CoSN
LEADING EDUCATION INNOVATION

DRIVING K-12 INNOVATION

2023 TECH ENABLERS

LEADING EDUCATION INNOVATION

Challenge

Technology is an essential element of learning, yet the use and application of it is inequitable.

Vision

CoSN is a community of visionary technology leaders empowering every learner to achieve their unique potential in a changing world.

Mission

CoSN provides current and aspiring education technology leaders for PreK–12 with the community, knowledge, and professional development they need to create and grow engaging learning environments.

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INTRODUCTION

CoSN's Driving K-12 Innovation initiative convenes an international Advisory Board of about 100 education and technology experts to select the most important topics impacting teaching, learning, and education innovation around the globe — the top Hurdles (barriers), Accelerators (mega-trends), and Tech Enablers (tools) for the upcoming year. This publication focuses on the Top 3 Tech Enablers for 2023.

STATE OF THE WORLD (Context)

HURDLES (Barriers)

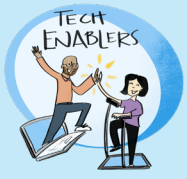
1. Attracting & Retaining Educators and IT Professionals
2. Designing Effective Digital Ecosystems
3. Digital Equity

ACCELERATORS (Mega-trends)

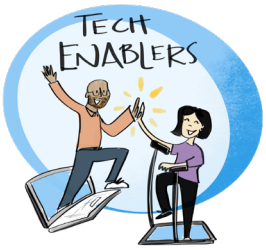
1. Building the Human Capacity of Leaders
2. Learner Agency
3. Social & Emotional Learning

TECH ENABLERS (Tools)

1. Artificial Intelligence (AI)
2. Untethered Broadband & Connectivity
3. Rich Digital Ecosystem



BRIDGES (Themes)



2023 TOP 3 TECH ENABLERS

1 ARTIFICIAL INTELLIGENCE

Interfaces that mimic the complexity and function of human brain processes, such as decision-making, learning, evolving, problem-solving, perceiving, and demonstrating creativity. Their capabilities and intelligence processes may be quite different from those of humans (consisting of algorithms, rules, data sets, etc. related to specific domains), but fulfill similar functions — sometimes surpassing human capabilities and sometimes outmatched by them. These technologies encompass machine learning, natural language processing, deep learning, computer perception, etc. As we move forward, we need to look at ethics surrounding the use of AI.

2 UNTETHERED BROADBAND & CONNECTIVITY

Ubiquitous broadband Internet and the underlying technologies that enable robust connected learning — without requiring devices to be physically connected (via cables, for example). These technologies enable mobility and learning anytime, anywhere.

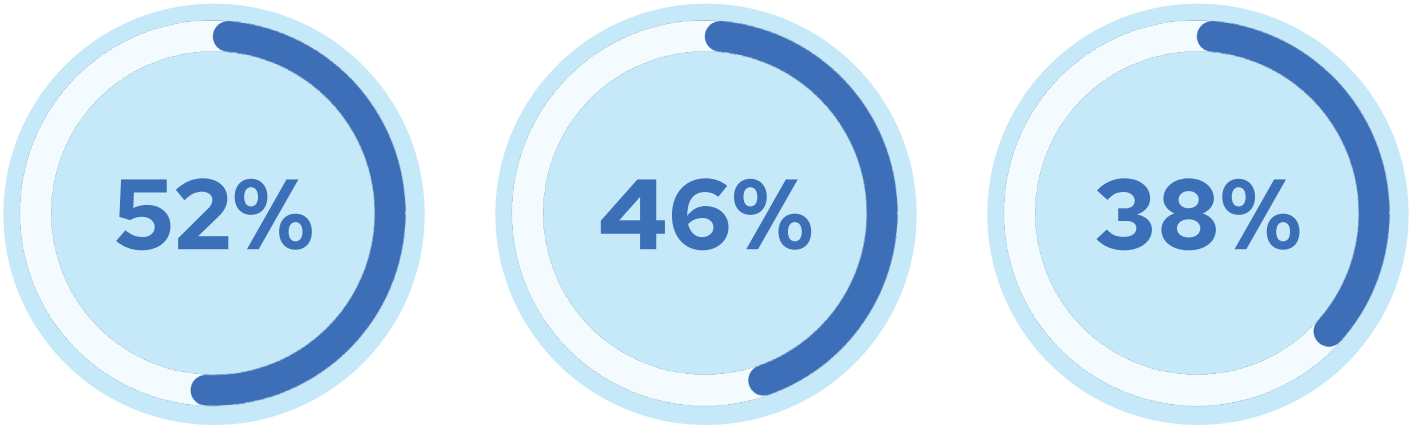
3 RICH DIGITAL ECOSYSTEM

Connecting systems or digital environments can form powerful digital ecosystems for enabling student learning and/or supporting education administration. These interconnected systems of online and virtual spaces can span formal school settings and beyond.

EXPLORING THE **2023 TECH ENABLERS**

... BY IMPORTANCE

Top 3 most important Tech Enablers for education systems to leverage in 2023 (63 respondents):



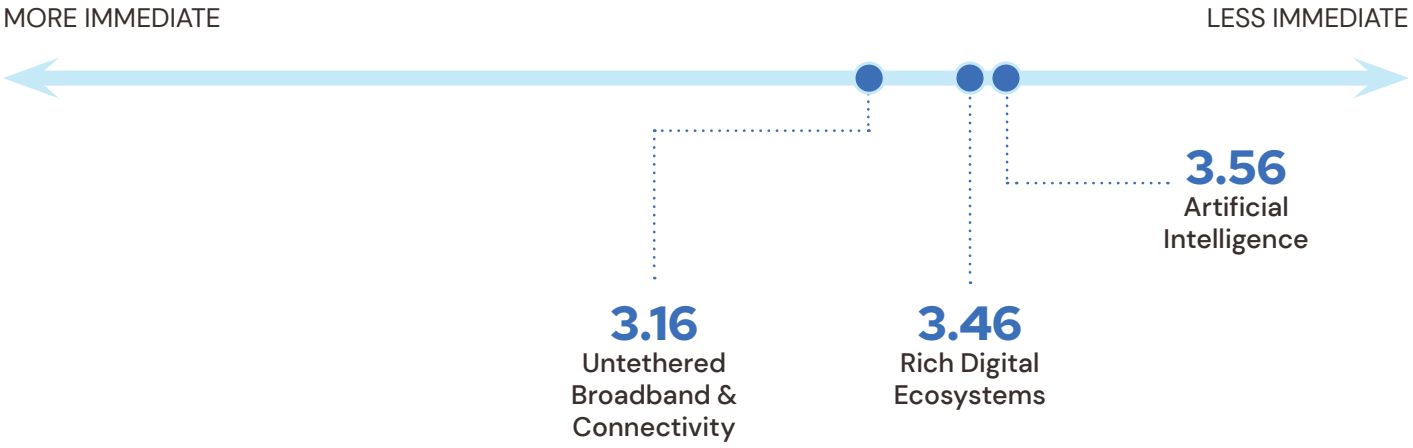
1. Artificial Intelligence

2. Untethered Broadband & Connectivity

3. Rich Digital Ecosystem

... BY IMMEDIACY

Top 3 Tech Enablers in order of the immediacy of its adoption at scale by schools worldwide, as ranked by the Advisory Board (Scores reflect the average score out of 5, with 1 being the most immediate adoption; 5 being the furthest away from adoption; 63 respondents).



1 ARTIFICIAL INTELLIGENCE

For the first time in the Driving K-12 Innovation initiative, Artificial Intelligence (AI) has made its way onto the list as a Top Tech Enabler, with 52% of respondents selecting AI as one of three "most important." AI in education (our definition includes machine learning, natural language processing, deep learning, and computer perception) is used in many ways. Advisory Board Member Sandra Paul (Township of Union Public Schools, New Jersey, United States) shared some examples in which AI may be used:

- for services for developing benchmarks and scaffolding instruction for students where teachers are "guides on the side" type of instruction;
- for mundane tasks that teachers do on a daily basis, such as grading, scheduling, assessments, tutoring and individualized/ personal instruction to name a few;
- for Services for Special Education with predictive capabilities, and voice commands (ask Alexa, Hey Google), enabling certain students to participate in their own learning with their classmates, autistic students working with Lawrence Smart Robot assisting with communication;
- and more.

Although the high cost of implementing AI in school systems may hinder some districts, others are experimenting with this new wave of technology. "Currently, I am exploring how AI systems can better craft lessons, building content from online resources (text, images and video) and linking these to curriculum and assessment requirements — essentially automating lesson and unit planning processes by generating lesson content linked to outcomes and assessment activities" (Jason Zagami, Griffith University, Queensland, Australia). "The advantage of this is that lessons and units can be easily personalised to individual student learning needs, something not readily achievable without automated processes, and with sufficient data, can be dynamically improved in each iteration."

But as education systems begin to test the use of AI in their district, Beth Holland (The Learning Accelerator, Rhode Island, United States), who has contributed to CoSN's AI in K-12 Report in the past, shared two points that are absolutely critical to this discussion: equity and ethics.

She shared that we must question how students are experiencing AI: Are they learning to create it or is it essentially "creating" them? "We know that in some districts (often white and more affluent), kids are designing with AI and engaging in creative learning experiences. However, a majority of students experience AI because of how it influences their education experience: monitoring, learning analytics/adaptive software, security, etc. As we think about AI as an enabler, we also need to have equity at the forefront to make sure that it enables all students in a positive way."

In addition to equity, education leaders must also consider ethics. "As we think about AI in K-12, not only do we need to consider the potential for bias in algorithms and equity of experience, but also the unintended consequences, the potential for making students feel as though they are learning under constant surveillance, and — most importantly — whether/how we are preparing our communities (students, teachers, families, etc) for a world where AI is embedded in everything," said Holland.

Governments around the world are starting to think more deeply about the utilization of AI in different sectors, including education. During this project cycle, the Biden-Harris Administration in the United States released a blueprint for a "Bill of Rights," which includes key actions to advance tech accountability and protect the rights of the American public.

The European Commission also recently released guidelines to help teachers address misconceptions about Artificial Intelligence and promote its ethical use: Ethical Guidelines on the Use of Artificial Intelligence (AI) and data in teaching and learning for educators. "The guidelines provide a foundation and inform educators on the potential that applications of AI and data usage can have in education and to raise awareness of the

possible risks so that educators can engage positively, critically and ethically with AI systems and realize their full potential" (Arjana Blazic, EduDigiCon, Zagreb, Croatia). "The EU Commission encourages schools to apply for funding for AI-related school projects through the Erasmus+ program in order to bring AI, its risks and challenges to teachers and students."

TIPS & RECOMMENDATIONS FROM THE ADVISORY BOARD

ENSURE STAFF KNOW AND UNDERSTAND THE BENEFITS OF AI

"**We really need to get teachers up to speed about AI**. Both in what it can offer and what we need to be wary about. We tend to overestimate in the short term but underestimate in the long term, but I do think most teachers would be happy in 10 years that all that marking [grading] could be done by AI" (John Heffernan, Tipperary Education and Training Board, Ireland).

CONSIDER AI FOR GROWTH OPPORTUNITIES

"**Our programs need to continue to grow in their AI capabilities** to help educators further personalize learning for students beyond hardware control" (Ken Zimmerman, Lancaster-Lebanon Intermediate Unit 13, Pennsylvania, United States).

USE AI FOR EQUITY

"Take the data from your Student Information System (SIS) to get the story on which students are impacted by Equity, Social Justice, and Economic Inequality. Then, you can do student-centered restorative practices to **turn the data in a positive direction and stop cycles**" (Ben Bayle, DeKalb CUSD428, Illinois, United States).

ADVISORY BOARD MEMBERS SHARE AI & EDUCATION RESOURCES

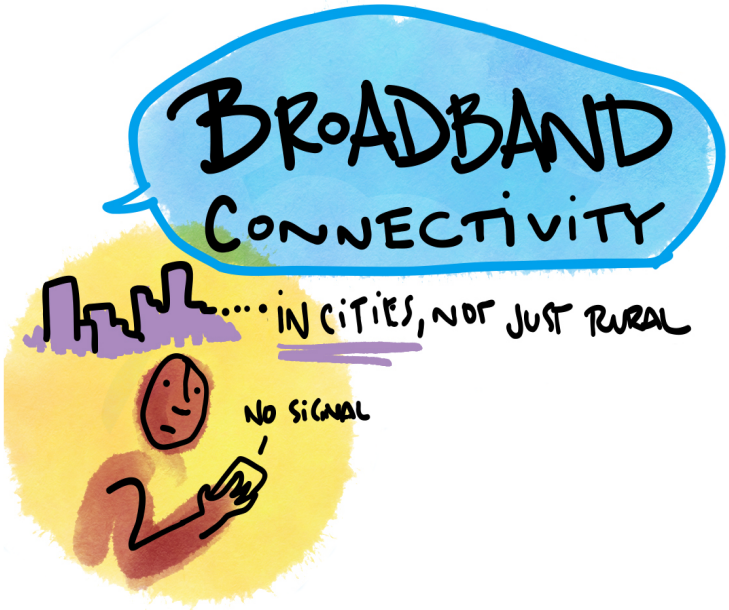
During this project cycle, Advisory Board Members shared many helpful resources, some listed in this chapter. Here are additional resources to familiarize yourself with AI and education:

- Artificial Intelligence: Toward a Humanistic Approach (UNESCO)
- What the White House 'AI Bill of Rights' Means for Education (EdSurge)
- Top 13 Artificial Intelligence Applications in 2023 (Medium)
- Artificial Intelligence in Education: Putting Educators and Students in the Driver's Seat (ISTE)
- Artificial Intelligence and Education: A critical view through the lens of human rights, democracy and the rule of law (Council of Europe)
- The cyclical ethical effects of using artificial intelligence in education (AI & SOCIETY)
- EdSAFE AI Resource Hub (EdSAFE AI Alliance)
- Artificial Intelligence Explorations and Their Practical Use in Schools (ISTE)

Additionally, the Advisory Board shared some available resources for teaching students about AI:

- Project STEM for MS
- Unit 7 - AI and Machine Learning ('22-'23) (Code.org)
- The AI Education Project (aiEDU)
- Day of AI Activities (Day of AI)
- The Artificial Intelligence (AI) for K-12 initiative (AI4K12)
- AI4ALL
- K-12 AI Curricula (UNESCO)
- AI + Ethics Curriculum for Middle School (MIT Media Lab)
- DeepRacer (AWS)
- Free AI Online Courses & Resources (IBM)

2 UNTETHERED BROADBAND & CONNECTIVITY



The COVID-19 pandemic shined a spotlight on an existing problem for many around the world: the need for increased broadband and connectivity. While 4.9 billion people in the world[1] – 62% of the world's population – currently have access to and use the internet, what happens to the other 34%?

Partnerships are key when it comes to improving internet connectivity to underserved students. Advisory Board Member Norton Gusky (NLG Consulting, LLC, Pennsylvania, United States) has connected with key organizers of the Every1online project in the Pittsburgh, Pennsylvania area. The project began in 2019 as a way to provide Internet connectivity to three underserved communities in the region: Homewood (city of Pittsburgh), Coraopolis (suburban area west of Pittsburgh), and New Kensington (rural/suburban area about 20 miles northeast of Pittsburgh). The project now connects 100 families to the internet thanks to a regional partnership that includes nonprofit Meta Mesh, Carnegie Mellon University, the University of Pittsburgh, two school districts, another nonprofit, and an array of local stakeholders. "This project is a great example of how the Education/Industry partnership Accelerator works," said Gusky. "Every1online brings together community groups, higher education, K-12 education, and state partners."

All Families Connected is another successful partnership story, between the Los Angeles Unified School District and AT&T. The program provides high-speed broadband to L.A. Unified students' homes at no cost and no income requirement. Made possible in part by the FCC's Emergency Connectivity Fund through June 2023, the program allows all students to finish their homework, connect with fellow students, and more. (For context, many districts that once provided students with home internet access are no longer doing so. According to the National Center for Education Statistics, 45% of public schools surveyed said they still offer home internet for students[2], down from 70% in September 2021.)

While districts and providers around the world have made efforts to increase network connectivity for students in both rural and urban areas, there is still more work to be done. CoSN's 2022 Home Connectivity Study Findings[3] revealed:

- Addressing insufficient home internet connectivity must continue to be a priority for educators and policymakers; although students returned to school, there was more internet traffic outside of school hours than there was during school hours.
- There remain ongoing gaps in network performance and Internet speeds at all grade levels for students connecting from outside the school.
- Large disparities persist among student subgroups around home connectivity, particularly by ethnicity and socioeconomically disadvantaged students.

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1 Flynn, Jack (2022, March 4). How Many People Use the Internet? [2022]: 35 Facts About Internet Usage in America and the World. Zippia. https://www.zippia.com/advice/how-many-people-use-the-internet/#:~:text=We%20use%20it%20to%20keep,of%20the%20world's%20total%20population.

2 (2022, August). School Pulse Panel: Technology. Institute of Education Sciences. https://ies.ed.gov/schoolsurvey/spp/.

3 Boronyak, Jennifer (2022, July). CoSN Home Internet Connectivity Findings. Consortium of School Networking. https://public.tableau.com/app/profile/jennifer.boronyak/viz/CoSNHomeInternetConnectivityFindingsJuly2022/DataStory.

TIPS & RECOMMENDATIONS FROM THE ADVISORY BOARD

ALWAYS LOOK FOR WAYS TO CONNECT STUDENTS

"**Support the availability of digital tools and connectivity**" (Mario Franco, Millennium@EDU SUSTAINABLE EDUCATION, Switzerland, Switzerland).

DON'T FORGET URBAN STUDENTS' CONNECTIVITY NEEDS

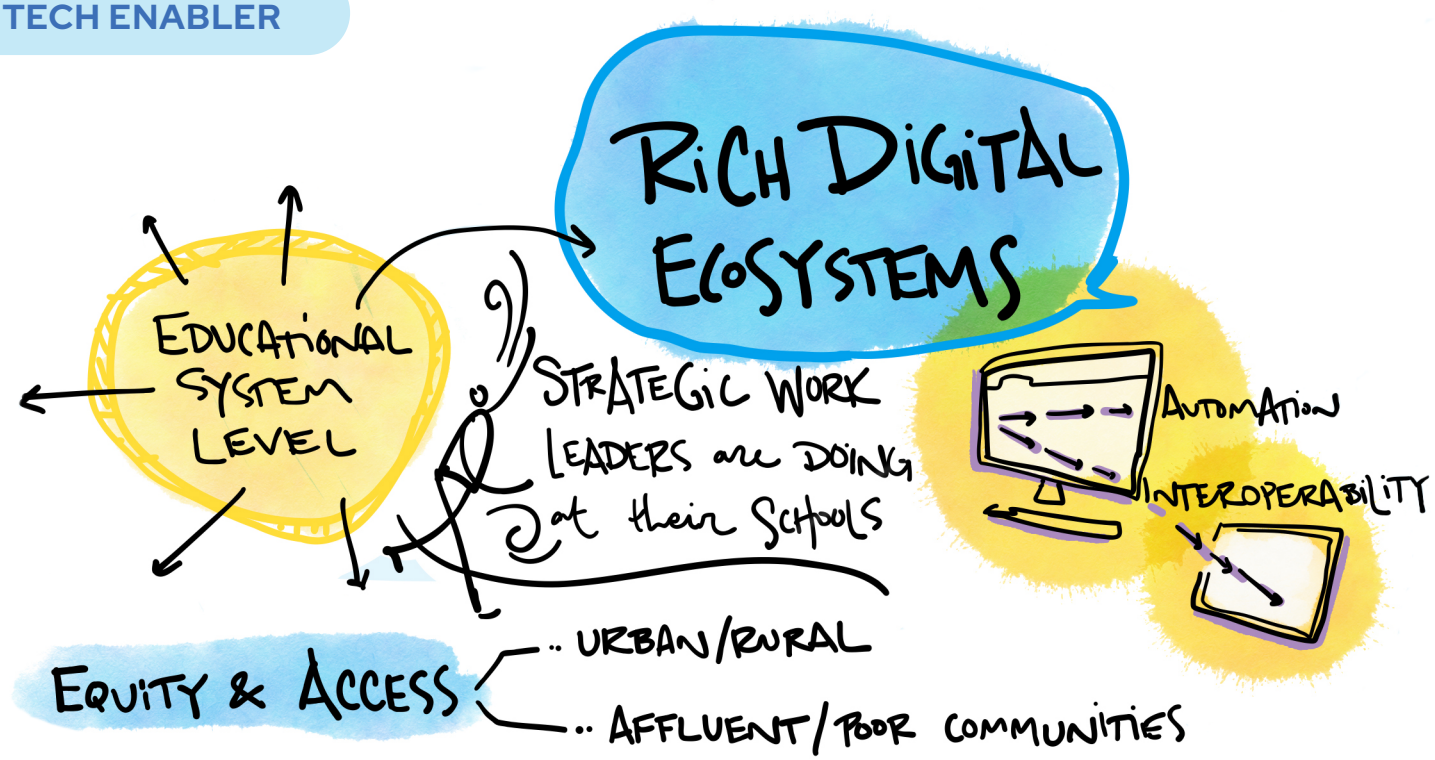
"Connectivity issues in America and around the world create barriers for access to digital learning. Oftentimes **connectivity issues in urban areas are not talked about nearly enough** as connectivity issues in rural areas. They've become really big problems that also create barriers for student learning and also for staff, as well" (Nicole Langford, ISTE, Illinois, United States).

COLLABORATE IN THE COMMUNITY TO SOLVE CONNECTIVITY PROBLEMS

Work with other districts, local city government, and other elected officials to **collectively solve connectivity issues in your area** (Kelly May-Vollmer, Desert Sands Unified School District, California, United States).

GO BEYOND ACCESS TO HELP OTHERS

"Universal access to untethered broadband and connectivity is the gateway to full participation in our modern society. Without this level of access, we are effectively denying medical care, education, employment, and social connections to millions of people, which hurts all of us. Educators and schools need to become hubs of information to help families connect with the FCCs Affordable Connectivity Program and other local opportunities. Our responsibility doesn't end after connecting families to the Internet, **we have a responsibility to help others understand and access the opportunities that come with full untethered broadband and connectivity**" (Stacy Hawthorne, Hawthorne Education, United States).



3 RICH DIGITAL ECOSYSTEM

"Consider the design of digital ecosystems to support the needs of learners and instructors, and endeavor to make technology a quiet and nonintrusive driver of student success" (Richard Platts, Allegheny Intermediate Unit, Pennsylvania, United States).

During the Driving K-12 Innovation Tech Enablers discussion call in Fall 2022, one of the breakout groups encouraged taking a higher level look at the strategic work that technology and school leaders are doing to ensure their ecosystems are well prepared for the future. This discussion led the Advisory Board to rethink the previous topic, Digital Environment, which reflected a less integrated approach. After diving deeply into the innovative components of a healthy digital ecosystem — automation, workflow, interoperability standards and more — the group felt a strong need for the topic of Rich Digital Ecosystem.

As mentioned, interoperability is an important aspect of this topic. "We must seek to build interoperability into not only our rich digital ecosystems, but the human organizational aspects of our school environments, whereby we reduce functional silos and ensure critical collaboration between the talented leaders, educators and technology professionals that we attract and retain to grow our capacity for innovative learning" (Edward McKaveney, Hampton Township School District, Pennsylvania, United States).

Advisory Board Member Beth Havinga (European Edtech Alliance, Berlin, Germany) explained that the Rich Digital Ecosystem approach must be a priority when defining learning and teaching environments, tools and possibilities. This means:

- incorporating different learning locations, styles and needs;
- considering the world as an extension of the classic learning environment;
- making the most of digital opportunities, which can support, elevate and personalise learning and teaching requirements; and
- ensuring both learners and teachers are empowered to understand and implement necessary safety measures as they move through their digital world.

"We need to prepare the ground for learning to take place in a safe and highly motivated environment where the latest technology is at their fingertips. An environment where while they discover, they also learn about being safe, acting with integrity, keeping a balanced life, and clean digital footprint. A learning atmosphere where they collaborate to design and create socially and environmentally sustainable solutions," (Ximena Nunez del Prado, Colegio Franklin D. Roosevelt, The American School of Lima, Peru).
"The sky's the limit at these exciting times of change in education. We are able to be part of the planned transformation of our schools. What an exciting time to be part of education as a service to our communities!"

TIPS & RECOMMENDATIONS FROM THE ADVISORY BOARD

PREPARE STUDENTS FOR FUTURE WORK ENVIRONMENTS

"The pandemic has created a change to the ways in which most professional organizations have structured their work environments, with much more virtual collaboration. It will be important to do two things:

- **Re-organize the education system** so that it is providing students regular opportunities to work in the hybrid ways that are now available and expected in the workforce. Not just as an extension of the classroom, but as an integral part of how tasks are approached and completed.
- **Modify the school ecosystem** so that there are more partnerships among the local school system, other education entities (e.g., universities, other districts, school systems outside of the United States.), NGOs, and private enterprise"

(Larry Molinaro, The National Center on Education and the Economy, Washington, D.C., United States).

CREATE DYNAMIC SYSTEMS TO THRIVE

"Develop digital education 'ecosystems', interdependent and interconnected communities of stakeholders…**Interdependence ensures that what happens in one part of the system affects other parts**. A principle of ecosystems in nature is that they thrive because they are not static, but interconnected, dynamic, and responsive to external change" (Morten Søby, The Norwegian Directorate for Education and Training, Oslo, Norway).

ESTABLISH A PROCESS FOR YOUR DIGITAL ECOSYSTEM

Create a well-defined, cross-functional process for adopting tools into the Digital Ecosystem. Be mindful of strategic abandonment!

TAKING A HOLISTIC VIEW

In addition to selecting the Top Topics for 2023, Advisory Board members looked across topics and offered recommendations that stretch beyond specific areas.

As you continue driving K-12 innovation forward in 2023, remember these wise directives from our Advisory Board, international education and school system leaders.

What do you think is the most important thing for educators and school system leaders to keep in mind in order to drive impactful K-12 innovation in 2023?

"We must learn and recognize that while not all students have adjusted to remote, blended, or hybrid learning environments, many students have done well with these educational opportunities and are **actively seeking to continue with a blended learning model for personalized learning**" (Phil Hintz, Barrington School District 220, Illinois, United States).

"**Always focus on the educational purpose, not on the technology** – and ensure it is deployed in an equitable way for all learners" (Keith Krueger, CoSN, Washington, D.C., United States).

"The most important thing to keep in mind is to **ask questions about the short-, mid-, and long-term consequences of these innovations**, and how they could particularly impact historically marginalized populations, to hopefully be able to anticipate and fix them by design instead of in a reactionary way. Ideally this inquiry would be done in collaboration with these populations and not to them" (Maria Crabtree, KnowledgeWorks, Texas, United States).

"In my experience, **we need to rebuild our sense of resilience** – both within our students and within adults. … If we work together, lean on each other in a positive way, and look forward to what could be instead of how things were, there is nothing we can't accomplish" (Ryan Cox, St. Cloud Area School District ISD742, Minnesota, United States).

"**Innovation is a risk that has to be taken**. It's a responsibility that we all have as school leaders, innovators, teachers. … We must consider our role

in this challenge, directly implementing innovative solutions, or providing the environment so others can do it" (David Vidal, EIM Consultores, Andalucía, Spain).

"**Ensure all students and staff have access to and confidence in the underlying technology requirements** (devices and access) to enable any new innovation initiative to be universally adopted" (Michael Flood, Kajeet, North Carolina, United States).

"The world is changing so quickly, and the pace of change is only going to accelerate in the coming years. **Keep heading toward your goals**, but also realize that plans may have to change on a dime with new and faster developing technologies coming available" (Kris Hagel, Peninsula School District, Washington, United States).

"**For an innovation to be impactful, it does not have to be transformational**. It can be subtle and inconspicuous and still provide positive change in learning" (Vince Humes, Northwest Tri-County Intermediate Unit, Pennsylvania, United States).

"**Students first, always**" (Sarah Margeson, Tippecanoe School Corporation, Indiana, United States).

"**Look to the future conditions we need for sustainability** and set in motion the essential shifts that will be most likely to realise that vision well beyond your lifespan" (Kim Flintoff, Peter Carnley ACS, Australia).

"**Remember how important education is** to solve the big challenges we face" (Claus Gregersen, Herning Gymnasium, Herning, Denmark).

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