

REMARKS BY GEORGIA TECH PRESIDENT G. WAYNE CLOUGH
Georgia Tech Executive Roundtable, March 16, 2000

Thank you, Margie (Dickerson) for that kind introduction. I'm honored to have an opportunity to address the Executive Roundtable, not only because this group represents the movers and shakers of Georgia Tech, but also because through its more than 30 years, it has come up with a number of outstanding practical ideas that we have implemented and that have made significant contributions to our life together on this campus. TEAM Buzz is a recent example of a wonderful activity that promotes campus community and community service at the same time, and it originated with this group. So I have come to expect timely and useful suggestions from ERT, and I am pleased to have an opportunity to pose a question on which I would appreciate your advice.

Some have compared it to the Industrial Revolution in fast-forward. Others say its magnitude is even greater – more like the discovery of fire in the scope of the changes it is bringing to all aspects of our lives. What is it? "It" in this case is I-T – information technology. And the topic I want to consider with you this evening is the impact of informational technology on higher education and the learning process in the classroom.

A couple of years ago, the well-known business consultant and author Peter Drucker predicted in a *Forbes* magazine interview that universities are headed the way of the dinosaur. He stated that "30 years from now, the big university campuses will be relics. Universities won't survive. It's as large a change as when we first got the printed book."

More recently, John Chambers, CEO of the high-tech superstar Cisco Systems, predicted in the *New York Times* that "the next big killer application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail look like rounding error."

Last March Dr. James Duderstadt, who is president emeritus of the University of Michigan, came to campus to deliver a lecture entitled "Beyond the Endless Frontier: The Future of the American Research University." He recounted his experience at the University of Michigan, where he helped to create an "MBA in a box" – a software box, that is – for IBM. The company was happier with the graduates of the computerized MBA program than with the MBAs who had gotten their degree on campus in the classroom.

He told us that traditional paradigm of university education – which he described as a high-cost, low-tech, residential campus – may not be adaptable to the 21st century. And

he talked about the need for a new vision for higher education in a world driven by technology.

Online educators agree. Take John Arle, chair of sciences at Rio Salado College in Arizona who operates the nation's only online anatomy course. He says that everything traditional students dissect in the lab, his students can dissect using an interactive CD-ROM program. "Students can't progress through the course without engaging with the subject matter," he says. "In the classroom, they may be looking at me, but who knows what they're thinking about. With this, you don't get to the end of the lesson unless you're doing the work."

Of course there are always two sides to every coin, and on the other side of this coin are people like Owen Dudley Edwards, renowned lecturer and history professor at the University of Edinburgh, who says, "Computers and lecturing aids are interesting and charming toys, but they are no substitute for the human stimulus that comes from a good lecturer in top form."

Or David Noble of York University, who complains that universities are in danger of becoming "digital diploma mills," and says, "It is a sign of our current confusion about education that we must be reminded of this obvious fact: that the relationship between people is central to the educational experience."

Stephen Talbott, a former software programmer who, ironically, puts his *NetFuture* newsletter on the Internet, says, "Digital technologies encourage us to abandon whatever vestiges of community are left to us. This is a disastrous loss, since our encounters with others and with the world are the primary matrix for all human growth and development."

The old saying that "There will always be a Harvard" is probably true, and it probably even holds for a Yale and a Princeton. But will other traditional colleges be bypassed as students opt for the convenience and custom-tailoring of an Internet education? Actually, the place where campus-based higher education needs to be is probably somewhere in the middle between these two sides.

Higher education does have a higher calling to produce an enlightened world citizen, and this is what distinguishes it from vocational training. James Duderstadt had to admit when he was here that educating the "whole person" has become more crucial than ever before in this age of technology, and that it can be done best on residential university campuses.

The dry-marker board has replaced the chalk board and after three decades in the bowling alley, the overhead projector has finally made it through the classroom door. Nevertheless, the technology skeptics have to admit that professors today function pretty much the same way they did a century or more ago. In the meantime, however, the learning styles of you students have changed. Professors complain that your attention span has become so short that lecturing for an hour is no longer a good way to teach, and bright students are failing lecture-based exams.

A recent National Science Foundation study calls you students the “MTV generation,” reared on a diet of television, and video and computer games, and points out that even though your attention spans are shorter, you have the ability to concentrate on several things at the same time – to watch TV and do your homework at the same time, for example.

So we have a dual challenge: Internet education is not going away, and we face the challenge of how to educate the whole person over the Internet and through “MBA in a box” type software programs. On the other hand, we also know that we must change the high-cost, low-tech residential campus model to make it more pertinent to both the learning styles of our students and the real world for which we are supposedly preparing them. Since all of us here this evening are participants in the residential campus model, I’d like to focus on the second challenge.

It is clear that on-campus higher education needs a new model for learning. A model that is learner-centered, interactive and collaborative. A model that is diverse and flexible. A model that extends beyond the classroom to become more asynchronous – anyone, anytime, any place – and more ubiquitous – everyone, every time, every place. A model that preserves the humanizing, whole-person attributes of the campus community, while adding the advantages of technology.

But before we begin to consider that model, I want to inject another consideration into the discussion. We are in the middle of Women’s Awareness Month, and the Women’s Resource Center is a co-sponsor of this Roundtable event. If we look back over the 20th century, two of the most powerful social trends were the technological revolution and the women’s movement. Technology now permeates every aspect of our lives at work and at play, from the office to the kitchen. Two-thirds of women now work outside the home, up from one-third just 30 years ago, and their advances have affected our social institutions to such a degree that we cannot imagine how a woman’s role could have been so narrowly defined 100 years ago.

But these two trends have not yet converged, and that is our challenge for the 21st century. Although women make up 46 percent of the total U.S. workforce, they comprise only 22 percent of the scientific workforce and only 9 percent of the engineering workforce. As a technological university, Georgia Tech has a unique opportunity to help change those numbers, and we are making progress in recruiting more women to our student body and our faculty.

But technology has been male phenomenon. It is not that women are not good at technology, but rather that boys are inducted into the world of technology by playing video and computer games, which do not appeal to girls because they mostly feature violence or men's sports. Although this immersion in electronic games gives young men a head-start, it also gives them a very abstract view of technology, and as a result they cannot be counted on to apply it where it's needed most.

In contrast, women are much more practical about how technology can be used to affect people's lives. Anita Borg, who founded the Institute for Women and Technology in 1997, says that guys think, "Here is this cool technology; what neat things can we do with it?" But women tend to start with a practical problem and look for ways to solve it using technology.

When women technology designers met last fall in Silicon Valley, they asked questions like: Why hasn't someone invented a smoke detector that can tell the difference between a burning house and burning toast. Or, why hasn't someone invented a sensor you can put in a Tupperware container to tell you when the food has gone bad? These are questions that it simply does not occur to young males to ask, yet they represent very useful applications for technology.

If we are serious about attracting more women to Georgia Tech, and we need to be if we are to provide Georgia and the nation with a technology workforce and include women in the leadership opportunities technology increasingly represents... if we are serious about attracting more women to Georgia Tech, we need to take their perspective on technology into account as we use it to shape the on-campus educational experience. And we need to do it not in order to avoid being sexist, but because women tend have a much more practical perspective on technology than men.

Now, given all of these considerations, here is the question: What should on-campus education look like in the 21st century? How should a university like Georgia Tech incorporate technology into the education experience we provide to our students here on campus?

MIT is attempting to answer this question with a \$25 million program funded by Microsoft. It has three goals: to provide technological access to the course content and activities for students; to provide tools for faculty to develop and deliver technology-enhanced courses, and to create technology-based administrative systems. One of the projects to be funded is the MIT Shakespeare Electronic Archives, which will give students in literature courses access to a multimedia environment of movie performances, digital facsimiles of manuscripts and early editions, and databases of both texts and critical reviews of the texts and the movie performances.

That is one example of how technology can be used to enrich a course for on-campus students. Here is another: Strathclyde University in Scotland is renovating classrooms to incorporate a technology system similar to the one used for audiences on “Who Wants to be a Millionaire?” I guess you could call it “Who Wants to Get a College Degree?” Each student will have a hand-held transmitter the size of a video remote control to use in responding to multiple-choice questions posed by the professor. Infrared sensors at the front of the classroom will pick up the responses and display them on a huge screen, just like the audience queries on the TV show. If the responses indicate that students are confused, the professor can stop and go back over the material.

Here at Georgia Tech, we now require every student to have a computer that meets certain specifications. We have been working diligently to retool our courses with web-enhancements, although I am not aware that anybody has yet tried the “Who Wants to be Millionaire?” approach. And I would like to know how that is working. Have you taken web-enhanced courses? What do you like about them, and what don’t you like? What helps you to learn, and what doesn’t make any difference? What new ideas do you have that we should try – especially from the women who are here – and what problems could be fixed with technology?

We surveyed our students and discovered that most of them function like stenographers in class – frantically trying to take down every thing the professor says or writes on the dry-marker board. They don’t have time to think along the way, let alone ask a question, and when they get back to their rooms and review their notes, they sometimes realize they didn’t comprehend what the professor was talking about.

So we developed Classroom 2000, which uses technology to free students from the laborious task of trying to capture every word and allows them to think, ask questions and participate more in classroom discussion. The exact details of the lectures are captured on audio, video and in writing for later reference. Have you taken a course in Classroom 2000? Did it help you to learn better?

Do e-mail and chat-rooms facilitate and increase communication between professors and students and among students, or do we lose something vital when the communication is not face-to-face?

And here is a more intriguing question: What role, if any does distance learning have for students who are on campus? Ostensibly your presence here on campus says you want your educational experience in person rather than over the Internet. But it is turning out not to be an “either-or” sort of thing. Distance learning is making inroads into the campus experience.

We now have students in Savannah and Statesboro who are enrolled in the Georgia Tech Regional Engineering Program, and they will get a Georgia Tech degree without ever setting foot on this campus. They take some of their courses in person, taught by Georgia Tech faculty who are based in the area. For other courses, they are distance learning participants in classes that are being taught here on campus.

Why shouldn't students here on campus be allowed to take a GTREP class by distance learning that is being taught in Savannah if the timing fits their academic course sequence better than when it is offered here on campus? There is precedence for it. Master's degree students in environmental engineering now take a course by distance learning that is taught by a Georgia Tech professor who is based at the Skidaway Institute of Oceanography on Skidaway Island near Savannah.

Here's another scenario. We are partners with the National University of Singapore in the Logistics Institute – Asia Pacific, located in Singapore, and we are presently developing a joint master's degree program in international logistics with the National University of Singapore. I can foresee using Internet2, which has interactive capabilities, to offer courses that are scheduled when it 8:30 in the evening here and 8:30 in the morning in Singapore. The courses could be taught at either location, and would have students participating live from both locations. We could do the same thing with the Georgia Tech campus in Metz, France.

In all of these instances, we are talking about in-houses courses that are part of the Georgia Tech curriculum. But it is only one step further to ask if students who are enrolled at Georgia Tech should be allowed to take distance learning courses offered by other universities and transfer the credit here toward their Tech degree. It would be an inexpensive way to enrich our curriculum offerings without the overhead cost of buildings and faculty, but it opens up a tangle of other questions. And it is time we started thinking realistically about how we address them.

For example, calculus is the bane of many a Tech freshman. What if students were to discover an easy calculus course on the web – a guaranteed “A” compared to a probable “C” in the Tech calculus class. Should they be allowed to take calculus over the Internet and transfer the credit to Tech?

Even if students want to take a tough course over the web – say a course from Stanford or MIT that Georgia Tech doesn’t offer, but that would enrich their educational experience. During the semester when they were taking that class in place of a Tech course, they would technically not be a full-time Georgia Tech student. What does that mean in terms of all the Tech regulations and policies relative to full-time and part-time students? Do we place limits on the amount of coursework our students can do by distance learning from other institutions and apply toward a Tech degree?

These are some of the considerations that will help to shape your response to the question I am posing for discussion this evening: How should Georgia Tech incorporate technology into the education we provide to our students here on campus, so that we enrich their educational experience without losing the personal communication and whole-person education that makes the campus experience valuable?