

Leading Schools and Educational Innovation with the help of technology

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It is evident that the development of computing and telecommunications technologies is transforming many industries and supporting innovations that can serve new groups, in new ways, at less cost. Since the first microcomputers were invented about thirty years ago, educators have wondered how technology could transform education. Since then, we have seen many attempts to use technology to improve teaching and learning, as well as support school administration and system management. Computers and digital media have been used to support instruction in more authentic, engaging and personalized ways; to assess students and provide feedback on student learning to teachers, school administrators and system management; to manage information about student enrollment, flows, academic progress, and the human resources of schools and education systems; to manage the payroll; and to communicate with the many constituencies that have interests in the work of schools.

Animated by the evident power of technology, and by the awareness that today's students will live in a world where technological literacy is essential for participation in work and civic life, many nations have made significant commitments to provide technology to schools. The most recent form these commitments have taken is to provide one computer or one tablet to each student. In spite of these sizable commitments, a number of studies as well as ordinary observations suggest that technology has not yet supported innovation of the education industry in ways that are commensurate with the transformations which technology has allowed in other industries. Given the many other education challenges remaining (students not in schools, in schools of low quality, or not gaining the necessary skills to be empowered as citizens or producers), why has technology not yet produced the transformation of the schools and educational institutions that would help address those challenges?

We believe that one failure of the efforts to introduce technology to support innovation in schools is that they have inadequately addressed the human side of the enterprise. Good things happen in schools and other institutions because there are individuals who make them happen. Getting groups of individuals to move organizations forward is the challenge of leadership. If we want schools to leverage the power of technology to produce the kind of innovation that will help students be better educated, we need to focus on the role of school leaders in steering this process of change.

Getting school principals to lead technology innovation in education requires first that school principals see this as using technology to support school leadership, and not as focusing their leadership on introducing technology in school. This is an important distinction. Many technology specialists are more focused on technology and its capabilities rather than on understanding the processes that are crucial to the performance of an organization. If principals are to effectively lead innovation using technology, they should first think about the goals they want to achieve and the processes they want to improve, and only then determine how technology can help improve organizational effectiveness. Obviously principals also need to have sufficient knowledge of technology and understand their own skill gaps so they can seek adequate assistance.

Begin with the end in mind

Effective school leaders must start with the end in mind—and the end of educational institutions is to support the development of skills, knowledge, and dispositions for students. What is it that students should learn in order to be engaged, effective, and productive citizens and workers in the 21st century? Clearly they must gain knowledge in core disciplines: the ability to communicate, language, mathematics, science, and social studies. They must also gain additional skills. In the United States, a public-private coalition that is advancing a conversation on what are the essential skills in the 21st century has proposed that the traditional knowledge domains need to be supplemented with critical thinking, creativity, communications, and collaboration (www.p21.org). Students need also to develop skills for citizenship and leadership in all the communities of which they are a part—local, national and global. In addition, socio-psychological research over the last decades has demonstrated the importance of competencies such as resiliency, perseverance, empathy, and the capacity to self-regulate.

The main purpose then of the school leader thinking about how to support innovation with technology should be to design and sustain processes that can help students gain those competencies that will most matter to them in the 21st century. Because schools are not effectively helping all students develop those competencies, this is an area ripe for innovation. At the very core of effective school leadership is instructional leadership.

Map Critical Processes

Following the identification of the instructional goals for innovation, instructional leaders can then map the various processes which can support students in achieving those goals. At the core of instruction is the interaction of students with content and with other learners, including teachers. The key questions for the school leader then are: is it possible to reconfigure curriculum and pedagogy in ways that make education more relevant and more effective? For example, making education relevant consists of helping students understand their world and circumstances and develop the skills that allow them to transform those circumstances. Curriculum and instructional materials are often too removed from the specific context and interests of students, with the result that students fail to see how what they are learning in school connects to their lives. This is the reason pedagogies that give students some choice over what to study, focusing on problems that interest them, tend to be more effective in engaging them. Yet this form of personalization is often difficult for teachers because they may not have access to the instructional resources that would allow students to pursue many different interests. The world wide web potentially offers access to many more resources than were available to teachers and students in a pre-web era. It is now possible for students (and teachers) to learn about subjects unconstrained by the knowledge of their teachers. They can now tap into a global pool of learning objects, from lectures on YouTube on a wide range of subjects; to texts, pictures, and music; course syllabi, lesson plans and lectures of many university courses; and specific lessons developed by specialized communities—computer programmers teaching a new language, people teaching how to make electric, plumbing or car repairs, artists teaching how to draw, and musicians teaching how to play musical instruments.

One of the challenges of traditional instruction is how to pace the presentation of content by the teacher in ways that serve most students in a class. Given the number of students teachers must serve and the amount of content they are expected to cover, allowing for different rates of progression over the material by different students is difficult. In this context there is very limited personalization of instruction. But using computers to support programmed instruction allows much greater personalization of instruction, making it possible for students to go over the material at various rates of progress, follow different sequences in order to achieve similar mastery of the material, and even pursue different pathways altogether.

Traditional instruction engages people in clearly differentiated roles of students and teachers, with the teacher having primary responsibility for the presentation of new content, the assessment of the degree to which students master this content, and the provision of feedback to students. Again the large number of students teachers must teach and the large amount of content limits not only the extent to which teachers can personalize, but also how much feedback they can provide. This limits the feedback students receive, making them very dependent on a single source of feedback. Technology allows us to reconfigure the roles of teachers and learners, allowing students to also be teachers and to provide each other feedback. For example, students can present their work to a wider audience—including teachers, their peers in the classroom, and peers around the world—and receive feedback from them. They can also provide feedback to others.

In addition to numerous innovations that technology can support in the classroom, it can also support multiple forms of learning outside the classroom. Online education and virtual classrooms expand the range of opportunities that students—and teachers—have to gain new knowledge and skills, providing not only access to new content, but also to new communities of peers and teachers beyond those they interact with in their school.

While instruction and pedagogy are the core of school effectiveness, other processes support them. Teacher preparation, from the daily preparation of lesson plans, to the preparation of the entire curriculum of a course, to the study of new subjects to improve pedagogical practice, can be dramatically enhanced by technology. Technology-based platforms make it possible for teachers to access lesson plans or course curriculum of colleagues, in their own school and beyond. Similarly they can learn new skills online, through online courses as well as through self-study of the rich content available on the web. They can also participate in online professional development communities where they can reflect on and improve their craft.

Supporting instruction are a number of administrative processes, from keeping records of student attendance and student progress to producing a range of reports for school administrators and parents. These too can be easily automated in ways that free up teachers' time for instruction and enhance the usability of this information. For example, online platforms make it possible to consolidate student work in portfolios that allow teachers to review the full extent of the work produced by a student over a year.. Similarly, platforms can make visible to students and their parents course objectives, lessons, assignments, and feedback on student work. Effective platforms can help engage parents in ways that

support student learning and can make clear to students what is expected of them and how they are progressing in a course at all times.

Student assessment can also be facilitated by technology, automating analysis of this information in ways that can support learning, teacher professional development, and instructional supervision by school leaders.

In a nutshell, technology can support educational innovations that dramatically improve the performance of traditional school processes, and it can also allow the emergence of new forms of learning. For example, we can allow students to play a greater role in determining their learning goals, to play the role of teachers, and to present their work to a wide variety of authentic audiences,,not just their teachers and peers. While these changes are possible, they are not happening consistently or at a sufficiently rapid pace to allow a substantial reinvention of education.

Think About People

As we suggested earlier, the main limitations in implementing the innovations we have described are not caused by technology. In fact technology at present is significantly underutilized in education; the main limitations are human. A critical actor in enabling the adoption of technology-based innovation is the school leader. In order to engage their organizations in these innovative processes, school leaders need to think about what processes are most conducive to adopting change. Open, participatory processes that empower students themselves, in addition to teachers, are more likely to be effective for a number of reasons. First, because younger generations are more likely to know how to use technology—even if they have not formally learned it in school—than older generations. This means the traditional roles of teacher as the expert and student as the novice do not fit the reality of who has greater expertise with technology in schools. Secondly, new technologies, in particular networked technologies and social media, make new, more democratic forms of leadership possible in ways that were less feasible in the past. At a time when it is possible to tap into the knowledge of the Internet, why do we accept that knowledge is only available to the person in a position of formal authority? Perhaps this is the most significant innovation that education technology enables—allowing teachers, students, parents, and other stakeholders to redefine and redesign old and antiquated processes.

Clearly, school leaders engaging in such participatory efforts of innovation need significant social and communication skills, confidence—so they can openly admit what they don't know and value those who know more than they do in some domains—and humility. But they also need to demonstrate a commitment to engaging in a digital world, themselves using technology to carry out their work and continuously learning how technology can help them lead in new and more effective ways. For example, simple emails, Google Docs, and wikis allow principals to orchestrate collaborative discussions with staff, making many face-to-face meetings unnecessary. If principals hope to engage their teams in a process of invention and innovation, they will need to foster a culture of risk-taking and experimentation, of learning from mistakes and of patience when things don't work out as planned. Doing this, of course, would be of great value in helping students themselves develop an innovative and entrepreneurial spirit.

What's Possible

What kinds of innovation are possible to achieve the objectives we have described? What would help school leaders engage their teams and build a culture of innovation?

Developing national standards for leadership in technology would provide some guidance to teachers. In the United States, for example, the International Society for Technology in Education has proposed 5 standards for digital age leadership, which include developing a shared vision for comprehensive integration of technology to promote excellence, creating a digital age learning culture, promoting professional learning and innovation for teachers, encouraging systemic improvement, and supporting digital citizenship. (<http://www.iste.org/standards/nets-for-administrators.aspx>)

Principals need to create shared responsibility for the development of a technology strategy in the school, engaging students and teachers (and perhaps parents and other stakeholders) in this process. As mentioned earlier, this strategy should begin with clear learning goals, mapping the processes that can support the achievement of these goals, and then engaging in the redesign of these processes. This will form the basis of a vision for the use of technology in the school that should become a shared vision by all staff and students. If students and teachers are to gain the skills necessary to use technology to innovate, they need access to technology in school and support with technology service. Infusing the school with technology and creating technology support structures in school are key responsibilities of the technology strategy team and of the principal. The technology team should also develop norms for technology security—including protecting students from strangers who may try to communicate with them online, ensuring that students are not bullied online, and communicating norms about plagiarism from online sources.

Principals need to develop their own skills and to support the development of their teachers' skills in the use of technology by using technology for professional development. For example, web-based platforms such as Edutopia provide rich resources for teachers to watch instructional practices aligned with the development of several 21st century skills. (www.edutopia.org) Similarly, principals could—individually in their school or collaboratively with other schools—use technology to support communities of practice in which teachers reflected on their work. For instance, teachers could use cell phones to take short videos of their own instruction, or of particular classroom activity, and upload this on a website that allowed peers to discuss what they observe. Similarly, teachers could share portfolios of student work and discuss this work as it relates to instructional goals and classroom practice with peers or with school principals. Online communities such as Pinterest or Learn.st allow teachers around the world to visually share ideas and best practices with one another quickly and easily.

As part of their support for teacher professional development, principals themselves could take high quality online courses and encourage their teachers to do the same, as a way to enable them to experience the potential of this resource. Subsequently, some teachers in the school could be supported in learning how to teach online, beginning the development of hybrid models in the school.

Principals could encourage teams of teachers to explore how they can integrate online resources into their curriculum. For example, TED Talks are subtitled in multiple languages, and provide a rich

repository of information on a range of subjects that could supplement instruction. (www.ted.org) There are a number of initiatives around the world to tag learning resources online for easy use by teachers—for example, the Association of Educational Publishers has established a Metadata Project to do this—and the technology group in each school should identify the most relevant frameworks to assist teachers in accessing online learning objects and resources.

In addition to helping teachers enhance their presentations to students, a more innovative role for technology is to allow students a greater role in directing their learning and in supporting the learning of their peers. Students should be spending more time exploring, studying independently or in small groups, engaging in research projects, and designing projects using written texts, digital presentations, or multimedia performances. Students should be encouraged to study real world problems and to design solutions for them. Further, students should be provided time to work on their own with technology on assignments that they design themselves.

If principals are to effectively encourage teachers and students in school to use technology, they need to model appropriate use of technology in their daily work and inspire their teachers by example. Principals could publish their thoughts on a blog, tweet, and use a range of technology-based platforms to manage their school. The art of leadership is largely about communication, and one of technology's greatest strengths is to facilitate one-way and two-way communication—in multiple languages, with text, images, and sound. Communication within a school is therefore another process that principals can improve with technology. For example, the principal could keep a blog, visible to all staff and students in the school, as a way to stay in touch with the entire community and to open discussions of items that necessitate broad input. Principals could use online surveys as a way to frequently elicit feedback from students and teachers. They could use these tools to reach out and promote parental engagement.

Educational innovation has never been more urgently needed in order to provide all learners the opportunities that empower them as citizens and producers in the 21st century. The exponential development of technology provides unprecedented opportunities to develop those innovations. Students, teachers, and principals need to play a central role in transforming schools so they are part of this process of innovation. School leaders can either play a catalytic role in this process, or they can stand in the way. What they choose will ultimately decide whether technology transforms the future of education.