

The End of Education As We Know It

By *Andrew J. Patterson, M.D., Ph.D., and Suzi Novak, M.A.*

Captivating the Audience

"Dinner's ready," my wife says as she shuttles between the kitchen and the dining room. "Can you get the kids? They're playing a game on the computer." "Sure," I reply. "Dinner's ready," I shout, ducking my head into the playroom. My son looks up briefly, as if an insect landed on his arm and he needs to brush it off quickly. My daughter doesn't even flinch. Five minutes later my wife stomps into the playroom and turns off the game. The protests begin. "We didn't know!" shouts my daughter. "Why didn't someone tell us dinner was ready?" Clearly, video game designers have perfected the art of captivating their audience.

The "Tipping Point"

In his 2002 best-seller, Malcolm Gladwell described the "tipping point" as the dramatic moment in an epidemic when everything changes. The authors of this article believe that medical education has reached a "tipping point." During the next five years, technology will transform medical education, resulting in enhanced learning efficiency, greater student satisfaction, and more effective communication of information and ideas.

Gladwell suggested that tipping points happen when technology exceeds certain thresholds, when critical masses embrace new things, and when needs become excessive. As my children demonstrated, computer technology has now achieved the status of being remarkably engaging. In many cases, the graphics are lifelike. The medium is entertaining. As we enter the second decade of the 21st century, an increasing number of students and health care workers are proficient in the use of computers. In addition, mobile computing and miniaturized digital devices are making the exchange of information fast and easy. As a consequence, large health care networks are adopting computer-aided communication and learning to improve the quality of care they deliver.

Although advances in technology and greater familiarity with digital devices are allowing the transformation of medical education, it is the information explosion that is making this transformation necessary. In a 2006 *Dartmouth Medicine* article, former Medical School Dean Dr. Stephen P. Spielberg commented that "biomedical knowledge continues to grow exponentially, but the time students can spend in class cannot expand indefinitely." Similarly, the amount of information that practicing physicians must absorb to keep current is expanding rapidly, but the time that clinicians can devote to learning

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is becoming more limited. Indeed, we have reached a point where more efficient and effective learning tools are a necessity for medical practitioners.

Revolutionizing Medical Education

Dr. Larry Chu is a Stanford University professor who directs the AIM (Anesthesia Informatics and Media) Laboratory for the department of anesthesia. An expert in the field of education technology, Dr. Chu was asked what five things are most likely to revolutionize medical education in the near future. His response: “Lecture capture, mobile computing, immersive simulation-based learning, high-quality video, and social networking technologies (i.e., Web 2.0).”

Elaborating on the first two items, Chu said, “Lecture capture will allow didactic lectures to be accessible anytime, anywhere. Mobile computing will bring educational content to the point of care, which is especially appealing to Millennials (i.e, those born between 1975 and 2000), who gravitate toward ‘just-in-time’ learning.” So, for example, clinicians will be able to review protocols and images at the bedside immediately prior to performing procedures like fiberoptic intubation or ultrasound-guided regional anesthetic placement.

Captivating the Audience, Part II

Chu then told us something that made me think about my kids. “By the time today’s Millennials graduate college, each will have spent about 5,000 hours reading books. However, each will have spent over 10,000 hours playing video games.” Chu explained that many of today’s students learn best by experiencing and doing. Consequently, more and more educators are incorporating video game technologies into their teaching. The result is immersion of learners in simulated scenarios, which could be particularly beneficial for anesthesia training and lifelong learning. One system, for example, allows learners to perform clinical procedures and manage crises using point-of-view cameras (which show what subjects are looking at). This technology is not only engaging; there is reason to believe that it is highly effective for teaching clinical skills.

Social Networking

Chu went on to explain that “Millennials are social creatures and prefer to work in groups to solve problems. Social media technologies attract these team-oriented learners because the technologies allow them to connect rapidly to their peers to share advice and knowledge.” According to Chu, “Web 2.0 and social technologies will revolutionize medical learning by changing the traditional educational paradigm. These technologies will enable peer-to-peer learning in ways that have never been possible before.” Residents, for example,

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will be able to request and receive advice from other residents using specialized social media faster than they might receive assistance from their attending physicians using pagers.

Lifelong Learning and Documenting Proficiency

In a 2010 commentary in the *American Journal of Neuroradiology*, Dr. R.D. Zimmerman pointed out that institutions, payers and the government are increasingly looking for documentation of continuing education activity and clinical skills as a means of ensuring quality and safety. For many anesthesiologists, the pressure to appease these entities comes at a time when funds to support nonclinical activities are on the decline. Technology might help solve this problem if convenient, effective and inexpensive tools can be developed and validated for learning and demonstrating proficiencies.

Teaching Teachers to Teach (with New Technologies)

Of course, new technologies do not simply arrive and become integrated into education systems. First, the teachers need to learn to use them. To understand how this process works, we spoke to Dr. Alex Macario, the residency director for Stanford's anesthesia department, who has encouraged use of new technologies by creating faculty education programs. One such program is the Teaching Scholars project, which each year affords six individuals the time and resources to advance their skills. The results are impressive. Thanks to Dr. Macario and several Stanford faculty who embraced new technologies, interns entering anesthesiology now use an effective 10-month on-line anesthesia and virtual mentorship program called Successful Transition to Anesthesia Residency Training (also known as START). A multiyear immersive learning and simulation program known as MY MILESTONES has also been launched. In addition, the Center for Immersive and Simulation-based Learning designed by Stanford's Dr. David Gaba is being used routinely to teach fundamental principles of obstetrics anesthesia, pediatric anesthesia, crisis management, difficult airway management, resuscitation and even echocardiography.

Downsides of the End of Education As We Know It

There will be downsides to the end of education as we know it. Patients are not avatars whose needs can be deferred at the convenience of the game operator. Real-life mistakes cannot be deleted. And there will always be decisions and diagnoses made on the basis of clinical acumen and experience from one-on-one patient interactions. Moreover, neither computers, nor simulators, nor lightning-fast communication devices will be able to teach physicians the humanistic elements of medicine that heretofore traditionally have been

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honored as integral to the calling of our profession: to be kind, compassionate, and committed to the welfare and best interests of patients. Nonetheless, medical education must change if it is to prepare learners for the increasing demands of clinical practice.

Medicine 2.0

Given anesthesiologists' history of embracing new technologies and using them to improve patient safety, it would be surprising if we didn't lead the way in transforming medical education. Indeed, Sept. 16–18 a three-day conference, entitled "Medicine 2.0" and directed by Dr. Chu, took place in Palo Alto, Calif. The event was designed to provide physicians with useful information about emerging technologies and the potential to revolutionize the practice of medicine. Thought leaders from around the world participated as the program offered attendees an opportunity to become a part of the force reshaping medical education.

Dr. Andrew Patterson is an associate professor in the department of anesthesia at Stanford University. Suzi Novak recently retired after 35 years as a high school teacher and administrator. Dr. Patterson was one of her students.

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