
To accompany The NMC Horizon Report: 2013 K-12 Edition

Discussion Activities

Toolkit presented by

In partnership with

Supported by
The NMC Horizon Report: 2013 K-12 Edition is an ongoing research project by the New Media Consortium, seeking to identify and describe emerging technologies likely to have a large impact on teaching, learning, and creative inquiry within education around the globe. The Report may be downloaded at www.CoSN.org/Horizon.

The CoSN Horizon Report: 2013 K-12 Edition Toolkit, released in conjunction with the Report, is intended to be used by educators, policymakers, and other stakeholders to continue the conversation around issues discussed in the Report.

K-12 is a term used in the United States to indicate education provided at the primary and secondary level. While we use the term K-12, our hope is that this Toolkit will be useful around the world in education institutions.

The CoSN Horizon Report: 2013 K-12 Edition Toolkit is made possible via a grant from HP.

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To learn more about NMC, visit: www.nmc.org.

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Education and technology leaders, policymakers, and key stakeholders in educational institutions need practical, forward thinking information that addresses opportunities for teaching, learning, and creative inquiry. The NMC Horizon Report: 2013 K-12 Edition provides a rich set of topics, examples, and resources for use in considering new technologies that hold strong promise for K-12 institutions. The free Report may be downloaded at www.CoSN.org/Horizon.

The CoSN Horizon Report: K-12 Edition Toolkit was first created in 2010 to help facilitate a conversation within your institution about trends in emerging technologies in K-12, based on the 2010 Horizon Report: K-12 Edition. Since that time, the Toolkit has served to enable you to involve school leaders, board/trustee members, policymakers, teacher groups, parents/community leaders, and others in a conversation about the future of learning.

The benefits of using the Report and Toolkit are to:
- Create or refresh your institution’s strategic technology plan to ensure that you are keeping pace with what’s possible.
- Gain local decision maker support for investing in new learning technologies that address key institutional challenges.
- “Leave no school system behind” when it comes to powerful technologies for powerful learning.
- Help local stakeholders re-imagine learning as they shift the conversation from the topic of technology to a focus on improving learning.


- Presentation Template – a PowerPoint presentation file providing an overview of the research-based report and its discussion of key trends, significant challenges, and of the six technologies that hold promise for K-12 education in the next one to five years. In the Notes View of the file, you will find a suggested script or set of notes you may use for group presentations. Use slide 2 to customize the presentation with the name of your school, district, or education institution and/or logo.
Discussion Facilitator’s Guide – a document to be used in conjunction with the Presentation Template, providing you with guiding questions to pose to school district or education institution stakeholders to stimulate thinking about the technologies identified in the Report and to use for group reflection and discussion about them and other technologies of interest.

Discussion Activities – engage stakeholders in dialogue to identify local instructional challenges, consider emerging technologies as solutions, and develop action plans.

Feedback Form – present to, then survey stakeholders. Capture key learnings, questions, and suggestions. Share results with CoSN and the NMC Horizon project team!

How to Use the Discussion Activities

In local discussions, help stakeholders to re-imagine learning. Don’t lead with technology; rather, work to identify needs or “the big instructional problem” stakeholders face. Begin with a question: *What is a problem our district or education institution is trying to solve? Are there emerging technologies that might hold promise for providing a solution?* This will help move the conversation from technology to improving learning.

The Report is merely a starting point for reflection and dialogue about technologies with potential for the K-12 community.

- Use the Discussion Activities to help your stakeholders successfully understand and plan for new technology applications that support teaching, learning, and creative inquiry.
- Strive to begin where your audience is—not where you are in your own understanding, knowledge, and concerns.
- Select or modify activities and guide discussion, based on stakeholder priorities and needs; consider what stakeholders already know.
- Consider their "hot buttons" or what your audience might be most interested in.
- Education administrators will be driven by different needs and concerns than, for example, teachers. Build on knowledge they have, using information from the Report to help them imagine new possibilities.

As you engage in reflection and dialogue with local stakeholders, consider:

- which emerging technologies might present solutions to current needs;
- which ones warrant more study; and
- which ones help open thinking to new possibilities for teaching, learning, and creative inquiry.
Local stakeholders may well identify other emerging technology trends that they think will be profoundly important for your district or education institution.

Using technology as you facilitate the discussion activities described in this document can enhance the experience for participants, but the activities do not require it. Activities are further designed so that they may be facilitated not only by technology leaders and those perhaps more comfortable with emerging technologies, but also by anyone interested in helping local stakeholders engage in dialogue about how emerging technologies and approaches, those cited in the Report or others, can help schools and institutions realize their goals and address their challenges and needs.

Be reminded that, in your discussions, it is reasonable to anticipate questions about challenges or obstacles to using technologies described in the Report, or others may be asked. These are valid questions, especially for more near-term technologies identified in the Report. Use questions as an opportunity to frame the discussion, e.g. contrasting challenges and opportunities, brainstorming ways to address or minimize potential obstacles, or asking what might get in the way of implementing a specific technology. As you have conversations with other education stakeholders, acknowledge that while technology holds promise for K-12 education, there can be challenges and costs to some implementations.

*Let the conversations begin!*

**Continuing the Conversation**

- Point your stakeholders to the resources at the end of each section in the Report. For each, there is a section describing the specific technology in practice and a second one “For Further Reading”. Find links to articles and sites discussing case studies on scenarios and applications from schools and education institutions worldwide.
- Explore resources on NMC’s Horizon Project Navigator, [www.nmc.org/horizon-project/horizon-project-navigator](http://www.nmc.org/horizon-project/horizon-project-navigator), a dynamic social media platform overlying an innovative set of intelligent search tools and a comprehensive collection of resources. It allows users to fully exploit the Horizon Project’s extensive and expanding collection of relevant articles, research, and projects related to emerging technology and its applications worldwide, as well as the NMC’s expert analysis and extensive catalog of sharable rich media assets.
- Resources listed in the Horizon Report and a wide collection of other helpful projects and readings can all be found in the project’s open content database that is accessible via the NMC Horizon EdTech Weekly App for iOS ([go.nmc.org/ios](http://go.nmc.org/ios)) and Android devices ([go.nmc.org/android](http://go.nmc.org/android)). All the background materials for the *NMC Horizon Report: 2013 K-12*
Edition, including the research data, the preliminary selections, the topic preview, and the Report itself, can be downloaded for free on iTunes U (go.nmc.org/itunes-u).

- Tag your own project or resources on the Horizon K-12 wiki at horizon.wiki.nmc.org/Tagging or on Twitter: #NMChz.
- If you have or know of a real-world example that uses one of the technologies identified in the Report in schools, especially if there is information on the Web describing the project, please post the information at one of the webpages noted above.
- Comment on the 2013 Report on Facebook: go.nmc.org/Horizon or on Twitter: #NMChz.
- Continue the conversation with your local stakeholders.
- Use the Feedback Form to tell us your story and how you are using the Report and Toolkit—voice your successes, questions, and suggestions for what more we can offer to help you in your efforts.
- Spread the word! Help your colleagues and peers in other schools and institutions by sharing this information.
Activity: Study Group—Reflecting on the Report

Education stakeholders participate in a study group to review and reflect on The NMC Horizon Report: 2013 K-12 Edition. Using guiding questions, they discuss reactions to the key trends, critical challenges, and six emerging technologies discussed in the Report and consider how to apply and use what they have learned to address any local needs or challenges.

Resources You Will Need:

- One copy of GuidingQuestions.doc file for each participant (downloaded with the Discussion Activities).
- Grid.doc (downloaded with the Discussion Activities) – ideally, displayed with a computer and projection device or whiteboard or reproduced on flip chart pages to record and share summary findings.
- (optional) Virtualize the study group by posting questions or statements for reflection online. Consider posting to a blog, wiki, custom social network, or similar Web 2.0 tool.

How to Conduct the Activity:

2. Distribute the Study Group Guiding Questions and have participants review and individually prepare responses to the questions. These responses may be in writing or just a preparation to present them orally.
3. Project or display in some way the What Was Learned grid and use it to summarize group findings and thoughts.
4. Identify next steps based on what has been learned, how what has been learned might be used, benefits, and any issues to further investigate or address.
After reading the Report, prepare responses to the following questions and be prepared to share your responses with the group:

1. Look at pages 7-8 of the Report, which discuss key trends that are currently affecting the practice of teaching, learning, and creative inquiry:
   a. Education paradigms are shifting to include online learning, hybrid learning, and collaborative models.
   b. Social media is changing the way people interact, present ideas and information, and communicate.
   c. Openness—concepts like open content, open data, and open resources, along with notions of transparency and easy access to data and information—is becoming a value.
   d. As the cost of technology drops and school districts revise and open up their access policies, it is becoming more common for students to bring their own mobile devices.
   e. The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.

   What does each of these trends say to you? How significant do you consider each of these to be in the next five years, based on local needs and circumstances?

2. Review pages 9-10 of the Report, which identify some of the significant challenges that schools face, especially those that are likely to continue to affect education in the five-year time period covered by the Report:
   a. Ongoing professional development needs to be valued and integrated into the culture of the schools.
   b. Too often it is education’s own practices that limit broader uptake of new technologies.
   c. New models of education are bringing unprecedented competition to traditional models of schooling.
   d. K-12 must address the increased blending of formal and informal learning.
   e. The demand for personalized learning is not adequately supported by current technology or practices.
   f. We are not using digital media for formative assessment the way we could and should.

   What does each of these challenges say to you? How significant do you consider each of these to be in the next five years, based on local needs and circumstances?
3. Review the entire Report.

   a. *What did the Report say that challenged what you already know or believe?*

   b. *What did you consider to be the “muddiest point”—what is still confusing or needs further clarification?*

   c. *Is there one emerging technology presented in the Report that you found most interesting or provocative to address local needs and challenges? Which one and why?*

4. *How will you use what you have read and learned?*

5. *What will you do with what you have read and learned to impact your school or educational institution?*
<table>
<thead>
<tr>
<th>What was learned</th>
<th>How what was learned might be used</th>
<th>Benefits</th>
<th>Issues</th>
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Activity: Polling—Significant Challenges

The Horizon Report presents six significant challenges facing schools, with each considered to be critical in the coming years in terms of its impact on teaching, learning, and creative inquiry. Polls of stakeholders are conducted to determine whether any represent local challenges; these or other challenges facing the school or institution are prioritized for determining next steps.

Resources You Will Need:

- Copy of the Challenges.ppt file (downloaded with the Discussion Activities).
- Computer and projection device or whiteboard for presenting PowerPoint slides and recording and sharing responses.
- (optional) Consider a Web-based polling application for smartphones or other mobile devices or handheld audience response systems, i.e., “clickers”.

How to Conduct the Activity:

1. Using the PPT file provided, present the critical challenges identified in the Report and let participants discuss each. Refer to the Notes View of the file for suggested comments about each challenge.
2. After discussing the first two slides, poll participants to determine, for each challenge identified, whether it is considered to be one experienced locally.
3. Use a Web-based polling application or ask for a show of hands to indicate yes or no for each challenge. Use slide 3 to record responses and discuss them.
4. Move to slide 4 and ask participants to respond to the question: What other critical challenges are our schools facing? Suggest that all responses will be considered—with the exception of “money”. Record responses.
5. Have participants prioritize from all challenges considered to be local, from those that seem to be the greatest challenge or highest priority to those representing less of a challenge or immediate need.
6. Use participants’ responses to determine next steps—
   o for investigating emerging technologies that might provide an approach or solution
   o for building or refining an action plan to address the challenges
   o for informing professional development
   o for addressing other goals or objectives
Significant Challenges

*The NMC Horizon Report: 2013 K-12 Edition*

presented challenges facing schools:

- Ongoing professional development needs to be valued and integrated into culture of schools
- Education’s own processes and practices limit broader uptake of new technologies
- New models of education bringing unprecedented competition to traditional models of education

Significant Challenges

- K-12 must address increased blending of formal and informal learning
- Demand for personalized learning not adequately supported by current technology or practices
- Digital media not being used for formative assessment the way it could or should
Let’s take a poll . . . .

<table>
<thead>
<tr>
<th>Local Challenge</th>
<th>Yes</th>
<th>No</th>
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<tr>
<td>Ongoing professional development needs to be valued and integrated into culture of schools</td>
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<tr>
<td>Digital media not being used for formative assessment the way it could or should</td>
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What other significant challenges are our schools facing?
Activity: Action Plan—Moving From Problem to Plan

Stakeholders brainstorm to identify a local problem and develop a plan to gather data about the problem, analyze it to better understand possible causes, identify and consider approaches to address the problem, and assess the success of the approach(es) selected.

Resources You Will Need:

- Participant copies of the Problem-solving.doc handout (downloaded with the Discussion Activities).
- Flip chart, computer and projection device, whiteboard or some medium for recording and sharing steps of the plan.

How to Conduct the Activity:

1. Give participants a copy of the Problem-Solving Process handout and discuss each of the steps in the process.
2. Use one of the other activities suggested in this Discussion Activities document (e.g. Polling – Critical Challenges) or brainstorm with participants to identify one or more key challenges or problems facing the school or institution.
3. Prioritize or reach consensus on one key problem to address. State the problem in terms of what is to be accomplished—what is the objective?
4. Make a list of the information or data that will be needed from diverse sources to better analyze and understand the problem. For each set of information or data, identify how the information or data will be collected and who will have responsibility for doing so.
5. Have participants as a whole group or in sub-groups analyze the information and data collected. Having information and data helps minimize the risk of just focusing on symptoms or effects of the problems rather than really isolating the core cause(s). Have participants determine the core cause(s) of the problem.
6. Next, have participants generate possible solutions to the core cause(s) of the problem and use one of the other activities in this Discussion Activities document (e.g. Compare/Contrast – 2 Problem Approaches) or determine the criteria for evaluating one or more approaches.
7. Develop an action plan to implement the best or most highly evaluated approach, taking into consideration the objective and available resources. Include all of the steps that will need to be taken to successfully implement the approach or solution, including the resources required, the time required, and how it will be evaluated or assessed in terms of meeting the stated objective.
8. Implement the approach.
9. Assess to determine if the approach worked. If the objective is met, move to the next key problem or challenge and repeat the problem-solving process or determine adjustments needed to improve upon the approach.
Identify the problem—state it as an objective

Analyze the problem—what information and data is required?

Determine the core cause(s) of the problem

Generate and evaluate possible problem approaches

Select the best approach and plan implementation

Implement the approach

Evaluate the approach

The Problem-Solving Process
Activity: Compare/Contrast—2 Problem Approaches

Starting with a problem to be solved, participants use a compare and contrast graphic organizer to analyze problem approaches. The focus is on the problem—not the technology. Consideration is given to how an emerging technology might support a new approach to a problem. Stakeholders consider characteristics of various approaches and then evaluate and synthesize the information.

Resources You Will Need:

- One copy of *The NMC Horizon Report: 2013 K-12 Edition* for each participant or selected pages from the Report discussing an emerging technology to be considered.
- Participant copies of a compare and contrast graphic organizer (samples downloaded with the Discussion Activities: Benefits-Concerns.doc, Similarities-Differences1.doc, Similarities-Differences2.doc). Consider using a commercial or open source (e.g. www.SourceForge.net - search “mind map”) graphic organizer or mind-mapping application to create your handout.
- Flip chart, computer and projection device, whiteboard, or some medium to record and share responses.

How to Conduct the Activity:

1. Begin with a whole group discussion of the “big problem” to be solved. What is the major instructional or educational challenge facing the school or institution? For example, equitable access to high quality schools remains an educational challenge in almost every country. One a more local basis or more targeted challenge, perhaps your school is struggling to increase the number of middle grade students who successfully complete Algebra instruction and finding traditional or current methods are not working.
2. Distribute copies of the *Horizon Report* or selected pages from it and have participants spend a few minutes reading the sections on one or two of the emerging technologies described. You may want to identify an emerging technology not cited in the Report. Or you may want to compare and contrast using an approach incorporating an emerging technology with a current approach to the problem.
3. Have participants, working with a partner or in small groups, use a graphic organizer to compare and contrast two approaches to a key problem (e.g. for increasing the number of middle grade students who successfully complete Algebra instruction):
   a. Identify similarities and differences in the two approaches or
   b. Compare and contrast the two approaches, identifying benefits and advantages and then concerns or reservations for each approach.
4. Have pairs or small groups report out regarding their work. Record responses so the master summary can be shared.
5. Debrief the activity. Ask, based on a synthesis of participants’ consideration of the two approaches, what are the next steps to be taken to further research or investigate any approach of interest? What questions remain?
Approach 1:

Approach 2:

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<th>Similarities</th>
<th>Differences</th>
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APPROACH 2:

BENEFITS/ADVANTAGES

CONCERNS/RESERVATIONS
Activity: K-W-L—Studying an Emerging Technology

Participants delve more deeply into understanding an emerging technology with the potential to address local needs and challenges by using a K-W-L chart to identify what they already (K)now about the technology, what they (W)ant to know, and after group study, what they (L)earned.

Resources You Will Need:

- One copy of the KWLchart.doc handout for each participant (downloaded with the Discussion Activities).
- Flip chart, computer and projection device, whiteboard, or some medium to record and share responses.

How to Conduct the Activity:

1. With the whole group, display a K-W-L chart on a flip chart or project it with a computer and projection device, whiteboard or some medium to record and share responses.
2. Identify the emerging technology to be considered and ask participants to share what they already know about the technology. Record responses in the K (What I Already Know) column. As you do so, let volunteers explain to their colleagues what they know and how they learned it.
3. Next, ask participants to identify any things they (W)ant to know about the topic.
4. Have participants read the electronic PDF copy of the section of the Report addressing the technology being studied, including the segment describing the technology in practice and the “For Further Reading” segment of additional articles and resources found at the end of the section. Ask them to individually create a list of things they learned about the technology. Point out to participants that they can hot link (click on the URL) from their electronic copy of the Report to access the resources. (Alternately, provide printed copies of the Report to participants, but they will not be able to link to the resources at the end of each section.)
5. As a whole group, complete the K-W-L chart, sharing what was (L)earned.
6. Identify any remaining questions or additional things to investigate and determine next steps regarding how the group might find answers to the remaining questions. (Examples might include online research, visiting a school using the technology, or others.)
### K – W – L Chart

**TOPIC:**

<table>
<thead>
<tr>
<th>What I Already (K)now</th>
<th>What I (W)ant to Know</th>
<th>What I (L)earned</th>
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Activity: Give One, Get One—Considering Key Trends

Participants share personal experience and professional knowledge with one another regarding key trends likely to be drivers of educational technology adoptions over the next five years and then consider shared suggestions, ideas, and insights.

Resources You Will Need:

- One copy of the Give-Get.doc handout for each participant (downloaded with the Discussion Activities).
- Flip chart, computer and projection device, whiteboard, or some medium to record and share responses.

How to Conduct the Activity:

1. Distribute to each participant a copy of the Give One, Get One handout.
2. Tell participants that *The NMC Horizon Report: 2013 K-12 Edition* identified five key trends that are currently affecting the practice of teaching, learning, and creative inquiry and which are predicted to have a significant impact on education and technology adoption in the next five years. The five trends are listed on the handout.
3. Have participants take a few minutes to individually consider each trend and the accompanying question and then respond on two of the lines for each question, leaving the remaining four blank.
4. At the end of the work time, tell participants to pair off. Have each person in the pair consider each question and, taking turns, offer suggestions, ideas, and responses for each of the questions. If the speaking person suggests a new idea not already recorded by the listening person in the pair, it should be explained and added to the list.
5. At the end of pair work time, have each participant find a new partner and repeat this process.
6. Debrief with the whole group and ask volunteers to provide the best suggestions, ideas, and responses offered. Record them and share.
Give One, Get One—Considering Key Trends

Trend #1A: Education paradigms are shifting to include online learning, hybrid learning, and collaborative models.

Consider: *What can we do to successfully leverage students’ active engagement in Internet-based activities and social networks?*

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6. 

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<th>Trend #1B: Education paradigms are shifting to include online learning, hybrid learning, and collaborative models.</th>
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<td>Consider: How are we exploring more collaborative alternatives to traditional face-to-face learning models? What more might we consider in this area?</td>
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Trend #2: Social media is changing the way people interact, present ideas and information, and communicate.

Consider: Students increasingly use social media to learn, to socialize, and to present information and ideas. How successfully are our teachers using social media sites and tools, such as Facebook, Twitter, Google Hangouts, and other platforms to connect with students?

1. 

2. 

3. 

4. 

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6.
Trend #3: Openness—concepts like open content, open data, and open resources, along with notions of transparency and easy access to data and information—is becoming a value.

**Consider:** How can openness support the growing shift and conceptualization of education being more about the process of learning than the information conveyed or learned?

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Trend #4: As the cost of technology drops and school districts revise and open up their access policies, it is becoming more common for students to bring their own mobile devices.

*Consider:* “Bring Your Own Device” (BYOD) programs are increasing in popularity in many schools. What do we need to think about as we revisit policies and procedures regarding technology for student use? How are we ensuring all students have access to technology for learning? Is BYOD a viable possibility?

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Trend #5a: The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.

Consider: How can we best leverage access to these vast resources, assess their credibility, and identify those that support our local learning objectives?

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Trend #5b: The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.

Consider: How can we best mentor and prepare our students to be keen evaluators and skilled users of these information resources?

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Activity: Jigsaw—Sharing the Teaching and Learning

Jigsaw is a cooperative learning strategy that allows for peer teaching. In the classroom, students create their own learning. Here, it is a strategy to help stakeholders take ownership of learning about and investigating technologies and not just hear the message from a presenter. Groups study different technologies and then share with their colleagues and learn from one another.

Resources You Will Need:

- At least one copy of The NMC Horizon Report: 2013 K-12 Edition for each study group and one copy per participant, if possible.
- One copy of each of the handouts for each person in the session. Use some or all of the six emerging technologies identified in the Horizon Report—Cloud Computing (Cloud.doc), Mobile Learning (Mobile.doc), Learning Analytics (Analytics.doc), Open Content (Open.doc), 3D Printing (3D.doc), and Virtual and Remote Laboratories (Laboratories.doc) (files downloaded with the Discussion Activities)—or create one or more of your own handouts, based on technologies of interest to your school or institution.

How to Conduct the Activity:

1. Determine how many emerging technologies you wish to focus on and divide session participants into that number of groups, e.g. if you decide to address each of the 6 technologies referenced in the Report, you will have 6 groups.
2. Count the number of session participants. For the sake of this example, let’s say there are 18 participants.
3. Divide the number of participants by the number of technologies to be discussed. This will be the number of participants in each group (for our example, 3 in each group). Groups do not have to be equal in number.

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4. Vary the time for the study period according to your timeframe and the audience. Distribute the handouts, giving one emerging technology to each group so that each participant in the group has a copy. (For very large groups, you might have more than one group discussing the same emerging technology.) During the study period, each group
should consider and discuss one new emerging technology, its benefits, and its potential to address any key local problems or needs. Each group will have responsibility to share information learned and questions posed by sharing with other groups. As they study the information they will present, participants may be reading, taking notes, discussing, asking questions, and preparing presentation materials.

5. At the conclusion of the study period, have participants in each group number off, e.g. 1, 2, 3, etc. Have participants form jigsaw learning groups—all of the 1’s will go to one jigsaw group, all of the 2’s to a second group, etc. With this example of 18 participants, there will be 3 jigsaw learning groups of 6 participants each.

Each jigsaw learning group will have one participant “expert or teacher” from each of the initial groups, i.e., one who can present an overview of the emerging technology, discuss its benefits, share the potential the technology might have to address any key local problems or needs, and identify questions and issues that warrant more research and investigation.

6. Have participants in the jigsaw learning groups, one at a time, “teach and share” with other participants what they have learned. Others in the group should be encouraged to ask questions to clarify their understanding of the technology, benefits, and further research needs posed.

7. By the end of the activity, each participant will have overview information and thoughts for reflection for six emerging technologies that may have potential to address local needs and problems. Just as each piece of a jigsaw puzzle is critical, each participant will have an important and critical part in successfully accomplishing the teaching, learning, and sharing.

8. Debrief with the whole group and record what was learned, what benefits were realized, and what additional research is warranted. Develop a plan for how to best accomplish it. Provide each participant with copies of each of the additional 5 handouts so that each participant has a complete set.
Emerging/Promising Technology: Cloud Computing

What is Cloud Computing?
Cloud computing refers to expandable, on-demand services and tools that users access via the Internet from specialized data centers, so services and tools do not have to reside on the user’s device. This saves resources and money and has changed how users think about computing and communication, data storage and access, and collaborative work.

The cloud makes it easy for teachers and students to access resources from any device, and classrooms are integrating cloud-based tools such as Google apps into the curriculum. Tablets and smartphones take full advantage of the cloud, and many schools are considering these devices for 1:1 implementations.

Cloud-based services provide solutions addressing a wide variety of needs related to infrastructure, software, and security. They cut the cost and time required for server maintenance and serve as an efficient way to protect data, develop applications, and deliver software and online platforms. Many schools have begun to outsource part of their infrastructure to cloud providers. While the cloud has reached mainstream use in schools for many purposes, new capabilities arising from development of private and hybrid clouds are helping to create a system that is even more scalable, secure, and safe.

Benefits:
• The cloud helps reduce IT overhead costs and costs of server-based infrastructures.
• It is recognized as a means of improving productivity and expanding collaboration in education.
• It supports easy sharing of media and materials as well as mobility.
• It helps schools support one-to-one learning and BYOD deployments.
• Web-based applications work in any browser and offer a device-agnostic place for project materials, submissions, and assignments.
• It helps remove the pressure of having to continually update machines and software.
• It helps to provide media-rich resources to students in remote or rural areas.

What do you see as promising benefits that could address local problems or needs?

What do you see as issues to be further researched/investigated?

ASSIGNMENT: You have 15 minutes with your group to collaborate and decide how to best present an overview of this emerging technology and its possible application to local problems or needs and to identify any questions you have or issues you think warrant further research and exploration. Be prepared to teach and share your discussion points about cloud computing with other participants.
**Emerging/Promising Technology: Mobile Learning**

**What is Mobile Learning?**
Mobile learning is positioned for widespread adoption over the next year, and schools are exploring how to make their websites, educational materials, resources, and opportunities available online and optimized for mobile devices. Education companies too are developing programs, platforms, and curricula for these devices.

The diversity of mobile apps has significantly expanded capabilities of mobile devices, with one of the fastest growing categories of apps being those for young children. These apps offer a wide range of tools for teaching and learning. And the easy-to-use, touchscreen interface found in tablets and smartphones supports use without the need for instructions or manuals. One of the biggest appeals of mobiles is that they naturally encourage exploration and help to expand knowledge.

Tablets, smartphones, and mobile apps have become too capable, ubiquitous, and useful to ignore. This year, mobile traffic on the Internet is expected to surpass desktop traffic. As schools consider and open up policies for Bring Your Own Device (BYOD), they are able to leverage devices that students already own and use. And a growing number of schools are using mobile devices to provide a systemic solution in which every student has access to a device to support learning both inside and outside the classroom.

**Benefits:**
- The simple interface of mobile devices allows for intuitive use.
- Tablets and smartphones can be used and interacted with by even the youngest of students.
- Highly portable mobile devices provide access to endless learning, collaboration, and productivity.
- They foster student engagement with peers and with content.
- Learning and productivity apps help users learn and experience new concepts anywhere they are and across multiple devices.
- Mobiles, tablets, and BYOD policies support cost-effective 1:1 learning experiences in schools.

**What do you see as promising benefits that could address local problems or needs?**

**What do you see as issues to be further researched/investigated?**

**ASSIGNMENT:** You have 15 minutes with your group to collaborate and decide how to best present an overview of this emerging technology and its possible application to local problems or needs and to identify any questions you have or issues you think warrant further research and exploration. Be prepared to teach and share your discussion points about mobile learning with other participants.
Emerging/Promising Technology: Learning Analytics

**What is Learning Analytics?**
Learning analytics is part of the growing discussion and exploration of the use of “big data” and analytic techniques to gain insight into behavior. In business, it is a science used to analyze and inform commercial activities, spending habits, and consumer interests and behavior. In education, it focuses on using student data to improve student retention and support high quality, personalized learning experiences. Applied analytics helps transform a more traditional one-size-fits-all education delivery system to a more flexible framework responding to the interests and the academic needs of each learner.

As teachers have worked to incorporate more web-based software and online resources into their curricula, it has become more difficult to track individual student progress—and even more so for an entire class—when data is coming from multiple websites. Analytics platforms are growing in both complexity and effectiveness, and some developers are offering ways to integrate data from various online learning platforms into a single interface, or dashboard.

There are privacy and safety issues to be considered but in the context of potential benefits to be gained by tracking and assessing valuable information about students’ online work, preferences, and experiences.

**Benefits:**
- Learning analytics leverages student data to build better pedagogies.
- It can help teachers gain insights into their students’ learning activities.
- Data can help make early detection of behavioral patterns and identification of learning issues.
- It helps target at-risk students and populations.
- It helps assess whether programs designed to improve retention have been effective.
- Data and analyses can be used to adapt instructional practice in real time to individual learner needs.
- Data and analyses help inform district-wide planning, designing, and assessing learning experiences.

**What do you see as promising benefits that could address local problems or needs?**

**What do you see as issues to be further researched/investigated?**

**Assignment:** You have 15 minutes with your group to collaborate and decide how to best present an overview of this emerging technology and its possible application to local problems or needs and to identify any questions you have or issues you think warrant further research and exploration. Be prepared to teach and share your discussion points about **learning analytics** with other participants.
Emerging/Promising Technology: Open Content

What is Open Content?
Interest in open content is expanding, driven by a growing set of open source textbooks and resources from publishers, K-12 organizations, and schools. Also contributing is a growing shift to conceptualizing education to be more about the process of learning than the information conveyed or learned.

Interest is additionally being driven by a growing recognition of the collaborative philosophy behind creating and sharing free content. A core part of the philosophy of open content and open education is that insight and experience, as well as information, can be collected and shared. Educators are becoming more comfortable creating and disseminating their own educational resources.

As more resources become available and often for free, via the Internet, educators are becoming more adept at finding, evaluating, and effectively using them. These same skills critical to maintaining currency in any area of study—the ability to find, evaluate, interpret, and put new information to use—are being acquired by students, too.

Open content addresses a number of concerns facing education institutions today, among them the rising costs of instructional materials and also the challenges of providing quality educational resources to all students. Open textbooks have proven worthy competitors to standardized texts, and publishers are being challenged to provide more digital, customizable alternatives to traditional print texts.

Benefits:
• Open content promotes acquisition of critical literacy skills.
• It provides an effective means of distributing high-quality, accessible educational materials.
• It encourages not only sharing of information, but also sharing of pedagogies and experiences.
• Open resources help expand curricula with media-rich tools and texts adapted to specific lessons.
• They help address the rising costs of textbooks and other educational resources.

What do you see as promising benefits that could address local problems or needs?

What do you see as issues to be further researched/investigated?

ASSIGNMENT: You have 15 minutes with your group to collaborate and decide how to best present an overview of this emerging technology and its possible application to local problems or needs and to identify any questions you have or issues you think warrant further research and exploration. Be prepared to teach and share your discussion points about open content with other participants.
Emerging/Promising Technology: 3D Printing

What is 3D Printing?
3D printing refers to technologies that construct physical objects from three-dimensional (3D) digital content and provides a more accessible, less expensive, desktop alternative to industrial forms of rapid prototyping. Much of the interest in this emerging technology stems from the Maker culture, which supports a do-it-yourself approach to science, engineering, and other disciplines and emphasizes innovation and prototyping.

In 3D printing, the printer is able to build a tangible model or prototypes from an electronic file, one layer at a time. An object can be created from the bottom up, layer by layer, and the process can allow for moving parts within the object, application of color, and more.

3D printers are easy to use and offer a variety of applications for teaching and learning, especially as students can rapidly prototype designs and engage in true experience-based learning with fragile objects or others that may not be available in the school. 3D printing is proving a popular solution for schools seeking to integrate more soft skills, such as creativity. And many schools are investigating it for STEM subjects and preparing students for the 21st century world of work.

Benefits:
• 3D printing helps illuminate the design process.
• It facilitates building of rapid prototypes and models that demonstrate concepts in curricula.
• It enables more authentic exploration of objects that may not be readily available in schools.
• It supports integration of soft skills into standards and the curriculum.
• 3D printing applications let students create something that is all their own.
• Students can translate scientific and mathematical principles into something they can physically grasp and create and test concepts and models without being challenged by the production process.

What do you see as promising benefits that could address local problems or needs?

What do you see as issues to be further researched/investigated?

Assignment: You have 15 minutes with your group to collaborate and decide how to best present an overview of this emerging technology and its possible application to local problems or needs and to identify any questions you have or issues you think warrant further research and exploration. Be prepared to teach and share your discussion points about 3D printing with other participants.
What are Virtual and Remote Laboratories?
Virtual and remote laboratories provide students a way to conduct scientific experiments from any device they are using. Experiments may be conducted repeatedly and with greater efficiency and precision. Plus, students can access the laboratories at any time, from anywhere, and can spend more time making scientific measurements, engaging in laboratory practice, and making and learning from their mistakes.

Virtual and remote laboratories, while not new technologies, are of growing interest in K-12 education to help improve STEM education, especially in schools unable to afford expensive technology and equipment. High-caliber lab equipment and other elements of a physical science lab can be made available to students from any location, via the Web.

In remote labs, apparatuses are monitored via webcam, microphone, or other sensors. Since actual tools are used, some labs restrict use to one user or class at a time. Virtual labs enable any number of users to simultaneously conduct experiments. In each setting, students are accountable for data collection and analysis, though some virtual labs offer built-in tools to support that work. If a student does not get desired results, the experiment may be conducted as many times as needed.

Benefits:
• Virtual and remote laboratories support authentic online education and access to authentic science.
• They make scientific experiences more accessible for schools that lack fully equipped labs.
• They alleviate the financial burden for schools that can access virtual or remote tools rather than having to purchase specific equipment.
• Students can conduct experiments as many times as they like, both inside and outside of school.
• They can participate in authentic but safe laboratory experiences from any location, any time.
• There is less pressure for students to execute perfectly the first time; they can make adjustments and learn from their mistakes.

What do you see as promising benefits that could address local problems or needs?

What do you see as issues to be further researched/investigated?

Assignment: You have 15 minutes with your group to collaborate and decide how to best present an overview of this emerging technology and its possible application to local problems or needs and to identify any questions you have or issues you think warrant further research and exploration. Be prepared to teach and share your discussion points about virtual and remote laboratories with other participants.
Activity: View/Discuss—Learning From Video Clips

As stakeholders consider emerging technologies for teaching, learning, and creative inquiry, use video clips to help paint the picture of their potential. As a group, participants view video clips of educator stories and experiences, analyze them, and make observations as they expand their understanding of the technologies and their application.

Resources You Will Need:

- Computer and projection device to present Web-based video clips.
- One or more of the videos found within the resources listed at the end of each emerging technology section in the Report.
- One copy for each participant of the handout, Observations.doc (downloaded with the Discussion Activities).
- Flip chart, computer and projection device or whiteboard to record observations and questions.

How to Conduct the Activity:

1. Distribute a copy of the Observations About Emerging Technologies and Their Application to each participant.
2. Select video clips from those included in the resource sections of the Report.
3. Review and select any video clip you choose. Some suggestions follow:
   a. Topic: General Overview
      • The New Media Consortium (NMC), producer of The Horizon Report, offers an excellent YouTube video overview of the 2013 key trends, significant challenges, and the six emerging technologies, go.nmc.org/k12-video.
   b. Topic: Cloud Computing
      • From page 13 of the Report, link to go.nmc.org/sugata to hear Sugata Mitra, 2013 TED Prize winner and scientist, share his vision of how cloud computing enables rich informal learning opportunities in his recent TED Talk. His observation that children can essentially organize their own learning led to the notion of “Schools in the Cloud,” learning facilities in impoverished regions of the world that can be operated entirely in the cloud, including lights, locks, and infrastructure.
      • Also on page 13, link to go.nmc.org/sci to learn about the Computer Supported Collaborative Science (CSCS) initiative, an ongoing effort to help science teachers in high-need Los Angeles area schools engage students in authentic research experiences through the use of cloud-based computing tools.
      • And on page 14 of the Report, link to go.nmc.org/momaths to hear about experiences in South Africa with Nokia Mobile Mathematics, which is already
implemented by 200 schools there. The project offers free math lessons for grades 10-12 using a cloud service that can be accessed via web browser on any computer or mobile device. Students can test themselves continuously and receive instant feedback on their answers — even outside of the classroom.

c. **Topic: Mobile Learning**
   - Check out a mobile learning application for music. Students at Institut International de Lancy in Switzerland use their tablets to create music in the school’s first iPad Orchestra. The iPads have provided opportunities for students with little or no musical training to create their own music with classmates. To hear the students perform, from page 18 of the Report, link to go.nmc.org/iil.
   - Also on page 18, link to go.nmc.org/ntthsd to learn how New Trier Township High School District in Illinois launched the Mobile Learning Initiative to evaluate the effectiveness of tablets for teaching and learning.

d. **Topic: Learning Analytics**
   - From page 22 of the Report, review the video overview of Citelighter, software that helps students better organize their research and streamline their writing process. It also provides analytics that pinpoint and diagnose problem areas, allowing them to improve their writing over time. Link to go.nmc.org/cit.
   - Also on page 22, link to go.nmc.org/fla to see how high school Spanish teacher Matthew Day uses Schoology in his flipped classroom to see how many attempts students have made before they were able to achieve a high score on their homework assignments.

e. **Topic: Open Content**
   - In the Report on page 26, link to go.nmc.org/sousa to learn about Arizona instructor James Sousa, who has been teaching math for 15 years at both the community college and K-12 levels. He has developed more than 2,600 video tutorials on topics from arithmetic to calculus, all licensed under a Creative Commons Attribution license at Mathispower4u.
   - Also on page 26, view an overview of Gooru, a STEM education research, search, and curation portal that relies on crowd sourcing and collective intelligence. A team of educators is tagging curated teaching resources at the conceptual level. They identify factually correct, image-rich web content that can aid students and teachers when they are learning about a specific subject, such as velocity. Link to the video at go.nmc.org/gooru.
   - As described on page 27 of the Report, Share My Lesson is an online community where educators can access and exchange educational resources. Registered users can search by grade, discipline, or topic, and connect with others through discussion forums. Link to go.nmc.org/myless to view one of the available video clips and learn more.
f. **Topic: 3D Printing**
   - From page 32 of the *Report*, link to [go.nmc.org/lcs3d](http://go.nmc.org/lcs3d). At the Limestone County Career Technical Center in Alabama, local high school students are using 3D printers to design and build models they can hold and explore. This gives them the ability to make revisions right away and consult with other students and educators about different engineering approaches.

g. **Topic: Virtual and Remote Laboratories**
   - As noted on page 32 of the *Report*, one of the most effective remote laboratory systems is iLab Central, featured in previous editions of the *NMC Horizon Report* for its collaborative applications and creative use of cloud computing. Developed by Northwestern University in partnership with MIT, iLab Central provides teachers and learners in traditional and online high schools, museums, and educational programs with opportunities to explore science by accessing the actual equipment that scientists use. Link to a descriptive video at [go.nmc.org/ilab](http://go.nmc.org/ilab).

4. Show a selected video.
5. Provide time for participants to record their observations on the handout.
6. Have participants work in small groups to compare and discuss their observations.
7. Call time and ask participants to take a minute to individually record on the handout questions they have and what more they would like to know.
8. Have each small group report its observations and discussions. Record these and group them, as makes sense, into common themes or categories.
9. Ask for volunteers to identify questions that remain and record them.
10. Brainstorm to develop suggestions and a plan for how to research and find answers to the remaining questions and share the findings.
Observations About Emerging Technologies and Their Application

OBSERVATIONS

List 5 or more observations you made while viewing the video clip.

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QUESTIONS

Considering your observations and discussion with your group, list any remaining questions you have and anything more you would like to know.

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Activity: Walk and Talk—Hearing Students’ Voices

As schools consider emerging technologies, some of the stakeholders with the broadest vision may well be students. Participants schedule time to visit classrooms and engage in dialogue with students about their vision of a learning environment where they would be most engaged and their opinions about emerging technologies and their application for teaching and learning.

Resources You Will Need:

- None required.
- (optional) As discussion starters, you could use some of the videos included in the View/Discuss – Learning From Video Clips activity included in this Discussion Activities document or the YouTube Horizon Report overview produced by the New Media Consortium (NMC), go.nmc.org/k12-video.

How to Conduct the Activity:

Do one or more of the following or modify these suggested activities to align to your local situation and to make the observation experience, discussions, and reflection most meaningful for your stakeholders:

1. Have stakeholders, in pairs or small groups, visit one or more classrooms to observe the learning environment. Ask them to be prepared to come back and share their observations and to specifically consider the following questions:
   - Did the learning environment appear to be engaging to students? Why or why not?
   - Did the learning environment positively contribute to achieving the mission, goals, and objectives of the school, district, or institution?
   - In the classroom you observed, if you were to imagine a 21st century learning environment ideally targeted to student needs, what would you see?

2. Have stakeholders, in pairs or small groups, visit one or more classrooms to interview students and engage in dialogue with them about their habits, learning preferences, and vision for how emerging technologies might positively contribute to their learning. Ask stakeholders to be prepared to come back and share what they heard.

Suggestions for types of questions that could be posed to students follow:
Habits

1. What kind of electronic devices do you have? Which two are the ones you most use?
2. How do you like to use technology to communicate with your friends? To communicate with students in your class? To communicate with teachers? To accomplish schoolwork?
3. Do you actively participate in online communities? What interests you and drives you to specific ones?
4. Which social networks do you use? How and for what purpose?
5. Do you use Facebook for any schoolwork? If so, in what ways?
6. Do you ever Tweet about school topics that interest you? About personal things that interest you? How frequently do you do each?
7. How do you use your cell phone, smartphone, tablet, or other mobile device? What functions are most important to you and for what purposes? How might mobile devices support learning activities?
8. Do you play online games? If so, what is the primary appeal? Are there any skills you are acquiring or strengthening when you play? Which ones? How might online games support learning?
9. Do you ever create and post videos or podcasts? For what purpose?
10. Do you ever use online tools for collaborative writing with students you know? With students you don’t know? Describe any experiences with these.

Learning Preferences

1. How do you like to learn new information?
2. Where do you most like to learn?
3. What kind of technology tools do you want to have access to when learning?
4. How do you use technology tools and digital resources to learn?
5. Do you use any web tools or apps to help organize your ideas, opinions, experiences, feelings, or research? Which ones and how?
6. Are there any technologies you use outside of school that you wish you had access to during the school day? Which ones and why?
7. Do you ever seek homework assistance online? Have you ever taken an online course you selected to study or help you better understand some topic? Describe the experience.
8. Have you ever worked with an online tutor or expert? Have you ever tutored others online? Describe the experience.
**Vision of Technology Use**

1. Describe an ideal learning environment that would appeal to you. What would it look like? What would the teacher be doing? What would students be doing? What kinds of tools and resources would be available? What kind of activities would be going on? What would help make learning more relevant and meaningful to your life or to your world outside of school?

2. Do you see any obstacles to using technology at school? If so, what are they?

Consider various audiences to hear the summary of these messages, e.g. teachers, principals, the superintendent or cabinet, the school board and others. Let the students know, too, that they were heard—report back to them what was learned from the dialogue.

3. Have stakeholders, in pairs or small groups, visit one or more classrooms to interview students and engage in dialogue with them about their vision for how the emerging technologies presented in the *Report* might contribute to the learning environment or help address educational challenges. It might be useful to start with one or more of the video clips suggested in the View/Discuss – Learning From Video Clips activity. Ask stakeholders to be prepared to come back and share what they heard. Report back to the students what was learned from the dialogue. Consider various audiences to hear the summary of these messages, e.g. teachers, principals, the superintendent or cabinet, the school board, and others. Let the students know that they were heard—report back to them what was learned from the dialogue.
Activity: Brainstorm—Professional Development Goals

Participants engage in individual and group brainstorming to identify priority professional development needs regarding the application of new technologies for teaching and learning. Needs are prioritized, and brainstorming a second time is conducted to identify ways to best meet professional development goals.

Resources You Will Need:

- Participants’ prior access to the emerging technologies discussed in *The NMC Horizon Report: 2013 K-12 Edition*.
- 20 index cards for each participant.
- Flip chart, computer and projection device, whiteboard, or some medium to record and share responses.

How to Conduct the Activity:

1. Before conducting this activity, use some method to provide participants with an overview of the emerging technologies discussed in *The NMC Horizon Report: 2013 K-12 Edition*. Use selected slides in the Presentation Template included in *The CoSN Horizon Report: 2013 K-12 Edition Toolkit*, show the YouTube Horizon Report overview produced by the New Media Consortium (NMC), [go.nmc.org/k12-video](http://go.nmc.org/k12-video), or some other method.
2. Tell participants you want them to help identify ways to best provide additional resource information and professional development that will support their gaining expanded knowledge about any emerging technologies that have promise for addressing local needs or challenges.
3. Divide the participants into groups of 4-5 each. Give each participant 10 index cards.
4. Tell participants they don’t have to use all of the cards but to individually write down questions they have or topics they want to know more about regarding emerging technologies that might have promise to address local challenges, putting one question or topic on each card.
5. After 5-7 minutes, call time. In the groups, have participants share their questions and topics with one another and group them into categories. (Do not identify categories, but examples might be questions or topics related to data-driven instruction, return on investment, improved communication, personal concerns, or others.)
6. After questions and topics have been discussed and categorized, have each group provide a 1-minute summary of the category with the most questions or topics. Record the findings as they are reported. (If time permits, you can have each group report on the top two or more categories.)
7. Point out the category with the highest level of interest or need.
8. Give each participant 10 new index cards. Tell participants to individually write down, one idea per card, ideas they have regarding the most effective or most creative ways they can think of to deliver responses to the questions and expand the knowledge of education stakeholders in the defined category.

9. After 5-7 minutes, call time. In the groups, have participants share their ideas with one another and prioritize them into the ones they feel will be most beneficial and effective or which are most creative in addressing professional development needs.

10. After ideas have been shared and categorized, have each group provide a 1-minute summary of the most effective or most creative ideas suggested. Record the findings as they are reported. (If time permits, you can repeat this process for one or more of the other categories with a high level of interest or need.)

11. Make a commitment to use some of the suggestions to provide professional development resources and support to address the identified needs. Follow through with that commitment, allowing stakeholders to see how the results of this activity influence printed, online, and face-to-face interaction as well as other types of resources and learning opportunities offered to target their identified needs.

FEEDBACK FORM

Please tell us your story and how you are using the Report and the Toolkit. As this is the third year CoSN has provided such a resource around the Report, we appreciate comments about your experiences using the Toolkit. Provide feedback following discussions with your local or regional stakeholders in order to help us know about your successes, better understand your needs, and improve our future resources. This form is available online at www.CoSN.org/Horizon or fax or email as indicated below.

1. How did you use the CoSN Toolkit (Presentation Template, Discussion Facilitator's Guide, Discussion Activities, and Video Clips) in your presentations and discussions? How well did the Toolkit support your conversations about emerging technologies in K-12?

2. How many people have been involved in reading and/or discussing the Report?

3. Were there any particular outcomes or action items that resulted from discussion?

4. What additional needs do you have, or what additional resources would you or your stakeholders like to see in the next version of the Toolkit?

5. Additional comments:

Name: ______________________________________________________________________________________

School, District, or Institution: __________________________________________________________________

Location (city, state, province, country): __________________________________________________________________

Email: _______________________________________________________________________________________

CoSN and the NMC Horizon Project sincerely thank you for your work and for your feedback. Complete the form online at www.CoSN.org/Horizon or fax it to 202-393-2011 or email it to info@cosn.org.