EDUCAUSE awarded its Excellence in Leadership Award for 2000 to Ira Fuchs, Vice President for Research in Information Technology at the Andrew W. Mellon Foundation. As chief information officer of Princeton University for fifteen years, Fuchs established a world-class networking environment at the university and continued to provide it with vital, innovative leadership until his move to the Mellon Foundation in July 2000. Throughout his career, he has brought extraordinary creativity, intelligence, and technological expertise to the challenges of furthering electronic access and providing information in support of teaching, learning, and research. Perhaps best known as the cofounder and longtime leader of the BITNET international academic networking project, Fuchs has also provided leadership to the worldwide higher education community as chairman of the board of the Corporation for Research and Educational Networking (CREN), as chief scientist and board member of the Mellon Foundation’s innovative JSTOR (Journal Storage) Project, and as an influential force for the development of the European Academic and Research Network (EARN). In addition to earlier service as chief information officer of the City University of New York, he was a founding board member of the Usenix Association and the Internet Society and has served on the boards of trustees of Educom, Princeton University Press, and Mills College and on corporate advisory boards for Apple, IBM, and NeXT.
Katz: Thank you for agreeing to this interview. I'd like to ask you about your ideas regarding information tech- nology developments in the past, present, and future. When receiving your award at the EDUCAUSE 2000 annual conference, you observed that your role as chief information offi- cier was to “insinuate information technol- ogy into higher education in ways that make a valuable difference.” This mission seems both poetic and pro- foundly important. Can you elaborate on what you mean by this?

Fuchs: My use of the word insinuate was deliberate. Many have observed that our higher education institutions are relatively uninterested in acquiring technology for its own sake. We are there- fore loath to press the envelope too far, to solve problems that are not yet widely perceived, and to make far-ranging higher education changes that can openly leverage and combine our resources. In short, we can freely collab- orate. That's why most of us love and stay in higher education. Open collaboration is at the core of EDUCAUSE and also of CREN. It is why several universi- ties and other organizations formed the Common Solutions Group, and frankly, it is the reason I received the EDUCAUSE Excellence in Leadership Award. When I accepted the award, I re- minded the audience that the Greek mathematician Archimedes claimed that with a sufficiently large lever, he could move the earth. I believe that in- stitutions of higher education will be able to sustain our comparative advan- tage only by working together and that our collaborative environments consti- tute our version of Archimedes’ lever.

I am concerned that educational dot-com businesses might restrict the free flow of information among them and the digitization of educational ma- terials offers us wonderful new opportu- nities, but we are not banks or manufactur- ers—devices that understand hand- writing, that perform all of the important functions to which we have become accustomed, and that have a long, twelve-to-fifteen-hour battery life. Stu- dents will take these devices to class, and we can imagine them like a book, will write their notes and papers on them, and will use them for high-speed wireless access to the Internet.

Katz: We are institutions of higher education. Our open collaborative environments are essential to our nature.

Fuchs: We have succeeded in making technology a significant part of the budget of higher education. There is no question that it is clear that the technology by itself has made notable changes in our institu- tions. Most of our institutions are ad- ministered, and they have been in the past. Our core mis- sion—education and research—has not changed. Technologies are being used to complement and supplement tradi- tional activities.

Katz: Are there technologies of com- parable influence under development now? Which information technologies do you think have the greatest potential for traditional institutions?

Fuchs: We have not yet exploited our existing bandwidth. We have used them in creative fashions in the past, but we must be careful not to lose the main advantages that we have in higher education. Today, it is a collection of not-for- profit organizations, higher education has a huge advantage that new profit- seeking entities cannot match. These entities are inherently competitive, closed commercial environments. By contrast, our higher education institution can openly leverage and combine our resources. In short, we can freely collabor- ate. That's why most of us love and stay in higher education. Open collaboration is at the core of EDUCAUSE and also of CREN. It is why several universi- ties and other organizations formed the Common Solutions Group, and frankly, it is the reason I received the EDUCAUSE Excellence in Leadership Award. When I accepted the award, I re- minded the audience that the Greek mathematician Archimedes claimed that with a sufficiently large lever, he could move the earth. I believe that in- stitutions of higher education will be able to sustain our comparative advan- tage only by working together and that our collaborative environments consti- tute our version of Archimedes’ lever.

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I am concerned that the creation of educational dot-com businesses might restrict the free flow of information among them and the digitization of educational ma- terials offers us wonderful new opportu- nities, but we are not banks or manufactur- ers—devices that understand hand- writing, that perform all of the important functions to which we have become accustomed, and that have a long, twelve-to-fifteen-hour battery life. Stu- dents will take these devices to class, and we can imagine them like a book, will write their notes and papers on them, and will use them for high-speed wireless access to the Internet.

Katz: Which information technologies do you think have the greatest potential to transform higher education as we know it?

Fuchs: In my experience, the perva- siveness of a high-speed network has had the greatest effect. Every discipline has easy access to a wealth of relevant material. The emergence of portals and information agents will help us to fulfill Pat Battre's wonderful dream, to take the search for information to a new level.

I am especially excited about the cre- ation of dynamic courses, with precepts and training personalized to individual needs. Many distance education pro- grams today simply replicate courses in a linear fashion on the Web. The results are roughly equivalent to online text- books. Technology can support a better approach, using diagnostics to alter courses dynamically in response to students' needs. When assessment tools identify deficiencies—for example, when a student doesn't understand a particular concept—the technol- ogies might emerge immediately to rein- force ideas or reintroduce underlying concepts.

We expect a 20 percent increase in college and university enrollment by 2010, but the institutions are unlikely to grow at a commensurate rate. The de- mographics will make our institutions more and more competitive, and will force us to become more efficient in many ways. We strive to provide one- one help, but as our courses grow in size, we must learn to rely increasingly on such online feedback mechanisms.

Katz: Most people no longer consider information technology to be a luxury. At the same time, the insinuation of in- formation technology into higher edu- cation in the manner you have de- scribed is perhaps an investment activity that is less than the capability of many institutions. Can institutions forgo these investments? What advice can you offer college and university leaders in this area?
obvious advantages and some significant savings. Storage and access through JSTOR is significantly less expensive using microfiche or purchasing and building collections and is certainly less expensive than constructing new libraries with additional shell space. Institutional collaboration has helped to reduce costs dramatically. Most important, perhaps, such advances have helped to redefine how we measure the worth of our libraries. The key determinant has become access, not the size of physical collections.

It will be interesting to see whether comparable advances will be made in the use of technology to help offset other costs of running colleges and universities. Will we be able to improve productivity sufficiently in response to the demographic changes I mentioned? Will we be able to teach 20 percent more students as a result of our investments in technology? Just as we saw productivity gains in the library, will we see such improvement on the teaching side?

KATZ: People like Cisco CEO John Chambers claim that education is going to be the Internet's biggest “killer application.” How do you react to this idea? What advice would you give to the leaders of traditional colleges and universities in light of such rhetoric and predictions? And is information technology capable of affecting the purpose of existing institutions?

FUCHS: I suspect that the real “killer app” is still entertainment—music, games, virtual reality. Napster proved that there is huge demand for multime dia, especially when adequate bandwidth is available and users perceive no cost. It is not yet clear how elastic the demand is, but students and others may be willing to pay modest fees to help overcome the existing intellectual property constraints.

With regard to education, my principal concern is that educational dot-com businesses will cherry-pick the courses that they deliver. Dynamic professors and popular courses will draw well, and the Internet will clearly become an effective delivery vehicle for such courses. But if commercial entities siphon off our most popular courses and programs, who will support research and teaching across the breadth and depth of academia? Today, through their tuition payments, students support research activities and access to a full curriculum. A new corporate model may endanger needed spending on science labs, on research staffs, and on areas within the humanities and social sciences. Who will make up the difference? Will the government or our taxes pay these costs? Or will we sacrifice those disciplines and areas of research that don’t command high-enough entertainment ratings?

We already hear that support for large science may be putting small science at risk. I am concerned that there is an even greater risk to the campus as we know it, from the science lab to the football field.

KATZ: At institutions like Princeton, you had a chance to work with and support some of the brightest students in the world. What do students like these expect from information technology?

FUCHS: Students generally have higher expectations than faculty. They expect e-mail without outages, free storage for their Web sites and for network backups of their data, and of course very high-speed access to the Internet. They expect every course to have its own Web page. They expect to be able to monitor their grades and academic progress online. They rely on the Internet for everything from checking their schedules to finding rides home over the holidays. Students, even more than faculty and staff, expect to be able to access all relevant information in every discipline at any time, from any place (wireless), and with any device.

Many institutions are providing online access to an impressive range of information resources, including reserve reading, lectures, study aids, distant expertise, and even guidance counseling. I expect that the availability of even higher bandwidth will further encourage image and voice transmission, video integration in student research, remote control of instrumentation, and distributed simulations and virtual laboratories, as well as teaching and faculty-student interactions via real-time video links.

Of course, our alumni are also excited about technology. Many institutions are developing what are in effect “maintenance contracts” for their graduates. Alumni already have access to online lectures, courses, and a rich variety of study materials. The trend will certainly accelerate.

KATZ: In the newly created position of Vice President for Research in Information Technology at the Andrew W. Mellon Foundation, you have yet another opportunity to influence directions in broad segments of higher education. What national higher education priorities would you like to influence through the Mellon's beneficence?

FUCHS: The Foundation’s focus will be on new information resources for teaching and learning and advances on the intellectual property front. The Foundation made a significant investment in JSTOR, a project that is now approaching self-sufficiency. The Foundation is now becoming involved in a comparable project, ArtStor. The Foundation...
will maintain an interest in both proj-

ects, with new enhancements and inno-
mations well under way.

I also expect that the Foundation will
become involved in Digital Rights Man-
agement, essentially the development of
an infrastructure to help colleges and
universities manage their intellectual
property rights and to help find an ap-
propriate balance between the rights of
information users and the desires of
information creators and the interests of
proprietary balance between the rights of
information users and the desires of
information creators. MIT and a group of collaborating
institutions are proposing an “Open
Higher education will be mov-
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The immediate priorities are new

collaborative projects that will counter
the current trend toward commercial
software solutions and proprietary
code—projects that celebrate our ability
to share information and solve our
problems collaboratively. One such
project is JA-SIG (Java in Administra-
tional Special Interest Group), a consor-
tium of colleges and universities. The
consortium hopes to develop and dis-
burse an open-source web application
that will provide a single, electronic
gateway for institutions of higher edu-
cation to access information resources.
The project is expected to create a col-
aborative alternative that will result in
free, open-source portal software. As
a result, institutions of higher education
and scholarly materials are in elec-
tronic form, institutions will be drawn
increasingly into the realm of com-
merce. I expect that cooperation among
institutions will include cooperative soft-
ware development, combined software
support centers, and effective coopera-
tion on projects such as certificates and
authentication. By working within a stan-
dards-based framework, the Open
Knowledge Initiative will permit col-
nages and universities, as well as com-
mercial vendors, to construct additional
collections.

KATZ: What accomplishments and new
priorities will we be discussing in our
interview in five years?

FUCHS: Higher education will be mov-
ing well beyond the initial investments in
infrastructure. Once the basic ele-
ments of higher education (both course
and scholarly materials) are in elec-
tronic form, institutions will be drawn
increasingly into the realm of com-
merce. I expect that cooperation among
institutions will include cooperative soft-
ware development, combined software
support centers, and effective coopera-
tion on projects such as certificates and
authentication.

Above all, I suspect that colleges and
universities will be trying to find the
most cost-effective uses of technology
in research and teaching by measuring,
as scientifically as possible, how best to
deploy existing and new technologies.

Today, we depend substantially on anec-
dotal evidence to guide our efforts and
our investments. Our resources will con-
tinue to be precious, especially as
demographic pressures focus more and
more attention on every investment. We
will never have the resources simply to
throw money at technology for its own

A new corporate model
may endanger needed
spending on
science
labs, on
research
staffs, and on
areas
within the humanities
and social
sciences.”

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