



Digital Recollections

Erika Woolsey
Jocelyn Woolsey
Matt Woolsey

With an introduction by Kristina Woolsey

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E D U C A U S E

4772 Walnut Street, Suite 206
Boulder, Colorado 80301
www.educause.edu/ecar/

Digital Recollections



EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.

The mission of the EDUCAUSE Center for Applied Research is to foster better decision making by conducting and disseminating research and analysis about the role and implications of information technology in higher education. ECAR will systematically address many of the challenges brought more sharply into focus by information technologies.

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Preface

The EDUCAUSE Center for Applied Research (ECAR) produces research to promote effective decisions regarding the selection, development, deployment, management, socialization, and use of information technologies in higher education. ECAR research includes

- ◆ research bulletins—short summary analyses of key IT issues;
- ◆ research studies—in-depth applied research on complex and consequential technologies and practices;
- ◆ case studies—institution-specific reports designed to exemplify important themes, trends, and experiences in the management of IT investments and activities; and
- ◆ roadmaps—designed to help senior executives quickly grasp the core of important technology issues.

From its most recent research, ECAR published a longitudinal extension of its 2004 study of students and information technology. The *ECAR Study of Students and Information Technology, 2005: Convenience, Connection, Control, and Learning* (Kvavik & Caruso, 2005) is based on quantitative data from

over 18,000 freshman and senior students at 63 higher education institutions. It focuses on what kinds of information technologies today's students are using, with what levels of skill they are using them, how information technology use contributes to the undergraduate experience, and what value the use of IT adds in terms of learning. The study also provides a review of and comparison with the 2003 ECAR study on faculty use of course management systems undertaken at the University of Wisconsin System.

Literature Review

The ECAR research team extended the literature review done for its 2004 study, looking especially to the EDUCAUSE Learning Initiative (ELI) for new findings on student use of technology and learning. Of particular interest is the recently published volume edited by Diana G. Oblinger and James L. Oblinger, *Educating the Net Generation* (Oblinger & Oblinger, 2005). We also reviewed case studies both for the United States and international institutions on student use of technology. Researchers also used the 2003 ECAR study *Faculty Use of Course Management Systems*, which provided data regarding faculty use of course

management systems. This data included comparative data for analysis of student and faculty perceptions (Morgan, 2003).

Online Survey

A quantitative Web-based survey was designed by ECAR to assess student skills and learning. A sample of 143,730 students at 63 higher education institutions in 24 states received the e-mail invitation to participate in the study. Fully 18,039 students responded to the survey. This survey was based, in large part, on the ECAR 2004 survey. A few questions were deleted because they did not work well in 2004. Other questions were improved with better wording and/or clearer definitions. Some questions were added in 2005 to address issues that were important in 2004, especially with respect to student learning. ECAR was careful not to change a number of questions in order to track changes in student behavior and opinions from 2004 to 2005. When appropriate, questions from other surveys were included, which makes possible a limited but useful comparison with student behavior at other institutions of higher education and affords an opportunity to track trends cautiously in student use of technology.

Interviews

Quantitative data was supplemented with interviews of 82 undergraduate students at seven institutions to provide diverse percep-

tions of the impact of information technology in higher education.¹ Student perceptions in this arena are offered to complement, but not to substitute for other research sources that might guide good instructional and/or IT practice.

Interviews with 20 instructional technology support staff at University of Wisconsin System institutions give further insights on student information technology issues. These interviews were designed less to build on a research base than to enhance the investigators' understanding of nuances in the instructional technology arena.

Case Study

To complement the core study of student use of technology in higher education, ECAR had the good fortune to work with Kristina Woolsey, a board member and visionary for the New Media Consortium, an organization that brings together forward-thinking organizations like colleges, universities, and museums with innovative high-tech companies to collaborate in a noncompetitive environment. Woolsey's recent focus on how youth and adults use media-rich technologies led her to engage her own children in a fascinating exercise. She discusses the experiment below in the form of a letter (below) to readers of this ECAR case study. The results of her experiments—the essays written by her children Erika, Jocelyn, and Matt Woolsey about growing up in a digital household—form the core of this case study.

Foreword

In 1812, Johann David Wyss wrote, “The raging storm increased in fury on the seventh day and all hope was lost.” These dramatic lines open a story of adventure surrounding the Robinsons—a Swiss pastor, his wife, four sons, their two dogs, and a shipload of livestock. Wyss’s tale portrays a family’s struggle to create a new life for themselves on a strange and fantastic tropical island. Each of the Robinsons must learn to control his own nature—such as Ernest’s bookishness and Fritz’s hot temper—as their adventures lead to amazing discoveries, danger, and surprises. The boys’ all-too-believable behavior, the ingenuity of the family, and the natural wonders of this exotic land made *The Swiss Family Robinson* one of the most enduring stories of shipwreck and survival in Western literature.

We forget too often that the 21st century remains filled with adventure. Indeed, each year, millions of young people find themselves washed up on the shores of those strange and fantastic islands we now call higher education campuses. They, too, embark on journeys of personal growth and discovery and make important life discoveries while encountering surprises, and even dangers.

Lest we forget the fears, hopes, dreams, anxieties, and outright adventure of the college experience, or even worse, blunt its edges by portraying only its statistical trails, ECAR is pleased to offer a modern enduring story of survival, *Digital Recollections*. This is a tale of what Don Tapscott called “growing up digital.”

Dr. Kristina Woolsey is a colleague, an educator, and a technologist. She once said that “we currently have technological tools available that can revolutionize education. We have readily available processing power that makes multimedia a reality. We have interconnectivity that allows collaborations across the world. We have students and administrators

and parents who are eager to engage technologies. Yet we still do not know much about what learning is in a digital environment, and many of us have been so busy mastering the newest tools that we have lost some time in thinking about this.”

Kristina is also a mother, and in the spirit of recapturing some of that lost time, she pressed her daughters Erika and Jocelyn and her son Matt into action. What follows are three very personal accounts of coming of age in college with technology. As with the Robinsons, a reading of *Digital Recollections* is full of life and adventure. The reader is struck by how each of the Woolseys, too, works for harmony with the environment and control of his or her own very different natures. In the Woolseys’ case, the environment is not only the campus, it is cyberspace.

The fundamental issue for the Robinson family was isolation—particularly the isolation of the Robinson kids who were neither raised in the Swiss culture nor among people. The Woolsey family’s issues are completely different. Their issues (and ours) are issues like: how do you raise a family that is totally connected (to the Net), where the major influences are unknown cultures, peer cultures, and unlimited access to all sorts of information? How do our wired youth attain and maintain identity amidst all this variation, even at a very young age? How might one (or should one?) encourage face-to-face interactions when screen interactions are so compelling? These differences, like the similarities, are profound, and they suggest to many more than we—*digital immigrants*—are bearing witness to the evolution of new *digital natives* and new family relations, social relations, patterns of interaction, and ideas about being and identity. The stories of the Robinsons and the Woolseys are tales of families shaping, and being shaped by, frontiers.

While the stock in trade of ECAR is “hard” analysis of data, we understand and

appreciate that the subjects of students and student life are also about texture, nuance, and—yes—adventure. The Woolsey family is not typical, but neither is it strange. This family is perhaps tomorrow's digital *cognoscenti*, if not *digerati*. They are the doers, thinkers, and writers who will likely have a tremendous influence on the emerging communication revolution. They are not on the frontier, they are the frontier.

And those of us who supply technology to our institutions' students know that our work must—to be successful—pass muster with the digitally precocious and not simply with those who struggle with digital literacy.

The stories of Erika, Jocelyn, and Matt remind us why we have chosen to make and leave our professional marks in higher education. They give us lots of hope for the future and they make us smile.

*Richard N. Katz
Boulder, Colorado*

Introduction

Dear Colleagues,

I have long believed that visual images—still and moving, representational and abstract, formal and informal—are very important for human understanding, expression, and general communication. This belief has kept me focused for years—at MIT, Atari, and Apple Computer Inc.—on the development of media-rich technologies and examples of their use in learning and thought.

Recently I have shifted my attention to the topic of “new media literacy” and the use of media-rich technologies by adults and youth. As I made this shift, I expected to find years of research carefully documenting the use of new media in learning, as well as its adoption (and adaptation!) by youth in enhancing their communications. To date, I have been disappointed in my search for this kind of documentation. I found many wonderful essays and books and predictions about new media use and many compelling stories of extremely innovative practices. I agree with some, but not all of what I read. Some predictive practices I find compelling; other practices seem to me to be intriguing but not extensible or generalizable.

With a goal of finding empirical evidence to support my opinions, I decided to ask my three college-aged children to describe their experiences growing up with technology. While my observations of their experiences helped to form my opinions, I wanted them to talk about their experiences in their own words.

Two things have happened since I made this request to my kids. For one, surprisingly, they have written short papers describing their views of their own and their peers’ technology use. (I did provide them some monetary incentives, but I am still impressed that they completed these pieces in a very short time frame!) For another, I learned through my discussions with my colleague Richard Katz that he and the ECAR fellowship have taken the bold step of trying to document the general technology use of youth of college age. As we discussed this, we realized that these two approaches—one a very small non-random sample describing a longitudinal slice and the other a snapshot of a very large number of youth—were complementary. My kids’ essays give a picture of how kids who have been using technology for a while think about its use; Richard’s data (which I haven’t yet seen) gives a context in which to evaluate these stories.

You will see in reading these three essays that my three children have all had extensive access to technology, in the same environment, but that they have engaged technology in a variety of personal ways. As you will read, my son Matthew—age 22, Vanderbilt 2005, a major in philosophy and literature, currently working as a legal project assistant at Jones Day in Washington, D.C.—was very involved in programming as a youth and is quite conceptual in his considerations. My daughter Erika—age 21, Duke 2005, a major in biology with an emphasis on marine biology and a minor in art—has focused much of her technology use in her own artistic expressions. Jocelyn—age 18, Claremont McKenna 2009, a new freshman with a major interest in playing college basketball and in economics—involves herself with her friends and with pop culture in her technology use. Three kids raised in the same house with the same technologies, with some very different patterns of use.

I will restrain myself from interpreting their stories, leaving this to you. I will only say that I found the matter-of-fact views that each of them presents quite unexpected. This may well be due to the fact that they wrote these essays for their mother! However, I think it is also due to the fact that these kids take technology for granted in a very deep way. My asking them about technology is a bit like asking a fish about water. They have never known anything else; they have never used white-out in the middle of the night rushing to type a paper for a class deadline (they may have never typed on a typewriter!), or associated technology with batches of hole-punched cards in the basement of the computer center where the computers were kept, or been devastated when the books they need for a report have already been checked out of the library, or lost track of all their friends from high school when they went on to college. I also realize that my two eldest children learned their technology use from a group of technology professionals, not from their peers; this too may contribute to their mainstream engagement. Or maybe college-aged youth typically engage technologies for very traditionally established practices even as my generation is amazed by their fluidity and seemingly amazing capabilities. There are certainly more questions in this area than answers. Something is happening to all of us with the engagement of digital tools, but what is happening is not exactly clear.

I hope these personal essays give you a broad stroke image of the casual, everyday use of technologies by college-aged youth in 2005, one that can raise questions and give a human face to some of the more representational data that others have gathered.

My thanks to my children for giving us the chance to benefit from their insights. Enjoy!

Sincerely, Kristina Woolsey

October 2005

Technology and Me

Erika Woolsey

Take a snapshot of my life. Perhaps I am at school at the time. Say, on my way to a lecture at 9 a.m. Bleary-eyed and sling bag in tow, I pull out my iPod so that I may continue the soundtrack to my life.

It's a Tuesday and I was up late last night chatting with a close friend online. Haven't seen her in person for over a year, but we talk casually on a daily basis. I am exhausted, but the music keeps me alert. I walk to the beat as I make my way across the quad.

I swipe my DukeCard in the cafeteria for a breakfast wrap and I hurry to catch a late bus. I am surrounded by white headphones.

I find myself in class at last and pull out my laptop, thankful that I remembered it this time. Yesterday morning I was forced to take notes with pencil and paper. I had to type them up in my own time last night when I really needed to work on my psych project. Simulating animal learning with a computer program is enough work for one night.

A guy a few rows in front of me is playing Tetris. Another is chatting online. I try to avoid the temptations presented from a lecture hall equipped with wireless service. I succumb once in a while, but have also found myself Googling information relevant to the lecture. Sometimes online information finds its way directly into the classroom discussion. I can also follow along with the PowerPoint presentation on my computer and type my own notes in the margins.

I see a few freshmen down in the front row. This proximity won't last through the semester. I know they're first years because they have their iPods propped on their desks, set to record the professor's lesson. Only the freshmen at this school were invited to partake in this experiment. They have become the cause of a lot of bitterness as a result. It seems like it might be a worthwhile experiment. New educational tools and methods are always of

value. But I have heard stories of professors offering extra credit to anyone who can think of a way to incorporate iPod use into the curriculum. I don't know anything about the outcomes, but I do know they're not continuing the experiment next year.

After class the bus takes me back to main campus where I work for the Creative Services department of the school newspaper. Clients' e-mail, logos, ideas, or images that I process into the advertisements seen in the paper. I design ads with MultiAd primarily, but I also use Photoshop and Acrobat. We use only Macs, thank God. I understand my bias, but I feel much more creative freedom here than I do with PCs.

After work and a quick lunch with friends, I swing by the computer lab. I need to update my basketball team's Web site from the tournament this weekend. While I'm there, I download the readings for my history class from the server and print them out.

After a few hours in the library typing up an essay, a biology lecture, and a Latin Dance class, I grab a sandwich and take it back to my room. It's getting dark and I'm getting tired. I check my e-mail and keep up some correspondence with professors and student group leaders. I chat online while perusing the Internet for leads on grad school programs. Simultaneously, I am able to talk to a friend in Florence, a friend in Dubai, and a friend down the hall. I send pictures to my mother and get songs from my brother. It's such a wonderful feeling to be so connected. But it's also nice to escape once in a while (if I can pull myself away). I sign off and read a few chapters of Harry Potter before I fall asleep.

Nothing about my technology use is extraordinary. A technological spin on everyday life is typical on a college campus. I've seen this immersion to be nothing short of a culture shock for those classmates who have never had their own laptop or have never had a

philosophy class that requires its students to be technologically savvy.

I have always had an advantage when it comes to these things. I was raised on it. I benefited greatly from my mom's profession. I was always around computers and used them whenever I could—and I don't mean just for the staple use of word processing. I have always had an artistic edge. Computers provided an amazing new medium without the hassle of clean up.

In sixth grade I was preparing a project for Spanish class. It was on the animals of South America. Using [Macromedia] Director, I created an animated guide. It was colorful and it was in motion. I did research on these animals and incorporated information. It was a visual and educational masterpiece and I was so proud of it. It was a simple presentation, with my class and my professor peering over my shoulder, I clicked on the various links, allowed the animations to run, and read the paragraphs I prepared. My class thought it was cool. Señora seemed unamused and unimpressed. When I was done, she said, "Is that all?"

Confused, I admitted it was.

"Where did you get that program?"

Relieved, I explained that I made it.

Her eyes wide, she gasped, "No!" and enthusiastically asked me to show it to her again.

Needless to say I received an "A" and I also gained a new fan. I brought in the cute little animations I made in my free time at home to show Señora, who loved them. They were filled with puppies and the like, which I had drawn with a template and made move with the magic of technology.

In eighth grade, with graduation impending and a lot of free time on my hands since breaking my ankle, I decided to make a present for my class. Using a program called Morph, I made a movie that morphed photographs of my classmates—one into the next—for the entire graduating class. I burned

a CD (complete with label) for everyone. This was back when CD burning was unheard of, and my classmates thought the movie was the best thing ever. It was a task, but I remember it as being quite gratifying.

In high school, I continued to develop computer art and I also started to make movies. Throughout my high school career, I made movies for my basketball and softball teams. I would show them at end-of-the-year parties and give copies to my teammates. Funnily enough, these movies were usually devoid of anything having to do with sports and consisted mainly of us running amok in a mall or in San Francisco, fulfilling random tasks like surprising our coach in his office or doing an impromptu street performance. Interspersed with music, titles, and special effects, they were a big hit and a great memory.

In high school was where I became dependent on the most addictive and wonderful drug of all—the Internet. Here is where I began the habit of *needing* to check my e-mail every fifteen minutes. Entertaining links would keep me amused in the library and Google replaced the Dewey decimal system. Nothing was ever the same.

The summer after I graduated high school, I worked at MetaDesign, an international design firm. First-hand I was able to really understand the design aspect of technology. All the artwork, every layout, was done on computers. This firm was so well versed in technological design that they had even created their very own signature fonts. While working there, my primary tasks included restructuring databases and organizing the company's online library. It was a total technological immersion.

The summer after my first year in college didn't really involve technology. I was working with marine mammals in a rescue and rehabilitation facility. I cut open dead 300-pound elephant seals on a regular basis and would often travel to remote beaches to release the

luckier ones. I did, however, get the chance to observe veterinarians employ medical technologies to keep sea otters and fur seals alive. I also watched sea lions get tagged so that they may be tracked via satellite. It was all so incredible to see.

At the end of the summer, I compiled all of the pictures and video clips I had aggregated during my time at the center and created a montage set to music. I made a copy for everyone on my volunteer crew, and they loved it. The volunteer department even requested a copy for use in recruiting. Another rave review.

When it comes to computers, I consider myself literate. I strive to use this literacy to create things that are entertaining and expressive. I grew up learning from computer programs and playing video games with my brother, so maybe that is why I demand a certain level of fun in my technological endeavors.

Throughout high school and college, I've always strived to make classroom presentations interesting—or at least entertaining. I employ bright colors, cool graphics, stupid jokes, video, animations, and occasionally 1980s music. I steer clear of the generic PowerPoint, where, no matter how incredible the findings are or how well organized the project is, people who watch want to shoot themselves. Or at least shoot you, so that they can move on to the next identical presentation. With a little creative use of technology (something very easy to incorporate) you can have the best of both worlds: a solid, well-prepared presentation and an enjoyable experience for the audience as well as the presenter. One of the ways I have gotten over stage fright, I admit, is to hide behind my abilities as a creator—this is leading to the strengthening of my abilities as an orator.

This past summer I worked in the Conservation and Education department of the Monterey Bay Aquarium. The primary responsibility of this department is the maintenance

and training of the over 1,200 volunteers who represent the aquarium out on the floor every day. This is no easy undertaking. They have to be consistently informed and routinely taught new things. It's one huge act of diplomacy after another. I had many jobs at the aquarium including working with both penguins and high school students (separately), but one task in particular that is relevant to the subject involves my dealings with the volunteering masses. On my first day on the job, I was told that I would be responsible for an entire enrichment (enrichment is a 30 minute presentation given to the volunteers on a selected topic). I was optimistic. What would I get to talk about? Marine mammals? Penguins? Sustainable seafood? Global warming?? Oh God, please let it be global warming!

Algae. My topic was algae. My big breakthrough on the marine science stage would be teaching people about slimy, smelly, photosynthesizing seaweeds! Needless to say I was a little thrown off. But eventually I came to see it as a challenge. With the help of Pages, I created a very concise and well presented guide's guide to the algae of Monterey Bay, complete with a consistent layout design scheme and beautiful images of the seaweeds. The more I learned myself, the more angles I found to make seaweeds interesting. They are beautiful, they are important, and there are quite a few fun facts that not many people know about. Like, did you know the red algae, *Nori (Porphyra)*, has more vitamin C than raw oranges? Or that a large growth of Dead Man's Fingers (quite a name, I know) is comprised entirely of only one single cell? Crazy stuff. When it came my time to present my souped-up PowerPoint, supplemented by the guide's guide that was handed out to everyone, things went very well. I was able to incorporate a lot of class participation and I really think I succeeded in spreading the good word of algae. I even heard through the grapevine that many of the guides agreed that

my enrichment was the best they'd ever had! Don't thank me, thank my access to technology! Haha—no, seriously...it was all me.

You may think that in my few precious weeks of summer break, I wouldn't deal with technology. Rest assured, I lie out in the sun and do nothing quite often. My quota is filled in that department. But at the moment, I am perpetually organizing my digital photos, creating movies to remember summers and college and friends, talking to

Australian professors about grad school, signing up for classes online, Googling teachers, downloading music, chatting with friends and family—all through this 15-inch window that sits in front of me now. Technology is a living, breathing animal that grows and develops before your eyes. You wrestle with it from time to time. But when it is well behaved and tame, it is anything but a one-trick pony. There's no denying how far technology can take you, as long as you know how to harness it.

On Growing Up Wired

Matt Woolsey

The skills I romanticize as difficult and unattainable are those to which I was not exposed in childhood. There are millions upon millions of people around the world who want to speak English, who try to speak English, but cannot. In fact, it is probably safe to say that I am in the top one-hundredth of one percent in the world in my ability to speak English. Yet, I don't feel special for it. I don't feel as though I've accomplished anything challenging. There was no elaborate process or planning, and no suffering. I think computer skills and digital literacy are the same; it is just a language I speak because I was taught at a young age. It is the flaw of the amateur linguist to be presented with a question in a foreign language, translate that question into his native language, create an answer in his native language, and then translate it back into the foreign language. I think this is the problem many in the older generations experience in terms of understanding computers. Presented with a digital problem, they think referentially: they go back to guides and lessons and try to find the solution in their realm of reference. Kids who possess fluency, however, naturally start to tinker and problem solve, without thinking, because they are comfortable in the environment.

It is critical to realize, however, that digital literacy is not an end; it is a tool. If we imagine education and learning as a series of logical puzzles, I think this becomes clearer. Start with a simple problem: If P, then Q. P is true. *Modus ponens*, the most basic of logical arguments, tells us that Q, then, must also be true. As logical problems become more difficult, we must learn more arguments, proofs, and tools in order to solve the problems. A good logician must be able to connect multiple logical moves to most efficiently achieve his or her solution. Computer skills are just components recently added to the education equation.

They must exist in the same educational tool box as all traditional methods of educational problem solving—they cannot solve, or be applied to all problems, just as in some logical instances, *modus ponens* does not advance a proof. It is important to always remember that the whole point of bringing computers into classrooms and educational settings is to enhance education, not to teach students how to use computers. Computers allow us to more efficiently manage and present information (in certain instances); they do not solve problems on their own.

This essay is designed to describe my digital education and to provide a series of observations on situations in which I have engaged digital media, for good and bad.

My technology story begins in 1982 when I was born. Somewhere in my mother's stack of finger-paintings and report cards is my Atari access badge. I used this badge every day when I went to work with my mother at the Atari Research Lab. The photo is of me as an infant, and my title is *Experimental Proto-Tyke*. It is likely that I was playing with computers before I could walk—even if that simply meant trying to chew on the keyboard. When you grow up with something, it doesn't seem special or complicated for you. Because I was always around computers, they didn't have much of a mystique to me. I learned that there were things computers could do, and many they couldn't. The wonder and novelty that technology holds for many does not often grab me.

By the time I was in lower elementary school, my mom was levelheaded enough to realize that missing days filled with learning how to write in cursive was not going to ruin my future. Every couple months, I would take a day off school and go with her to Cupertino and hang out around her Apple office. My mom took me around to her co-workers, who would ask me what I remember to be simple questions, though they were likely

loaded with meaning I still don't understand. After a trip to the Apple Company store, we would get a new piece of software. It could be anything from a game to an art program. When my mom went to afternoon meetings, I would sit in her office and try the new software, never reading the instructions, but trying to master it in the two hours I was there before going home.

In the fourth grade, my class did a project with the San Francisco Exploratorium, which is a science activity center. The project split my class into teams and linked each team to a specific staff member at the Exploratorium. Our end product was an interactive digital information and video project on observable weather phenomena. We were linked into the Exploratorium's weather center, so we could get data from stations positioned all around the Bay Area. We worked on our projects and would then send them to our assigned Exploratorium staff member for feedback and direction. The project was an incredible success with the students. Class members ended the project significantly more literate than they had started, and what's more, they retained much of what was learned.

For the most part, kids have been doing projects and presentations for their entire educational careers. As a result, they have a pretty good system for accomplishing assignments. Unless a compelling reason is given for sticking with technology, kids will revert back to traditional methods for their future assignments. Students need to be shown reasons that the acquisition of a skill will help them in the future, otherwise they will just consider it a detail contained within a specific project. A compelling reason has to do with efficiency. In the case of the Exploratorium, the average student may have had trouble with the technology we were using, but he or she could clearly see the advantages. By doing the project in electronic format, we were able to more easily correspond with experts, and they

could fix our problems remotely. By using the computer to collect data, we were able to get much better data and, once we learned how the program worked, it was much easier than reading newspapers or collecting our own data. Additionally, there was more we could do with the electronic data once we had it.

In other courses, there were many technological tricks and devices that I came across that tried to improve education, but they were simply novelties, at least in their implementation. A great example that comes to my mind was a middle school class of mine, doing a project with computers, around the same time that QuickTime VR came out. QuickTime VR is a program that takes a series of 10–12 photos radiating from a central point of origin. The governing program would mesh the photos together to make a side-scrollable, looped panoramic image. This was a snazzy piece of technology, and we were introduced to it before it was commonly found on the Internet. For pretty much all of us, it was the first time we'd seen anything like it. We were doing a HyperStudio project (cards, buttons, text boxes), and by that point in our tech-savvy education, we were pretty familiar with HyperStudio. As a result, the allure of the new toy in front of us was irresistible. Every single group spent multiple hours making its own QuickTime VR movie to include in its project. I don't even remember what the project was about, which is of course the point. Not a single QuickTime VR movie in any way related to the subject matter of our projects. This, to me, is a perfect example of technological misuse in schools. Did every single student increase his or her level of technological fluency? Absolutely. However, it detracted from our educations to waste time with it. At no point did any of the teachers stop to consider how this particular program was enhancing the educational subject matter and learning of the project undertaken.

While the teachers should have better

directed the students in the QuickTime VR example, grading standards are also to blame. As is often the case with projects involving technology, teachers get caught up in presentation instead of content. There are undoubtedly ways in which QuickTime VR could have been used to improve the projects we were working on, but we didn't find them. Students must know, however, that they will not be rewarded for the use of technology simply for the use of technology.

Some students will always have a better grasp of technology than the teachers in the wired classroom. Further, these students are aware of this fact. This is a problem conventional education does not have to deal with. It is obvious that in the English classroom, the teacher will know more than the students about Shakespeare. As such, if the student turns in a paper on Bacon, when it is supposed to be about Shakespeare, the teacher will not be impressed and will demand relevancy—there can be no bluff. In the wired classroom, however, the students (such as myself) who are more literate than the teachers can bluff away. I was certainly guilty of shortchanging content and research because I knew I could present a flashy technology product that would distract the teacher from the project's shortcomings. In these cases, my teachers rewarded perceived effort instead of the project's merits. Ideally, teachers should be able to redirect misguided student efforts, but if they cannot, they must be able to call the technology bluff.

Before most teachers felt comfortable enough with technology to incorporate digital media into the classroom, I was using my Mac to enhance my school projects. In the sixth grade, Ms. Lewczyk's class, we were required to make end-of-the-year portfolios. Because I typed everything I wrote that year—in part due to my illegible handwriting (I missed those cursive classes; thanks, mom)—I had a digital copy of everything I'd done in that

year. Other students scrambled to type up, or even find, their handwritten pieces. They went through all sorts of difficulties in organization, art, presentation, and binding. I spent about three total hours creating a bookstore on Macromedia Director. The interface was simple: it was me sitting behind a desk, next to a bust of Shakespeare. The user could click on a number of buttons that appeared on the screen for each of the different sixth-grade disciplines: English, social studies, history, and science. In each subsection were text views for my different pieces. While this appeared exceptionally complex, the most difficult script in the course of the program was, "on MouseDown go frame 20, end."

Portfolios are a staple of the middle school curriculum, and in order for the average sixth grader to complete a good one, we were given significant class time every day for about three weeks. Mine was done, and burned on a CD, by the end of the second day. For the next two weeks, I spent my allotted computer time surfing the Internet, reading jokes, helping others troubleshoot, and generally wasting time. This, of course, came with constant nagging from Ms. Lewczyk to be productive. Eventually, my mother was called into a student teacher conference. "Matt hasn't been working on his portfolio, he spends all his time wasting time and goofing around with his classmates." I'd been in a lot of parent-teacher conferences by the sixth grade, and they were mostly along this usual line of attack and parry. "Mom, I've got it under control." What most of my teachers failed to realize was that what they considered laziness was actually just boredom. My mom asked me why I hadn't been doing my work, and I said that I had it all done. I went to my book bag, pulled out the CD, and handed it to my teacher. My teacher didn't like me any more than she had before, but at least I had become an insubordinate instead of a slacker, and she had to admit the ridiculousness of the situation.

I first got into computer programming because of how little entertainment was available on the Mac. After the days of the SE, and MacGolf and Hardball, there wasn't much to play, save the occasional Hoyle card game. So there I was on a PowerPC, playing solitaire. HyperCard was as slick as anything I could imagine, and within a few minutes, I was developing concepts that would never be realized and designs that were far over my head. Yet I kept with it, experimenting through a sort of triumvirate with two friends, Andrew and Taylor. We each had our different interests and specialties. Taylor would download games off the Internet, open up their source codes and tinker with 10 percent of the game, mostly to eliminate the original programmer's name from appearing, and make it his own. Andrew got deep into the code and was a truly creative programmer. He would always start from scratch and apply the most complicated thing he had read to the simplest problem he could find. His programs, as a result, were needlessly complex, but were sophisticated beyond Taylor and my imaginations. Andrew's presentation, however, was always lacking. The art of it, to Andrew, existed in the symphony of simultaneous programs, whereas I would labor over a splash screen for hours, in order to set the tone. I was particularly obsessed with the aesthetics of the presentation or game we were working on, spending a large part of my time searching the Internet for the perfect image, or, in finding a perfect image, trying to craft the game around it. This led to completely different problem-solving strategies when we were working together on a project.

Given a new hurdle, I would try to fuse together things already created. This didn't necessarily solve our problem, and didn't equip us to solve future problems of the same nature, but it got us to the next challenge. Taylor would suggest patching in something he had seen or downloaded. While this would very

often change the meaning of the project, it spiced it up. Andrew would research and learn the perfect technical solution. Unfortunately, this usually resulted in our abandonment of the project (as a result of our seventh-grade attention spans), but Andrew always got it right. His menus were off centered, the pictures and fonts were poorly prepared, but the scripts were perfect.

A few years later, I was working as a programmer at True North Studies, a one-man operation under Bill Purdy. Bill's brilliance lay in his view of the big picture at all times. He was good in Photoshop, Macromedia, CodeWarrior, and so forth, but I never got the feeling that he was a master of any of them. We had a Sun machine in the corner for a Sun Microsystems project, but it didn't seem that Bill spoke (wrote) a word of Java. His approach to the project was trial-based and code-based—reading and replicating patterns in the script and recognizing when a pattern was broken. It wasn't the error in the JavaScript Bill was able to recognize; it was the error in the logic of the program.

Our greatest accomplishment at True North was a game called PhotoHunt in Yellowstone. It was a game where the player wandered through Yellowstone Park in search of a variety of animals. In each particular locale, there would be a static background image, and then a variety of animals interacting in that environment. Each animal was full motion and displayed different behaviors each time the scene was viewed. A grizzly bear might walk across the river in one visit to a scene, and in the next might start across the river, think better of it, chase a butterfly off screen, and come back and fall asleep. We accomplished this through a fairly simple artificial intelligence, based on a variety of checkpoints. Each time an animal reached a designated checkpoint on screen, it made a decision based on a series of probabilities—a logical tree diagram between a series of

points. My job was to build the animations for the animals and write the artificial intelligences, building small worlds over a single still photo.

Bill always worked on projects that actually brought money into the shop, so PhotoHunt became a pet project delegated to me. Any time I had a code question, Bill would refer me to the code. It irritated me at first. It was like a middle school teacher telling you to look up a word you don't know how to spell in the dictionary. If I knew where to find it in the dictionary, I wouldn't be asking how to spell it! Look at the script I wrote for the eagle, it'll tell you how to write the script for the coyote. At first my scripts were simple, my animals monotonous, but before long they took on personality and character. This was a departure from the days of the triumvirate. It was not my basic problem solving, Taylor's wholesale patchwork, or Andrew's meticulous nature. I was reading patterns and trying to invent or create the next logical step—programming became about creation, instead of reference.

Occasionally, Bill and I would come to a problem that would require mass amounts of debugging. When this was a structural problem that needed global fixing (reprogramming everything already written), Bill would calmly say, we'll get a tool for that. By "get a tool" he meant that he would call John and have John make a tool. John was a hardcore programmer who was a friend and associate of Bill's. A tool was a program to fix a program or to instantly apply long bits of code to components that needed them. Bill, after all, was not a nitty-gritty code guy, and he didn't pretend to be so. Similarly, when we needed professional-level artwork, Bill would call in Paul, who would whip up masterpieces on Photoshop. Though a good programmer and electronic artist, Bill's brilliance was in his ability to fix parts of John's programs, touch up Paul's art, and integrate

them together based on his imagination. Bill was conversational in a myriad of languages, but fluent in very few.

Looking at the two systems for computer based fluency, we see a very effective system (Bill) and a very ineffective one (the triumvirate). Bill was an autonomous entity who was fully capable, even if he needed help in specialized situations. The triumvirate was based on division of labor and skills. Wired students must be like Bill, and not be a component of a group. Unless students have achieved a high degree of digital fluency, they should not be working in groups for technology products. The dynamic of a group technology project always breaks down to the following: there is the driver, the navigator, and an indefinite number of passengers. The driver is on the mouse—he or she is doing all the work on the computer; there can only be one person at the controls. The navigator is in charge of directing content. He or she usually has a notebook with an outline or storyboard and is responsible for giving the driver, who has the know-how, content direction. Passengers are given menial tasks at the request of the driver and navigator; they accept them because the driver and navigator are ultimately responsible for the group's grade, and intimidated, the passengers don't want to interfere. The problem is, of course, that the driver leaves the project knowing nothing about how to fuse content into technology. Navigators leave knowing nothing about how to operate technology. Passengers leave the project having learned nothing new at all. If there are not enough computers available, teachers should push students to occupy different roles during the course of a project, or over the course of multiple projects.

I could spend the conclusion of my essay postulating about educational policy, technology, and the digital generation, but it probably makes more sense to finish up discussing where I am today, with regard to

technology. I'm not as up-to-date with programming languages as I was in high school, and for the most part I've stopped programming. I worked a summer as a digital graphic artist, but I eventually went on to be a double major in philosophy and literature. During college, I used computers primarily as research and

word-processing tools. Today, I live the lifestyle of the digital baby: iPods, digital photos, Internet communication, always up to the second. Right now my friends and I are tossing around the idea of making an online literary magazine. Odds are, I'll end up being the driver; more than likely, I will also argue with the navigator.

Technology and Education

Jocelyn Woolsey

Growing up in a household with a computer-involved mother, I was always allowed the great privilege of having my own computer. This meant I had the freedom of using it all the time for whatever I wanted. I remember the first major use of computers in my education was in fourth grade when my class would play the "Oregon Trail" game. Everyone loved playing that game, competing with other classmates to survive the longest on the long road to Oregon. This virtual game is one of the sole lessons I remember from that particular history unit. I remember having to trade other player's supplies I had for things I needed to survive myself.

The following year I remember using the computer to post pictures from our class activities. Well actually, to be honest, I do not remember doing this, but today when I Google my name, pictures from my "fifth grade bridge project" always pop up.

When middle school started (sixth to eighth grades), a huge frenzy for the instant message began. As hormones began to build, kids found it easier to talk to members of the opposite sex online rather than in person. I did not jump on the instant message train right away, but I remember having friends who would spend entire days and nights online talking to friends or visiting chat rooms.

When I started to finally understand the Internet, I began surfing the Web for many different things. Whether it was for the lyrics of my favorite song of the moment, or scores from the latest Giants game, everything I wanted was accessible to me at any time. I started to get more involved in instant messaging. It was a very convenient substitute for a phone, and a fun distraction from whatever work I actually had to do. When it came to schoolwork and technology, I made a couple of simple, informative PowerPoint presenta-

tions in middle school, but they were always optional (other possibilities for the projects included posters or videos). I also used technology simply with Claris Works (before Apple Works and Pages). I loved using word processing because I was always a bad speller, and I could use the spell check. I also often used the "thesaurus" function in writing documents in order to sound more intelligent.

When I entered high school, computers became a much bigger part of my life. Through school we all had First Class accounts. These were very nice to stay connected to our entire school through e-mail. I would get many course assignments and I could even chat to fellow classmates who were online. I would do practically all of my writing assignments on a computer. It was really nice having computers all over campus, especially since I had a couple free periods. During these free periods I could do homework on any of the computers where I had access to my own folders. I usually used computers far more for research than I ever used the library. Also when it came to dictionaries and Spanish dictionaries, I would always use them online. Google and Ask Jeeves became my best friends and great resources. Whether it was my PowerPoint presentation on steroids or my Web page for my ecology class, I could find tons of information online fast and efficiently. I always felt like I had a leg up on everyone with PowerPoint and other computer activities since I had become familiar with them through my two older siblings. Some of my PowerPoints included animations and really cool transitions. My chemistry project included visuals that helped display my points.

High school was another big time for instant messaging and such. As it became more and more popular, I would even find myself talking to my mother (who was downstairs) from my room. Whether dinner was ready or she needed something from me, talking to her online was simpler than yelling and/or finding me.

High school was also a time of using

computers for fun, in ways such as music and videos. A major use of my computer for me involved music. Although I have never produced much music, I developed a passion for listening to music. I file shared a lot and created my own play lists. Music became a soundtrack to my life, and I would listen to whatever emotions I was feeling at the time. I loved downloading new songs and blasting them through my speakers. I would often burn CDs for my friends for birthdays and presents filled with songs that reminded me of them or songs I thought they would like. All my favorite artists had really cool home pages, which showed their concert schedules and the titles of their new released songs. When the iPod came along I got one fast. I loved listening to my iPod all the time. Whether it was carried with me while I was running or just with me on the beach, music always made things better. Today in college I still love my iPod, and now I have iPod speakers and an iPod shuffle to go along with it. My roommate and I can control my music from across the room with our remote. My shuffle is very fun to use when I go running because it is so small.

I have also made some videos. By using my sister's digital recorder I produced and edited movies on iMovie. I made a movie documenting my basketball season from my freshman year. It was a tribute to the seniors and included music and many scene changes. It was really fun to produce and a great memento to still have. I also made a couple of movies for book reports. For example, after I read *Fast Food Nation*, I filmed myself and friends ordering things at fast food restaurants and reading the nutritional value of the greasy fries and food that we were consuming.

When it comes to video games, I never really got involved. Although I enjoyed playing games with my brother every once in a while, I never took the initiative to set up my own game system or to play with friends. Text messaging and my cellular phone have been a

huge part of my life. I use more minutes than my mother, father, and brother combined, and I use the phone a lot to stay in touch with friends and to meet up and see how they are doing. Text messaging is really fun, especially when you only have one small thing to say and don't need to have a whole conversation. It is also convenient for when you're in a movie, or even a boring class (don't tell my professors I said that). Luckily, they offer a text messaging plan or else my phone bill would be ridiculous.

So far in college I use my computer in order to see assignments for class or to keep myself updated with what is going on in the school (through school-wide e-mails). I also participate in the college Facebook, which is a directory of all college students who subscribe to it where you can view pictures and profiles of your friends. We also have something called WebCT in which there are online discussions and course descriptions and information on all of my classes. I also often use my digital camera to upload photos of activities I have been doing in college and send them to my high school friends to show them what I have been up to. I love my digital camera, and I hardly ever buy prints of anything (although it is nice to have a couple of framed tangible pictures).

Computers and technology have greatly affected my life. They have allowed for much procrastination (through chatting and surfing the Web), as well as a huge amount of convenience. I love signing online and getting a new message, and I love the convenience of not having to walk all the way over to the library. I love having my own grammar and spelling editor and being able to e-mail anyone at my school about anything. Being online talking to my family makes the distance seem shorter, and watching movies and browsing through old pictures always manage to put a smile on my face. I grew up in a technologically advanced generation, and it has shaped my habits and lifestyle a huge amount.

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Endnote

1. Interviews were conducted at Brandeis University, Bridgewater State College, Colgate University, Franklin W. Olin College of Engineering, South Dakota State University, University of Wisconsin–Madison, and University of Wisconsin–Milwaukee.