A change in the basic vehicles used for learning today—from archetypical courses, lectures, and textbooks to various interactive, electronically portable media—could be the seed for major positive change in our education system. Woodie Flowers, Pappalardo Professor of Mechanical Engineering and MacVicar Faculty Fellow at the Massachusetts Institute of Technology, firmly believes that higher education should have a larger positive influence on society. He describes how properly designed new media materials can significantly improve learning at all levels, including K–12, residential, distance, and lifelong learning.
**Education Strategies**

**Is Higher Education Working?**
A university education has three key components: (1) students must be trained so they have adequate knowledge; (2) they must be educated so they can think critically and grow; and (3) they must be offered an environment conducive to their maturation. By these standards, on a worldwide scale, we are failing. Half of the world’s population is under age 20. We have essentially no hope of educating these young people by conventional means, yet the need to move beyond education for the privileged few is clear.

Sir John Daniel, former vice-chancellor of the Open University in the United Kingdom, put it this way:

Our traditional concept of the campus university will deny higher education to nearly all these young people. Yet providing them with education and training is not just a pressing issue for the countries concerned. This is a time bomb ticking under our collective security. Without vigorous action, many of these young people will grow up to be unemployed, unconnected, and unstable. In a global world, that is a global problem. We require mass training for employability and mass education to inspire the human spirit.

Daniel made these comments in 1997, long before September 11, 2001.

**Training**
My shorthand for the key components of a university education is *informed creative thinking*. To become informed is mostly to be trained. This is the relatively easy part of education. Yet research shows that even at our most prominent institutions, we’re not accomplishing this job. One study asking engineering students at MIT to apply abstract concepts to concrete examples showed that they did not really understand simple machines, understood them less as they progressed toward a degree, and, moreover, were less likely to understand them if they had high grades. Another less scientific example is an infamous video showing Harvard graduates in cap and gown at graduation explaining that our seasons are associated with changes in the distance between Earth and Sun.

**Critical Thinking**
Training and education are readily distinguishable. We train students, for example, by teaching them the principles of calculus (although the preceding paragraph casts doubt even on this). The next step is to educate students to think *using* calculus—that is, to apply principles and concepts by actual performance and demonstration. The enhanced educational benefits of this approach, of “learning by doing,” have been demonstrated in controlled experiments, and yet the lecture and textbook still prevail on campus.

It seems that most colleges and universities, if they do so at all, assess the efficacy of their teaching efforts using tests that evaluate for training rather than for education. Because most studies of distance learning also use tests that evaluate for training, the studies show little difference between the two. I believe, however, that if we could objectively evaluate education, well-designed residential programs would be shown to be superior.

**Maturation Environment**
Quite simply, given the prevalence of alcohol, parties, and sports on our nation’s campuses, I argue that the typical residential freshmen year is almost the antithesis of a good maturation environment. Furthermore, it is my firm conviction that most freshmen courses focus on training and have little to do with education. Training does not justify the costs of most university experiences. Education does.
THE COTTAGE INDUSTRY VERSUS THE NEW MEDIA MODEL FOR HIGHER EDUCATION

There are nearly 3,800 two- and four-year colleges and universities in the United States. Although the diversity of American higher education is impressive, its enormous redundancies are troublesome. One must question the long-term viability of an educational system whose goals could be accomplished much more efficiently, particularly with the cooperative use of new media learning materials.

New media does not mean distance learning or videotaped lectures. Rather, I envision entertainment-quality, World Wide Web–based modules that use animation, voice and video clips, captions, and text—all combined as appropriate in accurate, well-organized, and pedagogically solid productions. I am convinced that the best lecture I have ever given would be no competition for a highly produced new media version covering the same material, particularly if that material were always and instantaneously available to the learner in whatever style he or she preferred.

Typical freshmen courses (as well as many subsequent courses) could effectively be obviated by the use of new media modules. But what, then, should happen on campus? Answering that question is one of the great challenges for the academy. We must learn what parts of education require residence or presence and what parts do not. We must work to understand what it is about being in the same room with another person that helps learning. Whatever that is may be sacred. Computers, however, can help us with much of what remains.

Clearly, students who have the luxury of being together and learning with other smart, motivated students gain enormously. But most students aren’t able to live in the midst of intelligent and culturally diverse colleagues while they learn. The academy has an obligation to these students, too. New media materials can help.

Although there is likely to be a place for residential education at least for the foreseeable future, it is doubtful that the small autonomous-group model will survive for what I call commodity training. Commodity courses are the high-enrollment, largely introductory topics taught at the undergraduate level. These types of courses justify the large investments needed to create rich, engaging, and carefully crafted new media learning materials. The good news is that reluctant learners—not necessarily eager for some of the commodity knowledge they need—will be treated to elegant presentations, and ideally, many will be won over.

CONTINUOUS IMPROVEMENT THROUGH NEW MEDIA

The inherent nature of new media educational materials will allow continuous improvement of the educational process. Compound growth of quality could result. Imagine that at some point in the not-too-distant future, 100,000 students are using an introductory physics new media module. Immediate and substantial feedback on the effectiveness of the module would be available based on test results or “hits” on online homework problems. If, for example, 20 percent of the students have trouble on a test with a specific topic, it is likely that the topic could be explained in a different and clearer fashion in the module. Adjustments to the module could be made immediately, and the latest update could be distributed at minimal cost. Unlike textbooks, modules could go through literally hundreds of updates or editions.

Alumni Relations

More rational alumni relations are long overdue. For hundreds of colleges and universities, homecoming is about sports, and alumni relations center as much on the coach as on the president. The academy must push for more relevant connections with our alumni. Using new media, we can offer what MIT professor Dick Larson calls educational maintenance organizations, or EMOs,
that facilitate ongoing intellectual interaction with graduates. Given the need for lifelong learning in an ever-increasing number of professions, the potential for appropriate lifelong alumni relations is enormous. Additionally, through their experience, alumni would contribute as much to the intellectual life of the institution as they take from it.

**CONCLUSION**

We are closer to being able to produce the compelling and effective new educational media I have described than most realize. Beyond the technology, though, what is most needed is a commitment among institutions to work cooperatively and invest in production of new media educational modules. Once initial investments—which could exceed $20 million for a set of modules—are recovered, the marginal cost of adding new users is so low that discount and free subscribers could be readily added. Cooperative efforts will not only address the serious flaws and enormous redundancies in our current higher education model but, more important, such efforts will help us face the enormous educational challenges we confront on a global scale.

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