



DRIVING K-12 INNOVATION

2022
TECH ENABLERS



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.

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





INTRODUCTION

CoSN's Driving K-12 Innovation initiative convenes an international Advisory Board of more than 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 2022¹.

The Driving K-12 Innovation framework helps us make sense of the state of the world and chart paths forward. The COVID-19 pandemic is one such state of the world, a critical component of the context in which students, educators, and families create learning experiences and re-imagine the future of education.

The Advisory Board discussed many ways in which the current state of the world is impacting Tech Enablers and the way we use them, and some of these examples are included on page 5².



¹ For more information on the Driving K-12 Innovation methodology, see the Driving K-12 Innovation: 2022 Hurdles + Accelerators publication. <https://www.cosn.org/k12innovation>

² For more information on the pandemic as a State of the World, see the Driving K-12 Innovation: 2022 Hurdles + Accelerators publication. <https://www.cosn.org/k12innovation>



DRIVING K-12 INNOVATION

STATE OF THE WORLD (Context)

- Covid-19 Pandemic



HURDLES (Barriers)

- 01/** Scaling Innovation & Inertia of Education Systems
- 02/** Attracting & Retaining Educators and IT Professionals
- 03/** Digital Equity



ACCELERATORS (Mega-trends)

- 01/** Personalization
- 02/** Building the Human Capacity of Leaders
- 03/** Social & Emotional Learning

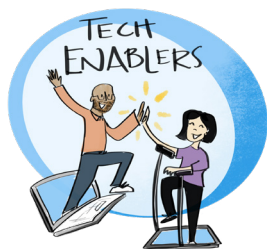


TECH ENABLERS (Tools)

- 01/** Digital Collaboration Environments
- 02/** Untethered Broadband & Connectivity
- 03/** Analytics & Adaptive Technologies

BRIDGES (Themes)

- Embrace this opportunity to change K-12 education for the better



2022 TOP 3 TECH ENABLERS

01/ DIGITAL COLLABORATION ENVIRONMENTS

Digital systems, tools, technologies, connectivity, and pedagogy that enable high levels of collaboration and support online and in-person learning. Digital Collaboration Environments include both synchronous and asynchronous communication tools — platforms that allow multi-user, virtual communications, whether across the room or across the globe. These environments may be tailor-made for education but are often designed for broader use (for example, video call technologies).

02/ 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.

03/ ANALYTICS & ADAPTIVE TECHNOLOGIES

Open digital technologies that collect and use data related to teaching and learning. Analytics refers to the process of analyzing data collected about student learning and the opportunity to leverage data to inform instructional decision making. Adaptive technologies are tools that adapt to the student based on their interactions with the technology. These adaptations could be in the form of suggesting next steps, providing remediation, controlling pacing, or providing feedback based on analysis of the student's performance.

EXPLORING THE 2022 TECH ENABLERS

... BY IMPORTANCE

Top 3 most important Tech Enablers for education systems to leverage in 2022 (74 respondents):

45% Digital Collaboration Environments

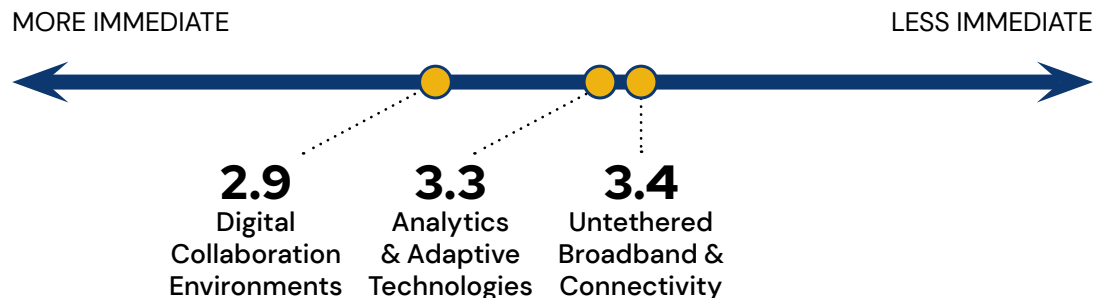
39% Untethered Broadband & Connectivity

36% Analytics & Adaptive Technologies



... 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; 74 respondents). From most immediate to least immediate adoption:





DIGITAL COLLABORATION ENVIRONMENTS

↑
A graphic facilitation image created live during one of the Advisory Board's synchronous discussion calls.

"By accelerating the implementation and accessibility of mobile devices, network access, hybrid learning tools, and digital collaboration environments, the state of the world [including the pandemic] enabled rapid change in technology use in K-12" (Michelle Watt, Scottsdale Unified School District, Arizona, U.S.).

Digital Collaboration Environments have now topped our Advisory Board's top Tech Enablers list for three years in a row. This long-standing run as a top Tech Enabler reflects how these environments flexibly support teaching and learning and their power to enable agility as schools shift between in-class, remote, and hybrid learning models.

Before the pandemic, there was a long period of growth of alternative learning models that relied on digital platforms. This allowed the use of Digital Collaboration Environments to balloon during the pandemic, as education systems around the globe scrambled to rapidly transition to hybrid and/or remote learning. Depending on where schools were on their adoption continuum, the state of the world propelled most schools forward by a year or two (or more!) on that adoption continuum in 2020. As education continues to adapt as the state of the world shifts, it is important for educators and students to maintain the benefits of using these tools when shifting to an in-person classroom setting.

But in order to unleash the full power of these environments, we must focus on collaboration and optimize the experience in the environments. For example, some educators are expanding collaborative scenario-based learning and speculative storytelling using the built-in whiteboard features. Effective collaboration allows educators to facilitate feedback loops, increase engagement, leverage peer interdependence to increase performance, build social skills, and promote higher-level thinking.

These powerful Digital Collaboration Environments will grow evermore essential as the state of the world grows evermore unpredictable.

"When moving to a hybrid or online model, we traveled back in time and used the traditional methods in our online environments, neglecting the methodological innovations. Let's think ahead and be prepared for any future scenario, not just considering the actual school, but what we think the future of learning will be."

—David Vidal, Aonia Educación, Seville, Spain



TIPS & RECOMMENDATIONS FROM THE ADVISORY BOARD

THINK FORWARD FOR YOUR STUDENTS' FUTURE

"Lean into the future by adopting mindsets and collaborative practices that will build the future-ready learning environments our students need to thrive and face their world with future-facing ideas, knowledge and skills" (Mary Lang, Los Angeles County Office of Education, California, U.S.).

IT'S NOT ABOUT "IN-PERSON" VS. "ONLINE" – IT'S ABOUT LEARNING

"Create experiences for students...go beyond the text/workbook/small group learning" (Michael Lambert, True North School, Hanoi, Vietnam).

STAY FOCUSED ON IMPACTFUL USES OF TECHNOLOGY

Advisory Board Member Kate Crawford (Fayette County Public Schools, Georgia, U.S.) is concerned about a loss of innovative instructional gains made by teachers during the shift to virtual, which could result from criticism that technology is now being overused. She recommends avoiding "throwing the baby out with the bathwater" and **taking a closer look at how the tools and resources are being utilized.**

SHIFT MINDSET FROM "GO LIVE" TO "GO ANYWHERE"

Partnering more closely with your IT team will allow you to move deeply into the full user adoption and optimization journey.

UNTETHERED BROADBAND & CONNECTIVITY



A graphic facilitation image created live during one of the Advisory Board's synchronous discussion calls.



"While, in the U.S. and some other nations, the pandemic threw many students into remote learning without full orientations for using devices, apps, and learning management systems (LMS), it did accelerate massively the recognition of the utility of mobile learning — and did so much more quickly than parents were able or ready to adjust to in their homes. Though it wasn't a very well designed experiment, it has accelerated for every district an opportunity for a long and thoughtful discussion — and gleaning the best opportunities for untethered and autonomous learning."

—Gordon Dahlby, Education Technology Leadership & Policy Consulting, Iowa, U.S.

Students' needs for untethered broadband and connectivity are great; according to CoSN's Student Home Connectivity Study³, more than 85 percent of network traffic in remote learning in the United States is used for video, which requires sufficient upload and download speeds, and 92 percent of students used Wi-Fi to participate in online learning activities outside of the home.

Not only has COVID-19 accelerated the need and implementation of mobile and remote learning, it also revealed how weak the connectivity infrastructure is in homes, schools, and communities around the world. "Connectivity is still a major, major issue. For example, at the first computer science high school in Ohio, which is an incredible school, nearly all of the students don't have internet access at home or devices at home. Meaning, at a computer science school, they can't do any computer science homework; everything must happen in class. That's still a major obstacle that we have to face," said Jeremy Shorr (Jeremy Shorr Educational Consulting, Ohio, U.S.). "Connectivity improved during the pandemic, but we also had kids sitting in parking lots because that's where the Wi-Fi was instead of their homes, which is not a good learning environment."

³ CoSN. (2021). *Student Home Connectivity Study*. https://emma-assets.s3.amazonaws.com/paqab/37cf06d0de533f59eb780f4ec065d766/Home_Connectivity_Study_Report_5.3.21_FINAL.pdf

There's no doubt that broadband access and increased connectivity has endless benefits to students and their educators, including the ability to access information and resources outside of the four walls of the classroom — which is why world leaders are taking action to make these benefits a reality for all. The United Nations' ninth Sustainable Development Goal (SDG) calls on states to "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation."⁴ In addition, the U.S. government passed the Infrastructure Investment and Jobs Act. The Broadband Equity, Access, and Development Program is included in the Act, in which the National Telecommunications and Information Administration will allocate \$42.5 billion to fund a last-mile broadband development grant program

TIPS & RECOMMENDATIONS FROM THE ADVISORY BOARD

CONTINUE TO PRIORITIZE DIGITAL EQUITY

The pandemic shined the spotlight on the digital divide and **the need for internet accessibility as a basic right** — and a foundational component of Digital Equity.⁵

LEVERAGE OPPORTUNITIES CATALYZED BY THE PANDEMIC

🌱 **Utilize funding** from connectivity and pandemic relief programs in your country. In the United States, leverage funding from the Emergency Connectivity Fund and the Elementary & Secondary School Emergency Relief Fund (ESSER Fund) to solve remote learning challenges around devices and connectivity.⁶

4 Blazhevskaya, V. (2018, April 22). *Sustainable Development Goal 9: Investing in ICT access and quality education to promote lasting peace*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/blog/2017/06/sustainable-development-goal-9-investing-in-ict-access-and-quality-education-to-promote-lasting-peace/>

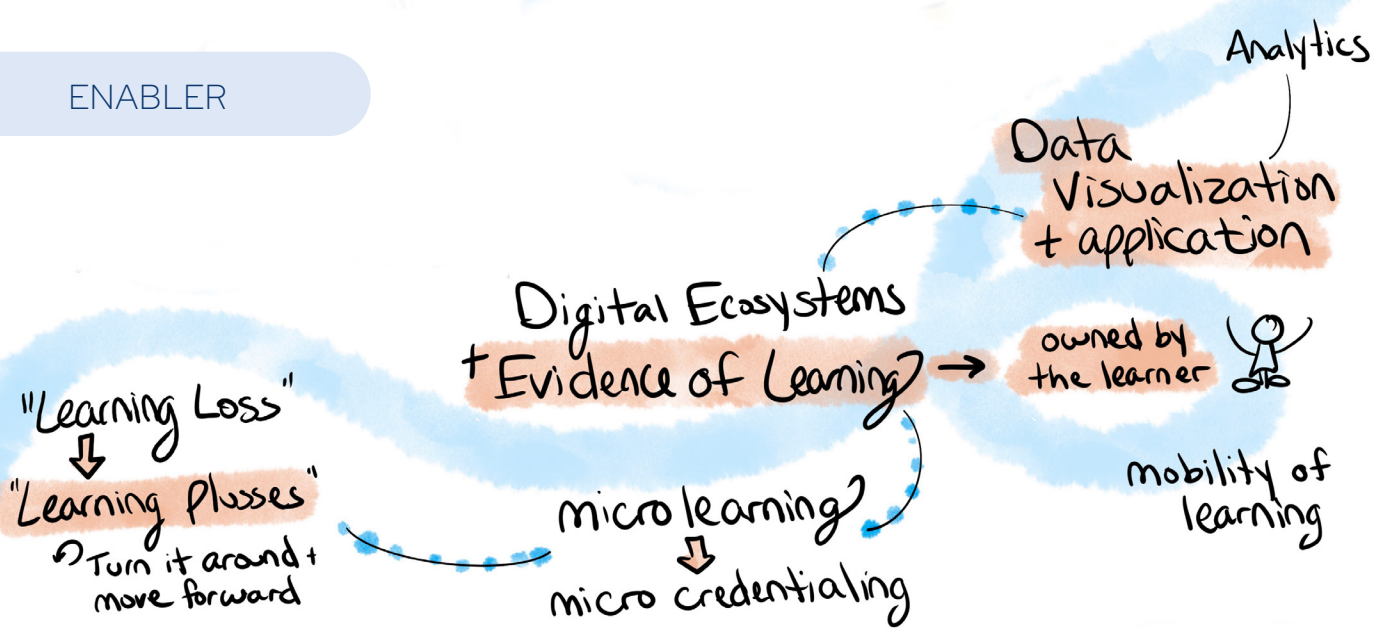
5 For more on Digital Equity, see *Driving K-12 Innovation: 2022 Hurdles & Accelerators*.

6 CoSN. (2021). *Student Home Connectivity Study*. https://emma-assets.s3.amazonaws.com/paqab/37cf06d0de533f59eb780f4ec065d766/Home_Connectivity_Study_Report_5.3.21_FINAL.pdf



ADVOCATE FOR INTERNET ACCESS BEYOND SCHOOL

"Students and families need access to learning in and beyond school. ... Learning is no longer constrained to the school yard" (Philip Neufeld, Fresno Unified School District, California, U.S.). "Students need connectivity across their daily journey: Wi-Fi in classrooms, buses, community centers, homes and cellular connectivity wherever possible." The promise of ubiquitous broadband connectivity lies enabling learning anytime, anywhere, for all.



A graphic facilitation image created live during one of the Advisory Board's synchronous discussion calls.

ANALYTICS & ADAPTIVE TECHNOLOGIES

If educators didn't already know that traditional schooling needed to shift, the COVID-19 pandemic made it clear that education systems as they knew them were in need of repair. The pandemic brought the inequity long baked into these systems into full view. Those inequities began to widen as the pandemic wore on, and educators began to ask: "Do we want to return 'back to normal'?"

While viable, going back to "normal" teaching methods was not an equitable or optimal solution. Enter Adaptive Technologies, tools that adapt to the student based on their interactions with the technology; adaptations that may include suggesting next steps, providing remediation or feedback, and more. These technologies hold promise as one of the tool sets that may help us realize learning in new, more robust and equitable ways.

The use of technologies that collect and use data have increased dramatically during the COVID-19 pandemic (nearly 93% of households with school-age children reported some form of distance learning during the pandemic⁷), and they have enabled educators to personalize⁸ learning more than ever before.

7 U.S. Census Bureau. (2021, October 8). *Nearly 93% of Households With School-Age Children Report Some Form of Distance Learning During COVID-19*. Census.Gov. <https://www.census.gov/library/stories/2020/08/schooling-during-the-covid-19-pandemic.html>

8 For a discussion of Personalization, a top Accelerator for 2022, see *Driving K-12 Innovation: 2022 Hurdles & Accelerators*.

There is great promise with data-gathering technologies — but it's also challenging, and imperative, to be ethical in the way that we use them. "There is a growing resistance to the collection and use of student data because of examples of manipulation shown possible through social media and advertising" (Jason Zagami, Griffith University, Gold Coast, Australia). "Being able to psychologically manipulate students to learn arithmetic or behave 'better' is one thing, doing so to manipulate them to believe a particular religion, social or indeed political agenda is a step society is unlikely to wish to see occur." For example, European Union's General Data Protection Regulation (GDPR⁹) constrains how schools collect and use student data with protections on the right to be informed, the right of access, the right to rectification, the right to erasure, the right to restrict processing, the right to data portability, the right to object and also rights around automated decision making and profiling. Zagami adds that this will have a significant impact on schools using data-driven systems for adaptive personalisation and analytics.

As IT professionals and educators, we need to consider how this data can personalize teaching methods to give the students a learning experience tailored to their needs. For example, Advisory Board member Norton Guskus (NLG Consulting, Pennsylvania, U.S.) mentioned

9 Complete guide to GDPR compliance. (n.d.). GDPR.EU. <https://gdpr.eu/>

that we must consider immersive learning opportunities with special populations, like those with social or emotional challenges, to determine how to make them feel more at ease when learning. Advisory Board member Ed McKaveney emphasized that the data gained about students isn't just for making high-level decisions. "What kinds of data provide value to learning? It's not just high stakes assessment data or the fact that they [students] click into a tool. How are you trying to use that data or inform instruction for learning?" (Ed McKaveney, Ed.D., Hampton Township School District, AP, U.S.)

When diving into the data, it's also important to proceed with caution. "In order to make successful use of Learning Analytics, and to be able to apply them to generating pathways for learners, we need great trust in our data sources, and the checks and balances that ensure the outcomes are not only meaningful but ethical and inclusive" (Kim Flintoff, Peter Carnley Anglican Community School, Western Australia, Australia).

Continuing to use these effective tools to supplement teachers' instruction can prove to be beneficial for their learners. Using adaptive learning allows students to progress faster, provide real-time instruction adjustments, gain better understanding of the subject matter, and more.¹⁰

SUGGESTED TRAITS OF ADAPTIVE LEARNING & INSIGHTS

When speaking on behalf of his group on a Tech Enablers discussion call, Philip Neufeld (Fresno Unified School District, California, U.S.) explained that adaptive technologies need to:

- Be responsive, and not just driven by some hypothetical correlation.
- Be aligned to grade-level abilities with relevant content, support families, and third parties like our mentors and tutors
- Meet people in their own language, around their special needs and locational context; and part of that is about building and helping people understand that what they do, how they do it well, give them the right support.
- Be focused on the learners and what they need to be successful in their future.

¹⁰ *Benefits of Adaptive Learning | Designing Digitally Inc.* (2020, April 16). Designing Digitally. <https://www.designingdigitally.com/blog/2020/04/benefits-adaptive-learning>

TIPS & RECOMMENDATIONS FROM THE ADVISORY BOARD

PROTECT STUDENTS' RIGHTS

Ensure that educational systems protect students' rights, both in general and as they relate to data.¹¹

COLLABORATE TO LEVERAGE DATA

To **make use data to inform instruction and create meaningful analytics**, we need to:

- collaborate with ed/tech solution providers to improve purpose-designed technologies that can integrate data from a variety of systems;
- invest in the organizational capacity (IT professionals, professional development, time for strategic analysis) to ingest and act upon the data;
- and leverage insights from new data signals combined with traditional measures to explore what works where, for whom, and when.

KNIT YOUR DATA FABRIC NOW

Because data is the fuel of all Analytics and Adaptive Technologies, **getting data practices right can improve equity across your schools on many levels**. Getting started with data analytics processing doesn't need to be cumbersome. Start with establishing a data equity framework to guide you in developing a data culture that is ethical and equitable.

¹¹ For more information, see GDPR example from Advisory Board member Jason Zagami in this section.

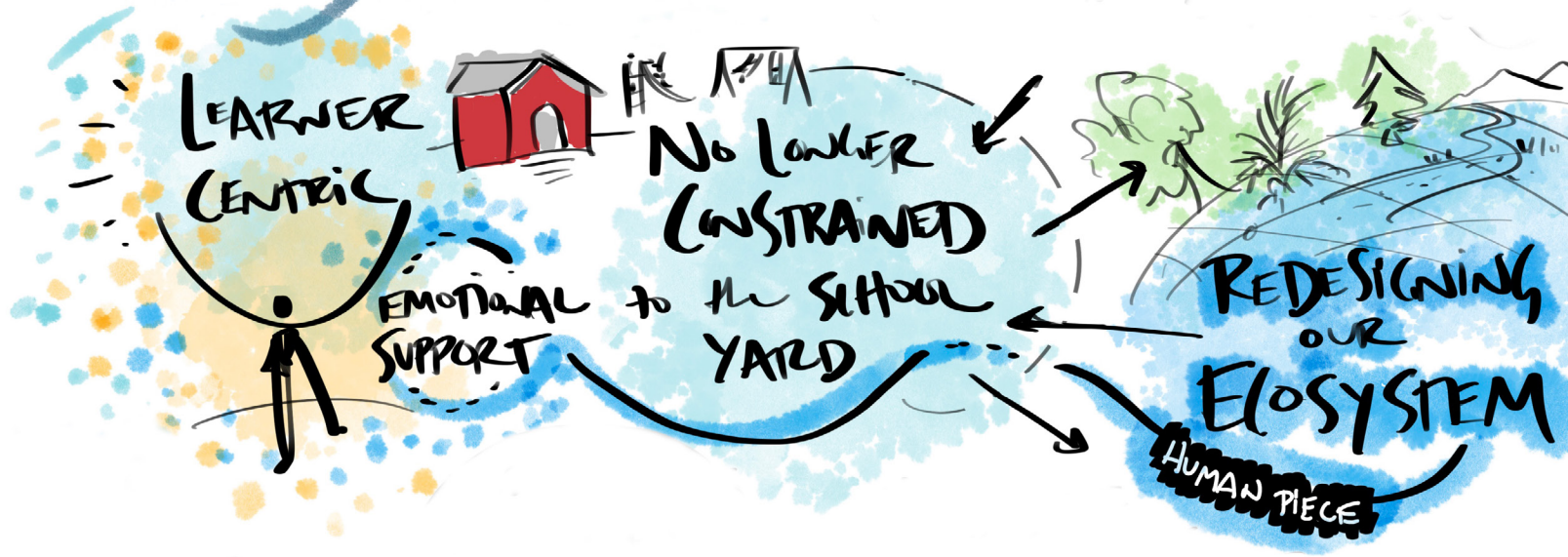
TAKING A HOLISTIC VIEW

In addition to selecting the Top Topics for 2022, Advisory Board members looked across topics and offered recommendations that spanned, or went beyond, the specific topics selected. As you continue driving K-12 innovation forward in 2022, keep these words of wisdom in mind from top educators and school system leaders from around the globe.

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 2022?

☀️ "This can be an inflection moment for innovation. The pandemic and remote learning opened the window for looking at new ways to do learning. But, there is also a very strong desire by teachers, parents and students to "return to normal". How can we take the lessons learned and reimagine learning is the key question. Let's make sure the window on innovation doesn't close as (hopefully) the pandemic fades" (Keith Krueger, CoSN, Washington, D.C., U.S.).

☀️ "Change is messy and takes time. Build on the little successes and celebrate often. Be mindful of who the early adopters are and embrace their energy. They will bring others with them in time" (Beverly Knox-Pipes, Ed.D., Nova Southeastern University, Michigan, U.S.).



A graphic facilitation image created live during one of the Advisory Board's synchronous discussion calls.

☀️ "The current state of the world has forced many of us to scaffold rapid ideation and implementation on legacy foundations. This rapid pace has led to our capacity for innovation being stretched... Identifying and contextualizing the Hurdles, Accelerators, and Tech Enablers allows districts to view some of the work that occurred during the pandemic as part of a more significant need to continue innovating and transforming to enable our learners and the people that support them" (Teshon Christie, Kent School District, Washington, U.S.).

☀️ "I believe we cannot miss the point that change is inevitable. We must all be prepared to live and work in a constant state of change. It is imperative that we are not put in a position to be unprepared for anything and everything. Spring of 2020 drove every school and school district worldwide to innovate and create new leading, teaching and learning environments. So, I believe flexibility and the willingness to change and innovate rapidly is a must for all educational leaders and institutions" (Sheryl Abshire, Ph.D., Retired CTO, Calcasieu Parish School Board, Texas, U.S.).

☀️ "Just as technology trends are constantly changing, so are the results of learning science research. You are in the classroom working with students every day. Take a close look, observe your students, when are they most engaged? What technology tools are you and your students using that enhance their ability to learn? What excites your students? Have you given yourself and your students the chance to experiment with new technologies? Change is risky, but can move us forward in positive ways" (Lisa Gustinelli, St. Vincent Ferrer School, Florida, U.S.).

☀️ "The pandemic has accelerated some digital transformations. It has also exposed other areas of opportunities to make even greater changes. Right now, the pandemic is causing severe stress on the system and we need to find opportunities to use some of these enablers and accelerators to reduce the stress and strain on the system" (Kris Hagel, Peninsula School District, Washington, U.S.).

☀️ "The pandemic has created a unique moment in the history of education, so take time to reflect on the heroic efforts of teachers and students, being sure to capture emerging innovations that may provide ongoing benefits now and in the future. It was (and still is) crazy and stressful — but the "stress-test" has revealed important shortcomings and exciting new opportunities to better serve all our students" (Jim Vanides, Vanides2.com, California, U.S.).

☀️ "Through the use of the identified Accelerators and Tech Enablers, we can make a difference in how our students learn, how teachers teach, and how leaders lead. Collectively, we can build a better, progressive education system that allows for personalization, differentiation, digital integration, blended learning, creativity, and innovation to best prepare students for their future. In this way, we will build the pathway for the success of all students in our own communities and in the world" (Julene Reed, Ed.D., Lamar University and Arizona State University, Tennessee, U.S.).

2. $2^{-3} = \frac{1}{2^3}$ T/F

3. $\sqrt{64} =$

4. $3[8 + (4 + 2)] =$

5. $\frac{2^5}{2^3}$

6. $3(4^2 + 1) =$



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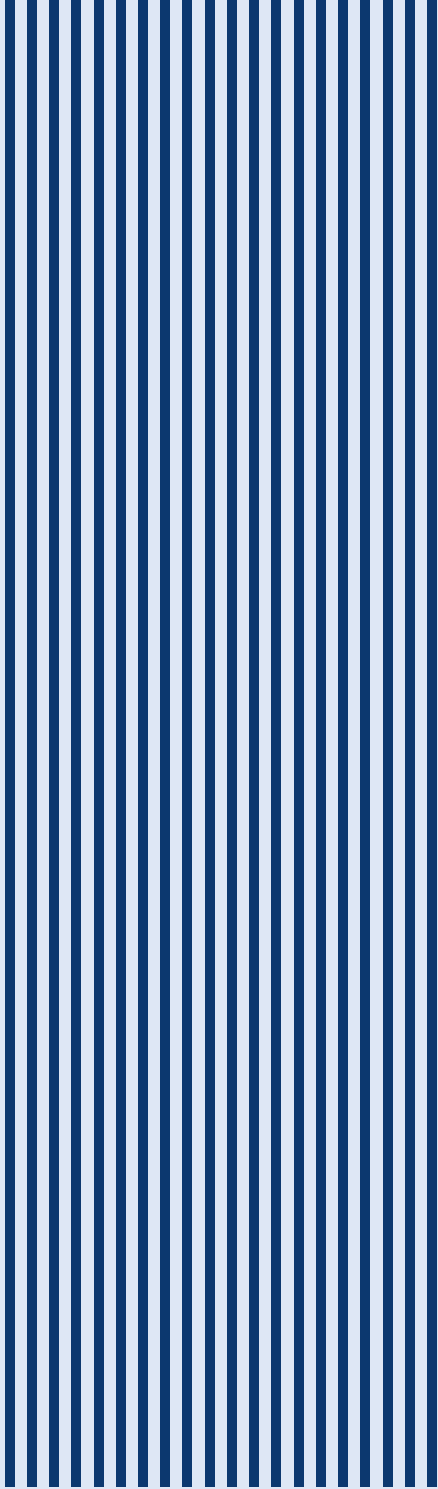
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