Technology has had a profound impact not only on colleges and universities but also on college and university students. Today's students have technological proficiencies not even imagined twenty-five or more years ago. Yet today's students are a varied group, composed of several generations. The Baby Boomers (born 1946–64), the Generation X-ers (born 1965–80), and the Millennials (born after 1980) have different backgrounds in, experiences with, and expectations of technology—and of higher education. Here, four students from these three generations share their thoughts on the use of technology in teaching and learning, on the role of professors and the adoption of technology by professors, on the importance of technology for social networking, and on university-provided technology services. They discuss their generational differences of opinion regarding technology—and also the commonalities that transcend all three generations. The students reflect on their academic, social, and personal experiences, offering their observations on how higher education might better respond to their technology needs and expectations. If higher education listened to them...
Technology in the Classroom

TIM: I’d like to start with a story about clickers. I had a physics class that used these clickers. When the idea was explained at the beginning of the semester, it seemed like a really good idea. In a large class, it’s hard to look at each student individually. The professor can ask people to raise their hands, but that provides only a general sense of what the entire class is thinking. The clickers record each individual student’s response and let the professor focus on what each student has to say. However, it didn’t work as well in practice. We had to rent the clickers at the beginning of the semester and give them back at the end. We had to pay twenty dollars, and we ended up using the clickers only about four or five times throughout the entire semester, which meant that every time we pushed the button, it cost us five dollars. There were also some technical problems with the arrangement of the room. At times, these became so much of a problem that it would almost have been better just to write our answers down on a sheet of paper, the old-fashioned way, and hand in the paper.

KITZZY: My experience with technology in the classroom has been a little bit smoother, maybe because it has involved a more simplistic use of technology. A lot of my classes have been in a lab setting. Each student had a computer to use while the professor was lecturing. So we could use Google and get more information during the lectures. Our professor made use of this in the classroom. Instead of spending the entire three-hour block of class time lecturing to us about whatever he felt was important, he would spend maybe a third of that time telling us the main point that he wanted to make sure we knew about. Then, for the rest of the time, he would give us a topic and have us get into groups, search Google, use the online databases, research the topic, and then present our findings to the rest of the class. So instead of us having to just listen to and learn from him, he allowed us to learn from each other. I thought that was very beneficial. And this is a very simple example of technology use. He didn’t have to go far and get a big piece of equipment.

BILL: The four of us agree—across the generations—on the importance of providing a minimum Web presence for all courses by posting handouts, syllabi, and class schedules online. In one of my classes, the instructor e-mailed everyone in the class to say that the first night of class was canceled. But two of us didn’t get the e-mail in time, and we showed up. After waiting forty-five minutes, we checked our e-mail next door at the lab and found out about the cancellation. I was frustrated. I had wasted about two hours going to class, waiting, and returning home. Had that information been provided on the Web, this would not have been an issue. Instead, it took me three phone calls and four e-mails to get a copy of a syllabus.

JESSICA: I would like to see professors try to integrate more technology into their courses. I’m a history major, and one of my professors taught his course traditionally. He sat up in front of the class, presenting the material in a very interesting way, as if it were a story. The students took their notes, and that was it. I did well in that class. Then I had another professor who, not fearful of technology, integrated it into everything we were doing. He assailed my senses. He had clips from the Web. He did Google searches. He used PowerPoint. He showed video. Anything that he could get his hands on he was putting right there in front of us. I did well in that class too, but I retained the material far better in the class that used technology. Don’t get me wrong: I don’t want a professor to put up PowerPoint slides and say, “Hey, I’m using technology!” That’s not going to work either, especially if the professor is simply presenting the information word-by-word. There’s no point in that.

KITZZY: As Bill mentioned, course materials need to be posted online. But having the syllabus and schedule online is not enough. One of my teachers put all his notes online. At the very beginning of the class, on the first day, he showed us the Web site and gave us the URL. He said: “I have all my notes up already. You can treat this as an advance transcript of my class.” It wasn’t word-for-word, but the notes addressed pretty much what he was going to cover. He said that as things changed in class, he would update the Web site. For example, if a student asked about a certain topic, he would add that
example to the Web. This was something that was right there for us. Students could print the Web material and use it for notes and could add their own notes. Also, if we missed class, we had a backup.

**JESSICA:** One of my professors—trying to be mindful of the fact that most of us are kids who can’t easily afford college—decided to have the library provide some of the required books completely online. So I didn’t have to spend twenty or forty dollars apiece on books that I was going to read only for that class. I also didn’t have to try to sell the books back to the bookstore. I had them online and could access them whenever I wanted to.

**BILL:** This is one area where the generational differences start to be felt. Even though I want to see material online and I read a lot of newspaper articles online, I can’t read page after page after page on a computer screen. I’m a highlighter, like many who went to college in the 1970s and earlier. I want to be able to print out the material and highlight it so that I can make notes and return to class with those notes.

**TIM:** Although I definitely appreciate the value of having something that I can write on, I really like online material. One of the resources I absolutely love is Wikipedia. It’s an online, open encyclopedia—anyone can contribute to it. It is an amazingly useful resource. If, for example, I’m sitting in class and I have my laptop with me and the professor is talking about some topic that I’m not too familiar with, I can look it up on Wikipedia, get a nice definition and information, and go on learning in that lecture. The lecture becomes a lot more meaningful for me. Or if I miss class one day and I find out the subject that was discussed, I can go home, searchting on Wikipedia, and get some really good explanations. Sometimes Wikipedia will have explanations that are even better than the professor’s. For research papers, Wikipedia is a very, very, very useful resource.

**KITZZY:** Is that the only thing you use for research?

**TIM:** No. A good research paper should have five, ten, twenty sources, depending on the size—ton of sources. But Wikipedia definitely is a good place to get a collection of facts to start the research. It gives you a good idea of what to look for.

**Knowledge Experts versus Facilitators**

**TIM:** In teaching, there seems to be a lot of emphasis on learning facts, with the teacher communicating facts to the students. But Wikipedia has pretty much all the facts a student needs. Or a Google search can provide the facts. One way or another, the Internet has the facts. What I’d love to see more of in the classroom is experience. If my professor has been a physicist for twenty years, has been solving calculus problems, I’d like the professor to share with me some of these things—share with me the approaches taken, the thought processes involved. That would definitely help students be able to work with the materials to solve the assigned problems.

**JESSICA:** I agree. Most of my classes are just fact memorizations, simply “spit-it-out” experiences. The teacher says: “Hey, you get an A. You memorized everything I said to you. Great.” But I had one professor who set up his history course around the experience of doing research, writing a paper, and trying to get it published. The entire semester was spent in that process. We submitted an idea, got it authorized, researched and wrote a paper, rearranged and fixed it—and at the end of the course, we had twenty-five-page papers. The students who excelled in that environment had something they could try to get published. I wouldn’t have had that otherwise. That’s something I would like to see more of in higher education.

**BILL:** I prefer to have the facts and the theory presented, but then I want some hands-on experience to be able to learn how to use that theory or those facts. I just completed three semesters of statistics, which I barely made it through. But I will give credit to the instructor in my second stats class. She spent about thirty minutes talking about the theory or the problem we were going to work on, and then she showed us how to use the theory, and then she let us put it into a practical application. This helped me a great deal to learn how to apply those facts or that theory.

**KITZZY:** Fortunately, many of my recent classes have not fallen into the conventional, fact-memorization category. Instead, a lot of my classes have been
“My laptop follows me wherever I go... the world should be wireless.”

**Students:** Jessica Vargas

AGE 23

**Generation** Millennial

**Major** History

**Degree** Bachelor's

**Interests** Video-gaming, writing, reading, cooking, nonrepresentational art

**Responsibilities** Part-time job, full-time student, one cat

**Quirks** I tend to go above and beyond what is required.

**Tech Background** I’ve been around computers pretty much all my life. When I was four years old, I was playing the Buck Rogers video game and typing with the word-processing system. I love technology. I can be cooking, IMing my friends, and playing video games as well. It’s integrated into my life.

**Phrase** “I like to spend Saturday nights wrapped up in my blankets as I go save the world one video game at a time.”

**TV Show** I don’t watch TV. I opted for high-speed Internet access instead.

**Music** Frou Frou, Maroon 5, Jem, Eric Clapton, Bing Crosby

**Books** J. K. Rowling, the *Harry Potter* series; Brian Jacques, the *Redwall* series; Ayn Rand, *Anthem*, *The Fountainhead*

**Video Games** *Final Fantasy* series

**If You Could Ask Higher Education to Change One Thing, What Would It Be?** I would like to have the libraries be completely Web-based, with books that have highlightable text.

Based on projects. The professor says: “OK, here is what this class is designed to teach you to do, and that is exactly what we’re going to do before this class is over.” Throughout the class, we have many assignments that are part of that big project. So we can be evaluated throughout the class and not with a pass-or-fail at the end. My research class is an example. Our “midterm” was the first half of the paper; our “final” was the final paper. The professor said: “Turn it in whenever. I will give you feedback. When you’re completely ready to turn it in, that’s when I will give you a mark for it.” So students are not penalized for trying things, and students are encouraged. He treated us as if he were a peer reviewer, which I thought was very beneficial. It definitely took the stress away and helped students enjoy the class a lot more. I hated research when I first started the class, but this research process was so rewarding. I could actually get a final project done, because it was placed in context. And the professor’s lectures were incredible. There were times when I didn’t want to go to class, but after I was there, I didn’t want to leave. The professor was so engaging. There are a lot of faculty who are experts in their field. They know their material very well, but they might not know how to teach. Teachers should be taught how to teach. The two aspects need to balance out.

**TIM:** Technology is a magnifying glass. If someone is a good teacher and has that good foundation, that person can teach anyway he or she wants: face-to-face, over the Web, with phone calls or written correspondence. If someone is a bad teacher and is given a computer and PowerPoint, that’s not going to help the person become a good teacher. Having a good foundation as a teacher—having the teaching skills—is important. I’d like to see professors be required to take some education classes. They should learn how to teach before they go in front of the class and attempt to teach. Just because someone is a genius doesn’t mean he or she can communicate well. There are many examples of that.

**BILL:** After institutions unplug the copy machines and make instructors put everything on the Web, colleges and universities need to fund and reinforce faculty development. Many institutions seem to be heading in the right direction with faculty development, but I think there’s a need to shove more dollars that way and to improve faculty development and to help faculty understand the technology. Don’t, don’t, don’t allow them to fear technology because of a lack of faculty development.

**KITZZY:** Teachers also need to realize that students are not just students: we have other responsibilities. One of the things that I hate about college is that many faculty treat us as if we were still in high school—taking attendance, for example. We’re all adults. We should be responsible for our own learning. Let me know what it is that’s required of me, and then let me get there. Facilitate my way there, provide me with the resources, be available—on the phone or online. It would be great if we could IM our professors.

**BILL:** They’d have to understand what IM is.

**KITZZY:** True. But if we could just instant message our professors, it would be so much easier and, I think, a lot less confrontational for many of us.

**TIM:** I use IM, instant messaging, to talk to my friends. It’s very informal. I can send people messages, and if they’re there, they respond; if they’re not, they don’t. If we could speak with professors that way, it would feel like they’re on our level, more accessible. We wouldn’t be trying to talk to someone who’s up on high. When you like someone, you’re going to listen to them more, and the more you listen, the more you can learn. An example is a physics class that I took. Throughout the beginning of the semester, the teacher was a little stiff. It was hard for him to relate to the students. Then one day, around the middle of the semester, we were learning about forces and how particles interact with one another, and he told us that his hobby was military history, military technology, military weaponry. He was telling us about a railgun, which is a weapon that the character in the video game *Quake* runs around and shoots. The professor explained that a railgun wouldn’t work like that in real life: unless it was bolted to the ground, a real railgun would end up about a mile in the other direction because of the extreme forces involved in shooting one. The
classroom was dead silent. Students were fascinated. Quake is a game we all play. This was something we were all at least aware of, and the professor was explaining things to us on our terms. After class that day, instead of running off to get lunch or hang out or whatever, students stayed and talked with the professor and listened to what he had to say. They wanted to know more. As Kitzy said, students shouldn't be required to attend class. They should want to be there so much that they have to be kicked out when the class ends.

Social Networking

KITZYY: When we talk about social interactions in colleges and universities, we tend to think about student-to-student social interactions, but the instructor-to-student social interaction is important too. Professors need to relate to their students. A professor should be more than just a “talking head” up in front of the class; the professor needs to be seen as a person who has hobbies and interests and not simply as someone with a degree and expertise in this specific field. Technology can be one way to make that connection, especially with the Millennials, who have grown up with technology. Just by using technology, professors can relate better to students.

JESSICA: Most people have this idea that Millennials aren’t social, which is kind of true. When I first meet someone, I’m not going to talk. I’m just going to sit in my corner and pretty much ignore what’s going on. Trying to get that initiation, trying to get someone to spark up, is always hard. Online, I’ll start talking immediately. I can join a discussion forum, and I can talk everybody that I love non-representational art and that Piet Mondrian is my favorite, and I can say exactly why. I can talk about history and all sorts of things. Universities need to provide a way for shy students, or for Millennials, or for any student to connect to the university and to the other people there. A discussion board, a forum, or some sort of social networking can allow students to meet others like them, something that might not happen face-to-face.

TIM: When I was a freshman, I lived in a dorm and played a lot of online games. There is that image of the lone geek sitting in front of the computer all the time. But in online gaming, you can play with people who are next door, in another state, across the world—wherever. In our dorm, we set up a game that we all enjoyed playing. It was called Counterstrike and was the military, run-around, shoot-em-up style. One day people started joining our game. We didn’t know who these people were, but the more people to shoot at, the more fun the game is. And so we welcomed them and we played, and after about eight to twelve hours, eventually we got hungry. We went to the meal plan on campus, and we were all still excited and talking about the game. And this person sitting next to us asked, “Are you talking about Counterstrike?” We said, “Yeah.” And he said, “I was just in that game!” It turns out this person we were playing the game with is now sitting right next to us, and that gave us something to start talking about. This person was no longer just some random stranger. He was the guy we had been playing the game with. With online gaming, we made friends, we made contacts for our classes, we met people we could study with. So, that lone geek sitting in front of his computer may be interacting with one hundred to two hundred people from around the world. On the other hand, if he went out to a movie or a bar or wherever, he might interact with fifteen people. These “isolated” geeks are actually some of the most social people around. They’re talking with two hundred people at once. Universities need to encourage these interactions. Right now, with peer-to-peer applications and viruses, universities are shutting down ports. But by shutting down those computer connections, they are shutting down the connections that those lone geeks have to the outside world and to other people.

BILL: This is where the generational differences kick into high gear. The last time I played video games, it was on a monochromatic monitor and it was a game called Pong or Tetris or something like that. I don’t play video games. But I do use the computer a great deal for social and also recreational activities. I recently purchased an old Boston Whaler, and in a matter of hours spent on the Internet, I had more information on restoring an old Boston Whaler than I could
deal with. I quickly had to run to Home Depot and buy all the supplies I needed. I met people locally and globally through this exchange.

KITZZY: I'm a very outgoing person, so I'm more of a face-to-face socializer. I like joining clubs, for instance. But technology does have its place: we use e-mail to contact each other and to set up meetings, and clubs have Web sites for their meeting minutes and their events. I think the difference is that whereas Millennials use the technology first and then have the face-to-face interactions to continue the connection, Boomers and Gen-Xers first have the face-to-face interaction and then use the technology to support the connection, to keep in touch. I think you need balance. Technology can be used as a crutch. The lone geeks need to get out there and meet the people they play games with online.

TIM: The image of the lone geek sitting alone in his room in front of the computer is starting to change. With wireless, many people are using laptops. I've got a Sidekick, with mobile Internet, IM, Web e-mail. It also makes phone calls and is really cool. I can be out at a club or at a bookstore—wherever—and I can still keep in touch with the people who are sitting in front of their computers. I can go out more, since I'm not tethered to the wall. The extension cord goes only so far. With wireless, I can go to Starbucks, which offers wireless Internet, and I can sit, have some coffee, do my homework, do my thing online, and if someone sits down next to me, I can start talking to that person as well. So, the image of the lone geek online and alone is changing.

**University Services**

KITZZY: What about administrative services that support learning, services such as the registration system and e-pay? We mentioned Web presence. I think this is important before students register for classes. If I can find out who my professor will be and what the course is about, that will help me make an informed decision, instead of randomly choosing a course and hoping for the best.

TIM: Universities are starting to deal with the generation of students who have been spoiled by companies providing services. Companies want the customer's dollar, so they're going to do whatever it takes to make the customer happy so that the customer will give them that dollar. Universities have been a little more laid-back. They have something we students want, so we have to come to them. But I've been dealing with all these companies, and I've come to expect a certain level of service. Imagine going to Amazon.com to order a book and being told: "Oh, sorry, we're out of stock. You can't have it." That is what it's like registering for classes. If the class is full, the registration system simply says: "You're not allowed in. Have a nice day." I have to get up every day for the next week at three in the morning and keep trying to register, in the hope that someone drops the class. It would be awesome if there were a wait list. Say, if there are thirty people in the class, and I'm the thirty-first person to register, I'd be told: "The class is full, but we've placed you on the wait list, and as soon as someone drops, we'll e-mail you and let you know you've got the class." That would save so much time for everyone, it would probably save the university money, and it would definitely make the students a lot happier.

JESSICA: I'm a history major, and I'm trying to do research. I'd prefer to have the resources made available to me at any time. I'd like to say to universities: "Put the library on the Web. Do it. Please. Place reference materials online." I understand there is concern about the kind of research that we Millennials are doing, but universities can control what we have access to. For example, I'm told to do an interlibrary loan. OK, so I do it, and I wait patiently for this book that I'm supposed to have. It doesn't show up. I don't have it. Simply put, I need those resources at my fingertips.

BILL: I recently tried to use Google Scholar to prepare a paper. It works, but it's very shallow. There's not much there yet. Still, Google Scholar has the potential to blow our libraries out of the water. When I go into the library to do research, either face-to-face or online, the library is just darn hard for me to use. Every database has a different set of search terms, and each has its own rules and regulations, and you have to know your mother's maiden name to be able to log in. They're all complicated to use.

KITZZY: I recently learned about a Web service called RateMyProfessors.com. Students talk to each other all the time: “Have you taken a class with this professor? Is he good? Is he hard? Is he challenging?” But now this sort of information is online. How great is that! You can go to the Web site, choose a university and a professor, and get actual anecdotes from students who took the class. They say what they thought of the class and of that professor. I think this is even more important now because universities are so big. Freshmen, in particular, don't know many people, so they can't very well ask questions about their first classes. Now they have an online source they can go to. Universities need to encourage these types of sites. And they need to have Web presence. Every course should have a Web site so that students can easily find out who the professor is and get contact information.

BILL: Students talk to other students a great deal, and I think this is true across the generations. That's how students found out which professors to take and which professors not to take before RateMyProfessors.com was created. What I would like to see institutions provide is a mentor program that will help students navigate their way through the campus and through the academic and the administrative decisions that have to be made.

**Conclusion**

BILL: Students have a variety of roles. Today's students are significantly busier than they were when I was working on an undergraduate degree in the 1970s. They're mothers, they're fathers, they're supervisors, they're employees, they're caregivers—they have all these different roles. If higher education listened to me, faculty and administrators would relate better to their students. They need to know more about their students.

KITZZY: If higher education listened to me, class attendance would not be required. I'm not saying this because I'm lazy and I don't want to go to class. What I would say to professors who require attendance is: “If you're going to make me go to class, make it worth my while. Don't stand there and read from PowerPoint slides that I can download from your Web
site. Don’t sit there and read the book to me. I can do that on my own. Provide me with something I can’t get on my own—that practical experience Bill mentioned. We can’t get that on our own; you, as the expert, can provide that. And make us responsible for our own learning.” I think that if professors respect students as adults and make them responsible for their own learning, students will respond to that. Because it’s up to me to get my money’s worth. As students, we’re paying for this education, and I think that most of us, if given the chance, will do what we need to do to get our money’s worth.

**TIM:** There is talk about how students can balance a social life and an academic life. I don’t think the two need to be different. Obviously, students aren’t going to hang out socially with their teachers all the time. But if higher education listened to me, we would go back a few hundred years, back to the style of Plato and Socrates, with students and teachers hanging out together and talking. Some of the best teachers I’ve had are the ones I connect with personally. I had one professor who would drag students into his office and say: “So, tell me about where you went to high school. Tell me about your parents. What are your dreams and aspirations for the next five, ten years?” We couldn’t escape the guy. I’m no longer taking his class, but I still talk to him. I have another teacher who is more like a friend. I’m definitely a lot more open listening to him than I would be listening to someone I don’t like. I’m not saying teachers have to be friends with everyone in the class. But if a professor knows a few students and those few can vouch for him to the rest of the class—“Yeah, this guy’s alright”—I think that really encourages learning.

**JESSICA:** If higher education listened to me, faculty and administrators would understand that students today cannot be dedicated just to learning. We have other responsibilities. We have other things that we have to do. Technology, if used correctly, can help. Technology isn’t perfect. I think all of us realize that, but it can be used to enhance our university experience. It can be a good way of communicating, of allowing all of us—students, faculty, staff, and administrators—to communicate with each other. Technology can make a big university seem personal, like it’s a small community, like it’s connected to me.