning might deliver on that possibility at long last.
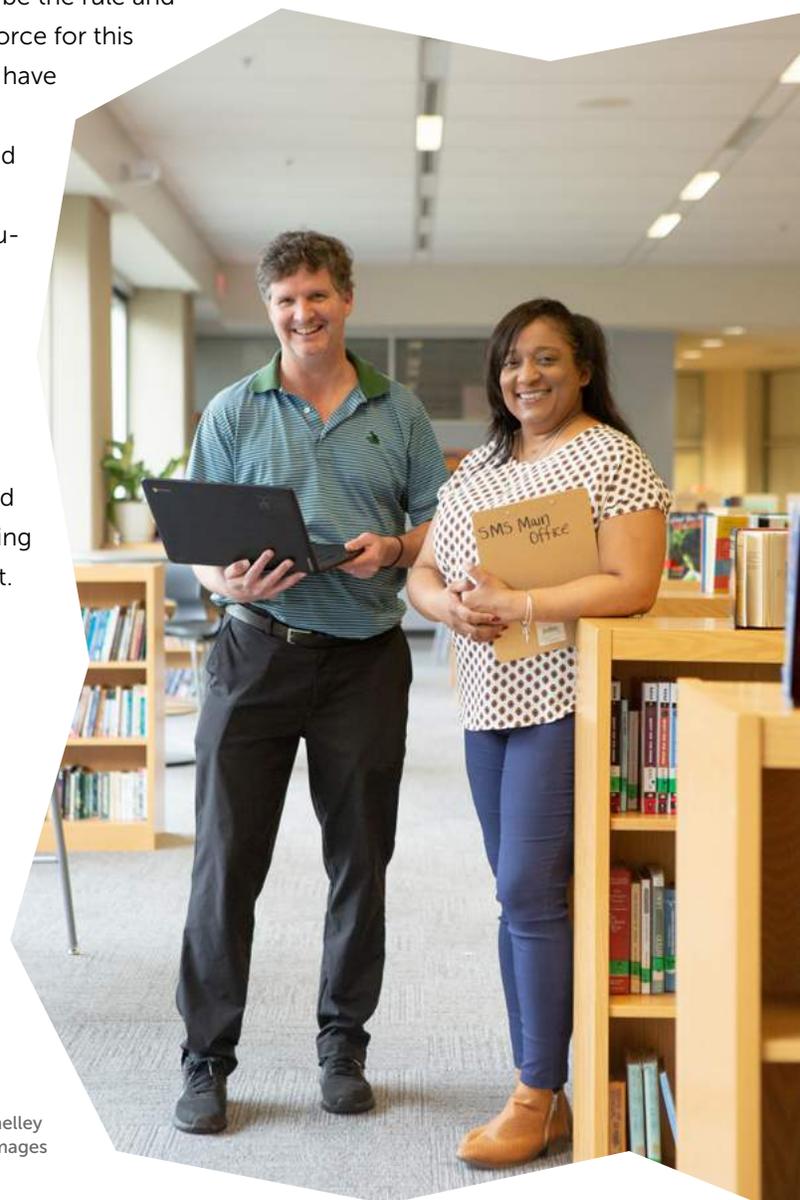
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Allison Shelley
for EDUimages

Digital Transformation at the
Classroom Level:

The Constructs for Teaching and Learning We Need and How Technology Enables Them

Learner Variability and Its Implications for Teaching and Learning

We have long understood that learners vary and, as a result, require what the field often calls "personalized approaches to teaching and learning." More often than not, we have considered personalization only for students struggling with learning differences that make it difficult for them to achieve grade-level expectations. The reality is, however, that learner variability exists for every learner—for students who are struggling and for those who are thriving.

Every learner has a unique and jagged learning profile in the context of what Digital Promise identifies as four domains: (1) content, (2) cognition, (3) social and emotional, and (4) biographical backgrounds. In any given math classroom, for instance, learners vary in their mathematics knowledge, skills, and belief in their own abilities. They might be strong and self-assured in some areas, but need help and are perhaps less confident in others. No two learners are the same.

Foundational to any framework for teaching and learning employed by schools, therefore, should be the rock-solid understanding that learner variability is the rule, not the exception. Learners develop skills and knowledge at different rates; are at varied stages of cognition and literacy development; and have wide-ranging social and emotional needs, interests, motivations, and levels of confidence. And learner variability has profound implications for teachers: They must be empowered and have the skills and tools to identify where their learners stand on progression toward learning standards and decide how to tailor instruction to gaps in knowledge and skills, cultural and family backgrounds, and individual student interests and attitudes about their own abilities.

The medical profession provides an analogy for the role teachers should play in addressing learner differences. Like doctors examining patients and collecting data on their health, teachers have to be able to make decisions about how to "treat" those in their charge based on data they have at hand. And, like doctors, teachers ultimately must take into account that it is their patients (learners) who follow
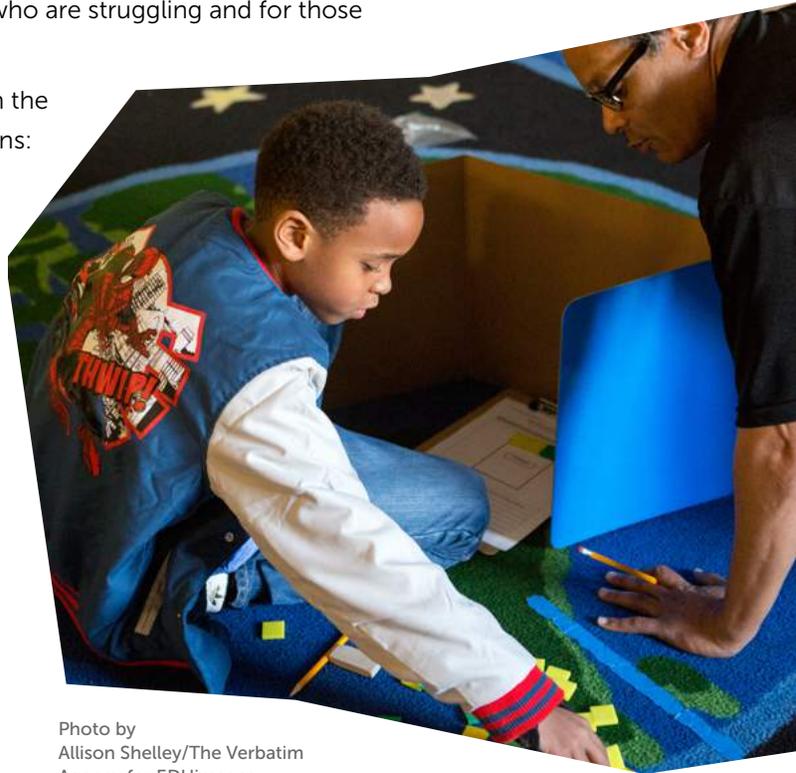
Photo by
Allison Shelley/The Verbatim
Agency for EDUimages

A Note from Digital Promise about Edtech Products Referenced in This Publication

To illustrate the power of new and emerging digital technologies that enable the transformation of teaching and learning, this publication identifies and describes a substantial number of edtech products schools and school districts are using to power that transformation. Their reference in this publication does not constitute a Digital Promise endorsement.

through on their "treatment" plans and are responsible for their own health—or, in this case, their own learning. The learning that teachers design for differentiation, therefore, must engage and motivate. Finally, we have come to understand that physicians can avoid delivering inequitable care and worsening health disparities only if they become more cognizant of unconscious bias related to race and socioeconomics. Likewise, teachers need to uncover their own biases to avoid inequitable practices that worsen historical gaps in learning.

With an understanding that any construct for teaching and learning employed by schools must address learner variability and that schools should empower teachers to act more like doctors than line workers following a manual to assemble a product, we see why the conventional approach to teaching and learning is not up to the task of educating America's diverse body of K-12 learners.

The one-size-fits-all approach to teaching and learning fails to account for learner variability and empower teachers to address it.

Since the dawn of American public education more than 100 years ago, learners, with all their variability, have not been the central focus of teaching and learning; rather, curriculum delivered by teachers has and continues to be the focus. That curriculum is now tied to learning standards that are further knotted to high-stakes end-of-year state assessments used to measure school and sometimes teacher performance. This approach calls for teachers to deliver the same content at the same pace to all learners to get them to the same level of skill and cognition each spring when schools administer summative assessments to measure grade-level proficiency.

Photo by Allison Shelley/The Verbatim Agency for EDUimages

Today, this approach has resulted in the proliferation of pacing guides that spell out exactly what teachers must teach and when—some going so far as to outline an exact number of days and even minutes that teachers should spend on a specific subject (a practice that is a far cry from expectations for other professional groups, such as doctors). Although pacing guides can be helpful for new teachers or those more experienced who need support, if pacing is too tight, too inflexible, and fails to accommodate learner variability, then learners pay far too great a price.

The greatest price they pay is that year after year, decade after decade, a majority of learners in K-12 do not reach grade-level proficiency at the pace expected of them. As a result, they are unprepared to meet the pace of the next grade level and the next and the next—and on and on until the end of high school. If we were to compress a 100-meter

dash into the eight-month timeframe between when learners start a given school year in the fall and when they take state assessments in April, we would find that only a minority of learners finish the race (see the National Assessment of Educational Progress (NAEP) results for reading and mathematics that show far fewer than 50 percent of fourth, eighth, and 12th graders cross the finish lines for those grade levels).

Every year, millions of learners finish behind the measuring tape—their starting point for the next academic year. Learners who have fallen behind the pace must travel greater distances during the next academic year's 100-meter dash, even though the curriculum their teachers cover for the race is engineered only to help them with the final 100 meters. The current approach to learning makes the task of covering that extra ground largely insurmountable, exacerbating existing inequities and widening learning gaps for historically and systemically excluded learners.

The evidence of this insoluble challenge can be found in the Nation's Report Card. It reveals where the nation's learners stand (and have stood year after year) after spending 13 years in K-12 classrooms. Pre-pandemic (2019), only 37 percent of 12th graders were proficient or better in reading and 24 percent in mathematics. Black (at 17 and 8 percent) and Latino (at 24 and 11 percent) learners fared far worse. Further, the average reading and math scale scores for *all* the nation's high school graduates have remained flat and below proficiency for two generations of K-12 learners in reading and a generation in mathematics. (The report card includes data on mathematics only since 2005.)

12th Graders Were Proficient or Better In:

37%
READING

24%
MATHEMATICS

24%
Latino (reading)

17%
Black (reading)

11%
Latino (mathematics)

8%
Black (mathematics)

Another related price that rigid pacing requirements exact is to diminish the quality of learning activities teachers design and students engage with. Jane L. David, author and director of the Bay Area Research Group, posits that pacing guides force teachers to "rely on teacher-centered lessons that seem more efficient and predictable" than learner-centered, engaging activities "that are more time-consuming, cognitively demanding, and that nurture understanding." Learners of color and those experiencing poverty have it worse. David notes that their teachers are "far more likely to drop cognitively demanding activities" and "focus on traditional teacher-centered instruction" because of the stress they feel trying to get learners that are typically behind up to grade level by the spring's state assessments.

Despite the fact that the unspecialized approach to teaching and learning fails to address learner variability, results in unacceptable levels of proficiency, and diminishes the quality of instruction, we still cling to it. There **is** a better way.
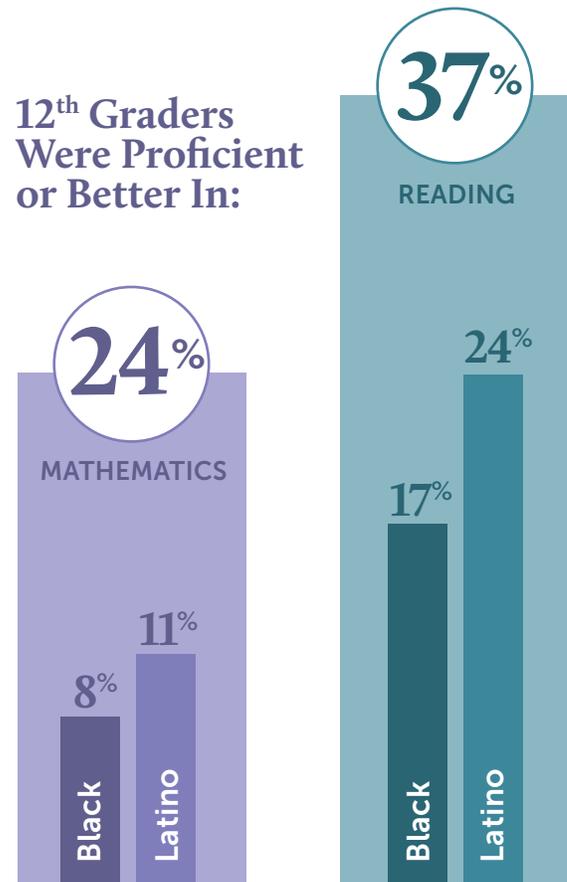
Emerging more personalized and competency-based learning constructs powered by educational technologies provide frameworks for addressing learner variability; delivering more engaging, relevant, cognitively demanding content; and empowering teachers.

Within these frameworks employed in pockets across the country, learners acquire skills and knowledge at a pace that is flexible but ambitious, and set with students by empowered educators making informed decisions based on understanding those whom they are serving. Time is no longer the constant—it is a variable. Proficiency based on standards is still expected of all students, but they develop knowledge and skills at different rates and can move on to more challenging competencies once they have demonstrated they are ready. Learners have more personalized and culturally relevant options to learn content and can demonstrate skills in a variety of modalities. Their engagement increases. Grade levels, end-of-course grades, and time-based require-ments for instruction become less important.

Efforts to implement competency-based learning (CBL) frameworks and complementary pedagogies such as PBL are not new but have been difficult to scale. We can attribute a large part of that difficulty to the fact that it is nearly impossible for one person leading a single elementary classroom of 25 to 30 students—let alone teachers in comprehensive secondary schools who interact with 150 or more students across five or six designated periods a day—to address each learner's varied levels of cognition and literacy, or their different backgrounds and social and emotional needs. **However, digital technologies now make possible what previously was not.** Applied skillfully and strategically, technol-ogies, both complex and simple, are potential game-changers.

Learning management systems are powering competency-based approaches to teaching and learning across the country.

Learning management systems (LMSs) are software applications schools and school districts use to automate learning digitally. Importantly, LMSs allow teachers, teams of teachers, schools, and districts to create learning modules/units for specific competencies across disciplines. They are able to upload learning activities that provide students with options both for learning content and demonstrating learning. Teachers can easily upload external links related to course content, such as YouTube videos, to make learning more relevant and engaging. The systems also provide teachers and administrators with instant access to student performance data and analysis, often at the individual item level, enabling teachers and administrators to monitor learner progress and tailor learning content to individual student needs in real time.

Learning Management Systems

Watch videos from Empower (at the four-minute mark) and PowerSchool's Schoology (at the 1:55 minute mark) to learn more about how LMSs support more personalized competency-based approaches to learning.

Both large and small school districts are using LMSs to great effect. **Lindsay Unified School District (LUSD) and Irving Independent School District (IISD)** are strong examples. LUSD serves 4,200 students in a small, rural farming community in California's "Citrus Center." Almost all its students are Latino and qualify for free and reduced-price meals. More than half start school as English language learners. A third are immigrants.

Today, Lindsay learners have 24/7 access to the internet and devices (LUSD built its own broadband network and equipped each learner's home with a hotspot) and to the district's LMS, Empower, which animates LUSD's performance-based system. The LMS breaks content down across various disciplines into smaller chunks of learning. Each of these chunks, or modules, provide two or three options for students to both learn content and demonstrate competency. Many of these options are developed by Lindsay educators themselves.

In LUSD, learners are no longer assigned grade levels. The LMS allows them to work at paces and performance levels set by them and their "learning facilitators" (LUSD's label for teachers) to ensure the tempo of their learning is flexible but healthy. They advance only after they demonstrate specific competencies. If a middle school-aged learner is advanced in mathematics, they participate in virtual high school-level math courses. The role of the LUSD teacher is not to stand at the head of the class and deliver instruction but rather facilitate learning; they monitor movement toward competency by reviewing student work online on the LMS as it develops and by meeting and working with individual learners daily, in small groups or on project teams, delivering more individualized learning activities tailored to needs uncovered with help of the LMS.

Irving Independent School District in Irving, Texas, uses Canvas to stand up its approach to CBL for more than 33,000 learners, 72 percent of whom are Latino and 13 percent of whom are Black. About 80 percent of all students are eligible for free or reduced-priced lunch. Teachers use their knowledge of individual learner needs to differentiate instruction, taking advantage of the LMS's capacity, for instance, to adjust the Lexile levels of reading materials or tailor specific assignments to learners with gaps in skills or understanding.

The LMS also anchors learning modules that address one or more competencies. In some cases, learners complete activities within the modules at their own rate in a specified sequence, moving from one activity to another only after they have mastered the first. In others, learners complete assignments in an order of their choosing. And in still others, IISD teachers can assign several activities that learners choose among—those that might be of higher interest to them, recognize their backgrounds and cultures, or that are tailored to their skill levels.

Finally, though Canvas is interoperable with a significant number of other digital platforms that address learner variability, it has its own adaptive learning features that employ AI to adjust learning activities to individual student skill levels. For instance, IISD learners take quizzes that branch them off onto unique learning journeys. An incorrect answer to a question takes them to another focused on the same content; however, Canvas provides them with video tutorials and additional reading materials to help them master the content implicit in the question.

Photo by Allison Shelley for EDUimages

While an LMS is a complex technology that performs many valuable functions, even simple digital technologies applied innovatively are fueling more personalized, competency-based education efforts.

Take, for instance, the Modern Classroom Project, which uses video technology to radically transform teaching and learning. Modern Classroom teachers create videos (averaging six minutes in length) that take the place of in-person lectures or other forms of direct instruction. They liberate teachers from standing and delivering to whole classes day in and day out, freeing them up to work one-on-one or with groups of students to address their individual needs and backgrounds. And they enable learners who in the past would have missed classroom instruction because of chronic absenteeism to catch up more quickly because the videos of that instruction are available to them online.

As in Lindsay and Irving, Modern Classroom students learn at a pace that is appropriate but also challenging. Teachers assess student work based on competency, not seat time or completion. Students progress to more advanced material only when they are ready. To further account for learner variability, units or modules designed by teachers typically include multiple activities that are "must-dos" that all must complete, "should-dos" for learners ready for more advanced content, and "aspire-tos," for those prepared for even more challenging activities.

Photo by Allison
Shelley for EDUimages

Modern Classroom teachers house their videos, instructional materials, activities that students complete, and other resources in LMSs provided by their districts.

Edtech products powered by artificial intelligence are also enabling more personalized CBL constructs designed to address learner variability and close gaps rapidly.

Artificial intelligence allows applications to adapt to the various learning levels of students immediately. These applications dramatically reduce the amount of time it normally takes a teacher to assess and place students on a learning progression, evaluate their progress, and make adjustments to their learning activities. This effectively accelerates the learning process, making it possible for learners who are behind to catch up more quickly.

These adaptive technologies do not take the place of one-on-one and group instruction conducted by classroom teachers. They are typically supplemental and can be employed in station rotations, during specific instructional blocks of time, or at home. Following is a small sample of adaptive edtech products for mathematics and reading. Each one has received Digital Promise Product Certifications for research-based design and/or learner variability.
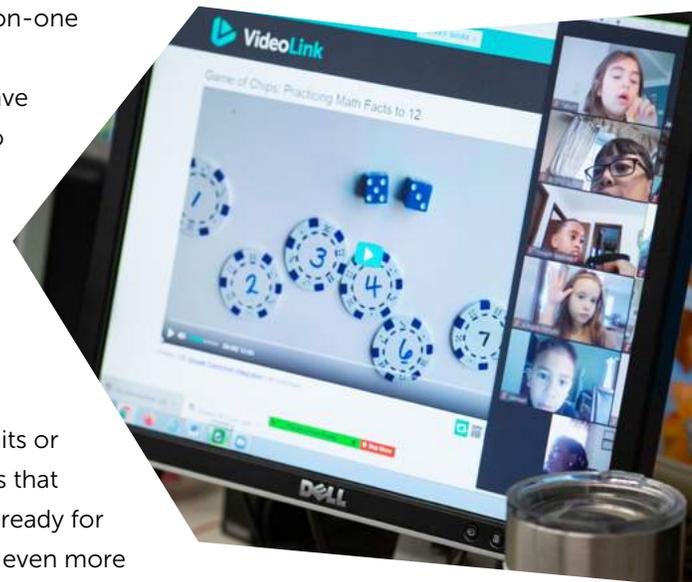
Woot Math is an example of how adaptive learning products are addressing learning variability and closing gaps. Woot Math was designed to supplement learning for students in grades 3–6 and as an intervention for grades 6–8. Other certified mathematics adaptive learning products include My Math Academy (a game-based platform) and MyPath K-5. The latter application measures student abilities at their assigned grade level. It identifies priority lessons based on the learner's actual operating level but also the competency expectations of the grade level they are placed in.

Amplify Reading uses an adaptive algorithm that unlocks different books as students develop as readers. And My Reading Academy, another game-based interactive and adaptive platform, uses formative assessments to quickly place students in a program that begins at their current reading levels and pushes them to the next and the next.

Though not certified by Digital Promise, there are also powerful adaptive learning products for writing, such as Quill. Quill spares English language arts teachers hundreds of hours of grading time. Its diagnostic assesses student skill in more than 300 concepts (such as complex and compound sentences and sentence fragments) and generates a 10-week individualized learning plan consisting of 10-to-15-minute activities that target needed skills, including those for English language learners.

Again, though these products are powerful enablers of more personalized, competency-based approaches to learning, they are supplemental. They augment but can never replace the skilled practice of teachers.

Photo by Allison Shelley for EDUimages

To this point, our publication has argued that we need to break the current one-size-fits-all approach to K-12 education and replace it with others, specifically more personalized competency-based constructs and related pedagogies, such as PBL. **Digital technologies now make it more possible than ever to pull schools at greater scale in these directions**. Approaches to teaching and learning in Talladega County, Alabama; Lindsay, California; Irving, Texas; and Modern Classroom Project classrooms demonstrate that large-scale digital transformation can occur and, with the help of adaptive learning technologies, address learner variability and close gaps in ways that the traditional approach never has.

But teachers and schools employing educational technologies smartly and powerfully cannot propel K-12 education into the 21st century on their own. They need supportive systems and an education ecosystem engineered for the demands and opportunities of the digital age.

Building Systems and an Ecosystem of Support for the Digital Transformation of Classroom Learning

Photo by Allison Shelley for EDUimages

Classrooms have always operated within the constructs of (1) state and local education **systems** governed by elected or appointed boards and staffed by professionals bunched in departments designed to deliver services, support teaching and learning, and ensure compliance with state and federal regulations, **and** (2) an **ecosystem** made up of legislative policies; foundation, nonprofit, and business initiatives and supports; educator preparation programs; and more. Schools must work toward the digital transformation of learning within the context of these same systems and ecosystem. They, too, are in need of transformation.

More learner-centered, personalized, competency-based, and digitally informed learning cannot and will not happen across school systems with the flip of a switch. It will require fundamental changes to mindsets about education among students, parents, educators, elected and appointed officials, and numerous other actors within systems and the ecosystem. Moving from a way of schooling that generations have come to know—and that many leading systems or organizations within the ecosystem achieved success in—will be difficult. Competency-based, digitally informed learning will upset the applecart of state school accountability and assessment systems, regulations for seat time, and traditional college-admissions processes.

Moreover, the digital transformation of learning will require K-12 education to get ahead of the technology curve, instead of perennially being behind the eight ball, playing catch-up to emerging technologies. The recent uproar over ChatGPT is an example. ChatGPT is a technology that could well facilitate learner understanding of complex topics but also cheating, as the sophisticated AI tool has the capacity to generate student essays. In response, for instance, New York City Schools recently restricted access to ChatGPT on district networks and devices.

The digital transformation of learning also necessitates skill-building for educators and different expectations of them; more explicit definitions of student competencies and graduate profiles that entire faculties rally around and uniformly measure; edtech platforms that are more interoperable so that educators easily can identify individual learning needs and gaps to address and close them; and universal access to broadband and devices, to name only a few challenges we face.

In the remainder of the publication, we explore seven challenges we believe that systems and the ecosystem must address. Our list of challenges is not all-inclusive. Nonetheless, it is a list of challenges we believe we must prioritize to both (1) lay the foundation for the digital transformation of classroom learning, and (2) supply the technology and digital infrastructure teachers and learners need for that transformation to occur.

Our hope is that education, nonprofit, philanthropic, business, and industry leaders not only will advocate for the digital transformation of learning but also address the seven challenges holistically to help school districts and schools make this transformation.

Laying the Foundation for More Personalized, Competency-Based, and Digitally Informed Classroom Learning

1. **Ecosystem Challenge:** To foster the expansion of more learner-centered, personalized, competency-based learning by creating a state planning apparatus and policies that acknowledge the complexity of the transformation of districts, schools, and classrooms at scale.

2. **Systems Challenge:** To transition from two-dimensional records of student learning to three-dimensional learning and employment records that are more competency-based, honor all learning, and establish the expectation that learning is a lifelong endeavor.

3. **Systems Challenge:** To foster comprehensive, multi-year professional learning efforts focused on learner-centered, personalized, competency-based education and digitally informed instruction.

4. **Ecosystem Challenge:** To transform teacher education programs to meet the future of teaching and ensure graduates are prepared to use digital technologies in service of learner-centered instruction.

Delivering the technology and digital infrastructure teachers and learners need to transform K-12 education.

5. **Ecosystem Challenge:** To create policies to ensure that students have 24/7 access to the internet and devices in perpetuity.

6. **Systems Challenge:** To build the technical support and data analytics capacity necessary to advance and sustain digitally informed, learner-centered, competency-based approaches to learning.

7. **Ecosystem Challenge:** To challenge edtech platform providers to respond to school district demand for greater data interoperability and student privacy.

Laying the Foundation for More Personalized, Competency-Based, and Digitally Informed Classroom Learning

1. Ecosystem Challenge:

Foster the expansion of more learner-centered, personalized, competency-based learning by creating a state planning apparatus and policies that acknowledge the complexity of the transformation of districts, schools, and classrooms at scale.

The nation is taking strides toward more competency-based, personalized approaches to learning. Getting Smart and XQ Institute reported in 2018 that only two states had shown little-to-no state policy activity to advance them. Seventeen states had moved into advanced stages of adoption and were supporting local school district efforts. Most state efforts, however, are fairly limited in scope, focused on pilots or a handful of schools in districts that have taken advantage of waivers offered by state education agencies.

Taking competency-based learning to much greater scale is a complicated endeavor. The Aurora Institute reports that districts more often than not have difficulty moving beyond pilots to broader implementation because they face many obstacles. Getting Smart identifies nearly 20 of them—at various systems levels, including current school accountability systems that emphasize grade-level assessments; inadequate teacher preparation programs; and postsecondary education's reliance on standardized tests, grades, and courses for college admission.

The Mastery-Based Learning Collaborative (MBLC)—a project of the Washington State Board of Education—has been clear-headed about these barriers, not only for an 18-school pilot it will launch in 2023, but also for moving to greater scale. We believe Washington State's planning apparatus

A Note to Philanthropies

Digital Promise believes that philanthropies will play a key role in helping states, schools, and districts digitally transform classroom learning. If you see the icon below among the seven challenges we present, it means that philanthropies are well-positioned to help states, schools, districts and others meet them.
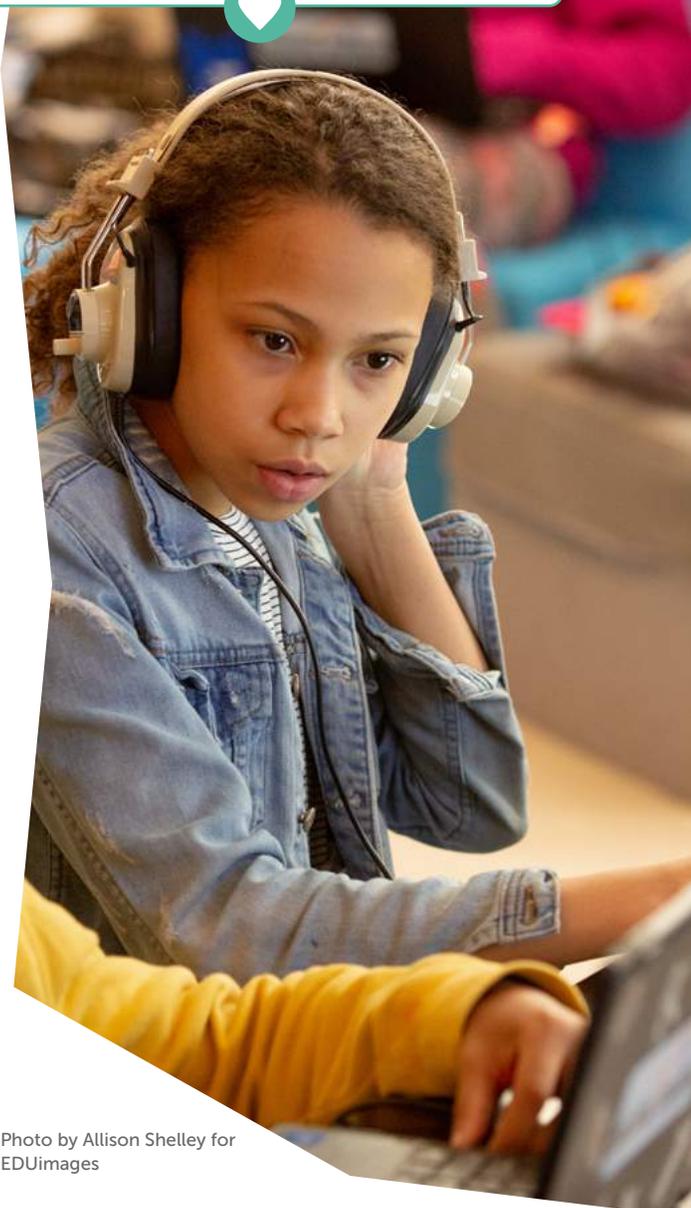
Photo by Allison Shelley for EDUimages

is a good model for other states to follow to potentially avoid some of the pitfalls experienced by other states, including one of the country's most important early policy leaders (see sidebar).

Issued in response to a legislative mandate, the Mastery-based Learning (MBL) Work Group's 2020 report recommends actions the state should take to avoid pitfalls and overcome barriers. It observes that what it calls "mastery-based learning" is not a concept that is well understood, neither within the education community, nor by the public." So, the report outlines engagement strategies for families and the education community. It also identifies state accountability as a challenge—and so lays out a strategy to review Washington State's account-ability system for alignment with mastery-based learning. The report's remaining recommenda-tions include developing a profile of a graduate and engagement with higher education.

By the end of 2021, the work group had published its profile of a graduate after an extensive stakeholder engagement process and issued additional recommendations, such as moving forward with the redesign of the state's accountability system and replacing the traditional high school transcript with a "mastery transcript" for willing schools. By May 2022, the presidents of six of Washington's colleges and universities responded to the group's engagement efforts, signing a letter to assure students and their families that submission of mastery transcripts would not disadvantage applicants for admission. And the state board of education was also in the process of working with partners to redesign the state's account-ability system to make it more authentic and equitable.

Digital Promise believes that every state should have a CBL workgroup, such as the one in Washington State, that develops recommendations and multi-year plans to address the barriers outlined above. State education agencies can lead the imple-mentation of that plan **and** likely eventual efforts to work with legislatures to revise existing policies around time-based requirements for learning, school account-ability, and even college admissions. While these teams may already exist in several states, they may need to be reconvened or refocused to tackle these barriers in more explicit ways and with an eye toward overcoming barriers to scaling.

Maine as a Cautionary Tale

The story of the crushing of Maine's lofty ambitions for mastery-based learning is cautionary tale for other states, Chalkbeat reports. In 2012, Maine's governor signed into law a bill requiring students to demonstrate mastery of material in eight subjects to earn a diploma. By 2018, the legis-lature repealed the requirement after substantial pushback from parents and teachers, public protests, concerns about poor planning and communi-cation, and the absence of clear defini-tions of competencies.

2. Systems Challenge:

Transition from two-dimensional records of student learning to three-dimensional learning and employment records that are more competency-based, honor all learning, and establish the expectation that learning is a lifelong endeavor.

Traditional transcripts don't speak to the competencies graduates acquired in and outside of school, the exciting projects they worked on in classrooms and their communities, their internships, or their passions.

At the end of the road of the conventional approach to K-12 education in America, schools package their graduates up with high school transcripts filled with little more than the grades they received in the courses they took, overall GPA, and high-stakes test scores that are not only inadequate but also subjective and culturally biased. Traditional transcripts don't speak to the competencies graduates acquired in and outside of school, the exciting projects they worked on in classrooms and their communities, their internships, or their passions. Seat time and the Carnegie Unit reign supreme.

Fortunately, **digital technologies now allow us to pull records of student learning into new directions.** There are three important components to this transformation. **First**, records of student learning need to become more robust or three-dimensional, capable of giving a complete picture of a human being who has engaged in profound acts of learning inside and outside of school.

Second, records need to become more competency-based. Because typically they are not, K-12 schools have little incentive to measure and ensure proficiency. Colleges and employers can only infer what competencies learners have and wind up deferring to standardized test measures in the absence of others. For employers, there's nothing in the transcripts that speaks to specific skills graduates have; they have to piece that information together through interviews, reference checks, or other aspects of a hiring process.

Finally, records of student learning at the K-12 and postsecondary level should no longer be government- or institution-owned and -controlled. While they need to be verifiable, they also must be put more squarely in the control of learners themselves. Failure to do so is profoundly problematic for a number of reasons. Educational institutions or employers may no longer exist or may be unavailable. They may have lost or accidently destroyed records, or changed or shared them without consent. And institutions often charge a fee for forwarding transcripts—a substantial barrier to opportunity for historically and systemically excluded populations who may not be able to pay it.

Stacked on top of this inequity is another: Individuals may not have time to piece together all the records they need for higher education or new employment opportunities. They may be working multiple jobs, lack transportation, or have family obligations they cannot mitigate because they lack financial resources to pay for child or eldercare, for instance.

Learning and employment records (LERs) can be the 21st century solution to problems fostered by 20th century frameworks for the documentation of learning and earning.

The National Student Clearinghouse calls LERs "the transcript of the future." However, LERs can record more than just the net results of learning in K-12 and even higher education. Through a third party, they can digitally curate and electronically verify a record of an individual's skills, competencies, credentials, and employment history across a lifetime. The American Workforce Policy Board defines an LER as "a private and secure digital application or interface available on [personal] devices, analogous to a filing cabinet" where a person "can manage all [their] data and records and authorize sharing."

So, though this publication is focused on K-12 learners and often speaks of LERs within the context of replacing the traditional high school transcript, it is important to think about transforming records of K-12 learning within the framework of a filing cabinet filled with information that spans decades.

LERs are the transcript of the future.

The enthusiasm for LERs is building.

The prospect of creating a three-dimensional filing cabinet—or digital wallet/digital locker as some LERs are called—to replace inadequate traditional transcripts and resumes has rallied a number of significant actors in education and employment ecosystems to the cause. Current and important explorations of emerging learning and employment innovations are being undertaken by entities such as the U.S. Department of Education; the American Council on Education; the National Student Clearinghouse; the Western Governors Association; IQ4 Corporation; and the U.S. Chamber of Commerce's T3 Innovation Network that includes more than 500 partners in business, government, education, and technology.

The groups are working to advance LER technologies, which may involve solutions powered by AI and blockchain. And several states—including Alabama, Arkansas, Colorado, Connecticut, Oklahoma, and Washington—are collaborating with the National Governors Association (NGA) and Jobs for the Future (JFF) to pilot statewide LER efforts.

There are several reasons that there is both increased enthusiasm for and gathering momentum around the development of LERs. **First**, LERs center themselves on individuals and not institutions. Learners and earners control how and with whom their information is presented and shared. For instance, if a high school graduate does not want to send their high school transcript to a potential employer, they can submit other information; the potential employer, on the other hand, can then request it. The graduate, in turn, can decide whether they want to submit it.

Second, they allow learners and earners to present much more information than that traditionally contained in a high school or college transcript or a resume. For K-12 learners, that means they can download demonstrations of competency in addition to transcripts: certificates, digital badges, micro-credentials, and other validated demonstrations of learning and employment to capture how their portfolio has grown and expanded over time.

Efforts to provide a more robust, complete picture of learners using LERs are afoot in K-12, notably in Dallas County, Texas, where Dallas County Promise—a nonprofit focused on college entry and completion for students in area school districts—is partnering with GreenLight Credentials to digitize three-dimensional learning records. GreenLight Credentials calls them "digital lockers."

LERs center themselves on individuals and not institutions.

Third, LERs can prioritize lifelong access and ease of use. Learners can download certifications, digital badges, or more evidence of skill at any point of their learning journey, and then submit them at a push of a button on their smartphones.

And, **finally**, LERs make the hiring or admissions process easier for business and industry and postsecondary institutions. These entities no longer have to contact an accrediting institution or previous employer because the learning and employment records are verified for them.

LERs range in scope, from recording learning for a specific industry to recording learning across a lifetime.

Among the efforts to develop LERs are those that are focused on specific sectors, such as healthcare, cybersecurity, and education, all of which might have their own distinct networked platforms, operating norms, standards, and decision-making processes. And there are those that aspire to what the Digital Credentials Consortium calls a "credentialing utopia," an "ideal state" in which "users should be able to have all their achievements documented as credentials" and "store those credentials in a [single] wallet [LER] of their choice."

Digital Promise believes that we should aspire to that more ideal state. This does not preclude the development of industry-specific platforms—but it does demand that from the outset LERs be designed so that credentials within them are interoperable and able to be exported to platforms that are designed to be more representative of a life of learning and work, including the years that individuals are in K-12.

States can foster LER pilots that include developing the K-12 transcripts of the future.

We are heartened by the statewide LER pilots several states are undertaking in collaboration with NGA and JFF and hope more states will create **pilots that pull high school transcripts into more competency-based directions**. Wherever there is a pilot, we encourage states to take into account the following considerations in addition to the aforementioned assurance that credentials within different LER platforms are interoperable with other platforms:

- **LERs could pose a threat to historically marginalized learners and earners and exacerbate long-standing inequities in education and employment absent intentional and coherent efforts to counter the risk.** We have already observed that affluent and privileged populations of K-12 learners are more apt to benefit from the use of educational technologies than learners of color, those experiencing poverty, multilingual learners, and learners in remedial or low-level courses.

  We cannot allow that inequity to stand or worsen as more states roll out LERs. To offset the threat, states must engage historically marginalized learners and earners in the design of LERs to ensure they account for their needs, concerns, and lived realities. Digital Promise recently engaged nearly 30 frontline workers to produce a set of five inclusive design principles for LER developers that include the assurance that LERs prioritize access and ease of use.

  Prioritizing access and ease of use means that efforts to roll out LERs should include supports for the digital skill development of users from historically marginalized populations who might have had fewer opportunities to develop them. To address this challenge, Digital Promise suggests that LER systems include onboarding and training materials that are free to users, such as video tutorials on various social media platforms.

  For schools and school districts that take the plunge into LERs, there should be provisions for developing the digital skills of learners and educators to ensure that they become skilled users of LER platforms.

- **LERs should pull K-12 into more competency-based learning constructs.** While designers are hard at work ensuring that earners are able to use LERs to document skills, they also need to tend to that concern in the design of records for K-12 learners. To that end, designers might learn from the Mastery Transcript Consortium, which is pioneering competency-based transcripts focused on skills, not courses, and include evidence (such as essays and projects) that those skills have been acquired through coursework. We suggest, however, that designers also should think deeply about how to include demonstrations of competency as they are measured through the acquisition of micro- and other credentials, compiled both in and outside of school.

- **Keep in mind, however, that all credentials are not created equal.** Some certify competency and require evidence and adjudication by a panel with expertise in that competency, while others simply acknowledge seat time (e.g., issuing a digital badge for the completion of a workshop). Digital Promise believes that credentials accepted as valid measures of learning should be compliant with the Open Badges format that requires inclusion of the criteria used to award a badge, evidence that the criteria was met, and a verifiable reference to the issuer. Rigorous standards will go a long way toward building confidence among employers and higher education officials that badges are serious, legitimate, verifiable, and not representative of a trivial achievement.

3. **Systems Challenge:**
Foster comprehensive, multi-year professional learning efforts focused on learner-centered, personalized, competency-based education and digitally informed instruction.

The backbone of the digital transformation of learning will be teachers. They will need skills to integrate technology into the design and implementation of more personalized, competency-based learning frameworks. Scaling transformation will require complex, interrelated professional learning activities that acknowledge the intricacy of the endeavor and the challenges that intricacy creates.

We see two major challenges: One is **pedagogical** and the other is related to **classroom use of technology**. The pedagogical challenge is shifting the mindsets, biases, and practices of teachers from the pedagogies of the one-size-fits-all approach to teaching and learning to new, more learner-centered frameworks. The challenge related to technology is helping a teaching corps that is largely unpracticed in the skilled use of technology to learn, practice, and become experts.

Challenge One: Shifts to new learner-centered pedagogies will require schools and districts to engage in rigorous, coherent, and complex professional learning activities to support teachers.

Teachers are used to being told they will be implementing new curriculums, new assessment systems, new standards, and new programs. They may embrace them, concede to them, or even oppose them, and go about the new effort enthusiastically, half-heartedly, or with a bare minimum of participation to ensure compliance.

Regardless, implementing an entirely new approach to teaching and learning is a much taller order than adopting new curriculums, standards, assessment systems, or programs. First, most teachers grew up, have been teaching, and may feel at home in the century-old approach with its assumptions about the distinct roles of teachers and learners, and might be completely unfamiliar with the assumptions of learner-centered approaches. Changing the mental model for the role of the teacher and building teacher knowledge about the rationale of any initiative—but especially this one—are essential to success.

Photo by Allison Shelley for EDUimages

We've already noted in this publication that many states have supported district pilots of CBL efforts and observed that one state had its lofty ambitions thwarted in part because of the vocal opposition of educators, among others. Further, the Aurora Institute points out in a 2022 publication that many districts have faced several obstacles moving beyond CBL pilots to broader implementation, including the difficulty of shifting the mental model for teaching away from one that places the teacher at the center of instruction.

The Aurora Institute's publication also proposes a way forward, not only for shifting the traditional mental model for teaching and building teacher knowledge but also for the adoption of learner-centered practices—all to ensure the permanence of change. To make change permanent, the Aurora Institute argues, schools and districts must confront three major challenges. Among them is "recognizing the nature, depth, and complexity of teacher change needed to shift to equitable, learner-centered education." As a result, schools and districts must provide supportive structures for teachers to engage in their own deep learning that addresses structural and dynamic shifts in practice and helps them become "adaptive experts in human learning [with the] capacity to orchestrate, attend, and respond to a dizzying array of factors related to individuals, activities, and relational contexts to maximize learning for all students."

Indeed, schools and school districts will need to smartly design professional learning activities to help teachers respond to the dizzying array of changes required by more learner-centered frameworks, among them the structural and dynamic shifts in practice they will need to make. These shifts, the Aurora Institute argues, include developing or using personalized learning plans; using learning management systems and performance-based rubrics; creating supportive and inclusive classrooms; employing knowledge of individual students' family backgrounds, culture, and experiences to tailor individual supports; and

"facilitating" learning, as opposed to teaching at the head of a classroom. To become adaptive experts who can effectively make complex decisions about how to adjust instruction based on their understanding of individual student learning gaps in skill and understanding, teachers will need still more supports. In short, there is a lot of professional learning that schools and districts must orchestrate to permanently shift teacher practice to more learner-centered paradigms for instruction.

The Aurora Institute argues that professional learning approaches to more learner-centered constructs and pedagogies should follow a "why-what-how" framework that helps teachers (1) address skepticisms and anxieties and arrive at a point where they are motivated—not compelled—to do something they might not otherwise want to; (2) tackle mindsets and implicit biases and build an understanding of the rationale for student-centered learning; and (3) learn and implement new practices to support it.

The Aurora Institute's "why-what-how" framework is just one approach to professional learning. Regardless of any state, district, or school effort to bring greater, more learner-centered, competency-based approaches to teaching and learning to fruition, they will have to plan and implement comprehensive multi-year efforts to shift mindsets about the role of the teacher, build teacher knowledge, and promote strong practice.

Challenge Two: Integrating digital technologies into new pedagogies requires schools and districts to address teachers' own digital skills and help them integrate technologies into teaching and learning.

The digital transformation of teaching and learning at scale requires a teaching corps that is digitally skilled. Data suggests we have some distance to travel to get to that point. A survey conducted by the National Center for Education Statistics during the 2019–2020 school year revealed that only 18 percent of schools strongly agreed that teachers "are sufficiently trained in how to use technology" and "have enough training to use it for teaching." While we believe that percentage likely grew as teachers honed their skills during the pandemic, our personal experience working with schools and districts teaches us that we still have a long way to go.

Getting what was once 18 percent into the 90s will require a coordinated, coherent, multi-year and -tiered approach to professional learning. Irving Independent School District has been up to the task. The brief vignette below describes the district's comprehensive and systemic approach to digitally upskilling its teachers.

Skilled Teachers Power the Digital Transformation of Learning: An Example from Irving, Texas

In the Verizon Innovative Learning Schools program's family of school districts, Irving Independent School District (IISD) stands out—even amid all the digital excellence the initiative has inspired. More than a decade ago, some high school teachers in IISD posted signs on their doors that no laptops were allowed in classrooms. By 2015, however, the Center for Digital Education had named IISD a top digital school district.

Irving ISD is leading the charge for the digital transformation of learning by providing multiple systems of supports to teachers. As noted earlier in this publication, IISD uses a learning management system (LMS) to help teachers address learner variability. Each of their schools also has a technician who is responsible for ensuring continuous connectivity for teachers and learners. Technicians coordinate repairs on all campus computers, set up and maintain operations of computer systems and other technologies, maintain networks, and assist in major district-wide technology installations.

Most notable, however, is the district's investment in staff. Through its participation in the Verizon Innovative Learning Schools program, IISD has thought deeply about how the digital transformation of the school district requires "us, first of all, to invest in all our people," says James Tiggeman, the district's assistant director of digital learning. Both the existence of his title and the department of digital learning say a lot about IISD's commitment to ensuring educators have the digital skills they need to transform learning.

Photo by Allison Shelley
for EDUimages

Tiggeman's department takes a multi-pronged approach to skill-building, and anchoring it are digital learning coaches (DLCs). Each school has a DLC; two elementary schools share one, and secondary schools have at least one of their own.

Tiggeman says that a DLC is a great teacher and an expert of both professional development and the use of technology in instruction. These professionals coordinate organized learning activities, such as professional learning communities focused on integrating technology into instruction, and provide just-in-time support to classroom teachers as they seek to integrate new technologies into learning activities.

The district provides additional instructional supports: monthly 20-minute online tech learning sessions (in October 2022, the session focused on using Nearpod to prepare lessons for substitute teachers); a digital training hub, where teachers can access videos, webinar recordings, and other training links for IISD's most-used digital resources and tools; online asynchronous courses, specifically those aimed at helping educators become certified tech educators in a variety of specific instructional technologies; and two guides for new teachers, one to help them learn how to use technology in the classroom and another that lists and provides links to 19 powerful tools for digital learning.

The district also hosts an annual conference for its educators, and the integration of technology is always a prominent feature. During the 2022–2023 school year, IISD encouraged its educators to attend its digital learning day. Participants attended six 55-minute learning sessions (with three options for each one), skill-building sessions ranging from using Google products to differentiate instruction, checking for understanding during the blended learning process, and building YouTube channels.

Photo by Allison Shelley for EDUimages

As a result of its comprehensive approach to professional learning, "what were once outlying teaching practices supported by digital technologies are now the norm in IISD," says Tiggeman. "We have created a culture of normalized excellence in IISD where teachers are constantly learning and trying new things. Pair this educational risk-taking with a true sense of collaboration, [it] means we provide excellence to IISD students daily."

Getting to the normalized excellence that Tiggemann identifies is a state to which we hope all school districts will aspire. While districts may take a variety of approaches, the point is that building digital skills and the skills to use them in the design and implementation of powerful learning activities requires a comprehensive, multi-year approach to professional learning. We would suggest, however, that there are three important must-haves: digital learning coaches, technology-focused certifications for educators and in particular the one offered by the International Society for Technology in Education (ISTE), and micro-credentialing.

Digital Learning Coaches

Noteworthy is the fact that the three school districts featured in this publication—Talladega County, Lindsay Unified, and Irving—all employ digital learning coaches in individual schools, though they may call them by different names. In each of its schools, the Verizon Innovative Learning Schools program also deploys a full-time coach dedicated to providing teachers with the pedagogical supports they need to effectively leverage technology in the classroom. These districts—and the Verizon program—understand that developing digital skills and instructional capacities is best done by DLCs in the context of real work educators are doing and often in real time. Coaches also lead professional development sessions and longer-term professional learning communities (PLCs). And the DLC position is sustainable, even in small districts—both LUSD and TCBOE have reallocated resources to pay for these positions.

Credentialing

There are many options for credentialing teachers to certify competencies required to teach in the digital age, and they also include those offered to certify the skilled use of specific edtech products, such as those encouraged in IISD, or in college- or university-based programs. The University of Rhode Island, for instance, offers a graduate certificate in digital literacy for classroom teachers, librarians, college faculty, and graduate students.

However, the credential we would most argue for—to the point where we would suggest every school should have several teachers with one—is the credential offered by the International Society for Technology in Education (ISTE). Its credential is designed to deepen and expand skill sets as they apply to ISTE Standards—which all 50 states have adopted. During the ISTE certification process, teachers prepare to model powerful practice in schools and districts and lead teacher network efforts to integrate technology into instruction effectively. The credential certifies their digital pedagogy expertise and allows them to earn graduate credit. Importantly, ISTE observes that its program in fact focuses on pedagogy—not devices and tools—and that certified teachers will be "prepared to support [a] teacher network in integrating tech for all of the right reasons," purposely, and in support of student learning gains. These teachers are multipliers. They become powerful resources for their colleagues in their own and across schools, helping them develop strong pedagogies and use educational technologies to support them.

Finally, because of the important role ISTE-certified teachers play, states and school districts may want to create incentives for teachers to pursue ISTE Certification, in the same way that some give financial rewards to teachers who have earned National Board for Professional Teaching Standards certification.

Micro-credentials

If teachers are to become more comfortable with and skilled in the delivery of CBL activities, they need opportunities to learn and demonstrate learning within the context of its pedagogies. Adding micro-credentials to the quiver of professional learning activities ensures that teachers have that chance.

Micro-credentials create opportunities for educators to demonstrate skills they have acquired and those they learn or expand on, such as using digital technologies to personalize learning. Micro-credentials provide educators with recognition for discrete skills or competencies they develop throughout their careers, regardless of where or how they learn them. They are research-based, personalized, digitally enabled, and can be earned on demand within a flexible schedule. They are more rigorous than workshops teachers attend to compile hours for licensure renewal. They require demonstrations of competency and can be used by educators for self-directed learning and by states and school districts to upskill educators in areas of identified need—potentially for learner-centered constructs and pedagogies.

Both states and school districts can initiate the creation of micro-credentials. Digital Promise has developed micro-credentials with both types of entities. For instance, we worked with the Delaware Department of Education and the state's institutions of higher education to produce micro-credentials to improve professional practice in early literacy, and with the Kettle Moraine School District in Wisconsin to produce micro-credentials for personalized learning that begin with a self-assessment of teacher technology competencies.

Photos by Allison Shelley for EDUimages

4. Ecosystem Challenge:

Transform teacher education programs to meet the future of teaching and ensure graduates are prepared to use digital technologies in service of learner-centered instruction.

Photo by Allison Shelley for EDUimages

Teacher preparation programs that train graduates to integrate technologies into powerful student-centered learning activities are an essential part of the ecosystem supports required for the digital transformation of teaching and learning. It is in these programs that faculty can and should model digitally informed, learner-centered pedagogies for future K-12 teachers, familiarize them with the technologies they will use as practitioners, and provide them opportunities to rehearse their use in higher education classrooms, virtually, and during their student teaching experiences. While programs can create laboratories for teachers to practice using devices, applications, and other digital learning products, or potentially have a specific methods course dedicated explicitly to technology in the classroom, teacher candidates best learn its application within the context of their actual coursework.

Saint Leo University's teacher preparation program is a sterling example of a program that was redesigned to ensure its graduates are prepared to teach in the digital age. Responding to a survey that suggested that graduates were satisfied with every aspect of their program except how it prepared them to use technology in classrooms, faculty engaged in a process of learning how to use technology in their classrooms. Now, in every course, faculty use technology for teaching and learning as a model for their graduates' future instruction. The university also built a lab for their teaching candidates to practice using tech products and devices, and it equips all student teachers with a digital backpack that includes a tablet, portable projector, and other digital resources.

Saint Leo University is serious about graduating candidates ready to use technology effectively at the point of hire. The U.S. Department of Education's Office of Educational Technology suggests all teacher preparation programs should have this ambition. Its 2017 National Educational Technology Plan (NETP) argues that schools "should be able to rely on teacher preparation programs to ensure that new teachers come to them prepared to use technology in meaningful ways" and that "**no** new

teacher exiting a preparation program should require remediation by his or her hiring school or district." To achieve this ambition, the NETP maintains there ought to be "technology competency expectations for candidates exiting teacher preparation programs for teaching in technologically enabled schools and post-secondary institutions. (It also suggests there should be competencies for university professors.)

Digital Promise believes that achieving this ambition is essential for the digital transformation of learning to take hold. In "Delivering on the Promise of Digital Equity," a paper we published in December 2022, we make the case that as part of the $65 billion national effort for digital equity embedded in the Infrastructure Investment and Jobs Act (IIJA), states should establish a task force consisting of a broad group of collaborators (including those in K-12 and higher education) to upskill the educator workforce. The publication suggests that states should set as an explicit goal that all graduates of educator preparation programs be ready from day one to use technology meaningfully.

Absent a full-fledged, all-out state effort backed by IIJA funds, individual preparation programs can lead their own. Fortunately, they don't need to set out alone on that path. A thriving network of preparation programs supporting and working with each other to rethink and transform their programs already exists. We urge preparation programs to join them.

Educator Preparation Programs for Digital Equity and Transformation

ISTE (in partnership with the U.S. Department of Education and with support from American Association of Colleges for Teacher Education(AACTE), Council for the Accreditation of Educator Preparation (CAEP), Association for Advancing Quality in Educator Preparation (AAQEP) and Society for Information Technology & Teacher Education (SITE) is supporting educator preparation program efforts to expand and scale digital equity and transformation in learning by networking

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programs that have signed a pledge. As of February 2023, more than 70 programs have signed the pledge and joined the network, signaling their commitment to a vision that includes preparing teachers to thrive in digital learning environments, applying frameworks to accelerate transformative digital learning, and equipping teacher preparation faculty to continuously improve expertise in technology for learning.

Importantly, the vision also includes a commitment to collaborating with school leaders to identify shared digital teaching competencies.

The network does its work within the context of ISTE Standards, a framework for effective teaching and learning with technology. The framework clearly observes that to meet standards, educators must use technology to support more personalized, learner-centered, engaging, and innovative teaching and learning that is authentic and accounts for learner variability. And programs that align their curriculum to the standards can receive recognition from ISTE validating that their pre-service teachers have opportunities to apply digitally informed practices required for success in today's connected classrooms.

We believe that it is possible for preparation programs to graduate teachers who are prepared to expand and scale digital equity and transformation in learning. Taking the pledge and joining the network will help set programs on a path to this success.

Delivering the Technology and Digital Infrastructure Teachers and Learners Need To Transform K-12 Education

While we will build the foundation for the digital transformation of teaching and learning on learner-centered, more personalized, and CBL pedagogies, that transformation cannot happen without the equitable distribution of technologies and a strong digital infrastructure. Delivering technology equitably and building the infrastructure for digital transformation have implications for public policy and edtech product development in the ecosystem and for the digital architecture of school systems. We address those implications here through three challenges we must tackle to pull teaching and learning into the digital age.

5. Ecosystem Challenge:
Create policies to ensure that students have 24/7 access to the internet and devices in perpetuity.

Photo by Allison Shelley for EDUimages

The digital transformation of learning requires systemic changes to how we fund access to connectivity and devices. Foundational to our vision of digital transformation is that learning can happen anytime and anywhere. This means that all students need round-the-clock access to high-speed internet and devices.

We made great strides to close gaps in access and devices during the COVID-19 pandemic. Before the global health crisis began, approximately 30 percent—15 to 16 million—student lacked access to adequate internet or devices. As a result of national investments through the CARES Act and other federal state, local, and philanthropic funding sources and commercial discounts, states and school districts closed connectivity and device gaps by 20 to 40 percent and 40 to 60 percent, respectively.

Still, estimates are that 12 million students are disconnected or are under-connected in their homes because of the speed of their internet or the limitations of their devices. Our hope is that local education agencies will continue to use federal funding sources to narrow gaps in access to devices and that the divide in connectivity will be closed as a result of our nation's $65 billion investment in broadband access through the IIJA.

Nevertheless, both real and potential advances should be considered temporary. Devices need to be refreshed every three to five years. CARES Act funding and other resources to pay for them will soon dry up. This is problematic for urban and rural areas where substantial populations of historically and systemically excluded learners do not have the financial resources of the middle and affluent classes to pay for devices. For the digital transformation of learning to take hold, we need strategies to ensure every learner has access to a device permanently.

Similarly, we hope that in the next few years as a result of the IIJA's investments, urban and rural areas currently lacking access to affordable high-speed broadband will gain it. However, IIJA funds will eventually expire, maintenance to broadband will need to be done, technologies will advance, and service will need to be upgraded to accommodate them. Internet service providers (ISPs) will make those upgrades in communities that can afford to pay for them. Low-income communities will be left holding the bag—consumers of lower-quality service. So, we also need strategies to ensure these communities have access to the same quality of broadband service as higher-income communities in perpetuity.

In this publication's sister document, "Delivering on the Promise of Digital Equity," we argued that states should take two actions to address these challenges. We reinforce them here because absent access to broadband and devices, the digital transformation of learning for the broad swaths of learners who need it most will never occur.

First, at this important moment in time, we hope that states will leverage the power that the IIJA affords them. The IIJA gives states the authority to subcontract with ISPs and other providers to extend service to underrepresented communities, many of which are experiencing poverty. States should leverage this contractual authority while they have it. We hope that states insert clauses into those contracts to ensure there is permanent, equitable

provision of broadband services. In other words, when ISPs upgrade broadband in communities that can afford to pay for it, they would be required to upgrade in communities that may not be able to. This should be a permanent requirement, not just over the brief lifespan of the IIJA programs. Upfront knowledge of this requirement will allow ISPs to estimate the total cost of their bids and make plans for future cost and fee structures.

Second, states can change the incentive structure for original equipment manufacturers (OEMs), leveraging their authority to issue contracts at greater scale than local municipalities or school districts can alone. Some momentum is building to consider "device as service" models as a sustainability strategy. These models make device procurement an operational and not a capital expense. In the model, a device becomes a service delivered along with hotspots, updates to cybersecurity, maintenance, and replacement. OEMs retain ownership of the devices and distribute them to school districts or regional education systems that in turn distribute them to students.

To foster these models at scale may require a legislative act mandating that a state education or technology agency negotiate a "device as service" contract with OEMs that include set pricings, warranties, and expectations for servicing and replacement. Districts then would have the option of buying into the contract. As more and more districts do, the incentives for OEMs to provide devices as a service would increase, driving down costs to more sustainable levels, especially for rural school districts that do not have the purchasing power of a large urban or suburban school district.

Regardless of the approach that states and school districts take to securing equitable access to the highest-quality broadband and devices for all students, they must understand that digitally transformed learning will be inaccessible to communities that cannot afford to pay for it.

6. **Systems Challenge:**
Build the technical support and data analytics capacity necessary to advance and sustain digitally informed, learner-centered, competency-based approaches to learning.

The Verizon Innovative Learning Schools program encourages districts to create technology sustainability plans.

Teaching and learning are the centerpieces of this publication. Teachers employing technologies effectively in service to powerful learning are in some respects the stars of digital transformation. Planning for and building the infrastructure to support teaching and learning takes place behind the curtains. Yet, as anyone in the theater knows, the show only goes on with the diligent work of stagehands—in this case, the people who staff and lead district technology and other offices.

To support the digital transformation of learning in schools, these "stagehands" will need to create and implement robust and sustainable technology plans that outline how districts develop, support, and maintain a digital infrastructure, including network management, device repair, customer service (which should include a call-center for parents and students who need help troubleshooting technical problems at home), information and data management systems, cybersecurity protections, and more.

The Verizon Innovative Learning Schools program provides insight into what districts should consider as they create these plans. The program has worked with nearly 600 schools. Through its partnership with Digital Promise, all learners in Verizon Innovative Learning Schools receive free devices with four-year data plans, or access to mobile hotspots. Teachers receive significant profes-sional learning supports for teaching in the digital age. Because its funding cycle is four years per school, the program encourages districts to create technology sustainability plans that set long-term educational technology and departmental infor-mation technology and infrastructure goals to support the digital transformation of learning in perpetuity. The Verizon Innovative Learning Schools Technology Sustainability Toolkit proposes a robust planning process, broken down into 11 digestible bits. The toolkit's explanations for each bit are extensive, include examples, and are framed around important questions district planners should ask. They are relevant to any district that seeks to enter full force into the digital age.

Noteworthy is that the toolkit acknowledges technology plans should be tied to district goals. In Lindsay Unified School District and Irving Independent School District, for instance, plans are tied to performance-based (competency-based) learning. In Talladega County Schools, they are tethered to PBL and its requisite performance-based assessments. Further, the toolkit asks districts to consider trends in the modernization of technology, the lifecycle of devices, and the lifespan of product effectiveness. In other words, it aspires to ensure that districts are no longer playing catch-up to emerging technologies. Rather, careful planning helps districts stay ahead of the curve.

Edtech platforms for data analytics are **an emerging technology that we believe should be in all school districts' digital arsenals to stay ahead of that curve**. These platforms allow administrators to monitor use of educational digital apps by individual students, classrooms, and schools. With high dollar amounts invested in new technologies, districts need analytics support to ensure that those dollars are being put to good use.

Through its edtech product certification program, Digital Promise recently issued its first research-based learning analytics certification to ClassLink. By way of example, not endorsement, we share the data analytics this vendor provides to illustrate their importance. The ClassLink platform enables districts' and schools' abilities to monitor data for logins, application launches, and time spent on applications by individual users. Importantly, administrators can use the platform to identify at-risk students—those who are not logging in to engage with instructional technology—and then ensure those students are getting the support they need, especially those who may not be achieving competencies. The platform also has an export setting feature that allows administrators to set a schedule on which the vendor delivers raw data.

The data helps school districts make decisions about applications that schools and teachers might not be employing at scale and make determinations about whether to continue their use or find new ones. They also allow districts to identify teachers who may not be using applications with their students. Districts can use that information to determine if the teacher needs technical and/or instructional supports to facilitate usage in their classroom, especially if other teachers are employing applications to great effect.

Planning for Technology Sustainability

1. **Evaluate Available Funding**
2. **Consider Your District's Overarching Goals**
3. **Identify Your District's Current Technology Reality**
4. **Identify District Technology Growth Plans**
5. **Collaborate to Support Learning**
6. **Determine the Total Cost of Ownership of Your Solutions**
7. **Review Products**
8. **Build Your Lifecycle Plan**
9. **Build Systems of Support Around Implementation**
10. **Share the Value of Investment**
11. **Commit to Sustaining the Plan**

7. Ecosystem Challenge:
Edtech platform providers must respond to school district demand for greater data interoperability and student privacy.

Photo by Allison Shelley/The Verbatim Agency for EDUimages

...in any given month the average school district uses in excess of 1,400 edtech applications.

Among the ecosystem of supports necessary for digital transformation of classroom learning are edtech products that enable the design and implementation of powerful learning activities and that teachers, principals, and district administrators use to monitor progress of their learners. But there is an important role that edtech vendors must take on beyond developing and continuously improving their products.

This publication challenges school systems to break traditional constructs for teaching and learning and teacher preparation programs to reinvent themselves. Now, we challenge edtech vendors to make their platforms interoperable with other edtech products.

Project Unicorn reports that in any given month the average school district uses in excess of 1,400 edtech applications. Some of these are anchored on the learning management systems districts purchase from vendors, but many are not. The end result for teachers and the district administrators who support them is that they wind up toggling back and forth between several platforms and applications, each with their own login and data silo. Because data often is not compatible across platforms, teachers have to connect it on their own to understand fully where learners are on progressions toward competency. Only then can they make informed decisions about how to address learner variability. District employees have to do the same to find out how learners are progressing across schools, provide supports to teachers and students, and produce reports required by boards of education at state and local levels.

Teachers report they are frustrated by these data silos. It's easy to understand why. A major finding of Teachers Know Best: Making Data Work for Teachers and Students, a report issued by the Bill & Melinda Gates Foundation, is that the lack of interoperability is a major drain on teacher time:

The limited use of application programming interfaces (APIs) and other mechanisms (such as common file formats and standards promoting interoperability) that allow products to share information with each other means that data from one tool may not flow to another. This requires teachers to spend excessive amounts of time on data entry before they can even begin analyzing information from multiple sources— which is precisely what they say is critical to developing a complete picture of each student.

The absence of data interoperability is an obstacle to the digital transformation of learning. Project Unicorn suggests that without data interoperability teachers cannot fully "understand each student's unique path to graduation" and "personalize instruction." Schools and districts cannot fully "contextualize their data and improve learning practices." More edtech providers must make their platforms interoperable if teachers and district administrators are to take advantage of the digital tools now available to the fullest extent.

In collaboration with Digital Promise, Project Unicorn is leading an effort to encourage edtech vendors to earn an Interoperability Certification. The certification signals to districts that vendor products prioritize interoperability. Because evidence of the encryption of student data is required for certification, districts can also be assured that certified vendors protect student privacy.

Currently, 20 vendors have earned certification.

Project Unicorn also invites edtech vendors to sign a pledge that commits them to protecting student privacy, advocating for data interoperability, and accelerating their products' progress toward it. We hope that more vendors will sign the pledge and go on to pursue certification.

Overtaxed teachers and administrators are depending on it.

Embracing Digital Transformation

K-12 education is an enterprise that has long needed breaking. For those reading this publication, it likely worked, at least somewhat. It is still working, to some extent, for swaths—although not all—of learners in our nation's most affluent schools. For large percentages of the U.S. population, it did not and does not work, nor was it designed to work for them. Those whom the outdated approach to American education failed and continues to fail are more likely to be Black, Latino, Native American, and Pacific Islander, or low-income learners of any race.

We argued in the opening pages of this paper, however, that the one-size-fits-all approach to teaching and learning needs to be put to bed once and for all for everyone. It simply cannot account for the learner variability that exists among all populations, whether they are advanced or struggling; Black, Latino, Native American, Pacific Islander, or white; low- or high-income. Still, we need to break the old paradigm for teaching and learning for populations that it has failed the most. Fortunately, educational technologies can pull us once and for all into more learner-centered constructs, accelerate learning, and help us close historic learning gaps.

Despite advances in educational technology, it is not a silver bullet. It is an enabler of powerful pedagogy delivered by teachers, who are the heart and soul of the digital transformation of classroom learning. Teachers, however, cannot achieve that transformation on their own. Far from it. They need the human touch of professionals and/or policy-makers in state agencies, school districts, teacher prepa-ration programs, philanthropy, and the nonprofit and edtech communities, who will create coherent and coordinated systems and an education ecosystem to support teaching and learning in the digital age.

> ## "If we teach students the same way as yesterday, we rob them of tomorrow."
> *—John Dewey*

Without their intentional efforts, American classrooms will remain locked in the earliest decades of the 20th century, unable to differentiate instruction for our diverse learners, ill-equipped to close historic gaps in achievement, and unprepared for the next disruption to in-person learning that will inevitably come.

The school districts featured in this publication—and many more—have used digital technologies to break free of the old paradigm. They are equipped to address learner variability and close historic gaps in achievement and college and career readiness. They are prepared for the next disruption to learning. They demonstrate what is now possible—and should be true—for every learner attending an American school.

What was once the digital promise of tomorrow is within our grasp today.

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