



Carl F. Berger, Director of Advanced Academic Technologies in the Collaboratory for Advanced Research and Academic Technologies (CARAT) at the University of Michigan, Ann Arbor, was one of two recipients of the 2001 EDUCAUSE Award for Leadership in Information Technologies. As a faculty member in the School of Education at the University of Michigan for almost three decades, Dr. Berger is known for his innovative work on how people learn by using technology, for his lively and visionary applications of technology to make complex subjects accessible to students, and for his development of assessment tools to evaluate the use of technology by faculty and students.



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WINWINI

Next Killer App

An Interview with
Carl F. Berger

By Carole A. Barone

As an administrator, Dr. Berger has structured responsive, forward-looking organizations to support faculty members' use of technology. Influential in the EDUCAUSE National Learning Infrastructure Initiative (NLII) since its beginning in the mid-1990s, he was also instrumental in the founding of the Instructional Management Systems (IMS) cooperative (now known as the IMS Global Learning Consortium Inc. <<http://www.imsglobal.org>>) to channel independent innovation and experimentation into widely useful tools for technology-supported learning.

In the following conversation with Carole A. Barone, Vice President of EDUCAUSE, Dr. Berger discusses—among other topics—his thoughts on the next “killer app,” the future of teaching and learning, and the students of tomorrow.



CAROLE A. BARONE: You have had a somewhat unorthodox professional career. How did you come to be involved in information technology?

CARL F. BERGER: I started in computing in 1957 as a programmer on a UNIVAC. I quickly came to the conclusion that computing would be just a passing fad, since we couldn't keep the computer's radio tubes running long enough to complete a decent program. So I left computing and went into teaching. Forty-four years later I'm still teaching, but we can get a decent program running today! I guess I started in information technology at the university with the advent of microcomputers in 1979–80. In order to get one, I had to go before the university computing committee to get permission to spend \$1,800 on a 32K Apple microcomputer, following the same process that was required for the acquisition of the latest Amdahl mainframe computer. I realized that if it took those kinds of resources to OK the purchase of a microcomputer, then something was wrong with our IT infrastructure. So I became an advocate for distributed computing

use in the university—when *distributed computing use* meant the use of something other than a mainframe. Some waves must have been made, since the provost appointed me to the computing center review committee in 1982, and the rest is history.

BARONE: You have spoken of the next “killer app.” What do you envision it to be?

BERGER: Any killer app must fit one or more of the following:

1. It should do something we couldn't do before. (Remember VisiCalc?)
2. It should do something so much more easily that we can't remember how we used the old system. (The natural example here would be a WYSIWYG.)
3. It should integrate several applications to make a process so seamless that we can't imagine that any part could be separated. (A Web browser is a good example of this.)

The next killer app that I've been thinking of does all three of these. It is a ubiqui-

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tous system for students, faculty, and support staff to carry out learning, instruction, and research.

BARONE: Will it appear seemingly out of nowhere, as the Web did previously?

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BERGER: For most of us, it will. Some of us will have that nagging feeling that we knew it would happen. And those of us in teaching and learning will be sure we could have thought of it if we had just had a little free time! Already there are pieces from such projects as MERLOT (<http://www.merlot.org>) and OKI (<http://web.mit.edu/oki/>), as well as that great project, the IMS Global Learning Consortium. Just take a look at those Web sites, and you'll see how pieces we have now might fit together, and then maybe you'll take the time and be the true author of the next killer app.

BARONE: What are you teaching your teacher-education students these days? Or are they teaching you?

BERGER: We're putting a lot more emphasis on meeting the many different “intelligences” of students and on preparing teaching that allows for many different learning styles. That, in turn, has caused us to match and, more importantly, mix our teaching methods for those styles. This means that as we look at more ways students learn, we start to understand that we must have more ways to teach. In that respect, the students are certainly teaching us. One of the real problems in teaching today is the notion that we can con-

tinue to use the tried-and-true and formerly successful teaching techniques and demand that students learn effectively. As one professor said to me, “Sure, your research shows that students spend more time on task with more types of media, but if they would spend the same amount of time paying attention to my lecture, they would get just as much out of it!” He was certainly right, and he is a great lecturer, but his students can't and don't spend time paying attention to his lectures, which was why he had come to talk about teaching problems. As I see it, he wanted ideas to make students pay more attention to his lectures, and he wanted ideas to change the students' learning rather than change his teaching. I've exaggerated somewhat here, since we know that the best give-and-take comes both from students learning how to learn and from teachers learning how to teach with a wide variety of styles, skills, and tools.

It's still clear today that most of our future teachers will teach as they have been taught, so we do much more teaching in a wide variety of media. For example, we had each student in a class create a thirty-second QuickTime movie with at least two scenes, a transition, titles, and credits. This sounded like an impossible task, but when it was completed, all the students said that this was one of the activities they would have their own students do when they taught. It was one of the most challenging, creative, and exciting activities they had done. Given that they had to create the movie on “another way to demonstrate a concept in xxxx,” they even saw the importance of context in content.

BARONE: What are the expectations of students entering higher education today?

BERGER: This one I call “WINWINI,” just like “WYSIWYG.” WINWINI stands for What I Need When I Need It. WINWINI will be most important in this killer app. As I look at the amount of work that we expect from students (and ourselves), I realize that we need a killer app that operates and gets “what I need when I need it.” As an example, we noticed that our incoming students didn't really understand and use the library reference tools until just before their first paper or quiz. We

had a few professors send their students messages stating that a session on how to use the library facilities would be available about a week before a paper was due. The session enrollment shot up, and the level of questions increased enormously.

BARONE: What will happen if we don't meet students' expectations?

BERGER: We'll move farther and farther down on national and international measures of success in teaching and learning, since these students who learn differently have little patience for the drill-and-kill techniques that we put up with and that were so successful in the past.

BARONE: What is your vision of how learning will change?

BERGER: First, I don't think we need to wait a generation to see how good learning and teaching will be implemented. We can see it now in places all around the country and even the world. But just as with the adoption of other technologies such as the book, the blackboard, and the overhead projector, we underestimate the time it takes to see the change become ubiquitous and we overestimate the extent and impact of the particular technology. We've all gone to talks where the speaker quotes a phrase about the transformation of teaching and learning and asks those in the audience to select the technology; we all laugh when we find out that the technology was the radio or the blackboard and not the PDA or MP3 player, as we were thinking. So my vision is that the tools we see in disparate locations and times today will become more common, the next “killer app” will emerge, and in about twenty years someone will stand in front of an audience and talk about how ridiculous we thought it was—early in the twenty-first century—that PDAs would change the world!

BARONE: Where do chat rooms fit into all of this?

BERGER: Chat rooms are similar to the pieces of technology that enable different learning proclivities to suddenly become visible. In and of themselves, they will

“Persistence—of ideas, of learning, of patience, of fine values—may be the most enduring trait we can all have.”

have little impact, but as part of a killer app, they form another piece that we all will look back on and say, “What a great app for that purpose.” Let me explain. Recently we decided to have an online conference instead of a fly-in meeting for about twenty people. Using HorizonLive, we put the presentations on the screen, included the chat below, and added a third element, a conference phone call. We used the chat screen to signal when we wanted to speak, to keep side conversations going, and to extend vocal comments. Amazing! The technologies worked well together, and the meeting was a real success. It was an unusual use of chat for me, but it emphasized how some applications that look like stand-alone work best when integrated.

BARONE: How quickly will that integration happen?

BERGER: We’ll see changes in a few years in some cases and not for twenty years in others, but fifty years from now we’ll wonder why it took so much time.

BARONE: Tell us about your “visible human” project.

BERGER: The University of Michigan Next Generation Internet Visible Human

Project takes the National Library of Medicine’s Visible Human database to the next level. It allows researchers, teachers, and learners to use the Visible Human database to learn in ways they want to learn. It allows us to try the ideas talked about here in a real environment. We’d like to provide students with the ability to “fly through” a human, much as in the old movie *Fantastic Voyage*, but with the ability to have labels, simulations, animations, rotations, and haptic interaction available so that they can extend learning and make it more efficient. As we watch medical students work through the years of medical school, we realize that they are stretched for time; we’ve got to help them learn more efficiently. This project is working toward providing the best environment so that the students, taking responsibility for their learning, can decrease the time to learn and increase the amount learned. Our most noble goal is then to extend the techniques we are working on for physicians and surgeons and to try out the new ideas on the learners that would benefit the most—middle-school students. It’s interesting to note that this idea isn’t just hyperbole; we know that students’ interest in science and mathematics drops most rapidly in middle school and thus decreases the opportunity for students to continue in these fields. We hope that by extending the same efficient and exciting techniques used for surgeons and medical students, we can maintain and even improve adolescents’ enthusiasm for science and math.

BARONE: What effect do computer games have on cognition and expectations of the learning environment? Do you play computer games?

BERGER: Shari, my wife, loves crossword puzzles, and we both know that I use computer games as a similar engaging pastime. But for me, games are trying out a new graphics program so that I can morph the grandkids’ faces in photos for giggles when we meet or trying out a new multiple-dimensional scaling angle on some faculty survey data. I have little patience for traditional role-playing or shooting games because I see little payoff. However, if those games had real payoff—

for example if you survived as a player because you did a successful virtual operation and learned anatomical content and dissection skills—then I’d be the first to champion such programs. This is why we’re thinking of building them into the Visible Human Project.

BARONE: You are as open-minded and curious as a child. To what do you attribute this?

BERGER: I think it is a personality defect, just like my invariant enthusiasm! I was lucky to grow up extremely poor in real goods and rich in toys like empty cardboard boxes and cast-off crystal radios. Plus, as compensation for our poverty, all of us in my family were voracious readers and overused the public libraries. This all contributed to my being fascinated with interesting ideas and people.

BARONE: What will the learning environment be like when your first great-grandchild enters higher education?

BERGER: Well, let’s see, that could be as soon as twenty years from now, since my first grandson is in higher education today. In watching him and what he is doing, I really think that my predictions for twenty years of real change may come true. So when my first great-grandchild starts higher education, he or she will be equipped with wearable technology that provides WINWINI. We’ll marvel and ask, “Why didn’t we do that twenty years ago, since we had all the pieces?”

BARONE: As you move into retirement, what advice do you have for your colleagues who continue to work in information technology in higher education?

BERGER: Enthusiasm and curiosity may be personality defects, but persistence definitely isn’t, and from my forty-five years in computing and technology, I feel that persistence—of ideas, of learning, of patience, of fine values—may be the most enduring trait we can all have. And it doesn’t hurt to try the next new idea and gadget to stay young—just don’t put too much faith into it as the next killer app. Now . . . where did I put that iPod? 