Berkeley Freshmen and Educational Technology Use

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May 11, 2005
# Table of Contents

## Introduction

Caveats ........................................................................................................................................... 4

Methods ........................................................................................................................................... 4

Survey findings .................................................................................................................................. 5

Three Student Profiles .................................................................................................................... 7

Super User - Kim ................................................................................................................................. 7

Not So Much of a User – Mike ........................................................................................................ 7

An International User - Sarah ........................................................................................................ 8

Education themes ............................................................................................................................. 8

Technology Adoption ..................................................................................................................... 8

Adopting because of school ............................................................................................................ 9

Parents and helping their children .................................................................................................. 10

Students learning on their own or from friends ............................................................................. 11

Research ......................................................................................................................................... 13

The Internet ..................................................................................................................................... 13

Online help ....................................................................................................................................... 14

Personal Interaction ......................................................................................................................... 15

Coordinating group activity ........................................................................................................... 15

Seeking help ..................................................................................................................................... 16

Keeping in touch with GSIs, professors, and classes ...................................................................... 18

In class etiquette ............................................................................................................................... 18

Texting ............................................................................................................................................... 19

Laptops .............................................................................................................................................. 20

Analysis of Technologies Used in Education .................................................................................. 20

Site Comparisons ............................................................................................................................. 21

Blackboard ........................................................................................................................................ 21

CourseWeb ......................................................................................................................................... 22

IDS 110 ............................................................................................................................................. 22

Digital Chemistry ............................................................................................................................. 23

Evaluation ......................................................................................................................................... 24

Recommendations ............................................................................................................................ 24

Conclusion ......................................................................................................................................... 26
Index of Tables
Table 1: Average age of adoption for selected technologies among Berkeley freshmen..................... 6@
Table 2: Technology use frequency among Berkeley freshmen..................................................... 6@

Figure Index
Figure 1: Informative/Interactive and Categorical/Convergence Axes...........................................24@
Figure 2: Blackboard: My Blackboard.............................................................................................28@
Figure 3: Blackboard: Announcements............................................................................................29@
Figure 4: Blackboard: Chat..............................................................................................................30@
Figure 5: CourseWeb.......................................................................................................................31@
Figure 6: IDS 110 Forum.................................................................................................................32@
Figure 7: BruinWalk: Profile............................................................................................................33@
Figure 8: BruinWalk: File Repository...............................................................................................34@


**Introduction**

For our final project, we sought to learn how Berkeley students use technology to support their social networks. The results have deluged us with information far beyond what we imagined we would collect when we began. Between the interviews, surveys, and other data we collected, we have enough information for a novel, to say the least of a final paper.

However, this is a paper about determining user needs. We wondered how we could apply our research in a way that could be beneficial to the UC Berkeley community. In the end, we phrased it in a question:

> What can our research reveal about the technology uses and needs of U.C. students within the context of their education?

In short, we've narrowed the scope of our project and extracted all the relevant data we could find relating to how students use technologies for school, learning, and other educational purposes. This paper presents those results.

**Caveats**

We want to note that we have intentionally narrowed the scope of this paper to the educational portions of our research. Where necessary, we've included other relevant observations and statistics to clarify or better explain our conclusions. Many other important facts and observations were intentionally omitted or briefly explained to focus on the educational themes in our research. If you are interested in those other themes and observations, please wait for Megan and Dave's final project paper which should fill in many of those omissions.

Finally, please realize that this research is strictly about U.C. Berkeley freshmen. Because of the nature of Berkeley, the findings here may not apply to other universities or to U.C. in past and future years. Ideally, this research could be conducted across the nation and results compared to form a greater view of technology use by college students. Having said that, we're overwhelmed with the volume of data we have to synthesize; we're quite content confining it to Berkeley.

With this in mind, we introduce the core of our findings. The paper begins with our research methods, a profile of three Berkeley students, and a summary of our survey findings. Our educational themes are divided into several parts. First, we briefly discuss how students adopt technologies in learning contexts. Next, we talk about how students use technology to help them research or find answers. We continue with ways students use technologies for personal interaction related to their educational goals. That section is followed with an analysis of technologies students use in the classroom for non-class purposes. We then analyze required technologies students use for their classes at Berkeley. The paper concludes with recommendations for U.C. and a synthesis of our findings.

**Methods**

We wanted to provide a better understanding of Berkeley Freshmen communication technology use through qualitative and quantitative methods. Our data was collected from two primary sources. First, our quantitative data came from a survey used to gather a broad view about how they use these technologies. The survey asked questions covering when the students began using these technologies,
how often they use them, who taught them how to use those technologies, and much more. Some
results of the survey are attached as an appendix.

We recruited people to take our survey by email in two groups. The first group was recruited from
friends and former students of Megan Finn's who in turn recruited their own friends to take the survey,
totaling 152 students, called the snowball group. The second group was recruited from a random list of
500 freshmen provided to us by U.C. Berkeley's Office of Student Life, which we will refer to as the
random group. In the random group, 80 people completed the survey.

After completing the survey portion of our research, we invited all of the random group who completed
the survey to participate in a 90 minute interview. We decided to use the random group because we
were worried about the potential bias of Megan's previous experiences with the snowball sample. The
purpose of the interview was to detail their communication technology habits, feelings,
communications, and history. The interview was largely open ended, guided by technologies that the
students said were important to them. While most questions asked for more detail about specific
technologies, some questions were aimed at better understanding the larger context in which
the students use these technologies, such as "If you needed to get in touch with your parents, how would
you do that?"

We coded the transcribed interviews using Atlas TI and used SPSS to do further analysis on the survey
results. This and the other papers relating to the final project draw from these two data sources.

**Survey findings**

To paint a better picture of the Berkeley freshman class, we chose to present a small amount of the
findings most relevant to this paper. This table shows the age range when most students first learned
how to use that technology. The age ranges we selected roughly correspond to typical school ages – 6-10
is roughly elementary school, 11-13 middle school, 14-17 high school, 18+ college. For all of these
technologies, the ages give you a sense of the progression of exposure to these technologies through
their lives. The percentages come from the 80 student random sample.¹

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¹ The random sample may not be representative of the Berkeley student body as a whole, but it's probably better than the
snowball sample.
<table>
<thead>
<tr>
<th>Technology</th>
<th>Age range when most likely to adopt technology (years)</th>
<th>% of students who used technology at and before that age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>6-10</td>
<td>86%</td>
</tr>
<tr>
<td>Computer with Internet</td>
<td>11-13</td>
<td>88%</td>
</tr>
<tr>
<td>Email</td>
<td>11-13</td>
<td>74%</td>
</tr>
<tr>
<td>Instant messaging</td>
<td>11-13</td>
<td>62.3%</td>
</tr>
<tr>
<td>Cell Phone</td>
<td>14-17</td>
<td>93.5%</td>
</tr>
<tr>
<td>Text messaging</td>
<td>14-17</td>
<td>75%</td>
</tr>
</tbody>
</table>

Table 1: Average age of adoption for selected technologies among Berkeley freshmen (N=80)

Obviously there are dependencies in these numbers – text messaging requires a cell phone, and Internet use is needed for email or instant messaging. For text messaging and cell phones, the 14-17 age range is not surprising since many concerned parents bought their children cell phones after receiving their drivers license.

Table 2 gives you a picture of how important each individual technology is to the students. For each technology listed, it lists the percent of students who used that technology at least daily and at least weekly.

<table>
<thead>
<tr>
<th>Technology</th>
<th>% use at least daily</th>
<th>% use at least weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>77%</td>
<td>94%</td>
</tr>
<tr>
<td>Email</td>
<td>75%</td>
<td>98%</td>
</tr>
<tr>
<td>Social networking service (Facebook, Friendster)</td>
<td>44%</td>
<td>80%</td>
</tr>
<tr>
<td>Read blogs</td>
<td>23%</td>
<td>50%</td>
</tr>
<tr>
<td>Text Messaging</td>
<td>18%</td>
<td>54%</td>
</tr>
<tr>
<td>Read online forums</td>
<td>13%</td>
<td>44%</td>
</tr>
<tr>
<td>Play computer games</td>
<td>10%</td>
<td>21%</td>
</tr>
</tbody>
</table>

Table 2: Technology use frequency among Berkeley freshmen (N=80)

This helps show the dominant communication methods students use at Berkeley. Since we distributed this survey by email, the actual email statistics may be lower than what we report. But with such a large number of students checking their email daily, we find it hard to refute the results based on that alone. These numbers help explain some of the findings below. The full results of our survey are
available at http://groups.sims.berkeley.edu/ikids/freshquest/data.html.

Three Student Profiles

To set the context of the research we conducted, here are profiles of three students we interviewed. These descriptions give you an idea about the variety of people we interviewed and their backgrounds. The first profile is for an “super user” who uses technology significantly more than her peers. Next is the profile of a student who doesn't use technology as much as his classmates, based on our observations. Finally, we include the profile of an international user because they often use technologies (like webcams) in ways different than their U.S. counterparts.

**Super User - Kim**

Kim describes herself as a “collector” and “loser” who leads a “kinda sad” life. Technology is a “big part of [her] world,” and her past partly shows why. She first used a computer at age five when her dad bought one despite the family's struggles with finances. Her dad bought her games, to the dismay of her mother, but never played any himself. Around age eight, Kim's family had dial-up access to the Internet. By age ten, she was building web pages. In middle school, she began playing online games and using instant messaging programs. She was part of a gaming “clan,” a group of game players who play together regularly that live around the world who she met while playing these games and participating in online gaming communities. As part of this clan, she used ICQ, a popular instant messaging client, to coordinate times for playing games and for chatting with teammates.

Freshman year in high school, she got a cell phone which was purchased by her parents in case of emergency. She began using the cell phone in earnest once she got a boyfriend sophomore year. In junior and senior years, she started texting her friends on the cell phone but eventually cut back due to costs. She has met people through online forums that she participates in, all gaming related.

These days, Kim plays games about 10 to 12 hours a week and is aware that she's a rare female gamer. She avoids the latest fads like iPods and Facebook because they're “too trendy.” She has three IM accounts that she uses regularly – one as her main account, one for her close friends, and one for “spying” to see if her friends are blocking or ignoring her. She has a laptop and desktop computer, and when she plays games she sometimes has both on so she can surf and chat on the laptop during game breaks on the desktop. She has a blog but hasn't updated it in a while. She likes technologies that are easy to use, convenient, efficient, useful for multitasking, and entertaining. And she likes beating guys in games.

**Not So Much of a User – Mike**

As long as he can remember, Mike had computers at his home. His parents introduced him to email when he was about 11 years old. They insisted that he regularly checked his Hotmail account so that he didn't lose it. In high school, Mike started regularly using email primarily for projects and, in junior and senior years, sending school related attachments to his peers. At first, he was probably using email about once a week; that has since increased to today where he checks it several times a day.

He infrequently uses IM – once every several days. Primarily he uses it to keep track of his friends and what they've been doing. His buddy list is small compared to some of his peers – 40 people – but he
regularly chats with a small group – 8 people – whenever he sees that they're online. He tried IM with his dad but it was very awkward (his dad was very formal) and it never supplanted their phone conversations. He got a cell phone between sophomore and junior years in high school. The phone is always on but in silent mode when he doesn't want to be interrupted.

Mike dislikes people who are always online saying they have “nothing better to do with their life.” His dad once told him that IRC is a waste of time, and generally he believes that relationships should be made face to face first before moving online. For Mike, technologies should allow meaningful communication between people. It's not surprising then that he especially likes technologies where he can know someone is at the other end, like a phone conversation.

**An International User - Sarah**

Sarah's dad is an electrical engineer who built many computers for the family. She first got a computer around seven years old, and he introduced her to many of the technologies that she uses today, like webcams, scanners, printers, digital cameras, but no video games. She started using IM at the end of middle school – first on MSN but later on AOL to chat with her friends. The reason she adopted MSN first was because her family was using it and much of her family lives overseas. MSN offers voice and video conferencing over IM so she could talk with and see her overseas relatives. These days, she will sometimes coordinate with her overseas family by phone before starting a webcam session on MSN.

She takes photos and when she wants to share them with other people, she uploads the pictures to Yahoo! Photos then puts the URL in her AIM profile. Sarah's parents bought her a cell phone the summer before she started at Berkeley to avoid paying the long distance costs and because she can talk with her family for free with their phone plan. Since she's gotten the cell phone, she calls friends more than she did previously, such as calling friends at other schools (instead of using IM) and even calling friends down the hall in her dorm. She always keeps her friends aware of her status, going as far as telling friends that she's busy or that she's away rather than ignoring incoming instant messages. Because of her technical skills, she also sometimes helps her less skilled friends with their computer problems.

Sarah especially values one-on-one communication more than other ways of keeping in touch with her friends. She doesn't like blogging, social networking services (like Facebook), or games because they're a waste of time. This is reinforced by the fact that she likes one-on-one communication like phone calls over other forms of communication. Her family is very important to her, as are “instant” communication methods that get to “anyone anywhere.”

**Education themes**

We now enter our discussion of the major education themes we discovered in our research. During this analysis, we draw relevant quotes and statistics where appropriate to tell a better story about how important technology is in the educational lives of these students.

**Technology Adoption**

When we began researching the nature of technology adoption, we were thinking about ways students hear about, learn how to use, or are required to use certain technologies in their lives. Here, we divide
the adoption section by influential groups – school, parents, and friends and self – to explain the importance of each for Berkeley students.

Adopting because of school

Several students told us stories about first using certain technologies because of school. Some schools required children to learn computer skills early on. For a few students we interviewed, this was their first introduction to Internet technologies like email. According to our survey, 11% of respondents said that teachers were one source of learning how to use email. Most students learned email from parents (31%), siblings (16%), friends (15%), or by themselves (54%).

Most comments about using email for school before Berkeley were about group coordination. For those students who used email because of school requirements or urging, this often encouraged them to learn more about it or adopt it for their own use. Ben used email at school first then asked his dad for help to understand it more.

“5th grade.. that was in a class actually, and I had never heard of e-mail before. We were all brought to the library, that was full of some antiquated computers that happened to run e-mail and some of my friends were running it and I was, basically, in oblivion trying to sign on to some name that didn’t exist and tried to send an e-mail from an email address that didn’t exist. It was interesting and exciting but when it didn’t work, then I went home and asked my dad about that and everything and he kind of explained a little bit to me.”

Ben

For James, he says school teachers wanted students to have email addresses for distributing class material.

“6th grade. I think Hotmail was first it was because, just because, I think when you sign up for a things, they ask for an email you so I felt like I needed one.... It is part of school, like school wanted us to have one Just because it was convenient to send us worksheets or whatever.”

James

Raj goes into more detail about the impacts of having an email account. In New Zealand, they strongly encouraged the students to use technologies like email.

“It was some local Internet service provider came along and said ‘alright, we are giving free emails to all middle school kids.’ And so they did a program where they brought in someone who taught the teacher and the teacher then showed the students how to log on... It was generally more of my friends. But, also to mom and dad like 'Hey, I am at school. How is your day?" As it progressed then I got more from learning to more to an actual form of communication like, 'Dear Mrs. Smith, I won't be coming into school today.' They promoted the idea of like, instead of say, you getting your parents to call in that you are sick, you email the teacher.”

Raj

A few students like Raj noted that some schools strongly urged that students use computers. This often came in the form of typed papers, PowerPoint presentations, and other special assignments. 

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2 This and all quotes have been cleaned of “like,” “um,” “you know,” and similar phrases to improve readability.
justification for this was often educational, encouraging kids to be comfortable and knowledgeable about computer technologies. 35% of our survey takers said that one of their sources for learning about word processors was from teachers, and another 51% said they learned from their parents. Danielle explains how she began typing because her school required it.

“I started typing out my papers and like entire elementary school we write papers but then everything were just paper and pen and in the middle school... they would obviously be hinting, yes, you should start typing your papers from now on. So then that’s like when you start using computer more... I remember in seventh grade I would still write paper and pen like piled on question paper and after that everything started getting typed.” Danielle

At least one student took it upon himself to start typing his assignments rather than writing them. It was all about being cool...

“I thought I felt cool doing some homework on the computer and but I think it was time wise... My teachers were just getting started on teaching us how to be efficient or to be acquainted with using the computer. So they don’t expect us to do much if even anything on a computer.” Joe

Parents helping their children

Besides schools, parents were also interested in getting their children on computers and online at young ages. From our data, students from poor families sometimes got computers and Internet access before their richer peers. This is covered more in the adoption part of the research but is very relevant here.

"I got a computer when I was five. We didn't have that much money… we lived in a little apartment and with a twin bed, and my dad insisted on getting computer. Every time my dad went to Costco he would surprise me with a little game without my mom knowing. My mom would get so pissed that he wasted money on a game." Kim

It may have been hard for poorer families to keep their children up to date with the latest technologies, but having a child attend Berkeley is an outcome probably worth the difficulties.

“My mom felt that whatever technology we needed to stay competitive with the rest of the kids in school and things that we should have. So, we, as a family we tried our best to prepare ourselves technology wise. Yes, we were a little bit behind in some cases but it was available. And definitely supported too, especially educational purposes. Yeah. I think because both of them [parents] finished 5th grade and they realized given a new opportunity, should make the most of the opportunity and allow me to stay on par with other kids.” Joe

Students from other families recall the occasion when they got a computer quite vividly. For some, a parent's job required access to a home computer, meaning the children also had a computer.

“We’ve always had a computer. Yeah, ever since I can remember we have had a computer because my dad worked for... a technology based company... And than my mom needed a computer for work so she got a computer and for her purpose she needed to be connected to the Internet, so we had an Internet. We had two computers.” Jenny
Parents in high tech jobs often had lots of technology in the house. For many of these students, they always remember having a computer at home.

"My parents have always been really into technology. My mom used to work for AT&T as a computer specialist in the late 70s. So we have always been around technology as I was the first kid to get computer... so at home we have like 6 or 7 computers and 3 laptops, and we have like 3 phone lines and we have like DSL and like back in New Zealand we were like the very first people to get like T1 line I guess" Eve

Some parents saw the value of having their children learn computer basics, often thinking about their children's' future.

"[Dad] was in the Army for a while and I think that like near the end he started to see like some of the new technologies that were used because they would be used for work related applications and he probably saw the potential amount – what could be done with online modes of communication and he want to get me involved with that.” Mike

In one case, the student's parents hired a tutor to teach them basic computer skills because his parents couldn't.

“They [parents] hired a computer guy to come and taught us an hour one day early on we would be confident in computers use.. taught my brother how to type, use like MS-DOS kind of stuff... My parents knew that it would be hard for them they kind of learn how to do it because computers were completely foreign to them.” Thad

A couple of students remembered early experiences with the home computer using educational software bought by their parents. They recalled this as their first exposure to educational games.

“[Around 2nd to 4th grade,] there was this 3D dinosaur games and put on the 3D glasses and watched dinosaurs and it’s like very educational. My parents are really into educational stuff. I always just had educational games and never had anything else... Yes, MathBlaster was cool man, that’s how learned my fractions. And I also had, all I can remember was that I played the piano, I had this one thing for like teaching everything and stuff like that.” Eve

“Elementary school. They were really shotty, like, beeping, very pixilated spelling games, I am sure those were the first ones. Yeah, spelling games. Computer matching. Or like typing games. I used to think those were exciting.” James

Overall, parents were very influential in getting their children to use computers and the Internet. In particular, survey takers said their parents helped them learn how to use email (31%), the Internet (30%), and word processing (51%). Parents were not important when these students learned how to use IM (0%), SMS (0%), video games(8%), file sharing (0%), or blogging (0%). For these technologies, students most often learned from their peers or by themselves.

**Students learning on their own or from friends**

On the survey, students overwhelmingly chose learning on their own as the most important source for all technologies that we asked about – over 40% for every question. Based on our interviews, we
learned that many students were self-motivated to learn about these new programs and devices that were available to them. Some of this is explained because parents could not teach their children these computer technologies, as explained above.

As for learning from friends, this was a very popular answer for the social technologies we asked about – IM (51%), blogging (37%), and text messaging (38%). Friends were also very important in adopting technologies often because of peer pressure or “coolness” associated with these new gadgets and applications.

The reason for discussing these two groups together – learning on their own and from friends – is because many students referred to these together as well. For example, many students said they would try on their own first then seek out help when they needed it. For others, they were inspired by the actions of others to try it themselves.

These examples are all focused on web page design to show the variety of ways students learned by themselves or with the help of others. Some students were inspired simply by pride to learn new skills. Kim describes her first web site here that she built in the 4th Grade.

“It wasn’t really a site, it was just like, I can. I don’t like I think I was writing a letter. I was just like, ‘Hey, I just learned how to make text big and small!’ I really didn’t have any use for it.” Kim

Ben said it was the interaction between himself and a classmate that inspired him to learn about HTML programming, in a competitive manner.

“I had one friend that was in another class of mine in the school, that I caught up with. That’s how I actually started making web pages and everything like that. He made one web page with one image on it, and then I made one web page with an image and a background color and he started typing things and I put music in the background of my web page and that’s how it progressed. It was actually, this exciting new, competition between the two of us.” Ben

Raj also said it was a friend of his that convinced him to learn web page design, but in a friendly way.

“And my friend from Australia, the technological kind of guy. And he [said]. 'what are you doing with your life?’ I am trying to build websites,’ and he [said], 'use this program, and start using it from now because you get better with it over time if you try.' I [said], 'why don’t I try and do something with FrontPage.’ Which I did, and I learned the basics.” Raj

Many students at U.C. are driven to learn on their own first. Jenny says that when she has a computer problem, she tries on her own first before seeking help.

“The guy.. he is an engineer and he is really, really fond of computers so if I ever had a problem then I’d definitely ask him or go next to the computer center or something but I try to first learn, I first try to learn everything on my own.” Jenny
This is just a brief introduction to how students learn about technologies from each other relevant to their education. For more information, Megan gives a much better treatment of this in her parts of our final research regarding technology adoption in general.

**Research**

Once acclimated to the technologies, students began using them in the course of their studies. For many students, technology gave them access to materials for learning and research outside the classroom. Students sought help on the Internet for a variety of information needs, even those outside school. Here, we discuss use of the Internet for researching specific topics. We also analyze how some students use the Internet to seek answers for their work (as opposed to contacting other students through Internet technologies for help).

**The Internet**

The interviewees mentioned many ways that the Internet helps them learn, conduct research, and find answers to homework. For some students, school was a primary factor for getting them acclimated to conducting research on the Internet, often for research projects. A few students mentioned how fascinated they were that they could use the Internet for such research.

“[In 5th grade, I used the Internet] to research, I remember, I had no idea how to research things. We had a project on the pilgrims and I printed out every single thing I could find on it. So I had this much stuff on it (gesturing) and I was like, 'Yes! This is my research.' And then I started making a little service. 'Anyone here wants to do a research, I will do it for you and I will print it out.' My parents [said], 'what is wrong with this kid?' I was using reams and reams of paper, that was really funny.” Eve

James compares the Internet to the library, a comparison that is very relevant for most students.

“In the beginning I just thought the Internet was like going to a library. Because you'll just be researching things. I guess eventually I found out that you can do more with this.”

James

This early fascination of using the Internet resounded strongly with students – so strong that many students expressed dismay when faced with going to the library as opposed to searching on the Internet. This shows how quickly that Internet has changed the expectations of students when researching. Why do research in the library when you can do it online? The Internet greatly speeds up research for some cases.

“For history right now, we have to do a research paper with primary resources so, they give us a lot of websites to look at old newspapers on the Internet and that was really handy. I tried to [use the library] but I got discouraged. It wasn’t just as easy as the Internet. I was trying that find newspapers for the micro films and it just seemed that I wasn’t coming out with very many that made it worth my time.” Betsy

For Anita, the library was a great meeting location, but she's never used the library's resources.

“I went to Moffitt [the undergraduate library] once or twice but for meetings. Someone
said, 'hey! Let’s work together on the project at Moffitt,’ so we went there. You can get everything online.” Anita

James points out that even books, which are a primary use for libraries, are even online today. Once again, students see little value to a library when the Internet fulfills much of their information needs.

“We needed [computers in our classes in high school] for research. Basically, all research nowadays is online. I mean, books are still there, but everything is online. Even books themselves.” James

Eve explains the student sentiment about libraries best. How did people do research before the Internet? Obviously she's found a substitute in Google.

“I have [been to the library] twice. I don’t know how people did it before the Internet. It’s kind of amazing, that people would actually have to go and research things. That’s crazy to me. I mean, I go to like lib.berkeley.edu and I find peer reviewed sources. I also like Google because I'm... Yeah, I guess Google is my friend. I love Google.” Eve

Research goes beyond the classroom, like Ben suggests. Students learn about other Internet resources and feel comfortable depending on them in important situations, like a hot date.

“Internet research has always been a part of my life.. I had this really hot date and I freaked out of my mind and needed to find something I wanted to do... I was thinking there must be some kind of directory on the Internet... There was actually one web page with every single restaurant in Orange County in it... The research goes beyond just intellectual and trying to understand things in school life. It goes into everyday life.” Ben

**Online help**

Students look for help online to complete their classwork. Many times, students ask their friends for help, which is discussed later. Other times, students seek answers to their problems via Internet resources – literally finding the answers online. Some students use this for cheating. However, Erin finds this useful for learning.

“T'm taking calculus right now. I could find solutions online and I use that. That really helps like a study guide. Like a whole manual – people will have it online... They have whole books. They have everything.” Erin

Cat describes an incident that occurred during high school where students could access math homework through a web page.

“There was this website that had every math book you have heard of and had all the answers to all the problems. It was 30 bucks years so our school got an account for it. It was supposed to be just the odd numbers to help you learn how to do the even ones yourself. But if you in the search bar change the numbers and type it in, it will give you the even numbers. Everyone figured that out, only the teachers didn't know about that. People
Students have realized that it is very difficult to get through classes in Berkeley without an Internet connection. Many classes require that the students use Internet based technologies for content distribution, homework submission, and more.

“I mean all kind of classes kind of require that you have Internet connection somehow. So you have Blackboard and stuff. If you don’t have an Internet connection then you're screwed.” Kim

This issue of technologies at U.C. was very important in our interviews, and we dedicate a later section of this paper to discuss it fully.

Personal Interaction

Other than the wealth of research resources on the Internet, many students used Internet technologies to seek the help of other individuals with their school work. We analyze this interaction in three ways – coordinating group activity, getting help from schoolmates, and formal class communications.

Coordinating group activity

Many students told us stories about how they use technologies to coordinate group school work and school related activities. When trying to organize groups, some interviewees said that technologies are not the best way to manage all project activities. IM or email is most often used to handle small requests and arranging meeting times. The denser part of group work is better to complete in person. Erin describes her chemistry lab project where she and her lab partner were able to conduct their research separately but eventually had to meet face-to-face to complete the work.

“I do use AIM to make meetings. Online, we actually did most of our chem projects. We researched it all together, but since [my chem lab partner] was in unit 2 and it is too far for me so we decided to do it online. We found sites relating to our topic and then sent it to each other, made sure that it was okay, and made a list of sources and then on the weekend we decided what to print out each. This is all online and so I printed it on Friday and then he came over and then we just did it. It was faster that way than the other things.” Erin

Kim talks about another way many students use email or IM – checking work. Exchanging documents is easy to do, but coordinating complex writing or editing is not as simple.

“Sometimes when you work in groups for classes, you'd say, 'Hey, I wrote this up. Check it out,' and send the Word file [on AIM].” Kim

Sandra gives the sentiment told by most students. Technologies are most useful for determining meeting times where they can do work together.

“For group projects we will say, 'let's meet at this time,' or something. Instead of calling everyone individually, you just send a mass email to them. Usually we’ll plan to meet up at
Students suggested that they used IM more in high school for group activities and school help rather than here at Berkeley: This was surprising given the ubiquity of AIM among Berkeley freshmen. Ben explains...

“Meeting for group projects in high school was very much done over AIM. Calling was there but it wasn’t as efficient because you can send IM’s in a second and copy the exact same message and send it to the five people in your group who are usually online. And then someone’s online then you call one person and you IM to four others, you know, so it’s easy.” Ben

One student told a story about how his friends used their blogs to collectively check their work. This group effort would be difficult without coordinating software.

“[Using blogs] around final time, high school people would post their final papers because it would just be your close friends who you would be reading it... They would read through it and tell you what they think about it.” James

**Seeking help**

Students used technologies to coordinate activities for their group works, and similarly students find IM useful when seeking easy answers for completing their work. This use is very different from the group use in two ways. First, the requests are often very specific – comparing answers, not methods. The other difference is that the request is sent to an individual rather than a group of people. Raj gives a good example of this.

“I have this chem lab report due tomorrow. If I’d see [a classmate] logged online and I happened to be typing it up the same time then I might say, ‘did you put a trend line for this graph?’” Raj

Similarly, students can send a small portion of text via IM or point students to other helpful resources.

“At high school we would just help each other. Maybe ask some friends to read each other stuff or … like part of essay or ‘can you help me with a certain problem’ like and then we would be like ‘whatever, whatever’... or it will be like ‘hey, where is the homework?’ then I would just send it.” Erin

Students often said they would find a classmate online to check their work or ask questions about assignments. Sometimes online communication had benefits that other methods didn't. A phone might wake up a sleeping student, but if he is online he must be awake and probably finishing his homework too.

“If you work on assignments at 3:00 in the morning, everyone is on the computer and if I wanted some help, you can just immediately talk to someone. You don't have to worry about waking them up because you know that they are online [on IM].” Anita
Anita gives another example where IM was helpful, finding her brother assistance with a math problem.

“My brother had a problem with his math homework. And it was abstract math, and I said, 'dude, I don't know how to do this.' So I just went on AIM to my friend who is good at abstract math, and said, 'hey, can you solve this problem?' So he solved it and I send it to him and that was that.” Anita

IM is often a first step in these kinds of activities. Some students exchanged IM screen names rather than phone numbers or other contact methods in general, and sometimes specifically traded screen names in an educational context:

“Well, for every projects, no, for homework, yeah. It’s a frequent question now. Someone needs to know something – it’s not 'can I have a phone number?' [or] 'what’s your email?' It's 'what’s your IM?' because it’s quicker and .... you just send it over on IM – like a picture or a file.” Joan

However, these technologies do not replace the old fashion working face to face. IM is a difficult medium for communicating answers. Amy points to one class of problems for which IM is a poor explanation tool.

“For mathematics or science homework, it is difficulty to convey a diagram or molecular structure through instant messenger. It doesn’t really work well for that.” Amy

With a similar experience, Joe recalls when he was helping students do math homework over IM. Once again, technology gets in the way of effective communication. A face-to-face conversation would provide much more information.

“I became a tutor and I actually came to people’s houses too, so kids would IM me and they would ask me, 'okay, how do you do math problem number 39?' and then I would start off with saying what the answer is and then on the following next I would have this giant paragraph, trying to explain it to them, but then I realized it’s so inconvenient. you realize that there are all this missing details along the way, that if you were there were in person you could fill them in and you can read reactions.” Joe

Many times though, students will just meet face to face and study together. As explained in the previous section on group work, these meetings are often planned by email or IM. Of course, sometimes it's simply easier to just walk down the hall and ask your friends for help rather than use technologies at all.

“Group studying is usually done [with] people in your classes so you meet up with them at the time that you already set or people in your dorm who are right next door, who you could IM. Sometimes you do, but you could just as well knock and just go over there and say, 'hey, let’s study.’” Ben

Laura and Angus echo Ben's account of getting help in person.

“Some people on my floor are in my classes. They might come over to me like to ask for
help or something.” Angus

“I send email to friends I have made through classes… 'oh, let’s study here.' ” Laura

**Keeping in touch with GSIs, professors, and classes**

As good as students help is for doing classwork, sometimes our interviewees had to seek further help – professors and graduate student instructors (GSIs). Not all students said they get the most email from their classes, but most mentioned school as a source of email correspondence at least once during the interview. Communications about classes are very important to students since many classes use email as the primary mechanism to inform students about homework, readings, and questions. Betsy and Amy see emails from GSIs as much as they do friends and family.

“[My emails are from] mostly just friends and sisters, like once in a while, I email a GSI or something. But that’s about it.” Betsy

“[Most of my incoming mail is from a] friend I have and my GSIs “ Amy

Fewer students talked about emailing their GSIs, but for some it was a very important means of information gathering. Amy states it quite bluntly.

“I email my GSIs a lot. They must hate me.” Amy

Anita talks about the distinction between contacting friends on AIM and GSIs on email.

“The only time I email questions [for help on homework] is for GSIs or professors because they don’t have AIM because if it is a student, you have their AIM and then you can just talk to them.” Anita

However, students are wary about letting school or anything else intrude on their more private communication methods. Some students go as far as dedicating an email address (often a berkeley.edu one) strictly for school business. This is an issue regarding private virtual spaces, and is treated in further depth in the paper about relationships. Many students said they would feel weird about non-friends, including GSIs, using communication methods other than email.

“People I get email most from... something from school. School related. My GSI, my professors and Spam... [But if they IMed me] that would be weird.” Kim

In the end, students did not complain about the amount of class related email or about using email for class administration. Instead, they seemed to expect it. One student even saw using email as a positive aspect.

“I can feel like sometimes I can email someone like my GSIs will get in touch with me faster than if I would call them or something.” Jenny

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3 For those of you not familiar with U.C. Berkeley terms, replace GSI with teacher's assistant or grader.
In class etiquette

Several students talked about how they or other students used certain technologies during classes. These anecdotes gave a sense that students have certain expectations about how to behave in class. Two technologies in particular – laptops and cell phone text messaging – were mentioned most of all. If there is a rule about using technologies in the classroom, the rule is that students should not disturb the other students paying attention to the lecture. Before laptops and cell phones, students would draw in their notebooks, pass notes, or stare vacantly into space. With laptops and cell phones, students can keep themselves occupied while minimally distracting their fellow classmates.

Texting

SMS, or short message service, is a protocol that allows cell phone users to send messages of up to 160 characters to other SMS users. Most, if not all, cell phones on the market today support this feature. Many service providers offer plans for sending these messages, like $5 a month for 100 messages, and additional messages can be sent for a small charge, typically ten cents each. SMS is often referred to as “text messaging” or simply “texting.” 50% of our survey takers use SMS at least once a week, and 19% use it daily.

Texting in classes is the modern equivalent of students passing notes between each other. Some students complained about how cost prohibitive texting can be as ten cents per message can quickly add up. As Erin, Anita, and Jenny say, most texters found it to be a great way to alleviate boredom in class or to get in touch with people who weren't accessible by phone call or IM.

“It’s a crutch and so I always have [my cell phone] on me and it’s usually on silent and then I'll be in class or whatever and then sometimes if I get bored I will text people.” Erin

“Text messaging. That’s what we do during class. If we can't talk to people then we text message them.” Anita

“When I was in 11th grade, whenever like I sat in class, especially in the morning, me and my friend both had classes that we didn’t need to pay attention to at all. We just text messaged the entire time.” Jenny

One student mentioned a more dangerous use of cell phones in schools. Given any new technology, students will always manage to find ways to cheat with it.

“[Cell phones were] banned by the school but I carried one anyway. [It was because of] cheating. People would text each other stuff. And it would ring in the classroom, just annoying.” Amy

As for being “annoying,” a few students mentioned what constitutes acceptable and unacceptable uses of text messaging in a classroom. Overall, students seemed adjusted to the presence of cell phones in the classroom.

“Text messaging – I don’t do that often. Usually it’s either I message in class or I don’t want to make any noise.” Sarah (check quote)
Sandra told a brief, funny story about one incident when another student broke the classroom etiquette rules.

“Yesterday one guy I know, his phone started ringing [in class] and he just picks up and starts whispering. I was like, 'just text message.'” Sandra

**Laptops**

Other than text messaging, the other tool used to eliminate classroom boredom was the laptop. With wireless connections in many classrooms and many students owning laptops at Berkeley (74% according to our survey), this is a trend that will likely increase in the future. However, very few of our interviewees use laptops in the class. Those that do often cited note taking as the primary reason. Still, laptops are not the ideal tool for taking notes.

“[I was using my laptop for] taking notes because the lecturer speaks too quickly to write them down. So I type them. [Now] I just use a notebook because it's not as heavy.” Sarah

Angus tried using his laptop in class but found it to be more of a distraction than a useful device.

“I brought it to class once, it wasn’t really worth it coz when you have your laptop, you're like, 'I can surf the net.' and not really paying attention at class. So it doesn’t really help.” Angus

Just like Angus, many students who use laptops in class probably weren't paying attention. Boredom is always a possibility in the classroom, and these students have found that laptops, just like texting, can entertain them while not disrupting other class activities.

“I see few people bring [laptops] to chem. Sometime I see people playing Street fighter on them inside the class and I say, 'Okay.'” (laughing) Angus

Sarah said that there are good uses for a laptop in class, especially when facing deadlines.

“[Friends bring their laptops to class] only if they have a project due that they need if the next day... Not everybody has [a laptop] but like in every class someone has a laptop. They are usually not paying attention. They are on instant messenger and just surfing.” Sarah

Anita mentions one other use for a laptop. Just like texting, a laptop can be used as a note passing device.

“I am never online like during class. But, if you have the laptop on, you usually talk to the person next to you... You don’t want to disturb anyone else in the class. Open up like a notepad or word document and just type down your conversation. It seems like you are still conversing but, everyone can still listen to the lecture.” Anita
Analysis of Technologies Used in Education

Interviews with students brought up the discussion of technologies that are currently used in the classroom. A good portion of undergraduate courses at Berkeley make heavy use of course websites. With each course site, the experience and interaction differ in how students can access material or even contact relevant people. While students have utilized course websites like CourseWeb, Digital Chemistry, Blackboard, and others, these sites vary widely from each other.

Students frequently use these and other sites to fill in communication gaps when necessary. As a contrast to the previous parts of this paper, we will evaluate the following sites to determine which features to consider when designing sites for student use: IDS 110 (CalMatrix), Digital Chemistry, Blackboard, and CourseWeb. In addition, we provide a framework to deconstruct sites along two particular axes: informative/interactive and categorical/convergence sites. Finally, we will discuss how best to capitalize on new emerging uses and behaviors and make some suggestions for future site designs.

Site Comparisons

For this assignment, we decided to look into some of the sites that students had mentioned in interviews. We broke down the analysis of each site according to the following: basic features, how would students use the site, benefits of the site, and failures. With some of the sites such as Blackboard and Digital Chemistry, we did not have access to items like quizzes and exams. We will look at each site in detail and list out some recommended baseline features.

Blackboard

Basic Features

Blackboard is a learning management system (LMS) that has built-in tools for developing, administering, and publishing a course website. It provides an all-in-one solution of managing a course. In addition, Blackboard includes a chat feature and also a class roster. Overall, the tools that are available in Blackboard have been thought out and are not bad.

Blackboard course sites include the some of the following links:

- Announcements (see Figure 3)
- Course Information
- Staff Information
- Course Documents
- Assignments
- Communication

How Would Students Use This Site

Upon logging into the site, students are presented with a main index page called “My Blackboard” that provides an overall view of things going like course announcements, courses that a student is enrolled in, a calendar, and tasks (see Figure 2). From this page, if the student needs to get class materials like a problem set for a chemistry class, he/she would go to the “Assignment” link to download the homework. In all, Blackboard acts as a personal information...
manager for course-related work.

For instructors that provide online chat sessions, the “Communication” section of the site includes many of the technologies that students use such as chat and Facebook. Here, students can engage in a chat session with instructors and classmates that comes with a shared whiteboard (see Figure 4).

The Good, The Bad, and The Ugly

Again, the nice thing about Blackboard is that all the features that we've discussed above are available in one place. In addition, it seems that Blackboard provides easy-to-use tools for instructors. For the majority of students, Blackboard was the one-stop shop to get course materials since instructors found it easier to post everything online.

“...You can get the information if you go to lecture and stuff but there are always things like posted documents, homework assignments, papers, work, for such a large class, you know, you can’t make copies for everyone so they just post it online and you grab it own your own.” Joe

However, one very big flaw is the fact that if a student is enrolled in a class, Blackboard does not sync with a student's matriculation record. In fact, from the ETS website states “Enrolling in a Blackboard course website is not the same as officially enrolling in the course. You still need to enroll in the course via Telebears.” This is a glaring violation because it requires students to go through a two-step process of signing up for an entirely different system.

CourseWeb

Basic Features

CourseWeb sites are automatically generated as a basic website for every course. Each CourseWeb site presents the following three main sections or tabs to the student: course information, instructor info, and syllabus (see Figure 5).

The course information tab contains general information regarding the course like office hours, contacts, links, and catalog description. The instructor information contains bio, image, and links. And finally, the syllabus includes a link to an actual document, a summary of the class, prerequisites, goals, readings, etc.

How Would Students Use This Site

Students normally get to CourseWeb sites from the Schedule of Classes site. Many of the lower division undergraduate courses had some information on it. On the other hand, many of the courses also had absolutely no information.

The Good, The Bad, and The Ugly

CourseWeb sites are very minimal in design yet informative. If a student needed to get quick information about a course, this site does the job. However, the site lacks much interactivity. Perhaps the purpose of these sites are to serve as launching pads to more detailed sites like departmental sites.
IDS 110

**Basic Features**

The IDS 110 site utilizes CalMatrix, a “Campus-Wide Self-Organizing Online Community.” As such, the entire site platform seems more like a forum as opposed to a formal course website. In fact, it took a little while to navigate to the IDS 110 site (see Figure 6). The site does not have much in terms of organized categories. Despite this, the site does have the course title and instructor information.

**How Would Students Use This Site**

Students need to log in with their CalNet ID. Once the student navigates to the site, he/she can proceed to enter in a post or comment or look at previous conversations.

**The Good, The Bad, and The Ugly**

The site is very informal and fairly straightforward. At the same time, the site lacks formal organization. This made finding relevant information somewhat cumbersome.

Digital Chemistry

**Basic Features**

In many of our interviews, students mentioned using the Digital Chemistry site to take exams. In fact, some also talked about how the site suffered from bandwidth and server issues when a majority of the students logged in to take these exams.

“A thousand kids would be doing their homework the night before and the server would crash and we could not do our homework because their server crashed. And it was really annoying and the chemistry 1 department was like, 'this is not working.' So basically we stopped using this mid semester.” Laura

However, we were not able to log in to do this and reproduce the error. As such, our evaluation of the site is strictly from a guest account perspective.

**How Would Students Use This Site**

This site is very well organized and consistent in design. Students can easily get necessary information on the class. Also, the header section of the site included small subtext that explained each section of the site.

**The Good, The Bad, and The Ugly**

Overall, the site is nicely laid out. However, we were not able to interact with the site in terms of taking quizzes and such. Yet, considering our interviewees mentioned this site often, it would seem that the site was met with some disdain in having to accomplish work in a timely fashion.
**Evaluation**

In looking at the sites mentioned above, we found it may be useful to compare sites along two axes – informative/interactive vs. categorical/convergence sites – as depicted in Figure 1.

The informative/interactive axis allows us to look at the variety of sites that fall under this spectrum and see if sites are too top-heavy on one side or the other. Ideally, sites will try to find an even medium in being informative and providing students with an opportunity to interact with others on the information available. The reason we suggest this balance is because it allows students to seek help themselves or find answers from peers and instructors as they see fit. As discussed above, students have different preferences for how they want to find information, and sites should try to offer multiple strategies to allow that information discovery. Looking at the IDS 110 versus the Digital Chemistry site, the two fall on opposite ends of this particular spectrum.

The categorical/convergence axis looks at sites that may be too focused on a particular medium or fulfilling a specific purpose as opposed to sites that try to converge various tools and technologies. Thefacebook.com is a site that is heavily used by students for the purpose of finding fellow peers and looking at their social networks in general. However, thefacebook scope is quite narrow in comparison to the UCLA BruinWalk site that combines various tools like email, file storage, social networks, and other useful tools.

By presenting these axes of evaluation, we hope to provide designers with a useful guideline to understand how their sites may or may not fall short of being relevant to students.
Recommendations

In interviewing and learning about students technology uses, Berkeley campus IT services have much they can improve upon. We must take account of students' attitudes towards instantaneous communication and collaborative work. Our suggestions for future design of campus sites and services all relate to letting students form communities, work together, and efficiently use online resources.

First and foremost, campus services need to be coordinated better. The fact that there are various systems across campus to manage course materials is troublesome. Students have more sites and resources where they have to get their class resources. Instructors currently use these technologies as they see fit, not converging on common standards or practices. The result is that some sites use informative strategies and not interactive ones and vice versa. Sites also offer varying amounts of course information, sometimes on many web sites, from a simple class description to course syllabi to assignments and even interactive forums.

We recommend that campus services look into establishing standards, showing a stronger understanding of students and the general Berkeley audience. This could come in the form of providing baseline functionalities for all course websites (course forums, class rosters, chat sessions with the instructors) and stronger branding and cohesion of site design to help navigate for resources. The goal of this is to provide students with the resources they need to get the information they need as they see fit, not as the instructors dictate.

Next, we recommend enhancing technological services to allow better group collaboration and community building. Students come from a variety of backgrounds and the university provides an ideal place to form new bonds in the pursuit of scholarship. Our interviews revealed many instances of the need to coordinate group work and help from fellow students. In many of those cases, technologies like IM help students engage in mutual activities like seeking help from their peers or coordinating events and meetings.

In this context, other technologies that proved to useful to students included:

- IM – overall work and social coordination with others.
- Email – important in exchanging notes and other course-related work.
- SNS (Social Networking Sites) – sites like thefacebook.com and Friendster proved useful for getting contact information.

Campus resources and services should try to reflect students' actual technological uses. From our studies and interviews, students are looking to collectively manage and construct knowledge with their peers. UC Berkeley should take a strong interest in providing these or similar features in the future. While these resources exist and are used informally, a stronger UC Berkeley presence would help students get the resources they need easier and show students that campus understands and is interested in their technology needs:

- Social networking – allow students to see their connections to fellow peers.
- Student profiles and online presence – allow students the ability to establish an online identity and to see if others are available.
- Common workspace – features like forums, Wikis, and file storage to let students collaborate and exchange data easily.
- Electronic resources – online texts, learning materials, and reference material all available.
through the Internet

There are services offered by the campus that head in the right direction. Cal WebDisk offers online storage that allows users to store and share files from a web browser. Also, ETS is also in the midst of creating bSpace, which will transition from supporting three different course systems to one integrated and standards compliant system.

If the university cannot or will not implement these services, they may instead seek to appropriate or leverage existing services. For instance, Berkeley could seek the assistance of Facebook to create a U.C. branded version of the services specifically for Berkeley students, including special features specifically for the Berkeley audience. In this way, Berkeley students could benefit with a minimal use of university resources.

The technologies discussed thus far reveal how important it is to not only connect with others, but to accomplish work together. As one student stated in regards to using Facebook,

“I think the coolest thing about Facebook is that I can see who knows what friends of mine like, ‘Well you know my friend she is in clubs or she is in my class with me.’ ” Sandra

Another next step for Berkeley would be to help students engage in group work together. Students taking programming classes in computer science must submitting their programs and worry keeping track of how their programs change over time. One idea may be to incorporate a common file space with version controlling with the ability to for students to create group spaces easily. If courses require mutual enterprises or coursework, it is only fitting that students should be able to create dynamic group sites that tailor to each groups needs and goals.

We also suggest that Berkeley considers creating space for informal and social uses of online resources. One example that we found useful was UCLA’s BruinWalk.com that incorporated features like social networking, file storage, classified ads, textbook swaps, and professor reviews. Though the site is not refined in design, BruinWalk serves as a potential illustration of how Berkeley could converge various services that students could use in one place (see Figure 7 and 8).

Implementing these suggestions does not mean Berkeley must duplicate existing technologies. Instead, the university could provide a way for better organization and coordination of present resources to facilitate easy access for students. As an example, the university does not need to reinvent the wheel by providing IM services. Instead, the university could mandate course sites to include an IM link (similar to an “emailto” link) for online readings and pages so that students can easily pass on information to one another while chatting. Also, the idea of a customizable portal site for students and resources would be extremely valuable. Useful items on such a site might include not only class schedules and web pages but also lists of one's classmates, their profiles, and their online status.

Above all, the university needs to be cognizant of the actual uses of technologies by the student body and aim to recognize those uses in their future products. Without this realization, the university's technology offerings may seem just as weird as going to the library is for these students.

**Conclusion**

We were very surprised at the disconnection between the university's use of technologies versus those that the students use for themselves. Especially surprising to us was how students wall off their school specific communication for classes versus helping or socializing communication with fellow students. To a certain extent, this shows that students want a barrier between their social and school lives. On
the other hand, the amount of communication they do with their fellow students about school related (and unrelated) topics reveals that the university is not recognizing the differences between how students treat technology versus how Berkeley thinks students should treat technology.

If our research reveals anything, we believe that U.C. should do further work trying to determine the best ways to accommodate or appropriate student communication habits for the benefit of everyone. Remember that some students felt that some realms, like instant messenger, were sacred for friends only, so sensitivity is an important consideration. Requiring students to use forums or email may be good from a managerial standpoint, but those technologies don't reflect the realities of student communication. Likewise, vast libraries of books and other resources may be useful for research, but most students feel it's antiquated especially compared to resources they can find on the Internet.

This is likely to be a contentious issue for Berkeley faculty and staff. If ever you find the need to justify further research or retooling of existing resources, ask the questioner how they think Berkeley students seek help for their classes. If they can't give an answer as detailed as we have, then you should hand them a copy of this paper so they can understand the disconnection between educational and student technology practices. With enough exposure and time, Berkeley can use this kind of information to transform their use of technology in the education realm in a way that's better for everybody.
Figure 2: Blackboard: My Blackboard
Figure 3: Blackboard: Announcements
Figure 4: Blackboard: Chat
### CourseWeb

**Syllabus Document**

None available

**Summary**

Information not available

**Prerequisites**

Information not available

**Course Goals**

Information not available

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*Figure 5: CourseWeb*
Figure 6: IDS 110 Forum
Figure 7: BruinWalk: Profile
Figure 8: BruinWalk: File Repository