



LEADING EDUCATION INNOVATION

DRIVING **K-12** INNOVATION



Hurdles
2019





CoSN (Consortium for School Networking) is the premier North American professional association for school system technology leaders. CoSN is the only professional association dedicated exclusively to the educational technology leaders who are working to transform learning. CoSN provides thought leadership resources, leadership development, best practices and advocacy tools for an engaged community of peers, helping leaders succeed in the digital transformation. CoSN represents over 13 million students in school districts nationwide and continues to grow as a powerful and influential voice in K–12 education.

CoSN is vendor-neutral and does not endorse specific products, services or solutions.



Dear Colleagues,

Welcome to the inaugural report of the *Driving K–12 Innovation* series, a new initiative of CoSN (Consortium for School Networking).

As the premier professional association for educational technology leaders in North America, CoSN represents state, district and school leaders, and the millions of educators and students they serve. Our vision is a world where individual learners can fully realize their potential in engaging, personalized and connected learning environments.

Technology is a vital aspect of this endeavor. Used wisely, technology can enrich learning experiences, empower students as digital creators, critical thinkers and problem solvers, and foster global connections. Technology can also help educators strengthen their instructional repertoires and collaborate with their peers.

Visionary, strategic technology leadership is critical for creating a systemic, digital ecosystem and preparing every child for the world of today and tomorrow. Making smart technology decisions in education is becoming more difficult, however. Technology is changing at breakneck speed—and the pace is accelerating.

The *Driving K–12 Innovation* series responds to this challenge. Each year, we plan to release three short, focused reports and a toolkit on innovation in K–12 education. We've commissioned an international Advisory Board of distinguished educational technology experts to identify, rank and elaborate on hurdles, accelerators and tech enablers of innovation. While technology is the common theme, this series will focus on the organizational and human capacity that impact the effectiveness of technology in education.

I'm delighted that you are beginning this journey with us, and I encourage you to share this report with your colleagues. Together, we can drive meaningful innovation in K–12 education—and ensure that students are the ultimate benefactors of technology-enriched learning.

Sincerely,

A handwritten signature in black ink that reads "Keith Krueger". The signature is fluid and cursive, with the first name "Keith" and last name "Krueger" clearly legible.

Keith R. Krueger
Chief Executive Officer

INTRODUCTION

When experts define innovation, they talk about staying relevant in changing times, applying bold ideas to address real challenges and adding value—even “magic”—to people’s lives. Innovation is bigger than technology: It is “the future delivered.”¹

At a time of accelerating change the world over, delivering the future is critical if students are to thrive, participate and contribute throughout their lives. Too often, however, technology is a proxy for innovation in K–12 education, rather than a strategic asset designed to support inspired vision, strategy and human capacity. Without this deeper understanding of innovation, it will be difficult to create meaningful teaching and learning experiences.

The strategic application of technologies is imperative if K–12 leaders truly want to make the digital leap. When schools offer visionary leadership, equip educators with the skills and knowhow to integrate technology meaningfully into learning, and foster cultures where students can create and experiment, they can engage learners of all kinds. Discerning the megatrends that could help or hinder and teaching and learning, however, can be challenging even for the most technology-savvy leaders.

A FRESH PERSPECTIVE ON TECHNOLOGY TRENDS IN EDUCATION

Driving K–12 Innovation, this new series of publications from CoSN (Consortium for School Networking), will provide insights into pressing educational challenges and thoughtful, intentional use of technology to address them.

Driving K–12 Innovation is the successor to the New Media Consortium’s *Horizon K–12* reports, a decade-long series that ended in 2017. CoSN was the co-founder and lead partner. We are honoring the legacy of the *Horizon K–12* reports with a fresh perspective. Rather than a single annual report, *Driving K–12 Innovation* is an annual series of **three shorter, focused publications**—*Hurdles*, *Accelerators* and *Tech Enablers*—and a culminating **toolkit** to inform strategic planning and smart technology integration into teaching and learning.



HURDLES

Hurdles are more than pesky obstacles. They are significant organizational and human capacity challenges that force educators to slow down, prepare themselves and—with sufficient practice, knowhow and tools—make the leap to innovation.



ACCELERATORS

Accelerators are megatrends that drive the needs and skills expected of students and educators. Some disruptive shifts are moving rapidly (even suddenly), while others are happening so gradually that their effects may not be felt for years.



TECH ENABLERS

Tech enablers are supporting tools that smooth the way to more expansive opportunities and solutions in education.



Top 5

HURDLES

Scaling and sustaining innovation

Digital equity

The gap between technology and pedagogy*

Ongoing professional development

Technology and the future of work*

1 Many school systems lack the agility, strategies and mindsets to move innovative technology practices from a few classrooms to multiple settings across schools and school systems. Institutionalizing innovation requires a systemic, iterative approach, including ways to identify *effective* practices to scale and sustain.

2 Equitable access to broadband connectivity, digital tools and content, and innovative instructional strategies is a growing concern. Socioeconomic status, geography, race, gender or disability limit access to opportunities to learn in a digital world.

3 Rapid advances in technology are putting pressure on educators to refresh or shift their approaches to teaching and learning. When digital tools are introduced without a continual, dialectical relationship between research and pedagogy, or without timely professional development for teachers, technology implementations can result in wasted time, effort and investments—and lost opportunities to learn for students.

4 Engaging all teachers in meaningful professional development on innovative teaching practices is key to successful technology integration. Top-down, one-size-fits-all, sit-and-get training shows little to no impact on student achievement. Instead, personalized, job-embedded professional development can support teachers in their journeys as lifelong learners and practitioners who continue developing their professional skills.

5 Artificial intelligence, robotics and “deep learning” are among the game-changing technologies that are altering how people think, learn, live and work. Now is the time for educators to seriously consider how technologies on the horizon will impact teaching, learning and the world that awaits students in coming years. Digital fluency is rapidly emerging as critical for workforce preparedness. Digital citizenship is important as well, as students must understand how to live ethically and responsibly in the digital world.

* Featured in this *Driving K–12 Innovation / 2019 Hurdles* report

Surveying the **HURDLES**

For this first report, *2019 Hurdles*, an international Advisory Board of 111 renowned educational technology experts collaborated virtually to identify broad issues, rank them in order of difficulty to overcome, and explore the scope, implications, opportunities and solutions for overcoming each hurdle. This group included leading members of CoSN's Emerging Technologies Committee, as well as leaders from key U.S. and international education organizations and ministries of education.

CoSN cast a wide net to identify hurdles—major obstacles standing in the way of innovation, access, equity and other priorities in K–12 education. The international Advisory Board began its work

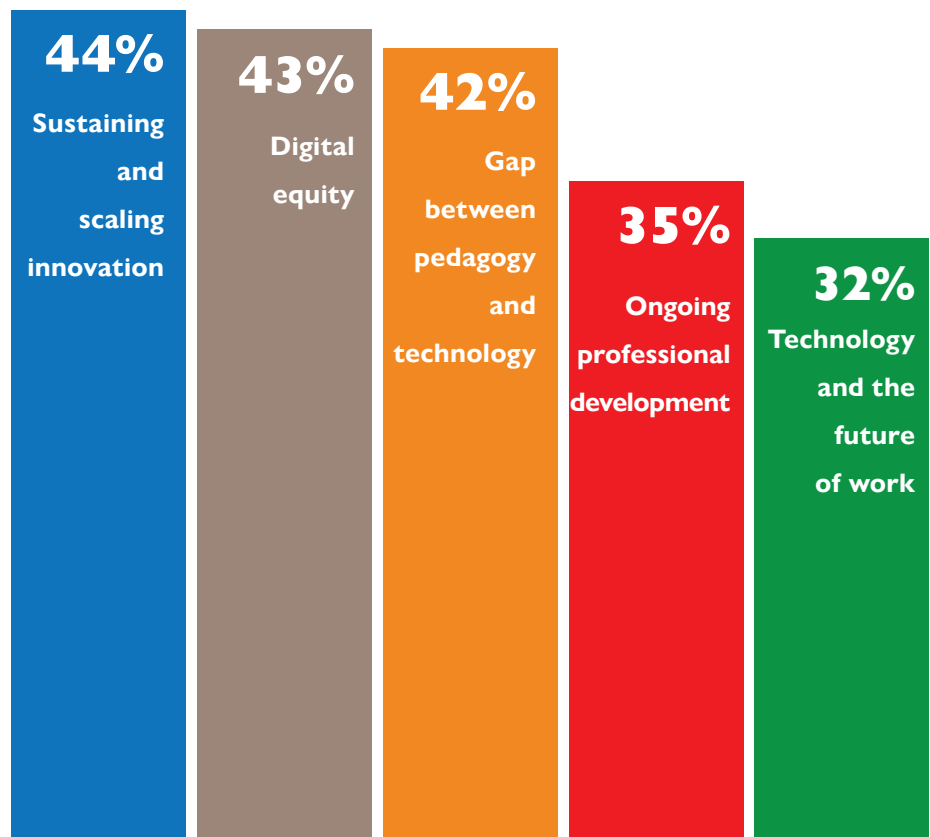
with a short list of potential hurdles and then added to the list. In all, the experts considered 27 distinct hurdles to innovation.

In an online forum, the Advisory Board then engaged in a series of



Top 5 **HURDLES** 2019 Survey Results **Most Important Hurdles to Address in 2019**

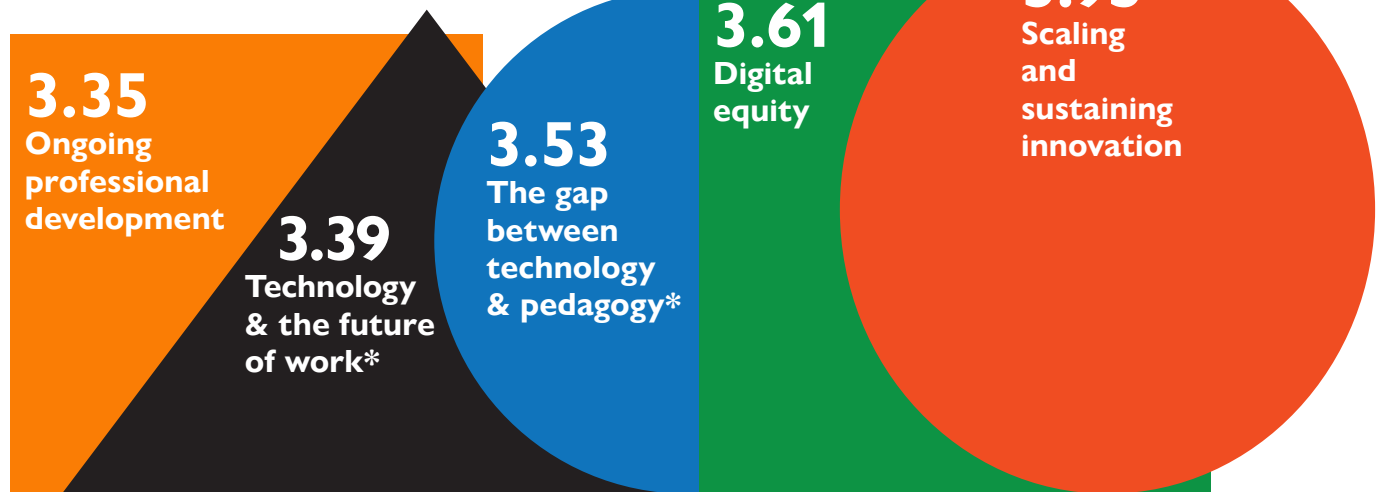
Percentage of Advisory Board members who believe these hurdles are the most important to address in 2019, regardless of difficulty, to pave the way for teaching and learning innovation and extraordinary student outcomes.



Top 5 **HURDLES** by Degree of Difficulty to Overcome

Average ranking by Advisory Board members on a **1-to-5** scale.

1 = easiest to surmount,
5 = most difficult to surmount



discussion and survey prompts, each of which correspond to actions that must be taken to understand and overcome the hurdles:

- **Define.** How would you define each hurdle?
- **Scope.** How surmountable is each hurdle? Rank each one on a scale of 1 to 5, with 1 the easiest hurdle and 5 the most difficult.

- **Imagine.** What are the implications if this hurdle is not addressed?
- **Reflect.** How is this hurdle materializing at your school, district or municipality?
- **Solve.** How can this hurdle be surmounted?
- **Iterate.** What hurdles are missing from the list?

Full survey results and the list of all Hurdles considered are available at cosn.org/k12innovation

CoSN's popular **EdTechNext** reports will align with the reports in the *Driving K–12 Innovation* series. Developed by CoSN's Emerging Technologies Committee, *EdTechNext* reports will provide deeper coverage of the hurdles, accelerators and tech enablers, including emerging technologies, best practices, guidance and tips for school system and educational technology leaders.

SPOTLIGHTING TWO **HURDLES**



THE GAP BETWEEN TECHNOLOGY AND PEDAGOGY

This hurdle captures with a new sense of urgency a perennial challenge: tensions that arise when the impulse to adopt new technologies takes precedence over preparedness to use them effectively. This challenge encompasses cultural, leadership, pedagogical, curricular and procedural issues. Continuing advances in technology create disconnects between the needs of students and the skill sets of teachers. Technology can accelerate teaching practices—good or bad—and necessitate instructional shifts to effectively support improved student learning.

Exploring the Challenge

The gap between technology and pedagogy is multifaceted—and it begins before technology gets to the classroom. From purchasing decisions to planning and implementation, schools sometimes prioritize technology over pedagogy, products over people and potential over reality.

The challenge starts at the top, where school system leadership, technology or curriculum departments tend to be the power centers of technology decisions. In school systems that operate with a “silo mentality,” stakeholders do not share or pursue common goals “responsibly, cohesively and strategically,” according to one educational strategist who has worked with more than 250 districts.² This requires a culture of collaboration across departments. A leadership team that champions

a unified vision builds trust and “empowers the masses” to work together toward that vision and keep the focus on student learning.

School systems can build their capacity to innovate by operating as innovation labs—innovating at a small scale, evaluating the impact with applied research and scaling only after matching 21st century pedagogical methods to the piloted technology.

School systems can give students a voice in purchasing decisions as well. With a vision of personalized learning where students can pursue their own passions, Albemarle County Public Schools (VA) opened an “unschool” for high school students in the 2018–19 school year. Flexible learning spaces and studios can accommodate specialized equipment. But the district purchased no equipment until

students arrived. Students decide what they need for their projects.³

The pursuit of the “next new thing” in technology can take precedence over teaching and learning. That’s backwards. Defining the knowledge and skills students need to succeed in a digital world, establishing a shared vision of curricular and pedagogical approaches, and developing a strategic plan should precede and then inform technology decisions that prioritize educational value.

Farmington Area Public Schools (MN) developed a community-driven strategic plan that calls for every student to be the agent of his or own self-paced learning, with more hands-on, project-based learning. Teachers are fully on board and in charge of this new model of education. For example, the district recently empowered each school and its teachers to create a new learning space, such as a science lab or media center, and equip the space with the technology they want to use.⁴

Professional development is critical for bridging the gap between technology and pedagogy. With the influx of technology into education, many school systems struggle to do it well. Moreover, it’s not just teachers who need professional development. To be effective champions and monitors of educational technology use, school system leaders, principals, coaches and other school leaders are equally in need of professional development.

School systems may provide training that covers the nuts and bolts of “how to” use technology, but not enough professional development on the “why to” use technology to support teaching and learning.⁵ Giving teachers opportunities to reason their own way through the “why” with exploration and reflection is important as well. This “struggle” is valuable to their learning

process. Deeper professional learning enables teachers to more effectively support student learning.

Frederick County Public Schools (VA) recently built a new middle school centered on the student experience and learning opportunities in a built environment. Planning for professional development went hand-in-hand with the design and construction project. Instructional technologists spent a full school year and a summer creating and delivering professional learning opportunities, including coaching and co-teaching, for teachers to feel comfortable with new technologies, instructional approaches and learning spaces.⁶

As technology advances, professional development will become a more urgent challenge. Only 10% of U.S. teachers feel confident teaching higher-level technology skills that are in increasing demand in the workforce, according to a 2018 survey of more than 2,000 K–12 educators by PwC.⁷ This finding held steady across grade level, school affluence and teacher experience level. Most teachers (79%) say they want more professional development in technology-related subjects and 81% say they want more funds and more “release time” to attend professional development, and more curriculum plans or course materials.⁸

By and large, teachers are not making innovative use of technology, the PwC survey found. According to U.S. teachers, most classroom technology use (60%) is passive (watching videos, reading websites), while only about one-third (32%) is for classroom activities such as coding, producing videos or performing data analytics, where students practice higher-level skills.⁹ While it is important for students to learn to create with technology, it is equally important

“When undertaking this work, schools and districts may begin with the implementation of new technologies as opposed to defining quality pedagogical practices and building an understanding of the core instructional strategies that, when implemented, have the greatest impact on learning.”

— Tara Nattrass,
Assistant Superintendent,
Teaching and Learning,
Arlington Public Schools (VA)

for them to use higher-order skills, such as critical thinking, reflection and computational thinking.

Internationally, the story is much the same: 59% of teachers expressed a moderate or high level of need for technology-related professional development, according to in a recent study by the Organisation for Economic Cooperation and Development (OECD).¹⁰ “Professional development should target their overall school culture, providing



time for professional practice, collaboration and identification of what works,” this report asserts.

With demand for science, technology, engineering and mathematics (STEM) skills increasing, some countries are taking concerted action. South Korea now emphasizes “computational thinking, coding skills and creative expression through software” in its national curriculum. By the end of 2018, South Korea will have trained 60,000 elementary teachers and 30,000 middle school teachers in software education.¹¹

Imagining the Potential

“Technology in education offers potential, not promise. This requires an equal understanding of learning science and the potential effectiveness of technology to draw out lasting impact. We find that few schools are strong in both areas.”

— Matt Harris,
International Educational
Consultant,
International EdTech,
Singapore

The gap between technology and pedagogy results in wasted spending, frustrated educators and lost opportunities for students to develop new curiosities and skills for the digital age.

What if we could bridge this gap? Schools could realize higher returns on technology investments with results that matter in education—sound pedagogical practices and opportunities for students to engage in high-value, forward-thinking learning activities. For example, mixed and virtual reality can enhance experiential learning with opportunities to explore and act within and beyond the physical world. With foresight and preparation, educators can move students from passive to active learners who take charge of their own learning, collaborate, participate, inquire, discover, reason and create.

What would innovation look like? Energy Institute High School, a STEM-focused, energy-themed high school in Houston (TX), provides a glimpse. The school prioritizes professional-grade technology, collaboration with companies that support teachers and students, and project-based learning, “a kind of magical way of learning.”¹² With the first two years of the school’s opening, enthusiasm for projects led to project overload, with every teacher assigning projects. That led to innovation.

Energy Institute High School merged English, social studies, science and engineering classes into team-taught cohorts and modified the 45-minute bell schedule into four-hour blocks of instruction. This provided time for more complex, interdisciplinary projects. The school builds planning periods for teacher collaboration into daily schedules, and an information technology specialist supports teachers with the instructional technology. Teachers and students also have a voice in technology selection and choices in their use of technology.

Surmounting the Challenge

“One typical failure pattern is that the most adventuresome teachers/early adopters recommend what to purchase based on their success. But the next set of teachers have different professional development needs than the early adopters did, and this isn’t recognized.”

— Jeremy Roschelle,
Executive Director,
Learning Sciences,
Digital Promise Global, CA

This hurdle is surmountable. What will it take? Professional development, professional development, professional development. No technology will have the desired impact without professional learning and growth.

But there’s more to it. Education leaders like superintendents, chief technology officers and chief information officers need to understand teacher needs and invite educators to the table for strategic planning. Being part of these conversations can be another aspect of professional development, as educators learn what it means to select and implement technology—and ask questions about costs, support, scalability and sustainability.

School systems and schools also might consider an investment in piloting new technologies

and sharing the results within a network of schools. Educators also could ask for a seat at the table and work with technology companies to inform research and development of products that truly support effective pedagogy.

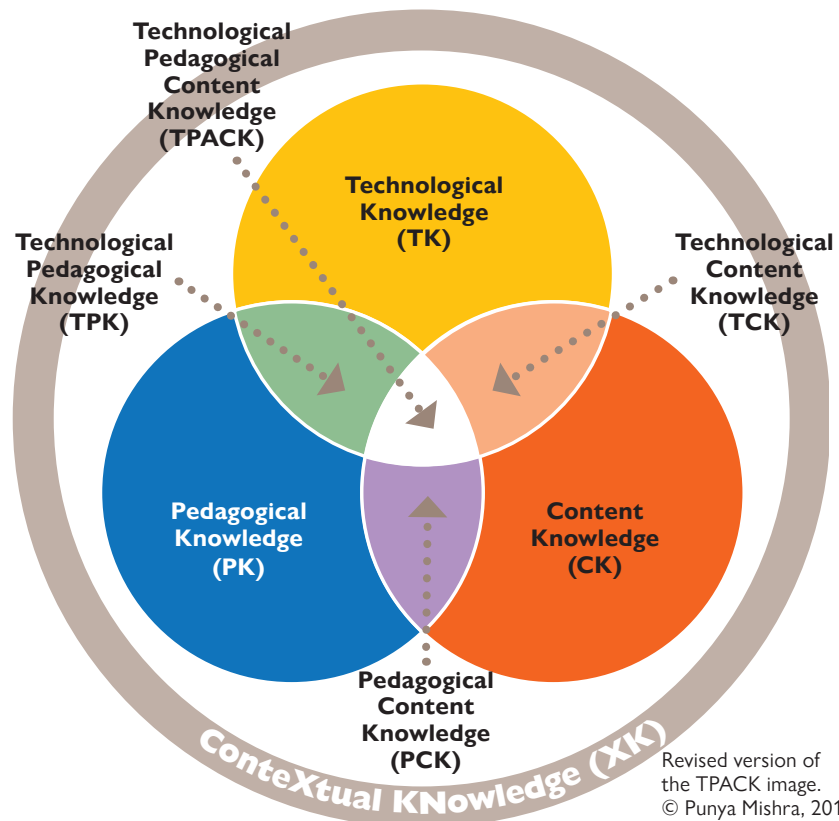
On the professional development front, making technology an explicit component of the learning equation is an emerging concept. Several professional learning frameworks, highlighted below, do this:

“It is so important that educators are supported by sound pedagogical practices within professional learning. Helping teachers to improve their craft by leveraging technology to improve the success of our students is crucial. As a district, we need to have all voices at the table when making technology purchase decisions. This is a vital step to ensure the technology and the pedagogy matches up within instruction.”

— Anna Baldwin,
 Director of eLearning and Integration,
 Anderson School District Five,
 SC

Technological Pedagogical Content Knowledge (TPACK)

- Technological Pedagogical Content Knowledge (TPACK)** brings together content, pedagogy and technology knowledge required by teachers for technology integration. This framework “has proved an interesting lens for researchers to investigate teachers’ meaningful use of technology in their practice, ... offering both teacher educators and policy makers the possibility to analyze and reflect upon technology integrated planning.”¹³



Revised version of the TPACK image. © Punya Mishra, 2018. Reproduced with permission.¹⁴

SAMR Model and Bloom's Taxonomy

- The **SAMR model** can help educators understand how well they are incorporating technology into instruction, think about the best pedagogical approach and move toward higher-level skills development. The SAMR model, which stands for Substitution, Augmentation, Modification and Redefinition, characterizes how technology is used and allows it to be mapped to Bloom's taxonomy of educational goals.¹⁵

Redefinition

Tech allows for the creation of new tasks, previously inconceivable

Modification

Tech allows for significant task redesign

Augmentation

Tech acts as a direct tool substitute, with functional improvement

Substitution

Tech acts as a direct tool substitute, with no functional change

Create

Evaluate

Analyze

Apply

Understand

Remember

Source: Ruben R. Puentedura, hippasus.com.

IN THE FIELD: MAKING THE DIGITAL LEAP

“I used design thinking with teachers to help them rethink their curriculum and their student learning objectives. Only then would we look at what technologies could help us.”

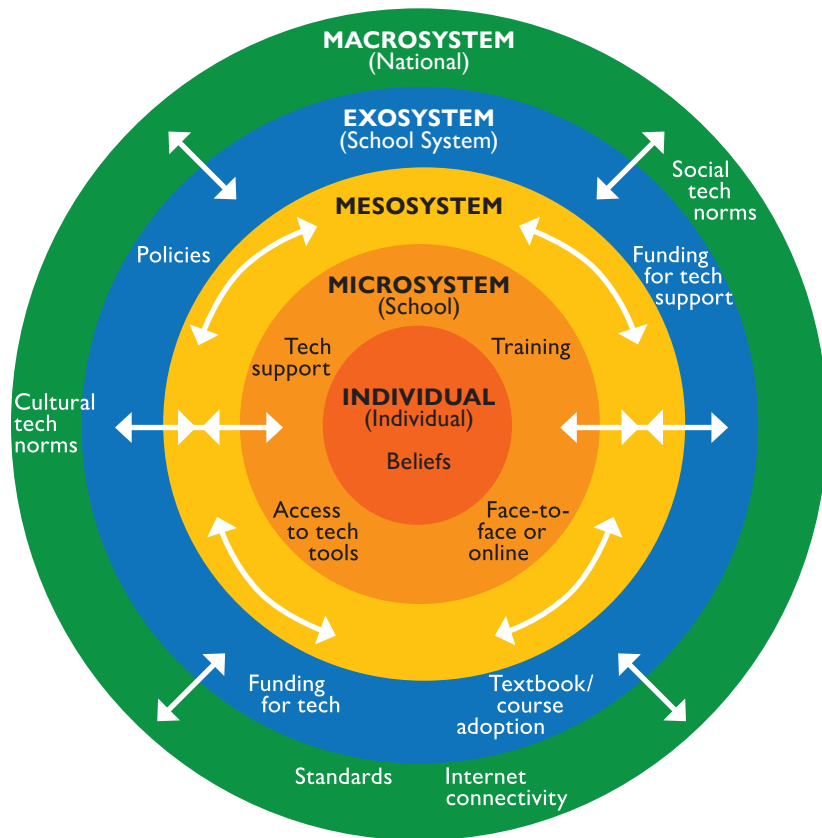
— Cristiana Mattos Assumpção,
STEAM and Educational
Technology Director,
EDUC4x100, FL

“We work on quality pedagogy first, establish common language and expectations, and then move to look for the infusion of the technology to support these practices. Leadership supports developing curriculum that supports changes in the classroom not only from the professional development standpoint but also the financial standpoint to value time individuals are giving. We try to focus on student needs above all else.”

— Rachel Yurk,
Chief Information
and Technology Officer, Pewaukee
School District, WI

Mlearning Integration Ecological Framework

- The **Mlearning integration framework** views mobile learning as a disruptive force that should prompt educators to examine their beliefs, resources, teaching methods and purpose for using technologies. This framework highlights the various components to be considered when integrating mobile technologies. It works from the individual teacher at the center of the framework, and then outwards to all the components that need to be considered at the school, school system and national levels. The Mesosystem, with the arrows, is a reminder that everything interconnects across all the levels. ¹⁶



Source: Crompton, H. (2017).
 "Moving Toward a Mobile Learning Landscape:
 Presenting a Mlearning Integration Framework."
Interactive Technology and Smart Education
 18(2) 97-109. doi: 10.1108/ITSE-02-2017-0018.

The Advisory Board offered other advice:

- Evaluate how technology can contribute to your vision, mission and goals.
- Develop a strategic plan that aligns technology with learning expectations and pedagogy.
- Avoid the "shiny object syndrome" in purchasing technology by bringing cross-cutting expertise, including teachers, to the table.
- Budget for professional development with every technology purchase.
- Champion technology with strong leadership in schools.
- Encourage professional learning communities (PLCs).
- Monitor the effectiveness of technology and make course corrections, if needed.
- Scale and sustain effective technology with an intentional system of multiple, reinforcing, aligned connections to the curriculum, professional development, leadership, assessment and parent engagement.



TECHNOLOGY AND THE FUTURE OF WORK

This hurdle pushes educators to start thinking now about what emerging technologies mean for education. Artificial intelligence (AI), “deep learning” and robotics are among the game-changing technologies that are beginning to alter the nature of work and, thus, workforce demands. While schools clearly face many hurdles in preparing students with skills they need to succeed today, emerging technologies could bring even steeper challenges for educators.

Exploring the Challenge

“I see this as a key question that sits above almost all of our other hurdles. It is the ultimate real-world issue when the stats report a range from 30% to 50% of today’s jobs will be affected.”

— Jonathan Nalder,
Educator,
FutureWe.org,
Australia

The World Economic Forum jolted people’s attention with a 2016 report, *The Future of Jobs*, which asserted that we are at the beginning of a Fourth Industrial Revolution.¹⁷ Even the short-term technological drivers of this new era—those making an impact by 2020—are stunning:

- Mobile and internet cloud technology
- Advances in computing power and Big Data
- New energy supplies and technologies

- The Internet of Things (IoT)
- Crowdsourcing, the sharing economy and peer-to-peer platforms
- Advanced robotics and autonomous transport
- Artificial intelligence and machine learning
- Advanced manufacturing and 3D printing
- Advanced materials, biotechnology and genomics

Demographic and socioeconomic shifts, such as changing work environments and flexible working arrangements, also are “expected to have a significant impact on jobs, ranging from significant job creation to job displacement ... and widening skills gaps.”¹⁸ Whole new categories of jobs, occupations and skill sets are emerging, “requiring an urgent and concerted effort for adjustment.”

The challenge for educators, then, is to anticipate and develop skill sets that will stand the test of time. Giving students ample opportunities to practice with emerging technologies could stir their interest and excitement about designing tomorrow’s technologies. Tying these tools to real-world and deep learning outcomes is essential.

Perhaps underrecognized is a new basic skill set: “Work at nearly every rung of the employment ladder is becoming more digitized. Often, the skills needed to succeed have less to do with computer programming than what experts call ‘digital literacy’—the ability to interpret, create, and strategically use digital information.”¹⁹

In a survey of more than 3,000 business leaders in seven countries, McKinsey Global Institute found that there is a “significant need for everyone to develop basic digital skills for the new age of automation.”²⁰ Basic digital literacy skills are the second fastest-growing set of 25 core workplace skills for the future, behind only advanced IT (information technology) and programming skills.

Technology is reducing the need for workers to do routine, manual tasks, according to *The New Work Smarts*, a 2017 report by the Foundation for Young Australians.²¹ The foundation analyzed over 20 billion hours of work done by 12 million Australians to predict future workforce skill demands. Among the findings: By 2030, workers will spend 30% more time learning on the job, 100% more time solving problems, 77% more time using science and mathematics skills and 41% more time on critical thinking and judgment. They’ll also need an entrepreneurial mindset, due to less management, organizational coordination and on-the-job teaching. Thriving in tomorrow’s workforce will require “new work smarts”—smart learning, smart thinking and smart doing.

Ideas for promoting and teaching newly recognized skills are bubbling up. In Australia, [Jump Start](#) and [Fix-Ed](#) are programs that use design thinking and social entrepreneurship to empower high school students to create prosperous futures. [JA Europe](#) provides education programs for entrepreneurship, work readiness and financial literacy, reaching 3.6

million students in 40 countries in 2017. North Chadderton School in the United Kingdom teaches secondary students the five Rs (Resourcefulness, Responsibility, Resilience, Reasoning and Reflective), and develops entrepreneurial skills through experiences with local, national and international organizations.²²



Imagining the Potential

“We’re missing a great opportunity if we don’t make the connection between the evolving role of robotics and AI as a factor on the opportunities for future learners. We need to make a real-world connection for learners.”

Norton Gusky,
Coordinator of Educational
Technology/Educational
Technology Broker,
NLG Consulting, and
Co-Chair of CoSN’s Emerging
Technologies Committee

Next-generation technologies are already making their way into many industries. Artificial intelligence (AI) can perform tasks that normally require human intelligence, such as predictive analytics, which uses algorithms to learn from and make determinations or predictions from massive data sets. In education, many learning management systems already have AI capabilities.

Products and services developed by nonprofit groups and companies are quickly becoming available to educators. For example, there are products that harness AI by using aggregated data

from students to understand how they solve math problems. Another product brings together data from multiple sources to create an AI analytics system.

AI has the potential to micro-personalize learning with perceptive, adaptive digital tutors and enliven learning experiences with mixed reality, augmented reality and virtual and artificial reality technologies, for example. With technologies like these, educators will be able to design learning environments that mimic working environments—and partner more easily with employers to provide students with authentic, virtual learning opportunities.

For teachers and administrators, next-generation technologies could support pedagogy, assist with classroom management and rote tasks, and offer granular insights into student learning and needs. Educators are expected to be able to spend more time on their core work: teaching, learning and in-person interactions with students.

Emerging technologies also will shift educational measurement to match 21st century skills, according to a Brookings Institution series on educational measurement.²³ “Stealth assessments” can be embedded into platforms, tools and learning environments, such as digital games with realistic scenarios that build both complex skills and content knowledge. Educators also can leverage new technologies to capture and analyze process data, as students interact in digital environments, to discover how students are learning in the moment.

Surmounting the Challenge

Unlike most hurdles, it will take time to fully grasp how next-generation technologies will change the future of work and education. For now, the Advisory Board recommends paying attention to developments in this arena and starting to discuss how emerging technologies will impact:

- life and work and what that means for preparing students for a happy and productive future life in that world (the “what” of education); and
- education through digital learning materials and environments, analyzing learning behavior, interactions between learners and individual learning experiences for each learner (the “how” of education).



Additional Resources

- A Future Ready project to develop a framework for identifying, developing, collecting evidence of and evaluating key attributes of future-ready learners. Collaboration, creativity, personal learning, problem solving and global sustainability and other attributes for which there is historical research. <https://futurereadylearning.wordpress.com>.
- *Ask About AI: The Future of Work and Learning*,²⁴ a 2017 report that provides a sharp primer on AI, summarizes the public policy issues, offers ways for educators to prepare and provides a robust list of resources.

IN THE FIELD: MAKING THE DIGITAL LEAP

“In my district we do a lot of work around updating labor market information and focusing on newer issues such as AI and the ever-changing world of work.”

— Kellie Sanders,
Chief Academic Officer,
School District of New Berlin, WI

CONCLUSION

D *Driving K–12 Innovation / 2019 Hurdles* is the first in the new CoSN series focusing on challenges and opportunities to digital transformation.

The two hurdles to innovation featured in this report—the gap between technology and pedagogy and technology and the future of work—pose significant challenges to educators. The first is a longstanding challenge with new sense of urgency, as the pace of technology innovation accelerates. The second is a megatrend challenge with implications that are just beginning to come into view. Both are among the top five hurdles that the Driving K–12 Innovation Advisory Board believes are important for school systems, schools and educators to begin addressing this year.

We recommend initiating conversations with your community, considering how to overcome the hurdles and turn them into opportunities:

- What would it take for your students to experience innovative education?
- How could you help teachers immerse students in engaging learning experiences designed to spark curiosities, deepen knowledge, and build higher-order thinking and practical skills?
- How could you help students become agents of their own learning, with the digital fluency to pursue knowledge, collaborate, create and solve problems?
- How are learning, doing and thinking intertwined and connected to the wider world?
- What skills will students need to navigate the world of work in the “fourth industrial revolution”?

We encourage you to stay connected with this series at cosn.org/k12innovation.

COMING SOON!

This year, CoSN will release two more reports in the *Driving K–12 Innovation* series, *Accelerators 2019* and *Tech Enablers 2019*, as well as a practical toolkit to inform strategic planning and smart technology integration into teaching and learning.



REFERENCES

- ¹ Skillicorn, N. (March 18, 2016). "What Is Innovation? 15 Innovation Experts Give Us Their Definition." Idea to Value. <https://www.ideatovalue.com/inno/nickskillicorn/2016/03/innovation-15-experts-share-innovation-definition/>
- ² Patnoudes, E. (Sept. 15, 2016). "Rise Above Your Silo Mentality with Technology Implementation". *EdTech. Focus on K–12*. <https://edtechmagazine.com/k12/article/2016/09/rise-above-your-silo-mentality-technology-implementation>
- ³ CoSN. (Summer 2018). "Redesigning Learning Spaces." *EdTechNext*.
- ⁴ Ibid.
- ⁵ Patterson, M. (April 26, 2016). "Tips for Transforming Educational Technology through Professional Development and Training." *EdTech. Focus on K–12*. <https://edtechmagazine.com/k12/article/2016/04/tips-transforming-educational-technology-through-professional-development-and>
- ⁶ CoSN. (Summer 2018). "Redesigning Learning Spaces." *EdTechNext*.
- ⁷ PwC. (2018). *Technology in US Schools: Are we preparing our kids for the jobs of tomorrow?* <https://www.pwc.com/us/en/about-us/corporate-responsibility/library/preparing-students-for-technology-jobs.html>
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Organisation for Economic Cooperation and Development. (2018). "A Brave New World: Technology & Education." *Trends Shaping Education Spotlight 15*. <https://www.oecd.org/education/eri/Spotlight-15-A-Brave-New-World-Technology-and-Education.pdf>
- ¹¹ Ibid.
- ¹² CoSN. (Winter 2017). "Digital Tools for Problem-Based Learning." *EdTechNext*.
- ¹³ De Rossi, M. & Trevisan, O. (2018). "Technological Pedagogical Content Knowledge: How TPCK Is Defined and Implemented in Initial Teacher Education." *Italian Journal of Educational Technology*, 21(1), 7–23. doi: 10.17471/2499-4324/988.
- ¹⁴ Mishra, P. (2018). Revised version of TPACK image. <https://punyamishra.com/2018/09/10/the-tpack-diagram-gets-an-upgrade/>.
- ¹⁵ Puentedura, R. (Sept. 24, 2014). "SAMR and Bloom's Taxonomy: Assembling the Puzzle." Blog post. Common Sense Education. <https://www.common sense.org/education/blog/samr-and-blooms-taxonomy-assembling-the-puzzle>
- ¹⁶ Crompton, H. (2017). "Moving Toward a Mobile Learning Landscape: Presenting a mLearning Integration Framework." *Interactive Technology and Smart Education*, 18(2), 97–109. doi: 10.1108/ITSE-02-2017-0018.
- ¹⁷ World Economic Forum. (2016). *The Future of Jobs: Employment, Skills and the Workforce Strategy for the Fourth Industrial Revolution*. Global Challenge Insight Report. http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
- ¹⁸ Ibid.
- ¹⁹ Herold, B. (Sept. 25, 2018). "Jobs at All Levels Now Require Digital Literacy. Here's Proof." *Education Week*. <https://www.edweek.org/ew/articles/2018/09/26/jobs-at-all-levels-now-require-digital.html>
- ²⁰ Bughin, J., Hazan, E., Lund, S., Dahlström, P., Wiesinger, A. & Subramaniam, A. (May 2018). *Skills Shift: Automation and the Future of the Workforce*. McKinsey Global Institute. <https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce>
- ²¹ The Foundation for Young Australians. (2017). *The New Work Smarts: Thriving in the New Work Order*. <https://www.fya.org.au/report/the-new-work-smarts/>
- ²² JA Europe. The Entrepreneurial School (TES) Awards 2017. http://jaeurope.org/index.php?option=com_attachments&ask=download&id=606:brochure-TESAwards-web
- ²³ Vista, A., & Care, E. (March 13, 2017). "Education Assessment in the 21st Century: Pathways to the Future". Blog Post. Brookings Institution. <https://www.brookings.edu/blog/education-plus-development/2017/03/13/education-assessment-in-the-21st-century-pathways-to-the-future/>
- ²⁴ Vander Ark, T. (November 2017). *Ask About AI: The Future of Work and Learning. Getting Smart*. <https://www.gettingsmart.com/wp-content/uploads/2018/01/17-EdIn-05-white-paper-rd9-1.pdf>

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Special thanks are due to our editorial board: Beatriz Arnillas, Norton Gusky, Vince Humes, Joani Kay, Jenna Linskens and Patrice Torcivia Prusko.

CoSN also acknowledges Samantha Becker for her vision and leadership on this series.

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