



Horizon Project

NMC Horizon Report

2014 K-12 Edition Preview

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The Horizon Project Preview is a high-level summary of an upcoming edition’s findings used to elaborate on the particular definitions and framings to be used in the report, and to provide a snapshot of the topics that will be explored in the final edition. The contents of this Preview are a work-in-progress.

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I. Key Trends Accelerating K-12 Ed Tech Adoption

Fast Trends: Driving Ed Tech adoption in schools over the next one to two years

Rethinking the Roles of Teachers

Teachers are increasingly expected to be adept at a variety of ICT-based and other approaches for content delivery, learner support, and assessment; to collaborate with other teachers both inside and outside their schools; to routinely use digital strategies in their work with students and act as guides and mentors; and to organize their own work and comply with administrative documentation and reporting requirements. Students, along with their families, add to these expectations through their own use of ICT to socialize, organize, and informally learn on a daily basis, and many educational thought leaders argue that schools should be providing ways for students to continue to engage in learning activities, formal and non-formal, beyond the traditional school day. As this trend gathers steam, many schools across the world are rethinking the primary responsibilities of teachers. Related to these evolving expectations are changes in the ways teachers engage in their own continuing professional development, much of which involves social media and online tools and resources. While fully online schoolwork is still relatively rare, an increasing number of teachers are using more hybrid and experiential learning scenarios, and experimenting with social media and others ways of building learning communities.

Shift to Deep Learning Approaches

There is a new emphasis in the classroom on more challenge based, active learning. Challenge Based Learning and similar methods foster more active learning experiences, both inside and outside the classroom. As technologies such as tablets and smartphones now have proven applications in schools, educators are leveraging these tools, which students already use, to connect the curriculum with real life issues. The active learning approaches are decidedly more student-centered, allowing them to take control of how they engage with a subject and to brainstorm and implement solutions to pressing local and global problems. The hope is that if learners can connect the course material with their own lives and their surrounding communities, then they will become more excited to learn and immerse themselves in the subject matter.

Mid-Range Trends: Driving Ed Tech adoption in schools within three to five years**Increasing Focus on Open Content**

Open content, or open educational resources (OER), are growing in breadth and quality, as is the use of these materials in classrooms, networks, and school communities. The use and adoption of open content materials is increasingly a matter of policy in schools, especially in the many disciplines in which high quality educational content is more abundant than ever. Understanding that the term “open” is a multifaceted concept is essential to following this trend; often mistaken to simply mean “free of charge,” advocates of open content have worked towards a common vision that defines it more broadly — not just free in economic terms, but also in terms of ownership and usage rights. The goal is that open content are freely copiable, freely remixable, and free of barriers to access, cultural sensitivities, sharing, and educational use. The 2012 UNESCO Paris OER Declaration has been a crucial document for defining open as it relates to the creation, circulation, and standardization of open content.

Increasing Use of Hybrid Learning Designs

As teachers and students alike become more familiar with and adept at using the Internet, traditional classroom pedagogies increasingly include online learning components, hybrid learning strategies, and increased focus on collaboration within the classroom. Schools that are making use of hybrid learning models are finding that using both the physical and the virtual learning environments to their highest potentials allows teachers to engage students in a broader variety of ways, and even extend the learning day. Hybrid models, when designed and implemented effectively, enable students to use the school day for group work and project-based activities, while using the network to access readings, videos, and other learning materials on their own time, leveraging the best of both environments.

Long-Range Trends: Driving Ed Tech adoption in schools in five or more years**Rapid Acceleration of Intuitive Technology**

Thanks to touchscreens and other natural user interfaces, today's students do not have to be experts to personalize their devices, manipulate content, and communicate and collaborate with other users. It is already common to interact with devices entirely by using natural movements and gestures. Smartphones and tablets, Xbox Kinect, Nintendo Wii, the new class of "smart TVs" and a growing list of other devices built with natural user interfaces (NUIs) accept input in the form of taps, swipes, and other ways of touching; hand and arm motions; body movement; and increasingly, natural language. These are the first in a growing array of alternative input devices that allow computers to recognize and interpret natural physical gestures as a means of control. Natural user interfaces allow users to engage in virtual activities with movements similar to what they would use in the real world, manipulating content intuitively.

Rethinking How Schools Work

There is now a focused movement to change the traditional classroom experience and rearrange the school day — a trend that is largely being driven by the shift to innovative learning approaches. Methods such as project- and challenge-based learning call for school set-ups that enable students to move from one learning activity to another more organically. Plus, as these approaches are increasingly multidisciplinary, there is a need for learning design that better connects each class and set of subject matter to each other. The traditional bell schedule can be perceived as jarring as it forces students to move from one class to another in an unnatural manner with no connection between the projects and activities. As learning becomes increasingly fluid and student-centered, some teachers and administrators believe that schedules should be more flexible to allow opportunities for authentic learning experiences to take place.

II. Significant Challenges Impeding K-12 Ed Tech Adoption

Solvable Challenges: Those that we understand and know how to solve

Creating Authentic Learning Opportunities

Authentic learning, especially that which brings real life experiences into the classroom, is still all too uncommon in schools. Authentic learning is seen as an important pedagogical strategy, with great potential to increase the engagement of students who are seeking some connection between the world as they know it exists outside of school, and their experiences in school that are meant to prepare them for that world. Use of learning scenarios that incorporate real life experiences, technology, and tools that are already familiar to students, and interactions from community members, are examples of approaches that can bring authentic learning into the classroom. Practices such as these may help retain students in school and prepare them for further education, careers, and citizenship in a way that traditional practices are too often failing to do.

Integrating Personalized Learning

Personalized learning includes a wide variety of approaches to support self-directed and group-based learning that can be designed around each learner's goals, and include concepts like personalized learning environments and networks, adaptive learning tools, and more. There are two paths of development for personalized learning: the first is organized by and for the learner and includes resources such as apps, social media, and related software. School goals and interests are driving the other path in the form of adaptive learning. In this view, which envisions the development of tools and data streams that are still some time away from being seen in schools, adaptive learning is enabled by intervention-focused machine intelligence that interprets data about how a student is learning and responds by changing the learning environment based on their needs. While the concept of personalized learning is fairly fluid, it is becoming more and more clear that it is individualized by design, different from person to person, and built around a vision of life-long learning.

Difficult Challenges: Those that we understand but for which solutions are elusive**Complex Thinking and Communication**

It is essential for schoolchildren both to understand the networked world in which they are growing up and also — through computational thinking — to understand the difference between human and artificial intelligence, learn how to use abstraction and decomposition when tackling complex tasks, and deploy heuristic reasoning to complex problems. The semantic web, big data, modeling technologies, and other innovations make new approaches to training learners in complex and systems thinking possible. Yet, mastering modes of complex thinking does not make an impact in isolation; communication skills must also be mastered for complex thinking to be applied in profound ways. Indeed, the most effective leaders are outstanding communicators with a high level of social intelligence; their capacity to connect people with other people, using technologies to collaborate and leveraging data to support their ideas, requires an ability to understand the bigger picture and to make appeals that are based on logic, data, and instinct.

Increased Privacy Concerns

Privacy has long been a concern in K-12 education, which is evident through legislation that has been passed to safeguard students and their personal data. As schools embrace ubiquitous technology, and more learning takes place online in 1:1 settings, many see great potential to leverage these digital learning environments to mine data, which can be used to decipher trends in student behavior and create personalized software. First mentioned in the *NMC Horizon Report > 2012 K-12 Edition*, learning analytics has intrigued many school leaders and educators that want to use data to improve learning outcomes; yet, parents along with leaders in the field have voiced their apprehension and outright suspicion about collecting data from K-12 students.

Wicked Challenges: Those that are complex to even define, much less address**Competition from New Models of Education**

New models of education are bringing unprecedented competition to schools, especially for students whose needs are not being well served by the current system. In the past year, massive open online courses have fueled much public interest in online learning, but competition from alternative schools, especially those with online programs, is not new in most K-12 school settings. Charter schools and online learning models have particularly gained traction in the United States, the United Kingdom, and Scandinavia. For school leaders and policymakers, the challenge is to meet such competition head on, offering high quality alternatives to students who need them. As new platforms emerge, there is a growing need to frankly evaluate models and determine how to best support collaboration, interaction, and assessment at scale.

Keeping Formal Education Relevant

As online learning and free educational content become more pervasive, stakeholders and administrators must seriously consider what schools can provide that cannot be replicated by other sources. The idea is to rethink the value of education from a student's perspective and identify what learners need to know to seek credible information, work in teams, and persist in achieving their goals. Educators are discussing the possibility of using high-quality, free online content to teach advanced courses at the secondary level. Hybrid and online learning experiences are commonplace in higher education, and are gradually gaining ground in K-12 education, too; this can be seen in the growing number of schools that are using resources like Khan Academy to implement the flipped classroom approach. In this blended model, time spent at school is focused on peer-to-peer and student-teacher interactions for problem solving. Meanwhile, students take advantage of the environment to socialize and participate in extracurricular activities that enrich their minds and bodies.

III. Important Developments in Technology for K-12 Education

Time-to-Adoption Horizon: One Year or Less

BYOD

The term BYOD, which stands for “Bring Your Own Device,” refers to the practice of students bringing their own laptops, tablets, smartphones, or other mobile devices with them to class. Intel coined the term in 2009, when the company observed that an increasing number of its employees were using their own devices and connecting them to the corporate network. Since then, this type of activity has become commonplace in workplaces all over the globe. The BYOD movement in education institutions is being driven by a major challenge that many institutions face — a lack of funds to support one-to-one learning, which is a systemic solution in which every student is provided a laptop or mobile device that can be used to support learning in and outside of the classroom. BYOD makes one-to-one easier by simply leveraging the devices that students already have, or those their parents can buy for them. In practice, it has proven important to provide funds to support families in financial need, and to standardize on a small set of devices and software packages. Often the school will negotiate advantageous pricing for families to reduce their costs.

Cloud Computing

Cloud computing refers to expandable, on-demand services and tools that are served to the user via the Internet from specialized data centers, and consume almost no local processing or storage resources. Over the past few years, cloud computing has been firmly established as an efficient way for businesses to protect data, develop applications, deliver software and online platforms, and to collaborate. Cloud computing resources support collaboration, file storage, virtualization, and access to computing cycles, and the number of available applications that rely on cloud technologies have grown to the point that few education institutions do not make some use of the cloud, whether as a matter of policy or not.

Time-to-Adoption Horizon: Two to Three Years**Games and Gamification**

The culture around digital games is growing to encompass a substantial proportion of the world's population, with the age of the average gamer increasing every year. The gaming industry is producing a steady stream of games that continue to expand their nature and impact – they can be artistic, social, and collaborative, with many allowing massive numbers of people from all over the world to participate simultaneously. Now that tablets and smartphones are commonplace, game play is a portable activity that can happen anywhere, and with anyone who is online. Once considered purely as entertainment, scientific studies are revealing the impact games can have on human behavior, leading to their uptake in the worlds of commerce, the military, and education. Similarly, there has been increased attention surrounding gamification — the integration of gaming elements, mechanics, and frameworks into non-game situations and scenarios for training and motivational purposes.

Learning Analytics

Learning analytics is an educational application of “big data,” a science that was originally leveraged by businesses to analyze commercial activities, identify spending trends, and predict consumer behavior. The rise of the Internet drove research into big data and metrics as well as the proliferation of web tracking tools, enabling companies to build vast reserves of information they could study and use to personalize their marketing campaigns. Education is embarking on a similar pursuit into data science with the aim of improving student retention and providing a high-quality, personalized experience for learners. Learning analytics research uses data analysis to inform decisions made on every tier of the educational system. Whereas analysts in business use consumer data to target potential customers and personalize advertising, learning analytics harnesses student data to build better pedagogies, target at-risk student populations, and assess whether programs designed to improve retention have been effective and should be sustained — outcomes for legislators and administrators that have profound impact. For educators and researchers, learning analytics has been crucial to gaining insights about student interaction with online texts and courseware. Students are beginning to experience the benefits of learning analytics as they engage with mobile and online platforms that track data to create responsive, personalized learning experiences.

Time-to-Adoption Horizon: Four to Five Years**The Internet of Things**

The Internet of Things (IoT) conveys information communicated by network aware objects that connect the physical world with the world of information through the web. It does so through TCP/IP, the set of standards that enables network connections and specifies how information finds its way to and from the myriad of connections it contains. TCP/IP was formulated in the 1970s by Vinton Cerf and Robert E. Kahn. The advent of TCP/IP v6, launched in 2006, added enormous new addressing capabilities to the Internet, and enabled objects and the information they might carry in attached sensors or devices to be addressable and searchable across the web. This expanded address space is particularly useful for tracking objects that monitor sensitive equipment or materials, point-of-sale purchases, passport tracking, inventory management, identification, and similar applications. Embedded chips, sensors, or tiny processors attached to an object allow helpful information about the object such as cost, age, temperature, color, pressure, or humidity to be transmitted over the Internet. This simple connection allows remote management, status monitoring, tracking, and alerts if the objects they are attached to are in danger of being damaged or spoiled. Traditional web tools allow objects to be annotated with descriptions, photographs, and connections to other objects, and other contextual information. The Internet of Things makes access to these data as easy as it is to use the web.

Wearable Technology

Wearable technology refers to devices that can be worn by users, taking the form of an accessory such as jewelry, sunglasses, a backpack, or even actual items of clothing such as shoes or a jacket. The benefit of wearable technology is that it can conveniently integrate tools that track sleep, movement, location, social media, and even new classes of devices that are seamlessly integrated with a user's everyday life and movements. Google's "Project Glass" is one of the most talked about current examples — the device resembles a pair of glasses, but with a single lens. A user can see information about their surroundings displayed in front of them, such as the names of friends who are in close proximity, or nearby places to access data that would be relevant to a research project. Another is the Jawbone UP bracelet that tracks how one eats, sleeps, and moves. Other wearable technology already in the market includes clothing that can keep a mobile device charged via solar cells, allow interactions with a user's devices via sewn-in controls or touch pads, or collect data on a person's movements.