

HORIZON REPORT

DIGITAL TOOLKIT

2016 K-12 Edition



COSN
LEADING EDUCATION INNOVATION



ABOUT THE HORIZON REPORT DIGITAL TOOLKIT: 2016 K–12 EDITION

Each year, the New Media Consortium (NMC) and the Consortium for School Networking (CoSN) jointly create the [NMC/CoSN Horizon Report: K–12 Edition](#). The Report addresses new and emerging technologies for learning and helps education technology leaders, innovators and practitioners develop future-focused digital strategies and learning approaches reflecting the needs and skills of the world beyond the classroom.

The report is produced with the insights of an international panel of experts. Each year, nearly one million educators, policymakers, parents, students and community leaders download the report to learn more about the trends and challenges in planning for their use of technology now and over the next five years.

The report itself, and this Digital Toolkit, are made possible by Share Fair Nation at go.nmc.org/2016-k12. The Digital Toolkit provides conversation starters, event ideas, visual resources and more to use as you engage colleagues and your community in essential planning, vision and strategy discussions.

Please think of this resource as a conversation launching pad—a way to start planning to harness the power of emerging technologies for your students, teachers, administrators and communities.

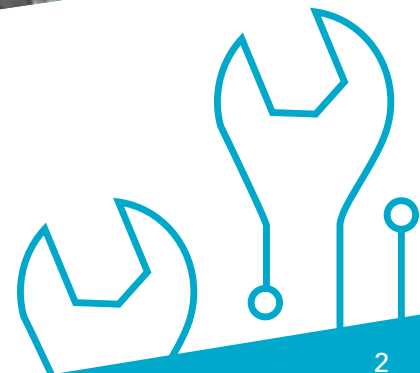


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GETTING STARTED

FIRST THINGS FIRST

The *NMC/CoSN Horizon Report* contains compelling coverage of the trends and technologies that will drive educational change over the next several years. A panel of 55 experts identified these issues, opportunities and challenges. The report is organized to help stakeholders think about the years ahead strategically and imaginatively.

This toolkit gives you ideas and resources to use in engaging your community in thoughtful and informed discussions about what's ahead. It's organized to help you plan events, outreach and other engagement programs so your stakeholders can share their vision and voice in the policies and programs your school district and other organizations.



Share the *NMC/CoSN Horizon Report* with Your Team.
Download it at go.nmc.org/2016-k12

PARTICIPATION MAKES A DIFFERENCE

For 15 years, the *NMC Horizon Report* has charted the five-year horizon for the impact of emerging technologies in school communities across the globe. The report is regarded as the world's longest-running exploration of emerging technology trends and uptake in education. By sharing the findings with school administrators, faculty, families, and the members of your community, you give everyone the opportunity to learn more about your objectives, challenges, and needs in your pursuit of quality teaching and learning for every K–12 learner.

Dialogue, shared exploration and the critical steps of aligning trends to specific community needs and priorities will help every educational leader move forward with more confidence and clarity. Equally important, when stakeholders share in the key work of building technology vision and commitment for their community's schools, they become invested in supporting innovation and excellence.

We encourage you and your team to take the ideas introduced here and adapt them for your specific needs—and we look forward to hearing about your successes.

THE NMC/COSN HORIZON REPORT:

2016 K–12 Edition at a Glance

THE REPORT IS ORGANIZED IN THREE MAJOR SECTIONS
AND IN EACH SECTION THERE ARE SIX SETS OF KEY FINDINGS:

Key Trends Accelerating Technology Adoption in K–12 Education

- Long-Term Trends for Five or More Years
 - Redesigning Learning Spaces
 - Rethinking How Schools Work
- Mid-Term Trends for Three to Five Years
 - Collaborative Learning
 - Deeper Learning Approaches
- Short Term Trends for the Next One to Two Years
 - Coding as a Literacy
 - Students as Creators

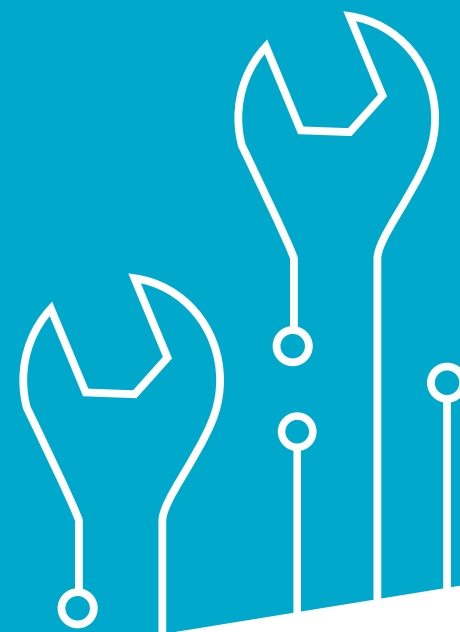
Significant Challenges Impeding Technology Adoption in K–12 Education

- Solvable Challenges
 - Authentic Learning Experiences
 - Rethinking the Roles of Teachers
- Difficult Challenges
 - Advancing Digital Equity
 - Scaling Teaching Innovations
- Wicked Challenges
 - Achievement Gap
 - Personalizing Learning

Important Developments in Educational Technology for K–12 Education

- Time-to-Adoption of One Year or Less
 - Makerspaces
 - Online Learning
- Time-to-Adoption of Two to Three Years
 - Robotics
 - Virtual Reality
- Time-to-Adoption of Four to Five Years
 - Artificial Intelligence
 - Wearable Technology

In this toolkit, you'll find ideas for organizing events and outreach that will stimulate discussions around these topics. You'll also find tools and resources to help you make these conversations productive and memorable for the participants who join and contribute to the dialogue.



LET'S GET THE CONVERSATION STARTED...

EVENT FORMATS

Here are several options for events and gatherings to consider:

COMMUNITY TOWN HALL

Recruit a panel of experts from your district and community supporters to discuss each of the three major sections of the report. Select a moderator to ask the panelists questions and to field questions from the audience.

- The moderator can summarize each trend, challenge and development and then ask panelists for their views about the specifics, outlined in the report.
- Panelists can provide their opinions and views about how they see your community's schools addressing these issues and opportunities.
- You can amplify the impacts of an event like this by live streaming it or videotaping it to share with your community members on a video channel such as YouTube or Vimeo.
- You can ask attendees to attend additional meetings or participate in future "working groups" to review and comment on your plans going forward.
- A report summary can be provided to attendees.

COMMUNITY WORKSHOP

In this event format, you can invite faculty, staff, parents, community leaders and policy makers, representatives of the business community or other key stakeholders for a half- or full-day workshop. You can provide an overview of the Horizon Report as the opening session and then organize smaller group working sessions to discuss specific sections of the report, with the goal of developing their recommendations for next steps.

- Appoint a moderator and scribe for each small group session to record opinions and then recommendations.
- Leave time in the event agenda to hear "report outs" from each small group.
- Provide "next steps" and opportunities for on-going dialog and discussion following the workshop session.

**Helpful Resources
and Links about
Each Discussion
Topic Are Available
in the *NMC/CoSN
Horizon Report*.
Download it for
your colleagues
and collaborators at
go.nmc.org/2016-k12**



LET'S GET THE CONVERSATION STARTED...

EVENT FORMATS

FOCUS GROUP/ADVISORY SESSIONS

Over a four to six week timeframe, you can organize a series of three group sessions (one for each of the report's three main topic areas: Key Trends, Significant Challenges and Important Developments). Typically, these sessions run for two hours or less and the conversation focuses in depth on the ideas presented in the report.

- Choose a moderator who is knowledgeable and neutral to moderate the discussions.
- Record the sessions on audio or video and make these recordings available to your larger community.
- Summarize the attendees input and use the summaries as part of your subsequent planning discussions.

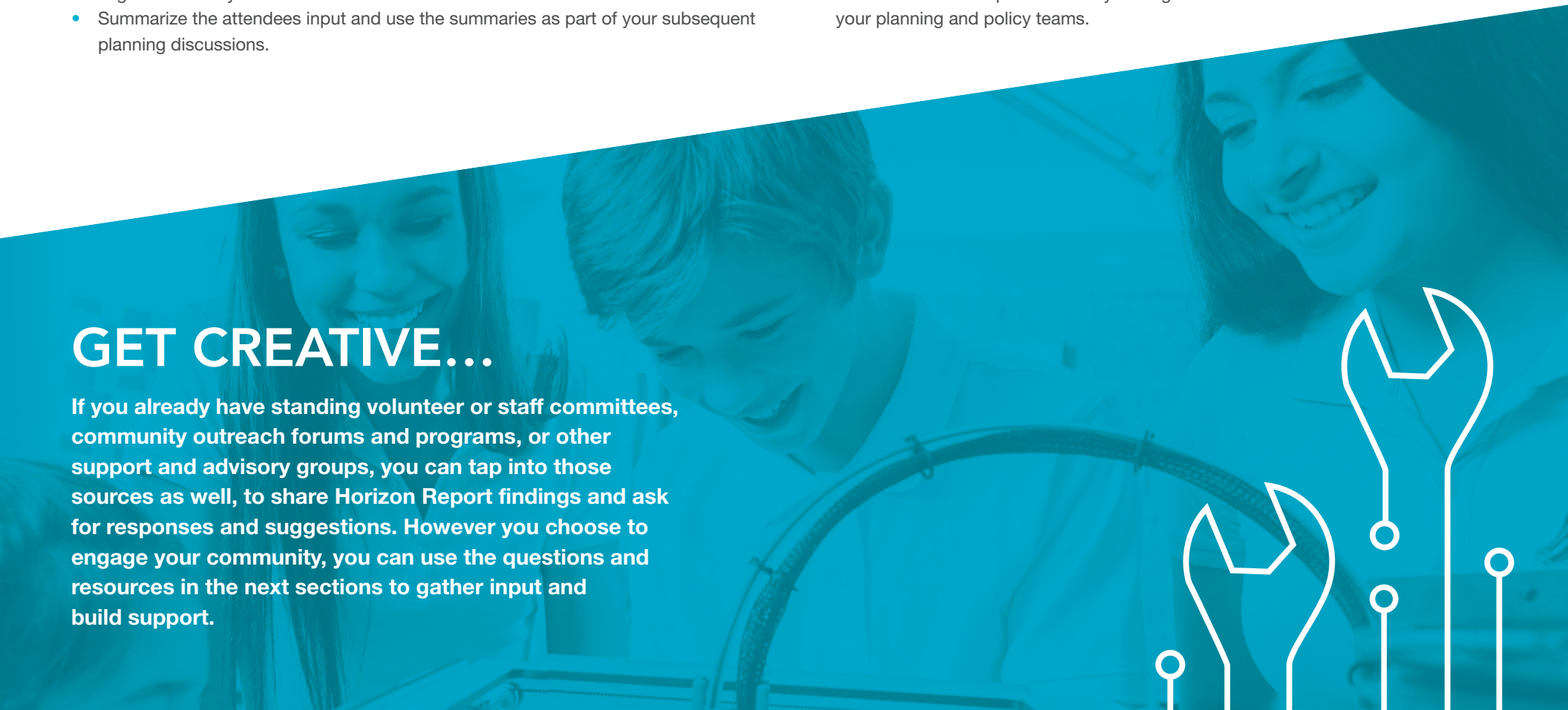
VIRTUAL DISCUSSIONS

You can convene discussions using telepresence solutions such as Google Hangouts, GoToMeeting, WebEx or your own internal distance/collaborative platform. You can host focus groups, weekly discussion working groups or other panel discussions. You can also consider hosting interactive discussions via social media or secure communications channels such as Slack or Basecamp.

- Post key questions about report findings and ask for group members to respond and discuss the findings.
- Summarize discuss points and key findings to share with your planning and policy teams.

GET CREATIVE...

If you already have standing volunteer or staff committees, community outreach forums and programs, or other support and advisory groups, you can tap into those sources as well, to share Horizon Report findings and ask for responses and suggestions. However you choose to engage your community, you can use the questions and resources in the next sections to gather input and build support.



A photograph of four people (three men and one woman) sitting around a table, looking at papers and smiling, suggesting a collaborative meeting or discussion. The image is overlaid with a blue tint.

DISCUSSION QUESTIONS

Whether you're hosting a large town hall meeting or planning focus group advisory sessions, here are questions and statements you can use and adapt in getting the conversation started around each of the *NMC/CoSN Horizon Report: 2016 K-12 Edition* topics.



DISCUSSION QUESTIONS

Topic One: Key Trends Accelerating Technology Adoption in K–12 Education

Long-Term Trends for Five or More Years

REDESIGNING LEARNING SPACES

Many thought leaders believe that new forms of teaching and learning require new kinds of learning spaces. Already schools are reconfiguring classrooms to support new learning models, such as flipped classrooms and arranging space to accommodate more active learning. Learning environments are increasingly designed to support project-based learning with attention to mobility, flexibility and multiple device usage. Wireless bandwidth is being upgraded to create “smart rooms” that support web conferencing and remote, collaborative communication. Large displays and screens are being installed to support collaboration on digital projects and informal presentations. K–12 education is moving from traditional teacher-centered settings to more hands-on learning environments. Classroom may start to resemble real-world work and social environments that facilitate organic interactions and cross-disciplinary problem solving.

DISCUSSION QUESTIONS

1. Will our current school sites and facilities support this kind of transformation? If not, how can we make changes in support of this transformation?
2. Does this kind of flexible, student-centric classroom design align with our goals for energy-efficiency and cost-effective building maintenance?
3. Are there simple steps we can take now to support upgrades to our learning environments, system-wide?
4. Research in the U.S. and around the world shows that active learning classrooms, and classrooms that have simple adjustments to lighting, temperature and decoration can have measurable impacts on academic performance. How can we leverage this data in our future planning?
5. What expertise do we have in our community that we can tap to help us re-envision our learning environments?
6. What are the first planning steps we could or should take to consider redesigning our learning spaces?
7. When you consider our many priorities, from equity to improving graduation rates, where do you think re-designing our learning environments should rank?
8. In preparing students for college and career, is it important for the learning environment to resemble the work and social environment students will encounter?

DISCUSSION QUESTIONS

Topic One: Key Trends Accelerating Technology Adoption in K–12 Education

Long-Term Trends for Five or More Years

RETHINKING HOW SCHOOLS WORK

In the drive to reform and improve teaching and learning, there is new emphasis on reinventing the traditional classroom paradigm and rearranging the entire formal learning experience. Project- and challenge-based learning models are calling for structures that enable students to move from one learning activity to another more organically, removing the limitations of disparate disciplines. These approaches are multidisciplinary and they've helped to popularize the creative application of technology. They've also fostered innovative designs of institutional models that link each class and subject matter to one another. As learning becomes more fluid and student-centered, some education leaders believe that schedules should be more flexible so students have opportunities for authentic learning and independent study. This could require shifts in the business models of schools. Public, private and charter schools may no longer be the sole options.

DISCUSSION QUESTIONS

1. Is our community ready for new education models, like open, virtual or project-based learning schools?
2. Rather than credit hours, are competency and mastery better measures of student achievement in your community?
3. What are the advantages and disadvantages of project and challenge-based learning?
4. How can we evaluate the benefits of re-thinking how our schools work?
5. What kinds of internal and external resources and supports do we need to begin evaluating options and approaches?
6. What are the barriers to beginning a process to evaluate and plan this kind of transformation?
7. How do we engage the larger community in planning this kind of transformation?
8. What are the first steps we can/should take to address this trend?

DISCUSSION QUESTIONS

Topic One: Key Trends Accelerating Technology Adoption in K–12 Education

Mid-Term Trends for Three to Five Years

INCREASING COLLABORATIVE LEARNING

Collaborative learning is a model in which students or teachers work together in peer-to-peer or group activities. It's based on the idea that learning is a social construct. Typically, collaborative learning involves activities focused around four principles: placing the learner at the center, emphasizing interaction and doing, working in groups and developing solutions to real-world problems. Collaborative learning is proving successful in improving student engagement, especially for students from economically challenged families. Educators also benefit from collaboration, as they participate in professional learning and interdisciplinary teaching opportunities. Enhancing this trend is an increasing focus on online global collaboration using digital tools to connect students and teachers with others around the world to support curricular objectives and intercultural awareness and understanding.

DISCUSSION QUESTIONS

1. Is our community ready for new education models, like collaborative learning?
2. What kinds of changes do you envision in curriculum and instructional practices to integrate collaborative learning opportunities for both teachers and students?
3. Do you see potential downsides to collaborative learning?
4. Do collaborative learning models prepare students in a better way for 21st century careers?
5. What kinds of new or additional facilities, technologies, or other supports would we need to introduce collaborative learning approaches successfully?
6. Should we evaluate student outcomes differently when using collaborative learning models?
7. What is the role of our larger community in collaborative learning models?
8. What are the first steps we can/should take to address this trend?

DISCUSSION QUESTIONS

Topic One: Key Trends Accelerating Technology Adoption in K–12 Education

Mid-Term Trends for Three to Five Years

DEEPER LEARNING APPROACHES

The William and Flora Hewlett Foundation defined deeper learning approaches as the mastery of content that engages students in critical thinking, problem-solving, collaboration and self-directed learning. To maintain motivation, students need to make clear, real-world connections, and to understand how their new knowledge and skills will impact and help them. Project-based learning, challenge-based learning, inquiry-based learning and similar methods foster more active learn experiences, inside and beyond the classroom. Technology enables deeper learning approaches and educators are leveraging these tools to connect curriculum to real life applications. These approaches are far more student-centered and they empower learners to take control of how they engage with a subject, even brainstorming solutions to pressing global problems and beginning to implement them in their communities.

DISCUSSION QUESTIONS

1. Will a move to “deeper learning” have major impacts on our curriculum, our instructional practices, and other components of instruction, such as professional development and the purchase of resources?
2. Should a “deeper learning” approach be offered only for students above grade 5 or 6?
3. What are the barriers to implementing deeper learning in our schools?
4. Will testing and assessment need to change if we implement a “deeper learning” model for students? How and what would those changes be?
5. Does “deeper learning” align with our district’s core mission and vision?
6. Does “deeper learning” depend on providing students and teachers with different kinds of learning facilities, environments, materials and technologies? Can we afford this going forward?
7. How do we introduce this trend and opportunity to key stakeholders? What kinds of evidence, plans or other supports would we need?
8. What are the first steps we can/should take to address this trend?

DISCUSSION QUESTIONS

Topic One: Key Trends Accelerating Technology Adoption in K–12 Education

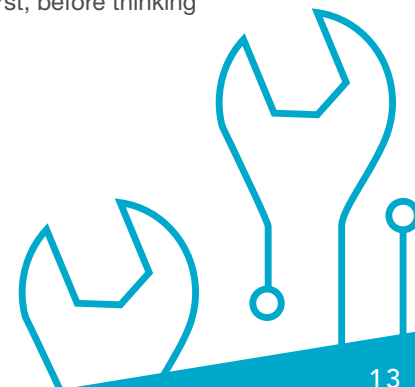
CODING AS A LITERACY

Many educators believe that coding instructions is a way to stimulate computational thinking. The skills required to learn coding combine deep computer science knowledge with creativity and problem-solving. In 2015, Code.org projected that by the year 2020, there will be 1.4 million computing jobs but only 400,000 computer science students to fill them. As a result, a growing number of school leaders are successfully making the case that coding needs to be integrated into K–12 curriculum to help promote complex thinking at a young age. Many schools worldwide are already developing coding classes and programs giving students the opportunity to design websites collaboratively, develop educational games and apps and design solutions to local challenges by modeling and prototyping new products. The introduction of user-friendly tools such as Scratch and LegoNXT makes it easier than ever for students to begin learning programming.

Short-Term Trends Over the Next One to Two Years

DISCUSSION QUESTIONS

1. Should our schools make a commitment to offering (or expanding) coding classes for all learners?
2. What kinds of technology devices and software would we need to start or expand a coding program?
3. Are there critical advantages or disadvantages to investing now in coding programs for our students?
4. How can we evaluate the benefits of re-thinking how our schools work?
5. Should all of our students be required to learn coding?
6. Are our teachers prepared to teach coding? If not, what steps do we need to take?
7. Are there community-based resources and experts we should tap to help us launch or expand our current coding programs?
8. Are there other instructional priorities we should consider first, before thinking about adding coding to our curriculum?



DISCUSSION QUESTIONS

Topic One: Key Trends Accelerating Technology Adoption in K–12 Education

STUDENTS AS CREATORS

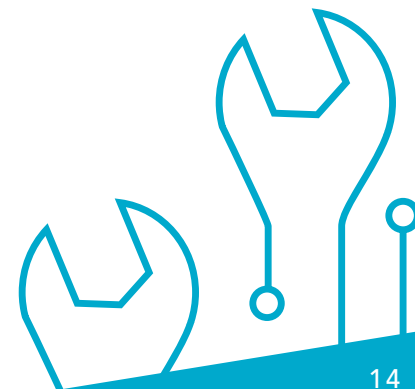
Pedagogical practices in schools worldwide are shifting focus as students across a wide variety of disciplines are learning by making rather than from the simple consumption of content. Creativity, illustrated by the growth of user-generated videos, maker communities and crowd-funded projects in the last few years, is increasingly the means for active, hands-on learning.



Short-Term Trends Over the Next One to Two Years

DISCUSSION QUESTIONS

1. Do we provide students with enough opportunity to create and make projects and content that demonstrate their learning?
2. Do students need new or different technology, devices, materials or other supports to learn by creating?
3. Are our teachers prepared to support and guide students who create?
4. How can we evaluate the real learning benefits of creativity and ‘maker’ projects?
5. Are there specific content areas or subjects in which student-created projects can greatly enhance learning and engagement?
6. What are the first steps we can/should take to address this trend?



DISCUSSION QUESTIONS

Topic Two: Significant Challenges Impeding Technology Adoption in K–12 Education

CREATING AUTHENTIC LEARNING EXPERIENCES

Authentic learning, especially the kind that brings real life experiences into the classroom, is not the norm in most schools. It's an important pedagogical strategy, and it has the real potential to boost student engagement, helping students connect the world as they know it exists outside of school and their school experiences. Authentic learning in the classroom relies on learning strategies such as incorporating real life experiences, technology, tools students are familiar with and interactions with community members. These strategies and instructional approaches may help retain students in school and prepare them for further education, careers and citizenship in ways that traditional practices often do not.

Solvable Challenges: Those That We Understand and Know How to Solve

DISCUSSION QUESTIONS

1. Can we create authentic learning opportunities for students without drastically changing curriculum?
2. How can technology support authentic learning opportunities for our students?
3. What kinds of resources and supports will our teachers need to integrate authentic learning into their regular teaching practices?
4. What should the role of local employers, policy makers, and other community leaders be in helping our schools access needed expertise and resources?
5. Are there specific content areas or subjects in which authentic learning opportunities can greatly enhance learning and engagement?
6. What are the first steps we can/should take to address this challenge?
7. What are the measures of success we can apply when we integrate authentic learning opportunities?

DISCUSSION QUESTIONS

Topic Two: Significant Challenges Impeding Technology Adoption in K–12 Education

Solvable Challenges: Those That We Understand and Know How to Solve

RETHINKING THE ROLES OF TEACHERS

Teachers are increasingly expected to be proficient in a variety of technology-based and other approaches for content delivery, learner support and assessment. In the technology enabled classroom, the primary responsibilities of a teacher are shifting from providing expert-level knowledge to constructing learning environments that help student build 21st century skills including creative inquiry and digital literacy. Educators are now guides and mentors, modeling responsible global citizenship and motivating students to adopt lifelong learning habits. Teachers are challenged to provide opportunities for students to direct their own learning trajectories. All of these factors combine to change the ways teachers engage in their own continuing professional development, much of which involves social media, online tools and resources and collaboration with other educators in and beyond their schools. Pre-service teaching programs are also challenged to equip educators with digital competencies amid other professional requirements to ensure classroom readiness.

DISCUSSION QUESTIONS

1. What are **our** expectations of teachers in our district and community?
2. Are we providing enough support for teachers to help them integrate technology successfully into their instructional approaches?
3. Are we providing enough time and opportunity for teachers to mentor and support one another?
4. Do we provide direction and encouragement to teachers who want to evolve their skills, content knowledge and collaboration?
5. Are we compensating, recognizing and rewarding teachers for growing their skills and approaches to 21st century instruction?
6. Are there resources, tools and expertise our teachers need to use technology more effectively with and for students?



DISCUSSION QUESTIONS

Topic Two: Significant Challenges Impeding Technology Adoption in K–12 Education

Difficult Challenges: Those We Understand But For Which Solutions Are Elusive

ADVANCING DIGITAL EQUITY

Digital equity refers to uneven access to high-speed broadband, a rampant social justice issue that impacts every nation. Pew Research reports that five million US households with school-aged children do not have high-speed service. While more schools now benefit from improved connectivity, the growth of blended learning approaches underscores new gaps between those with and without high-speed broadband. In countries that emphasize homework, students are increasingly expected to engage in learning activities outside the classroom. For students from economically disadvantaged households, access to broadband and sufficient computing devices is not a given, giving rise to the “Homework Gap”. Solving this challenge will take concerted efforts between policymakers and school leaders. In the US, President Obama recently announced the ConnectALL initiative, which promises high-speed broadband and technology access for every American. Further, internet and technology providers such as Google are enabling greater access in low-income areas by providing entire cities with global fiber connectivity

DISCUSSION QUESTIONS

1. What are we doing now to advance digital equity in our school community? Have our efforts been successful?
2. What efforts are currently underway to provide access to broadband and computing devices to our economically disadvantaged students and their families?
3. Are there community-based organizations and businesses that might have the ability and interest to help advance digital equity? Can we articulate the benefits to those organizations when asking for support or partnerships?
4. How are we advancing digital equity inside each of our school sites and in our own district ecosystem?
5. What kinds of programs can we develop or expand to help all learners take better advantage of the opportunities offered by open education resources (OER) and flipped classroom models?
6. What are “out of the box” creative solutions to this challenge? For example, some schools have equipped buses with WiFi and offer mobile computer labs. Others have created traveling hot spots. Are these ideas we can adopt? Are there other options our community can and should explore?

DISCUSSION QUESTIONS

Topic Two: Significant Challenges Impeding Technology Adoption in K–12 Education

Difficult Challenges: Those We Understand But For Which Solutions Are Elusive

SCALING TEACHING INNOVATIONS

Schools are not fully adept at moving teaching innovations into mainstream practice. Innovation springs from the freedom to try and implement new ideas and yet, schools generally allow for top-down changes that unfold in prescribed ways. Success in teaching is closely tied to test results and teachers are seldom rewarded to innovative approaches and improvements in teaching and learning. Often, educators become frustrated by the rigid confines of a school in desperate need of transformation. Scaling pedagogical innovation requires adequate funding, capable leadership, effective evaluation practices and the removal of restrictive policies—all in an environment of financial scarcity. The reality is that many teachers are not prepared to lead innovative, effective practices, and there is a kaleidoscope of systemic factors that must be addressed to resolve this complex issue.

DISCUSSION QUESTIONS

1. Is ours an “innovation-friendly” teaching and learning environment?
2. Where have we seen innovation in our schools and district? Can we use those successes as a model to “scale” innovation?
3. Do we encourage teachers to innovate? How?
4. Can we work more effectively with our technology and curriculum vendors to “incubate” new ideas and then develop plans to amplify those successes system wide?
5. How can we systemically encourage experimentation and innovation throughout our district? As an example, should we create a new department of innovation or work with outside consultants and community organizations?
6. What are the first steps we can/should take to address this challenge?

DISCUSSION QUESTIONS

Topic Two: Significant Challenges Impeding Technology Adoption in K–12 Education

Wicked Challenges: Those That Are Complex to Even Define, Much Less Address

ACHIEVEMENT GAP

The achievement gap refers to the disparity in academic performance between student groups, especially as defined by socioeconomic status, race, ethnicity, or gender. Environmental factors such as peer pressure, student tracking, negative stereotyping, and test bias intensify this challenge. Schools use many success standards to define learning expectations, including grades, standardized test scores and completion rates, leading to comparison of student performance at the individual and group level. Adaptive and personalized learning technologies are beginning to play a more integral role in identifying lower performing students and student populations, helping educators and leaders understand contributing factors, and enabling and scaling targeted intervention methods and engagement strategies that help close the gap. Global concerted action will be necessary to address ongoing obstacles to education for children in countries experiencing civil unrest, as well as cultural barriers depriving females access to school in some developing countries.

DISCUSSION QUESTIONS

1. How much do we know and understand about the achievement gap in the communities our school district serves? How can we learn more?
2. What can our district do to help children overcome the obstacles of poverty, such as a lack of access to quality health care?
3. How are we addressing the needs of our higher need schools? Are our efforts producing the desired outcomes?
4. Is there a greater role for technology in our efforts to close the achievement gap?
5. Are we providing support and intervention for lower-performing students in time? Are there approaches we should change or add to our initiatives?
6. How can we work more successfully with community-based organizations and partners?

DISCUSSION QUESTIONS

Topic Two: Significant Challenges Impeding Technology Adoption in K–12 Education

Wicked Challenges: Those That Are Complex to Even Define, Much Less Address

PERSONALIZED LEARNING

Personalized learning is receiving a great deal of attention from educational leaders, parents, and many education stakeholders. Personalized learning refers to the range of education programs, learning experiences, instructional approaches and academic-support strategies intended to address the specific learning needs, interests, aspirations, or cultural backgrounds of individual students. There is growing demand for personalized learning but to date, it is not adequately supported by current technology or practices—especially at scale. Educators are increasingly focused on customizing instruction to meet students’ unique needs. This is driving the development of new technologies that provide more learner choice and support differentiated instruction. Advances in online learning environments and adaptive learning technologies now make it possible to support a learner’s individual learning path. One major barrier is a lack of infrastructure within school systems to support widespread adoption of personalized learning technologies. Compounding the problem is the notion that technology alone is not the whole solution—personalized learning efforts must incorporate effective pedagogy and include teachers in the development process.

DISCUSSION QUESTIONS

1. Are we currently making efforts to personalize instruction? What initiatives are working? Where do we need additional ideas?
2. Is our current technology infrastructure capable of supporting personalized learning? What additions and changes are needed?
3. Are our teachers prepared and skilled in personalized learning? What steps are necessary?
4. Can personalized learning help us address equity in learning opportunities?
5. Do we have access to best practice and evidence-based strategies for adoption of personalized learning?
6. What role can our state department of education play in helping to evaluate and implement personalized learning strategies successfully?

DISCUSSION QUESTIONS

Topic Three: Important Developments in Education Technology for K–12 Education

Time-to-Adoption Horizon: One Year or Less

MAKERSPACES

K–12 education is increasingly focused on methods to foster students' development of 21st century skills to prepare them for the demands and opportunities of the global technological economy. To address these needs, a growing number of classrooms, libraries and community centers are being transformed into makerspaces—physical environments that offer tools and opportunities for hands-on learning and creation. Educators use makerspaces and maker activities to engage learners in creative, higher-order problem-solving through design, construction, and iteration. School leaders are incorporating making into the curriculum to encourage students and teachers to bring ideas to life and explore design thinking approaches. This also serves to expose students to STEM subjects and technical disciplines. Learners are applying maker skills to address some of the world's pressing challenges with innovative solutions.

DISCUSSION QUESTIONS

1. Can we incorporate makerspaces into our existing classroom, library or other school site facilities?
2. Are our teachers prepared to serve as facilitators and guides for makerspace learning activities?
3. What kinds of materials, equipment and technologies will we need? How can we plan for and budget for these investments?
4. Where should makerspaces fit in our current instructional programs? Should they be part of STEM or STEAM? Should they be considered as “specials” or extra-curricular programs?
5. How can we assess student performance and program success?
6. Can we involve community organizations, foundations, university partners or other organizations in helping us start and support makerspace programs and activities?

DISCUSSION QUESTIONS

Topic Three: Important Developments in Education Technology for K–12 Education

Time-to-Adoption Horizon: One Year or Less

ONLINE LEARNING

Online learning encompasses both formal and informal educational opportunities that take place through the web. Today, most schools have a web presence, and increasingly people expect for that to include learning modules and resources so students and educators can acquire new knowledge and skills on the go. Digital learning includes blended learning approaches and today, online learning is surging, as more than 2.7 million students in the US alone participate. Educators are becoming more comfortable using various levels of integration in their existing classes and programs. Many believe that online learning can be an effective catalyst for thoughtful discussion for all pedagogical practice. For example, online learning, especially when coupled with immersive technologies such as virtual reality, has the potential to facilitate simulations that help students better understand and respond appropriately to real life environments and situations. Major online learning trends include more project-based learning, personalized learning and interactivity.

DISCUSSION QUESTIONS

1. How do you evaluate the success of our current online learning programs?
2. What steps can we take to improve our current online learning programs?
3. Some studies show that site-based mentors and program facilitators can help students achieve better outcomes in online learning environments. Should we consider this kind of approach?
4. How can we better leverage online learning programs to support at-risk students and improve graduation rates?
5. Do we provide adequate support for families of students participating in online learning programs?
6. Online credit recovery is helping many school districts help students graduate. Can our graduation rates be improved with more support for online credit recovery programs?

DISCUSSION QUESTIONS

Topic Three: Important Developments in Education Technology for K–12 Education

Time-to-Adoption Horizon: Two to Three Years

ROBOTICS

Robotics is the design and application of robots—automated machines that accomplish a range of activities. Early robots were integrated into factory assembly lines to streamline and increase manufacturing productivity. Today, robots in mining, transportation and the military have helped improve operations for industries as they perform tasks that are unsafe or tedious for humans. The global robot population is expected to double to four million by the year 2020—a shift that will impact business models and economies worldwide, with a projected market value of \$135 billion in 2019. Robotics is two to three years away from mainstream adoption in K–12 education but even now it's gaining traction for hands-on learning, particularly in STEM disciplines. Classes and outreach programs are incorporating robotics and programming to promote students' critical and computational thinking, along with problem-solving skills. Studies also show that interaction with humanoid robots can help learners with spectrum disorders develop better communication and social skills.

DISCUSSION QUESTIONS

1. Is there a role for robotics in our future STEM and Special Education programs?
2. Will robotics programs and activities support our goals of preparing students for college and career?
3. Should robotics programs be offered as extra-curricular activities that are parent supported?
4. Should we begin planning for robotics by offering training opportunities to interested teachers?
5. How can we ensure that every student has the opportunity to explore robotics?
6. Can we “pilot” or explore the role of humanoid robots in our special education programs? What should be our first and next steps?

DISCUSSION QUESTIONS

Topic Three: Important Developments in Education Technology for K–12 Education

Time-to-Adoption Horizon: Two to Three Years

VIRTUAL REALITY

Virtual reality (VR) refers to computer-generated environments that simulate the physical presence of people and/or objects and realistic sensory experiences. At a basic level, this technology takes the form of 3D images that users interact with and manipulate via mouse and keyboard. Contemporary applications allow users to more authentically “feel” the objects in these displays through gesture-based and haptic devices, which provide tactile information. While VR has compelling implications for learning, to date, it has been most prominently used for military training. With advances in graphics hardware, CAD software and 3D displays, VR is moving into the mainstream, especially in video games. Head-mounted displays make game environments and actions more lifelike. Both games and natural user interfaces are finding applications in classrooms and VR has the power to make learning simulations more authentic.

DISCUSSION QUESTIONS

1. Is VR a technology we should begin planning for and testing now?
2. Should we attempt to pilot and plan for VR in our curriculum independently or seek community and university partners to help us build a VR program?
3. Is VR technology a “necessity” for our curriculum or a “nice to have”?
4. Can VR help us address equity issues by introducing all students to global and local landmarks or cultural events and exhibitions?
5. Do we have access to vendors who can help us evaluate options for the future?
6. Should we begin to train a small cadre of teachers in using and teaching with VR?

DISCUSSION QUESTIONS

Topic Three: Important Developments in Education Technology for K–12 Education

Time to Adoption: Four to Five Years

ARTIFICIAL INTELLIGENCE

In the field of artificial intelligence (AI), computer science is being leveraged to create intelligent machines that more closely resemble humans in their functions. The knowledge engineering that allows computers to simulate human perception, learning and decision-making is based on access to abundant knowledge including categories, properties and relationships among various information sets. Neural networks, a significant area of AI research, are currently proving to be valuable for more natural user interfaces through voice recognition and natural language processing. In other words, AI allows humans to interact with machines similarly to ways they interact with each other. Neural networks model the biological function of animal brains to interpret and react to specific inputs such as words and tone of voice. As AI continues to develop, it has the potential to enhance online learning, adaptive learning software and simulations in ways that more intuitively respond to and engage with students.

DISCUSSION QUESTIONS

1. Where do we envision the benefits of AI in our learning systems and approaches?
2. Chatbots are envisioned as virtual tutors, eventually helping students as they learn in an online environment. How can we stay current with AI developments so we can make decisions moving forward?
3. Already, there are adaptive learning solutions that leverage AI and natural language processing to identify students' knowledge gaps. Other solutions conduct individual assessments and then deliver tailored content and support, targeting subject areas and skills where students need additional instruction and practice to achieve mastery. Should we begin piloting some of these solutions now?
4. Who in our district (including students or faculty) and community should help us monitor advances in AI?
5. How can integrate AI explorations in our current STEM and STEAM programs?

DISCUSSION QUESTIONS

Topic Three: Important Developments in Education Technology for K–12 Education

Time to Adoption: Four to Five Years

WEARABLE TECHNOLOGY

Smart devices worn by users, taking the form of an accessory such as jewelry or eyewear are part of the emerging wearable technology phenomenon. Today, there are smart textiles that make it possible for clothing items such as shoes or jackets to interact with other devices. “Wearables” enable us to use smart tools in our everyday lives, allowing seamless tracking of personal data such as sleep, movement, location and social media interactions. Head-mounted wearable displays facilitate immersive virtual reality experience. Well positioned to advance the quantified “self” movement, today’s wearables not only track where people go, what they do and how much time they spend doing it, but also tracks their aspirations and when those can be accomplished. This category also offers the potential to interest a variety of students in STEAM learning, as classroom activities can encompass multidisciplinary efforts connecting design, building and programming.

DISCUSSION QUESTIONS

1. Is there a future role for wearable technology in our programs, such as STEAM, physical education and health or student safety?
2. Should we form a task force or study group to investigate potential uses of wearable technology?
3. Can we engage students in designing new wearable technologies or applying current technologies to solve challenges?
4. Is there a role for wearable technology in our services and programs for students with disabilities?

DISCUSSION SUPPORT

Discussion Worksheet

Discussion Topic(s): _____

Participants: _____

This form can help you organize your notes during discussions and outreach events.

Points of Agreement/Consensus _____

Points of Disagreement _____

Points of Confusion _____

Ideas Emerging from Discussion _____

DISCUSSION SUPPORT

Discussion Worksheet

Suggestions for Next Steps _____

Indications of Priorities _____

Additional Information Needed/Requested _____

Individuals Interested in Additional Opportunities for Involvement and Discussion _____



PROMOTING YOUR EVENTS

In this section of the Toolkit, you'll find materials you can customize to promote *NMC/CoSN Horizon Report: 2016 K-12 Edition* discussion and planning events. These include:

- A Sample Press Release
- Email and Print Invitation Templates
- Follow-Up Communications
- Social Media Suggestions

You can use these resources to create materials for your local media, school and district communications channels, and regularly scheduled announcements.

PROMOTING YOUR EVENTS

A Sample Press Release



**Get Your
Colleagues &
Community
Engaged in
Technology
Planning. Use the
*NMC/CoSN Horizon
Report* as Your
Discussion Catalyst**

FOR IMMEDIATE RELEASE

[District Name] to Discuss Future of Education Technology at NMC/CoSN Horizon Report Forum
[City or state name] educators to review report on upcoming education technology trends

[Location] (Date)—As technology continues to change the face of education, teachers and district leaders need informed on current and upcoming practices in technology-based teaching and learning. To support community discussion about K–12 technology adoption, [district name] is hosting an event to review the *NMC/CoSN Horizon Report: 2016 K–12 Edition*.

The *NMC/CoSN Horizon Report* provides a five-year forecast of trends and technologies that will drive educational change. A group of 55 experts work in collaboration to produce the roundup of key trends, significant challenges and important developments. The report serves as a technology-planning guide for educators, school leaders, administrators, policymakers and technologists.

“This discussion is an opportunity for members of our district to learn from the report as well as their colleagues’ interpretations of the key trends,” said [District leader]. “It is a priority for our district to initiate discussions about how we can adapt our strategies to the latest technological pedagogy in order to improve student learning.”

With 15 years of research and publications, the Horizon Report is one of the longest-standing explorations of education technology developments. Trends highlighted in the report are expected to impact the K–12 education community on a global scale.

At the forum, attendees will discuss how issues highlighted in the report apply to [District name]’s technology initiatives moving forward. The event will be held at [location] at [date and time].

To learn more about the *NMC/CoSN Horizon Report*, please visit go.nmc.org/2016-k12.

PROMOTING YOUR EVENTS

A Sample Press Release



FOR IMMEDIATE RELEASE

CoSN

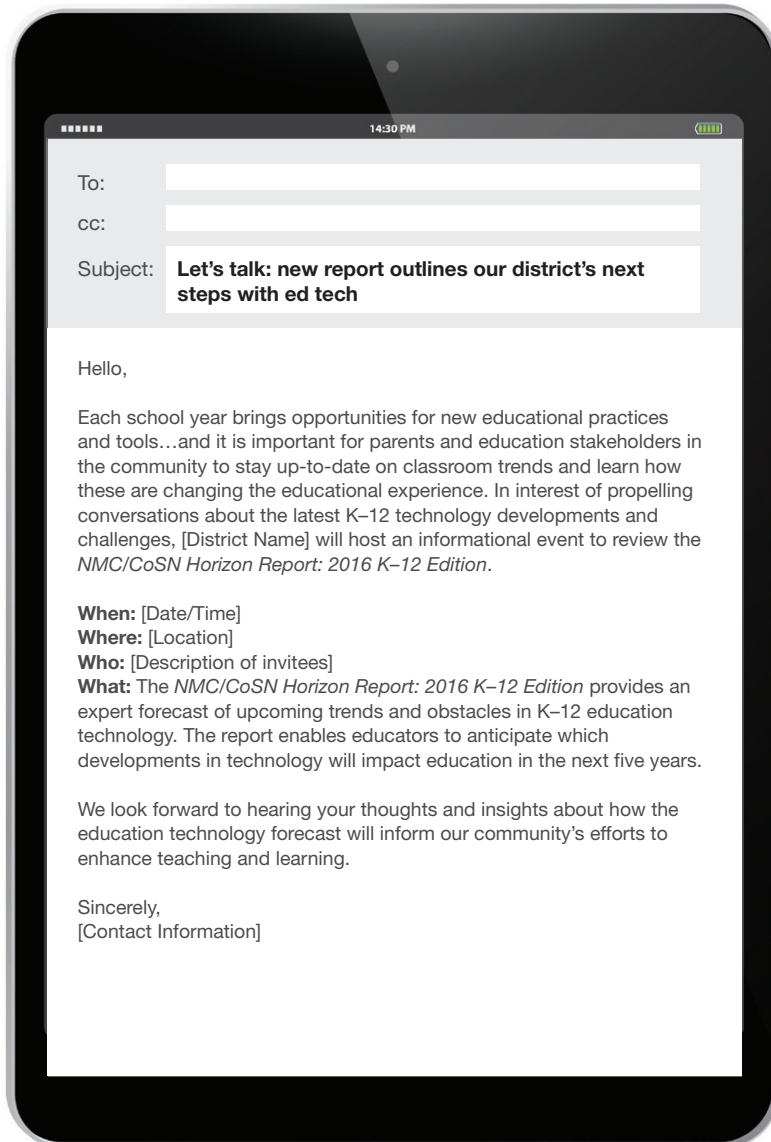
CoSN (the Consortium for School Networking) is the premier professional association for district technology leaders. For nearly 25 years, CoSN has provided leaders with the management, community building, and advocacy tools they need to succeed. Today, CoSN represents over 11 million students in school districts nationwide and continues to grow as a powerful and influential voice in K–12 education. www.cosn.org

NMC

The New Media Consortium (NMC) is a community of hundreds of leading universities, colleges, museums, and research centers. The NMC stimulates and furthers the exploration and use of new media and technologies for learning and creative expression. From its founding in 1993, the NMC has always focused on the future and the implications of emerging technology for schools, museums, universities, and society. The NMC celebrated its 20th anniversary in 2013. www.nmh.org

PROMOTING YOUR EVENTS

Email Invite Copy



Written Invite Copy

Hello,

To generate conversations about the latest developments in K–12 technology, [District Name] will host an informational event to review the *NMC/CoSN Horizon Report: 2016 K–12 Edition*.

When: [Date/Time]


Where: [Location]

Who: [Description of invitees]

What: The *NMC/CoSN Horizon Report: 2016 K–12 Edition* provides an expert forecast of upcoming trends and obstacles in K–12 education technology. The report enables educators to anticipate which developments in technology will impact education in the next five years.

We look forward to hearing your thoughts and insights about how the education technology forecast will inform our community's efforts to enhance teaching and learning.

Sincerely,
[Contact Information]

A photograph of three people in an office setting, overlaid with a blue tint. A woman in a striped shirt, a woman in a light blazer, and a man in a dark sweater are gathered around a tablet, looking at the screen with interest. The background shows office shelves and papers.

EVENT FOLLOW-UP CONTENT AND STRATEGY

After hosting an event to discuss the *NMC/CoSN Horizon Report: 2016 K–12 Edition*, distributing follow-up communications through multiple channels will encourage further community engagement and action. Suggested follow-up includes social media content, an email to the district as well as an email to local media.

SOCIAL CONTENT

Your district can get extra mileage out of the event by sharing updates and photos after the discussion. Please find social content and suggested timing below:

Facebook		
DAY/TIMING	CONTENT	SUGGESTED MEDIA
Day of event, 3 hours before	Just a few short hours until our review of the <i>NMC/CoSN Horizon Report</i> begins. Remember to bring a notebook and your best edtech ideas.	
Day of event, 1 hour after	Thank you to those who attended the Horizon Report discussion. We value the input of our community in next big tech steps.	Photo of event attendees
1 day after the event, 11 AM	Yesterday, we discussed how our district will address challenges in tech implementation. What do you think our next big move should be?	Slide from event presentation
3 days after the event, 2 PM	Still thinking about the upcoming trends in education technology? Share your strongest takeaways from our Horizon Report chat.	Photo from event
1 week after the event, 1 PM	Providing the best #edtech tools and strategies is a top priority in our district. The ideas that came out of our Horizon Report chat will be vital to our continued efforts to adapt to new technologies.	Slide from event presentation

Twitter		
DAY/TIMING	CONTENT	SUGGESTED MEDIA
Day of event, 3 hours before	Don't miss our discussion of the Horizon Report in just a few hours! #edtech	
Day of event, 1 hour after	Thank you to @NMCorg, @CoSN and to all who attended our Horizon Report review	Photo from event
1 day after the event, 10 AM	Yesterday, we opened up a conversation about the future of #edtech based on the Horizon Report	Event photo
1 day after the event, 3 PM	Do you have any thoughts on which #edtech developments we should keep tabs on for the years to come?	Slide from event presentation
2 days after the event, 11 AM	Members from our community discussed the #AchievementGap & more at the Horizon Report discussion:	Event photo
3 days after the event, 10 AM	Our district is tackling findings from the Horizon Report into our tech plans for 2017 and beyond	Slide from event presentation
3 days after the event, 1 PM	#Makerspaces, robotics & virtual reality, oh my! All this and more was discussed at our Horizon Report chat:	Event photo
1 week after the event, 11 AM	It's been one week since our Horizon Report event. What #edtech topics stuck with you the most?	Event photo

COMMUNITY FOLLOW-UP EMAIL

The purpose of this email is to recap the discussion and encourage further conversation in your district. This is also an opportunity to share the full report with invitees along with supporting materials developed by your district. We recommend sending this email two days after the event. Please find sample content below:



14:30 PM

To:

cc:

Subject:

Hello,

On [date], [district name] held a discussion to review the *NMC/CoSN Horizon Report: 2016 K–12 Edition* and upcoming education technology trends. As a follow-up to the event, I am providing a summary of the conversation as well as the full report.

At the event, we discussed how our learning and teaching community might specifically address the trends, challenges and developments outlined by the Horizon Report. Highlights include:

- Key education technology trends: Redesigning learning spaces, rethinking how schools work, collaborative learning, deeper learning, coding as literacy, and students as creators
- Education technology challenges: authentic learning opportunities, rethinking the roles of teachers, the digital divide, scaling teaching innovations, the achievement gap, and personalizing learning
- Education technology developments: makerspaces, online learning, robotics, virtual reality, artificial intelligence and wearable technology

[Any additional details from the discussion the district wishes to share]

If you have any additional thoughts to share with us about the Horizon Report or technology adoption, please reach out to me.

Best,
[Contact information]

[Report attachment]

LOCAL MEDIA FOLLOW-UP EMAIL

We recommend sharing details from the event with journalists from your local media to gain positive visibility for your district. These communications should be sent one day after the event. Please find sample content for email outreach to the right:



14:30 PM

To:

cc:

Subject:

Hello [Journalist's name],

In interest of informing our educational community about upcoming technology trends, [district name] held a discussion on [date] to review the horizon of education technology for the next five years. I wanted to draw your attention to this event in case you have any interest in covering key takeaways from the discussion.

Guided by the *NMC/CoSN Horizon Report: 2016 K-12 Edition*, educators reviewed upcoming trends, challenges and developments for technology adoption. This conversation will inform our technology plan moving forward to improve teaching and learning in our district.

I am happy to share additional details and photos from the discussion if you are interested in sharing a review of the event.

Best,
[Contact information]

A woman with long, wavy hair is sitting at a desk, smiling as she looks at a laptop. She is wearing a dark top and a light-colored scarf. The background is a blurred office setting. The entire image is covered with a semi-transparent blue overlay.

RESOURCES & LINKS

HORIZON REPORT RESOURCES

SURVEYS



Survey Monkey

<https://www.surveymonkey.com/>

Survey Monkey is a free survey software that enables users to ask a variety of question types to a targeted audience. This resource will be helpful to those districts that wish to get insight from their community about a Horizon Report discussion or the report in general.

HORIZON REPORT RESOURCES

WEBINAR SERVICES



join.me

<https://www.join.me/solutions/free-webinar-software>

FreeConferenceCall

<https://www.freeconferencecall.com/>

AnyMeeting

<https://www.anymeeting.com/adw/Free-Webinar-Service.aspx>

Rather than hosting an in-person discussion, some districts might prefer to conduct a webinar reviewing the Horizon Report. There are a number of platforms that provide webinar-hosting services. Each website will vary in price and capabilities.

HORIZON REPORT RESOURCES

FACEBOOK LIVE RESOURCES



Tips for using Facebook Live

<https://www.facebook.com/facebookmedia/best-practices/live>

How to start a Facebook Live video

<http://www.cnet.com/how-to/how-to-use-facebooks-live-video-feature/>

Facebook Live can be used to live stream a video at your Horizon Report event or a message from your district leader about the report. The above resources will help you get started in planning a Facebook Live video that will effectively reach your community members.

HORIZON REPORT RESOURCES

ADDITIONAL COSN RESOURCES



Digital Equity Action Toolkit

<http://cosn.org/focus-areas/leadership-vision/digital-equity-action-agenda>

CoSN's Digital Equity Action Toolkit provides district leaders with information to address digital equity in out-of-school learning. This toolkit supports the Horizon Report by helping schools ensure that each student receives the benefits of future education technology.

CoSN Blog

<http://www.cosn.org/blog>

The CoSN blog provides up-to-date insights on education technology. The blog frequently addresses trends highlighted in the Horizon Report. For example, previous blogs have discussed digital inclusion and how to measure the impact of technology initiatives.

HORIZON REPORT RESOURCES

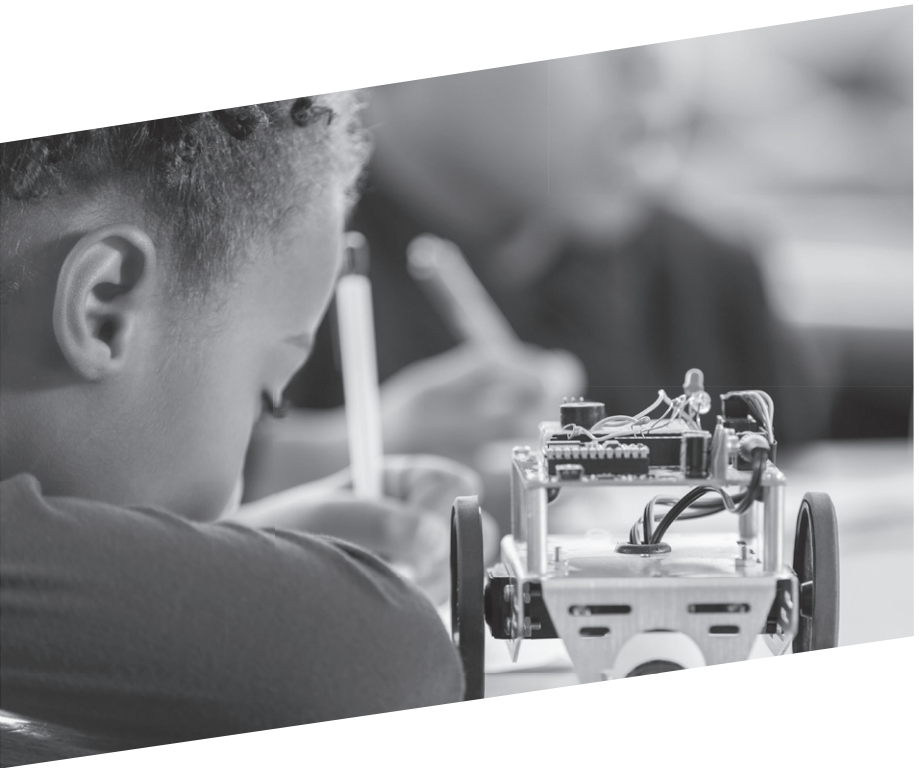
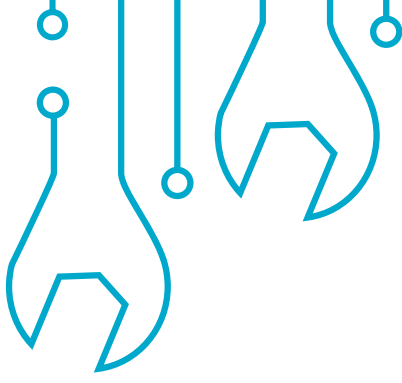
ADDITIONAL COSN RESOURCES



NMC Horizon Project

<http://www.nmc.org/nmc-horizon>

When it comes to analyzing emerging technology uptake in education, the NMC Horizon Project is truly global in scope and reach. To date, over 50 editions of the NMC Horizon Report have been published, along with 50 foreign language translations in areas including global higher education, K–12 education, libraries, and museums. The regional- and sector-focused NMC Technology Outlook series has examined STEM+ education, community colleges, Australian tertiary education, Irish higher education, Brazilian higher education, Latin American higher education, European schools, Singaporean schools, Chinese schools, International Schools in Asia, Scandinavian schools, and Norwegian schools. Every edition leverages the perspectives of a diverse expert panel and features projects that showcase innovative educational technology in action.



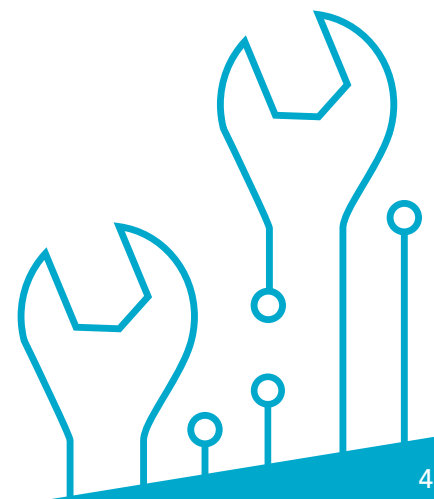
ABOUT

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