Insights Into Technology-Empowered Learning

With fresh ways of thinking about learning environments, schools can capture the promise of evolving educational models without diminishing the importance of teachers and bricks-and-mortar campuses.

Technology is reshaping education around the world. From the rapid proliferation of massive open online courses, or MOOCs, to the widespread use of devices that support a variety of “blended learning” models (part online, part bricks-and-mortar). This is creating an intersection between new challenges and new opportunities within educational institutions of all types, from early education to universities.

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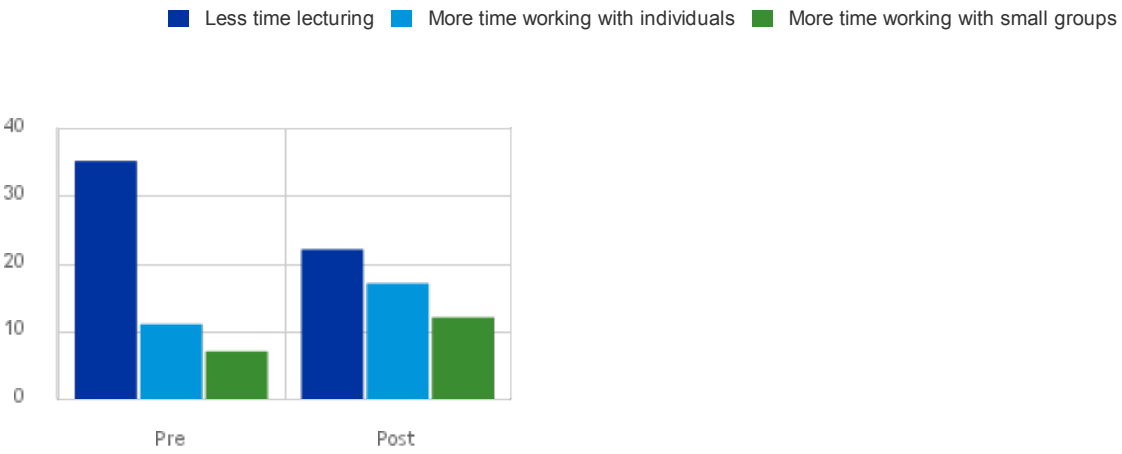
To better understand the dynamics and spatial implications of technology-empowered learning, the Steelcase Education team recently completed a design research study that involved observations and interviews at 16 schools, colleges and universities throughout the United States. This included six colleges and ten high schools. The colleges consisted of both public and private. High schools were public, private and charter. The team also interviewed educators, administrators, technologists and students at the primary, secondary and higher education levels. A key insight from this work: Technology is a tool that is significantly changing the relationship between instructors and students — and improving it in many ways when aligned with teaching strategies and goals.

Instructors are using technology to replace old models of standardized, rote learning and instead creating more personalized, self-directed experiences for their students. There's more multi-device synchronization with software that supports multi-user collaboration and more support for virtual conversations, both within and beyond the classroom. And more students and instructors are creating their own digital content, including animations and videos. The result is deeper, more personalized learning and easier, more efficient access to education.

As educators begin to rethink learning through the lens of effective use of technology, reshaping educational spaces is a pivotal factor for success. With fresh ways of thinking about learning environments, schools can capture the promise of evolving educational models without diminishing the importance of teachers and bricks-and-mortar campuses.

AFTER TECHNOLOGY WAS ADDED TO A CLASSROOM TEACHERS SPENT:



Source: Pennsylvania State's College of Education evaluation of the Pennsylvania Department of Education "Classroom of the Future" program.

Based on its study, the Steelcase research team has identified six key insights to help educators consider spatial responses to the technology revolution that is now well underway in learning.

1) PERSON-TO-PERSON CONNECTIONS REMAIN ESSENTIAL FOR SUCCESSFUL LEARNING.

Early signals from several studies suggest that blended learning is better learning. One prominent example: A 2010 U.S. Department of Education study found that instruction combining online and face-to-face elements had an advantage over purely face-to-face or purely online learning, and neither mode produced better results over the other on its own. In fact, the learning outcomes for students in purely online conditions and purely face-to-face conditions were equivalent. (U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, 2010.)

Educators have long known that schools engender social learning as well as cognitive learning, and many studies have validated that. Recently, for example, in a pilot study of a blended learning high school class, four key elements were identified as important for the role of the teacher: fostering a culture of hard work and persistence, monitoring students throughout the class period for motivation and learning, personalizing instruction and intervening when students are struggling, and building personal relationships of trust and caring. The study was conducted by Envision Schools, Google and Stanford University (Greenberg, Medlock, & Stephens, 2011).

It's clear that learning happens best when people, technology and space are brought together in innovative ways. Even in higher education, despite abundant online instruction and discussion forums, there's evidence that many students still seek face time with their professors and each other as important components of learning. MOOC platforms are meeting the need for interaction by making it easier for students to meet through online social networking portals, grouped by geographical proximity so students have options to meet in person. One MOOC professor announces "office hours" at a coffee shop in his destination city whenever he travels, for students who want to meet him. Some community colleges are now creating blended courses using MOOC content, with the MOOC providing the online experience and the community college picking up the offline experience of professors interacting in person with students.

A joint study undertaken by Harvard and MIT in 2012 showed that students who had person-to-person interactions were more successful in a MOOC electronics course. Almost 155,000 people enrolled in the course, but just over 7,100 passed it and earned a certificate. Whether they collaborated offline with someone else taking the course, as 17.7% of the respondents reported, or with someone who teaches or has expertise in the subject matter of the course area, as 2.5% did, human interaction had a beneficial effect on the grades they earned, according to a published report of the study (Breslow, Pritchard, DeBoer, Stump, Ho, & Seaton, 2013).

As online learning continues to spread and more institutions develop MOOC-based programs for credit, higher-touch options should be explored for online students who want some interaction with faculty, albeit at a higher cost than no-touch or low-touch. The issue of how best to conduct assessments is another largely unexplored issue of MOOCs that may require a spatial solution, such as regional test centers.

2) TECHNOLOGY IS SUPPORTING RICHER FACE-TO-FACE INTERACTIONS AND HIGHER-LEVEL COGNITIVE LEARNING.

Much of the information that only instructors possessed in the past is now available to students online, challenging the old model of educators presenting content and students absorbing it. As a result, progressive educators are now leveraging technology to create a different role for themselves in their classrooms. Instead of using class time to spoon-feed information, technology is helping instructors use their time with students to advance problem-solving, communication and collaboration: exactly the type of higher-order skills that leading education specialists and employers say should be the goals of education – going as far back as those who created the influential Bloom's taxonomy of learning objectives in 1956 (Bloom).

The "flipped classroom" model, in particular, demonstrates this shift to higher-order activities in the classroom by having students learn new content at home and then work through assigned problems in class with the teacher offering personalized guidance and interaction.

Technology along with professional development encourages changes in teaching styles. Data from an evaluation of Pennsylvania's Department of Education 'Classrooms for the Future' program showed that after technology was added to a classroom, teachers spent less time lecturing (35% pre compared to 22% post) and more time working with individuals (11% pre, 17% post) and with small groups (7% pre, 12% post) (Jobe & Peck, 2008).

As students become more engaged in hands-on activities and group work, spaces must support these activities. More mobility inside classrooms and often outside of classrooms, too, calls for flexible learning spaces that support varying activities and modes of learning. One high school principal in the Steelcase study expressed that, instead of classrooms with orderly, row-by-column desks, she needed "a messy room" for creative, generative learning. In a similar vein, the Envision Schools/Google/Stanford University study report states: "From observation, we concluded that good individual or team workspace is at a much higher premium than having direct sight-lines to the front of the room, and that flexible, configurable space will serve the blended classroom much better than traditional desks or tables." (Greenberg et al, 2011, p. 4)

3) INTEGRATING TECHNOLOGY INTO CLASSROOMS MANDATES FLEXIBILITY AND ACTIVITY-BASED SPACE PLANNING.

With technology-enabled learning, students can progress through material at different paces and multiple subjects can all be taught in the same room. Because blended learning changes the role of the educator to become more of a facilitator and coach, teaching is often shoulder-to-shoulder, with multiple teachers acting as tutors and motivators to give directed support. In elementary-level blended learning experiences, there's a growing use of para-educators who work alongside teachers to manage online learning and help with classroom activities, much like graduate students in a university setting.

With the right technology in learning spaces, digital and physical presences can complement each other and participate on nearly equal terms.

Classrooms designed for a teacher to lecture at the front of the room are now being redefined to support self-directed work at computers as well as collaborative projects. Individual rooms are designed with multiple zones versus treated as one-type-fits-all, and different types of spaces are being created to support different types of activities. In the United States, even some kindergarten classes now have a separate zone for individual online work within the classroom. High schools and colleges are gaining efficiencies by repurposing computer labs to use as classrooms. Others are freeing up space previously used for classrooms, instead creating large open areas for self-directed learning. Moveable walls, screens and other flexible approaches to space division make it possible to create a range of spaces for different activities.

In all these instances, instructors are available to assist students as needed.

The need to shut out distractions in self-directed learning environments for focused work is emerging as an issue to solve. Adding screens, panels or dividers to student workstations is a relatively easy way to provide higher levels of privacy. These flexible approaches to space division also make it possible to create a range of spaces for different activities: group project work, group discussions, videoconferencing and one-on-one remote tutoring. They also help future-proof a facility as needs continue to evolve.

It's worth noting that, in addition to supporting successful learning, a range of spaces that support frequent movement throughout the day is positive for students' health, too.

Mounting evidence points to excessive sitting as a major contributor to rising obesity rates, and even short spurts of movement interspersed throughout the day are beneficial (Levine et al, 2005).

4) SPATIAL BOUNDARIES ARE LOOSENING.

As instructors become untethered from the front of the room, concepts of how to define a classroom space are expanding. During the past decade, colleges and universities have increasingly recognized the value of “in-between places” — i.e., informal areas outside classrooms where interaction tied to learning can occur. Now that concept has even more relevance.

Flexible spaces have become more important than ever. Classrooms with mobile tables and chairs, wider hallways to support more activities, cafés with whiteboards, lounges with informal seating and power connections, moveable walls so space can be easily divided and recombined — these are among the fast-emerging design imperatives for effective educational environments.

For some institutions, entire buildings and grounds are being used as “the classroom” — i.e., places where learning activities take place. Especially when using mobile technologies, students and teachers can choose different spaces according to their different needs, making spaces outside the classrooms an integral part of the learning experience, whether students are working alone, with peers or with instructors. Educators at schools that have adopted use of in-between spaces for learning say giving students choices and control is key. It helps students and teachers tailor learning experiences to their specific needs, prepares students for college where learning is typically dispersed in a variety of settings, and also helps institutions more fully use all their real estate.

5) SPACES MUST BE DESIGNED TO CAPTURE AND STREAM INFORMATION.

Video is creating multiple new ways to capture and present content. Instructors’ offices are being adapted to become “recording studios” for creating online content, and web cams are being added to classrooms to capture class activities. University professors are using videoconferencing to connect with subject matter experts around the world to further their research.

Although the use of video for capturing educator-generated content has become well known due to efforts such as Khan Academy and MOOCs, Steelcase researchers also discovered widespread use of video as an evaluation tool for student-presented content or demonstration of practical skills. By videotaping presentations of practical skills, students have the advantage of self-assessment in addition to feedback from peers and grading from the teacher. One innovative teacher in the Steelcase study used video as part of her grading process, giving students personally delivered feedback via video versus only marking up papers in red.

Videoconferencing capabilities are increasingly valued by groups of students. For team assignments or study groups, they often find videoconferencing more convenient and just as effective as everyone meeting together in person.

Increasingly important investments for educational institutions to consider are video-conferencing capabilities that ensure remote participants can easily share information with those in the room plus creating spaces that support audio and lighting needs for creating video content. With the right technology in earning spaces, digital and physical presences can complement each other and participate on nearly equal terms.

6) HIGH-TECH AND LOW-TECH WILL COEXIST.

Although technology developments will continue to revolutionize education, students and teachers haven’t abandoned analog materials — and aren’t expected to anytime soon.

Steelcase research confirmed that analog tools (i.e., tools that are non-digital such as whiteboards, paper, etc.) are increasingly used in tandem with digital tools to capture, visualize and share thought processes. While technology inclusion in lesson delivery is becoming a norm, whiteboards, paper and notebooks remain important tools for teaching and learning. Cognitive mapping research has shown that the physical process of writing and diagramming helps people learn and recall information, cementing their importance to learning in an increasingly digital world.

Schools will continue to need spaces designed to support the parallel use of analog and digital tools. Work surfaces, including tablet arms, should be large enough to support both the analog and digital tools that students use in class. Whiteboards should be affixed to multiple walls versus only at the front of the room, and mobile whiteboards for both student and faculty use offer distinct advantages.

NEW SPACES FOR NEW WAYS OF LEARNING

More than ever, classrooms and informal learning spaces must be highly flexible to support the new behaviors of learning that are the direct result of new technologies. As rapid development occurs and new technologies impact the ways that knowledge is transferred and embodied, the time is right to refine both the processes of education and the places where it occurs. Through innovation, it's possible to bring the best of technology-empowered learning into bricks-and-mortar schools. The results can be positively transforming, for educators as well as their students.

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