

Leveraging Information Technology In Education: Better Models (and Maybe Fewer Computers) Needed

by [Stephen Ruth](#)

MIT media expert [Nicholas Negroponte](#), in his book, *Being Digital*, observes that while a medical doctor from the previous century would not recognize the technology in today's hospital, a college professor from that era would see virtually no change in the tools of education. The teaching tools are not much different from those of Charles Dickens' era, or for that matter, Plato's.

Information technology (IT) is supposed to be making a revolutionary change in all this, but most teaching is still done in classrooms, by teachers physically present, using blackboards and butcher paper, textbooks, frequent exams written on lined paper or blue books, etc. And the costs are going up at a rate lately not much different than that of health care. I believe that the problem is not with IT-the machines and plumbing that connect the institution-but with the way teachers and administrators leverage the new technology. In this context leveraging means squeezing all the possibilities out of a technology to obtain the potential yield, and not simply to install machines. From my perspective as both a teacher and administrator, the very maxim we drill into the students in management courses-strategy must precede structure-is not observed in many educational applications.

Let me use an example from my university. The underlying strategy here at George Mason University is not that we will solve all problems with computers-that is a structural issue, an afterthought once the strategy is determined. We start with a basic strategy: IT services to each student must reach them wherever they happen to be and across all disciplines. Further, a major part of the strategy is that if any special structural (not strategic) uses of WWW, Internet or distance learning emerge, then we would make major investments beforehand to get our faculty up to speed in leveraging them.

Two examples of how strategy led to structure will give a practical sense of what I mean. The president of the university, George Johnson, decided many years ago that he would invest heavily in a center that was aimed exclusively at helping professors become skilled with the new techniques long before we were ever wired up across the campus. The Instructional Development Office cost several million dollars and

has trained a large proportion of our faculty. Campus-wide diffusion of these techniques continues but hundreds of classes leverage the new IT tools far better than would have occurred if a piecemeal approach had been taken to leveraging the IT investment.

The second example is my favorite because it has to do with a very difficult choice—a \$15 million decision—that the president had to make in 1994. He could invest \$15 million and build a brand new academic building, or take the money and rewire the existing buildings—increasing bandwidth, more student ports, better opportunities to deliver high-speed video, etc. Since his strategy was already clear the structural decision was easy for him. He gave up a new academic facility and instead had the campus wired for a broad range of connectivity options, which have proved more useful in the long run than a new building.

A Personal Example

Since the university provided faculty with the structure to leverage these investments, I set out to take advantage of all this new technology. I crept out of my shell and tried an experiment. The proposal: teach a required, mainstream course using every possible new technology available and see if there is a measurable improvement in results. The course selected was MIS 201, an undergraduate requirement taught perhaps eight times per year, and aimed at introducing pre-business students to the concepts and the tools of computer-based automation in a business setting. This type of course is taught at most universities and junior colleges in the US. A lengthy discussion of my findings appeared in the September/October issue of *Educom Bulletin*, but here, more briefly, are the results: The class did a lot more work than is usually required—but they loved it. I used all the technologies—World Wide Web, Internet, CD-ROM, audiocassettes and videocassettes, distance education, touch screen multimedia training, autodidactic teaching systems for learning spreadsheet and database programming, and many more. Nearly all our students have jobs and some do not finish in exactly four years so the idea of working a lot harder, but doing most of it away from the formal classroom, delighted them. They worked better, learned more and we even reduced the unit cost of course delivery. The work output expected of the students was increased significantly but the delivery system was drastically changed. Time in the formal class setting was reduced from 45 hours to 12 hours. These hours were replaced by increased one-on-one office hours with individual students—on their schedules, not mine. There were no formal exams. Most lectures were on TV or audiocassettes or in

cyberspace. Extensive writing and practice with information technologies were required. And there was a major individual research project that offered the option of presenting the results on the campus TV studio. The course was definitely not "dumbed down." Just the opposite. For example, students were required to use an 800-plus page graduate text instead of the 400-page undergraduate version.

Was technology the reason for this success story? Only partly. In fact, technology was only a bit player-the star of this show was a completely different model of what teachers and students do in the learning process.

Learning Model: Students as Discoverers, Not Receptacles

The model that education has used for centuries considers the student a vessel to be filled at regular intervals with knowledge. It's certainly the one I have used and the one that the students seem to expect. The alternative, and the one employed in MIS 201, is that the student is a co-discoverer of knowledge and the professor is responsible for seeing that the discovery takes place. This model means that we don't need to be confined to a classroom if discovery can take place in different spaces, even cyberspace. Even co-discoverers still need some traditional navigating tools, though. An excellent text, as well as lots of TLC, were necessary ingredients of these computer-based discovery projects.

Technology: Everything but the Kitchen Sink

I used everything available to exploit the technology that is so abundant in the US education system. Like most universities, we have TV facilities, links to the Internet and World Wide Web, a capability to have our own course home pages, PCs for students to use if they don't have one at home or work, CD-ROMs in the library and some of the labs, and so on. We also have a few automated classrooms, although these rooms were often monopolized by some of our young English and astronomy professors who were teaching with some of the most amazing Web-produced materials I've ever seen.

Several weeks before the course started students were given a series of tasks to complete, networks to connect to, and audiocassettes to listen to in preparation for the class. Many students found it a big help to be able to get about a quarter of the course work "out of the way" before classes started.

Traditional Exams: Not Needed For MIS 201

When the educational model is one of discovery rather than the meting out of facts, new measurement methods become possible. First of all, this course involved a lot of writing. Students were required to keep a detailed notebook, which I reviewed often. At a minimum I expected them to find about a dozen pages of things to write about in each of the fifteen book chapters. My friends in psychology tell me that there is a high correlation between writing and learning-so we wrote (and wrote, and wrote) in lieu of traditional exams. Even a single error was grounds for having a paper returned, so standards were easy to establish and enforce.

Lectures

Since we only met in the formal classroom setting for ten hours there had to be a way for me to impart my spin on the material. Thus, I became a TV personality. The lectures appeared on the university's Northern Virginia cable channel and were also available in the library. Most of the students had jobs so they either set their VCR for the appropriate time or went over to the library when they were on campus and viewed the material at their convenience.

Discovery Projects

The university also made it possible for us to have a class home page, a place where students could get daily tips from the professor, student volunteers and each other. The home page was also the location of about half-dozen discovery projects, in which students had to use technology to figure out a problem from another class.

Meeting With the Students

A lot of taxpayers will rightly complain if students have only a dozen hours with the professor in class and no other contact. While it's true that we were in touch by email all the time, that clearly is not enough. First, I drastically increased my weekly office hours. And I got to know the students a lot better, as their office visits were not limited to those that were required. We talked about the course, about students' jobs, and anything else that needed to be discussed. During the course evaluations I was pleased that most of the students said they had gotten to know the professor in this course more than in any other they had taken at the university.

Needed: Not Better Computers: Better Models to Serve our Customers

What were the results? The indicators that are most important to me were positive. The students unanimously preferred the approach to the traditional methods. Obviously they produced more and learned more. The dean of my school approved subsequent use of the approach, not just in MIS 201, but in other classes, including graduate classes. And Dr. Johnson, the university president, invited me to present the idea to a delegation of state legislators. They seemed to like it too.

If this works, how can we take advantage of it? I think the answer lies in looking very closely at the customer. Our "average" customer at George Mason University is a culturally diverse student, closer in age to 30 than to 20, who has at least one job. It is clearly possible to offer that customer a lot more content in a way that allows far fewer visits to campus. Instead of coming to campus 15, 30 or 45 times for every 3 credits, it's possible to come only once or twice a week for class. This can mean other visits to campus for attending cultural events or symposia. However, I don't think standard distance learning alone is the answer since most students still want to get to know the professor-not just her or his manifestation in cyberspace.

My assessment of the bottom line is that that we need be leveraging more of the IT we already have. Using the structure better in the future can only attain increased yield-lowering of unit costs and, eventually, tuition. This is a job for professors as well as administrators. In my case the technology was helpful, especially email, but the change in learning model was what made the difference. That was definitely a strategic change for me. Others will have different experiences-but I believe we need to do some stretching to take advantage of the structure that already exists in educational institutions-to use the scarce IT resources better. And we also need to consider revising the educational model from meting-and-monitoring to on-line discovery. My experience indicates that it's possible to reduce costs while delivering a rich experience to our customers.

References

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