

Diffusion of the Internet Among University Undergraduates

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Republication Note¹

The following paper is a re-publication of the honors thesis I wrote in 1996 as a senior at the University of California at Berkeley. As the title indicates, it was designed to study Internet adoption among my fellow students.

As an undergraduate in the early 1990s found myself in school at an auspicious time: the dawning of the Internet age. The Internet itself pre-dated my enrollment, and even back in 1992 was available for students to use, but (at least for students at UC Berkeley) only if you knew where to look for it. Or even *to* look for it.

As it turns out, I did. As a senior in high school the year before I had friends who had already gone off to college come home at the semester breaks and tell me all about this *completely free* system they could use to send messages to each other. It sounded too good to be true, but once I got to college I decided to get myself one of those email accounts I'd heard so much about. It took some searching but I eventually found the Open Computing Facility (OCF), a student-run organization in the basement of Evans Hall where one could sign up an account on an Internet-connected UNIX server cluster. I then also found a phone number where I could point my 2400 baud modem to dial into the campus network (after first remembering to enter the code prefix to turn off the call waiting and telling my dorm roommates that I would be tying up the phonenumber) and then Telnet into my account.

My Internet experience was initially limited to the software I could run through my UNIX shell account, such as Talk for chats and Mail for email, but happily soon we got access to PINE as an easier-to-use mail client (a client I continued to use for more than ten years until my Gmail account and personal domain eventually mooted the need to maintain my Berkeley accounts).

Eventually the school rolled out a new program called "Home IP," which allowed us to make SLIP/PPP connections over the modem, which in turn let us use other Internet client software running directly on our own computers, including the first graphical web browsers and desktop-based mail clients. The school also began to offer all students (and faculty) email accounts on a campus-wide basis, obviating the need for students (and faculty) to independently find and get accounts on student or department-run servers. The full IT support that the university community now takes for granted has its roots in these mid-1990s offerings.

My studies also got me a front row seat to see how the Internet was being introduced to the world outside of the Academy. As a mass communications major I scavenged every single IT-related course I could find on campus, courses that during my first years at school originally focused on subjects like the French government's subsidization of MINITEL and the impact of

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Japanese chip dumping on the American computer industry but eventually turned to the Internet itself. It was through one graduate seminar in particular that I had the opportunity to surf the web for the very first time (I pulled up a satellite weather image with colorful radar highlighting and was astounded). I also learned how to code web pages, which turned out to be useful for finding a job as a web developer once I graduated – a career that had not existed at the time I was a freshman.

Meanwhile I had also double-majored in sociology, and it is for that major that I wrote this thesis. Inspired by my mass communications coursework, I decided to see how university students were adopting this brand new thing called the Internet. While today it may seem unimaginable, in the mid-1990s the Internet was not at all the ubiquitous thing it is today. Where today the Internet tends to blend into people's lives almost seamlessly, back then it required an affirmative choice to make use of it (as well as clumsier tools and slower access options). Obviously enough people ultimately came to use the Internet such that it eventually became what it is now: an essential utility that modern life cannot easily be maintained without. But this evolution did not happen automatically or overnight.

What follows then is a snapshot from the initial stages of mass Internet adoption, at least within this one community, which, by virtue of being a university community, was able to have subsidized access readily available. As the paper's methodology section discusses further, I managed to find a large class of students pulled from all parts of the campus (most classes tended to only enroll people from certain colleges or departments, but to fulfill the campus-wide "American Cultures" pre-requisite there were several large classes populated with students from hard sciences, social sciences, humanities, and everything in between). I then asked these students a number of questions about if and how they used the Internet, and whether they planned to use it once the university no longer gave them their access. (Of note: not everyone said yes.)

The paper necessarily suffers from being the work product of a harried 21-year-old pushing to graduate. I seem to have given it some sort of edit in 1998, and in preparing it for re-publication now I've given it a bit more polish where certain sentences were either unclear or otherwise cringeworthy. I've opted to leave most of it the way I wrote it originally however, at least in terms of substantive assertions, because what I got wrong back then (such as the fixation on certain terminology or technology), as well as what I got right, is itself almost as meaningful as any of the data collected. No one could have imagined in 1996 the Internet becoming what it has 20+ years later, but as we consider what the Internet might come to look like in the next 20 years it is helpful to see how the future looked to us then as we look to it now.²

² Most footnotes are original, unless indicated by "2017 note." Another shortcoming of this study is that I was not more diligent in providing citations for many of my assertions. Certain studies that I relied upon, however, are referenced and later incorporated in the bibliography. They, too, offer interesting snapshots chronicling how the Internet came to be widely adopted.

Introduction

Hardly a day passes when the San Francisco Chronicle doesn't run some sort of article having to do with the Internet. The same is true for most other mainstream mass media, not to mention the variety of special interest magazines dedicated to the subject. There is no question that the Internet has become a hot topic of the mid-nineties, frequently popping up in discourse ranging from economic policy to political policy to civil rights to education, and so on. Nearly every facet of modern life stands to be affected by the Internet if it hasn't been already.

Now, in 1996, society stands on the cusp of a future full of computer-mediated communication, guided by the popularity and the relative technical efficiency of the Internet. If the Internet is to have the potential to realign social life, as many pundits claim, however, it is worth investigating the inroads it has already made in becoming an important, perhaps integral, communications medium. Its history, though young, can shed light on the sort of potential it has to truly create a new communications paradigm. Proponents of the Internet may spout optimism about how the Internet stands to revolutionize modern life, but in order to gauge how correct these predictions will be it is necessary to examine how the Internet has already begun to do so. This examination may offer clues to future integration trends, as well as suggest what more should be done to make the Internet become a ubiquitous facet of modern life.

Statistics measuring Internet usage populations today tend to vary widely, mostly because the nature of the Internet makes it difficult to calculate these numbers. Most of the data currently available comes from marketers who, eager to tap into the Internet as a lucrative marketplace, have been pushing the envelope in measurement techniques. Several Internet demographic studies were released in 1995 and early 1996 that put the Internet user population figure at anywhere from 8.4 million users [FIND/SVP, 1995-6] to 16.4 million [Hoffman, 1996]³ to 28 million [Yankelovich, 1995-6], depending on how each study defined an "Internet user." Regardless of the exact number, however, it is safe to say that there are millions of people who use the Internet. Yet there are many millions more who are *not* using the Internet, thus warranting studies such as this one to assess why not.

Nearly all of the current studies find that Internet usage is most prevalent amongst younger, more educated people [Hoffman, 1996; Yankelovich, 1995-6].⁴ Because of that fact, and the availability of the sample, this study surveyed students at the University of California at

³ Hoffman's data for Project 2000 is based on the 1995-6 CommerceNet/Nielsen survey. She has publicly criticized Nielsen for skewing the sample by too heavily weighting certain segments of the population. Using the Nielsen data she recalculated the numbers reflecting each demographic to correlate with the proportions represented in the census. Consequently, when the Nielsen data is cited within this text, it is in reference to her recalibrated numbers.

⁴ "Younger -- 38% under 30 versus 26% for adults in general; average age of 35 versus 43 for adults in general. Better educated -- 33% with a college degree versus 19% adults in general; 57% with some college versus 43% for adults in general." [Yankelovich, 1995-6].

Berkeley (“UC Berkeley”) to see if and how they were using the Internet and to examine what factors might have been influencing their Internet usage.

The sample was comprised mostly of undergraduates of varying ethnicities, economic backgrounds and academic disciplines. Cost and education (which in this case refers to the skills and instruction necessary to use the Internet), two major factors that normally affect people’s adoption of information technology, should not have been significant factors affecting their use of the Internet, because the University provided access to both Internet-enabled computers and classes on how to use them.

However, the survey results showed that while the respondents overwhelmingly saw the Internet as being an important communications medium in the future, a considerable number of those sampled had yet to adopt it as a significant part of their lives. Moreover, those who did fall into the category of Internet “users” did not necessarily all incorporate it into their lives the same way, despite having equal opportunity to.⁵

The data suggested that while the University played a passive role in shaping Internet usage by providing access to it, if and how people seized the opportunity to use it depended on other characteristics particular to those individuals. The characteristics chosen for examination by this study were sex, economic background, and race. Each group of students sharing these characteristics was analyzed to see what proportion of them used the Internet, and then the users within each characteristic group were examined to see if their usage patterns were similar. Ultimately, however, it did not appear that the University played any sort of equalizing role that might have mitigated the influence of any of these factors. Nor did it appear to be a strong, overt influence in shaping its students’ behavior overall.

⁵ “Equal opportunity” refers to the various campus labs, classes, and modem pools that are available for any currently registered student to use. However, some students’ access was more equal than others. Students affiliated with certain departments get the benefit of access to additional IT infrastructure dedicated exclusively to those departments. Computer science majors represent just one such example: they have access to machines that they only have to share with other CS or Electrical Engineering majors, not the rest of the campus. Also some other departments provide Internet accounts for their own machines that may allow for more comprehensive Internet uses than the generic UCLink accounts provided by the campus for the use of all students. (For instance, UCLink4 accounts, which are the most common type of respondent account, do not offer UNIX shell access. While the UNIX shell may be initially difficult to learn to use, without it users are forced to install, configure, and maintain any and all Internet client software on their own machines, which can be equally unnerving for a neophyte to configure. The University does offer a prepared software suite to assist the process, but getting set up still requires a degree of technical confidence that many students may not have.) But these alternative IT resources are not available to the entire campus community, which leaves the majority of UC Berkeley students, and especially those within the humanities and social sciences, competing for the same generally-available campus resources.

There are two major theories that can shed light on why the adoption patterns across these subject categories were not uniform. One is a theory from mass media research known as the “Uses and Gratifications” theory. This theory was originally derived as a way to counter mass media observers who felt that mass media had simple, direct, and unavoidable behavioral results on the audience. The theory took the emphasis away from the message itself and instead focused on the audience.⁶ As the name of this theory suggests, with the Uses and Gratifications theory the audience “uses” a medium only as it serves its interests and/or satisfies a need. This idea, when applied to traditional mass communications, can help explain why people watch certain types of television. In the case of this study, this theory can explain why certain people were drawn to using the Internet and why certain people used it in certain ways.

The other helpful theory comes from the area of social research known as “diffusion of innovations.” In his pioneering work, Rogers [1995] described the process by which an innovation becomes a fixture in society. First the innovation must be developed, and then people need to be exposed to it, but whether or not this innovation will be truly “diffused” throughout society is a much more complex matter very much dependent on the individuals (“adopters”) themselves. This theory applies to this study because if the Internet is to play a strong role in society, then it has to become evenly diffused throughout society, much as the telephone and television have been, both in terms of its physical access and common uses, before it can be of any service to society.

Definition of Terms

Before the results of this study can be understood, it is important to clarify what is meant by the various terms used by the project. The most important term to define is what is meant by the “Internet.” For people not familiar with it, it can be difficult to grasp what the Internet actually is because it is much more abstract than any other modern communications technology. (This difficulty in understanding what the Internet is itself is one of the problems interfering with the adoption of the Internet as a technology.)⁷

Unlike the telephone network, the Internet is not a specific network. Nor is it a specific place, nor a specific technology or appliance. To mentally conceive of what the Internet is, it helps to break

⁶ An example of the type of assumption the “Uses and Gratifications” theory tries to counter is the notion that violence on TV induces violent behavior. While a Uses and Gratifications study might agree there is a connection between the two, it would also suggest that the relationship between the message and the receiver is much more complex than a bare causal one, and ultimately any link is more dependent on the viewer of violent messaging than on the message.

⁷ It is also one of the problems in measuring the Internet. Every study to date has had to decide whether to consider as Internet users all people who have simply used email, people who have used some sort of Internet application other than email, and/or people who use commercial on-line services. Some studies have also considered the frequency Internet usage in deciding whether to label any particular individual an Internet user. [Hoffman, 1996; FIND/SVP, 1995-6; Yankelovich, 1995-6].

it down into its parts. Envision first just one computer: inside this computer there is memory (a hard drive) and processing power (a chip, like a “Pentium” or a 486). The user of the computer only has access to this single computer’s resources. But if this computer is connected to another somehow, then the user will also have access to the second computer’s memory and processing power. (It is not particularly important for this discussion exactly how the two computers are connected, be it by copper phone wire, by ethernet, or by wireless technology such as cellular links or even satellites.) If a third computer is added, then a network is created, which can then be connected, somehow, to another network somewhere else.

However, none of these networks are “the Internet” because, again, the Internet is not a physical entity. What causes these various networks to be part of the collective “Internet” is that there is a standard protocol that all these computers use to talk to each other, called TCP/IP. This protocol provides a way for each network to handle data so that any machine connected to any other via any network can receive the data and know what to do with it. What people commonly confuse as the Internet are various software applications that use this protocol to enable the transmission and processing of data via numerous interconnected wide-area and local-area networks. These applications enable various uses of the Internet, but are not actually the Internet itself.

The most common applications for the Internet are email and the World Wide Web. Email is a specific type of file transmission, usually of a text file, from one address to another. There are various “mail” programs, but all do the same thing, which is to take apart the file created on one end and send it off in bits and pieces to the receiving computer, where another mail program will put it back together into an “electronic letter.”

The World Wide Web (or “Web” for short) is a little more complex, but the essence is still the same. There are various software programs called “browsers,” which exist on local computers. Most of these browsers are graphical, with Netscape and Mosaic being just two of the more prominent examples. These browsers can be told by the user to look at a file on some other computer that is somehow “connected to the Internet” and that can understand the instructions sent to it telling it to share the file. The browser then reads the file and, depending on what kind of file it is, displays something on the screen for the local computer user to see. What makes the Web so unique is that many of the files that the browsers like to read are created in such a way that they become dynamic documents filled with “hypertext.” Hypertext tells the browser how to render the document and what to do when users interact with it, usually by clicking on part of it. Often these instructions contain the address of another file. Clicking on hypertext can send the person using the browser to virtually any other file that is connected to the Internet. This dynamic nature, this ability to hopscotch around the world by a few clicks of the mouse, is one of the most important characteristics of the Internet that give it its perceived value⁸ and popularity.

⁸ A user of the Web will have access to any information anywhere in the world, so long as it is readable by web browsers. Even by the beginning of 1996 when this survey was administered there were very few subjects that did not have at least some information relating to them somewhere on the Web.

Again, though, the “Internet” is not limited to only the online information available to Web browsers. As a broader network the Internet can support other functions, including real-time communications connectivity, which are enabled by programs such as “Talk,” “CUSeeMe,” or even the Internet “phone.” These programs establish a connection between Internet addresses and transmit data from one computer to another as soon as it has been created. Typically this data is text, but it can also be video or sound. These types of immediate connections are not always person-to-person; for instance, Internet Relay Chat (“IRC”) connects several people at once, while programs like MUDs (Multi-User Dungeons) let people interact with many others in a game situation.

Other Internet applications mentioned in the survey include newsgroups (files pertaining to certain subjects are posted in such a way that anyone with news-reading software can read them), gopher (similar to the Web except not as dynamic or graphical), finger (a program that looks for basic information at another address conveying another user’s name, whether the user is currently logged on, other address book information, etc.), ping (ping programs send out data to test whether another machine is responding and how long the transmission takes), telnet or rlogin (these are programs that let people from one machine “log on” and use another even if the user isn’t physically at the other machine), FTP (which stands for “file transfer protocol,” commonly used to download larger files like software packages), and mailing lists (mass mailings of email to a community of subscribers usually pertaining to particular topics of discussion).

Other terminology used deliberately by the survey include SLIP/PPP and Ethernet. All of these terms go towards describing the type of connection a user’s computer may have had with the Internet. These types of connections turn the local computer into a node on the Internet and enable Internet software to be used locally. It is also possible to connect to the Internet without turning one’s local computer into a full Internet node, but this generally requires using a modem connection that simply turns the local computer into a dumb terminal dependent on a remote server for the actual connection to the Internet. The servers one connects to can be quite powerful, but their remote user interface is generally line-prompt driven and often daunting for new users to learn because it requires knowing precise commands to enter.

The survey also mentions homepages. A homepage is a file written in Hypertext Mark-up Language (“HTML”), the kind of language that Web browsers like to read. Making homepages does not require a sophisticated programming background. The ease of creating them gives individual users the ready ability to post whatever information they would like for the anyone else on the Internet to have access to at the URL where they’ve posted it. In Internet parlance a “URL,” or “Uniform Resource Locator,” is the address of a homepage that the web browsing software uses to locate it. For example, “<http://www.berkeley.edu/>” is the URL for the homepage of the University.

Finally, it is necessary to differentiate the Internet from computer-mediated communication generally. The Internet is computer-mediated communication, but not all computer-mediated communication is the Internet. Similarly, not all electronic mail uses the Internet. Electronic mail, an example of computer-mediated communication, can be on a local, private network. It doesn’t even need to use the same protocol as Internet networking requires. Furthermore, not all email using TCP/IP even “gets on” the Internet. In the case of these Berkeley students, if they

were emailing each other, they were only using the local campus network. Only when their intended recipient had an account on a computer beyond the campus network did the user actually “use” the Internet.

This study focused only on the various software applications designed to make use of the Internet’s actual networking protocols. The analysis set forth therefore generally applies only to the Internet and its applications although some of the analysis is applicable to computer-mediated communication in general.

Methodology

This survey differs from the other Internet market surveys available in that while they tried to map out the entire population and its propensity to use the Internet, for this study only a specific segment of the population was observed: students (primarily undergraduates) currently attending a university.

The survey was administered to a large music class at UC Berkeley. The class was chosen because of the variety of ages and disciplines it has historically attracted. By and large the respondents were all undergraduates, although there were a few graduate students as well. They were included in the analysis because there is little functional difference in their experiences and those of other undergraduates who had studied elsewhere before attending the University. However, the responses of people who were over 29 were removed to consolidate the sample, and because it is reasonable to believe that the experiences of a 31-year old are considerably different from those of a 21-year old. This survey deliberately had focused on a younger population because of the general assumption that of all Internet users at large, the greatest proportion of them are young and university-educated [Yankelovich, 1995-6; Hoffman, 1996]. Here, then, was a sample of people who were young and university-educated, yet it appeared that not all of them had fully adopted the Internet. The survey was accordingly designed to map out what within this young, university student sample was shaping their usage behavior.

Approximately 250 surveys were distributed, of which 213 were returned. Of these, 204 were used following the adjustments for age. With respect to sex, age, economic background, and race the sample was comprised as follows:

- Sex: 93 people were males and 109 were females (approximately 46 and 54 percent, respectively, with 2 cases missing).⁹
- Age: Years of birth were adjusted to include only those from 1967 through 1979. Ages were consolidated into categories spanning two years (for instance 1970 and 1971), except for the first category which spanned from 1967 through 1969. The breakdown is represented by the following table:

⁹ All percentages are based on the adjusted sample (with missing cases removed from the total) unless otherwise indicated.

V alue	Frequency	% of total 204	% of valid 192
67-69	6	2.9	3.1
70-71	11	5.4	5.7
72-73	15	7.4	7.8
74-75	37	18.1	19.3
76-77	116	56.9	60.4
78-79	7	3.4	3.6
missing	12	5.9	missing

Table 1 - Age distribution of the sample

- Economic background: Respondents were asked what their family income was while they were in high school. The five original categories were compressed for analysis into three categories: \$0-25,000, \$26-75,000, and \$76,000 and above.¹⁰ The breakdown is represented by the following table:

V alue	Frequency	% of total 204	% of valid 185
\$0-25,000	25	12.3	13.5
\$26-75,000	91	44.6	49.2
\$76,000+	69	33.8	37.3
missing	19	9.3	missing

Table 2 - Economic background of the sample

- Race: This question was phrased, “When others are asked to describe you, what term might they use?” The choices were Black, White, Asian, Indian, Latino, and Other.¹¹ The wording was chosen in part because there are too many ethnic possibilities to code efficiently and because if the economic standing of the individual or educational opportunities would have been affected by racial bias, then it was important to ask the question in those terms. For the analysis the “Others” were coded as missing, and Black and Latino were combined, as was Asian and Indian. The breakdown is represented in the following table:

¹⁰ These categories were chosen to differentiate those from a poor background, a generally middle-class background, or from a wealthy background.

¹¹ *2017 note:* today these breakdowns appear crude and inaccurate. They may have appeared less so in that era, but exactly why these categories were specifically chosen has been lost to history.

Value	Frequency	% of total 204	% of valid 187
Black and Latino	14	6.9	7.5
White	65	31.9	34.8
Asian/Indian	108	52.9	57.8
missing	17	8.3	missing

Table 3 - Racial distribution of the sample

Certain questions were designed to assess usage patterns. Question 23 asked which Internet software applications were used, and question 24 listed various possible uses for the Internet and asked how often the respondent used the Internet for any of them. For the analysis, the sub-questions to question 24 were divided up into 3 categories: Internet uses designed to take advantage of the Internet as an information resource,¹² Internet uses designed to take advantage of it as an inter-personal communications medium,¹³ and the remaining questions referred to specific functions that could now be done on line.¹⁴

The rest of the questions inquired about what types of direct influences caused people to start using the Internet. These influences included jobs, high school classes, university classes, family, and friends. They differ from personal attributes such as economic background, sex, or race in that those were innate to the individual, while these others were more recent external pressures that caused the individual to use, or perhaps avoid using, the Internet.

Of the 204 respondents there were very few who answered the entire survey perfectly without misunderstanding or erroneously skipping any questions. There were some questions that required only one answer, so cases that had more than one response were coded as missing. While doing cross-tabulations, if the variable (question) being cross-tabulated with was coded missing for a particular case, then the other variable for that case was also coded as missing and not counted for the cross-tabulation.

¹² Looking at government documents, reading campaign literature, doing library research, visiting museums, finding out about news events, finding out about the weather, finding out about other places, getting help with hobbies, using the Internet instead of a newspaper, and using the Internet instead of a TV.

¹³ Keeping in touch with friends, relatives, neighbors, co-workers, and classmates, meeting people, using the Internet instead of a telephone, using the Internet instead of writing letters, and using the Internet instead of a fax machine.

¹⁴ Renewing library books, and buying or selling anything on line. Not many people said they used either of these functions so they were generally left out of the analysis, particularly since the two more important distinctions appeared to be the first two categories. [2017 note: by today's standards it is almost unfathomable that few people said they bought or sold anything online.]

However, while there were never 204 perfect cases for any question, there were rarely fewer than 150 usable cases either. The only occasions where the numbers were too small to work with were for some questions with many responses. In most of these cases responses were combined, reasonably, to generate more usable numbers. Some combinations were previously described for age, income, and race. The responses for question 16, which asked how often the Internet was used, were combined for some cross-tabulations to differentiate the Non-Users (“Never Used” and “Used Once or Twice”) from the Internet Users (“Beginning to Use More” and “Frequent User”). The four separate categories were used only when it was necessary to differentiate intensity of use.¹⁵

However, there were still some groups that had considerably smaller populations to work with, such with the Black/Latino category, which had fewer than 15 cases at any time to work with. The effect of the smallness of the data is that some results might be due to chance since the standard error was relatively large (consuming entire cases instead of fractions of them). This problem was generally overcome by graphing the percentages within each group, as opposed to the number of cases in each group,¹⁶ and by avoiding deriving too much significance from smaller variations.

Another coding difficulty arose from having offered various questions for free-response. The consequence of this practice meant it was often difficult to categorize and quantify the results. However, for both difficulties it should be remembered that the function of this study was not to definitively define patterns and tendencies but rather to map out those influences which might previously have been overlooked or over-simplified in order to suggest valuable areas for subsequent studies to look into.

Analysis

By and large the sampled students believed that people will need to use the Internet (92.5% versus 7.5% believing otherwise). However, when asked if people already needed to use the Internet, only 58% thought it was currently necessary. This datapoint is just one example showing how the Internet has not yet completely diffused itself throughout the University

¹⁵ Frequency or intensity of use is an important factor in analyzing Internet usage because it goes to define a more accurate picture of an Internet “user.” A person only using email is not using the Internet in the same way as a person using the Web or other Internet utilities. However, for this study users were allowed to self-report their Internet usage without necessarily being recoded based on what they said they actually used the Internet for. This type of differentiation was made later in the analysis to indicate particular usage patterns, rather than to define whether someone should be considered a “user.”

¹⁶ For example, if there were 10 people in a group and one said he didn’t use the Internet, then the results were graphed as 10% and 90%, just as a group with 50 people would have been if five said they didn’t use the Internet. This adaption was necessary to do since the demographic distribution in the survey sample was neither random nor even.

population. The remaining data goes to suggest why it has not become more widely adopted in this sample, as well as why it has already been adopted by certain people.

The original inspiration for this study came from pondering the influences of the “Knowledge Gap” on Internet usage, and vice versa. The idea behind the Knowledge Gap is that people with money can afford the education that will let them earn more money, and so on. While their upward social mobility increases exponentially, those without the initial opportunity to have money or an education will remain in lower social standing, ever more unable to compete.

In this sample, all the respondents are at a university. The original social standing should now be equalized since everybody has the same chance to be educated. However, the results suggest that the influence of personal characteristics (such as age, race, income) is not completely neutralized upon entering the university. Providing access to machines and classes did not make everyone use the Internet because merely eliminating cost and education as barriers to using the Internet does not also eliminate the other characteristics that govern individuals’ propensities to use it.

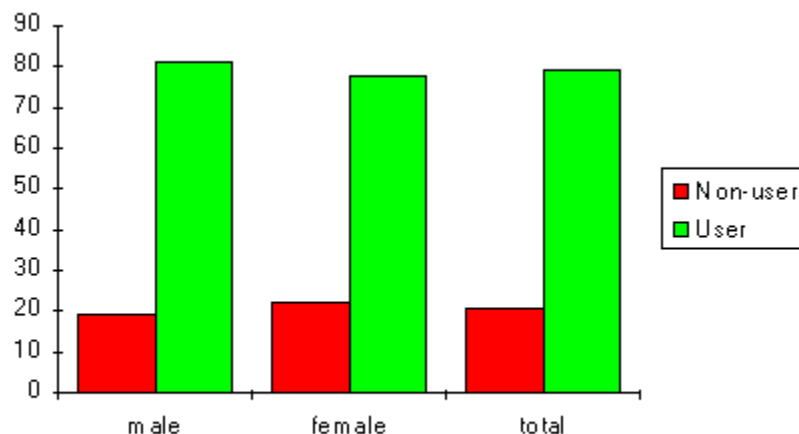
Sex

There is some disagreement among researchers about the influence sex has on Internet usage. While most studies show that Internet users are mostly male, the ratio of men to women varies from study to study. Using the adjusted Nielsen survey figures, Project 2000 puts the percentage of female users at 33% [Hoffman, 1996]¹⁷ and the FIND/SVP study concurs with 35% [1995-6], although the Yankelovich survey places their proportion at 43% [1995-6].

Other studies have suggested that women tend to be at a disadvantage in using computer technology. Krendl, *et al.*, did a three-year study that suggested middle and high school girls appeared less interested in computers “even when they have as much experience with the technology as boys.” Their study was originally designed to see if the sex differences disappeared over time, but what they found was that while both boys and girls became less confident with their computer skills over time, girls’ confidence waned more significantly than the boys’. [Krendl, *et al.*, 1989].

The Berkeley data, however, tends to contradict the notion that women are any more likely to refrain from using the Internet. The following graph shows that the proportion of users and non-users by sex. It indicates shows that men and women are equally likely to use the Internet.

¹⁷ The original Nielsen data put the figure at 23%. [Plotnikoff, 1996].



Graph 4 - Proportion of Internet users and non-users for each gender

Part of the explanation for the differences between Krendl's data and the Berkeley data can be found by critiquing some of the assumptions put forth by Krendl or the literature she cited. She cited for instance a study by Vredenburg, Flett, Krames, and Pliner,¹⁸ which said that male undergraduates were more likely to buy a computer. However, that study was from 1984. By 1996 the undergraduates in the Berkeley sample showed more equal computer ownership (77% of the men had computers [72 out of 93] while 74% of the women also owned their own [78 out of 106]).

She also cited two studies¹⁹ that said that boys were more likely to enroll in programming courses, which could influence their later comfort with computers. However, the Berkeley data tended to discount the influence of more intensive computer uses in childhood on later tendencies to use the Internet. The following table shows how early computer experience affected whether students were Internet users now.²⁰ While people who had used computers young tended to now be Internet users, it was at the same ratio as Internet Users v. Non-users for the sample overall.

¹⁸ Vredenburg, K, G. L. Flett, L. Krames, and P. Pliner. "Sex differences in Attitudes, Feelings, and Behaviors Toward Computers." Paper presented to the annual convention of the American Psychological Association, Toronto, 1984.

¹⁹ Anderson, R. E., W. W. Welch, and L. J. Harris. "Computer inequities in Opportunities for Computer Literacy." Unpublished manuscript, University of Minnesota, Minnesota Research and Evaluation Center, Minneapolis, 1983; Linn, M. "Gender Equity in Computer Learning Environments." *Computers and the Social Sciences*. 1(1), 1985, pp. 19-27.

²⁰ The actual responses included were Calling BBSs; Email; programming; Computer class; Internet; Database; Library use; Logo and Turtle graphics [rudimentary programming]; and Computer science class.

	Non-Users	Users
People with programming experience, etc.	15 28%	37 71.2%
Overall sample (25 missing)	37 20.7%	142 79.3%

Table 5 - Propensity of people with programming experience from childhood to use Internet compared to overall sample

This finding was surprising, and a similar surprise was that while most of the respondents reported using a computer at home and/or at school as children, not all of them were Internet Users once at college. If early exposure is to be a predisposing factor influencing later adoption of the Internet there must be some other aspect to people's early exposure to computers that affects their later usage. Further discussion on this topic appears later in the analysis.

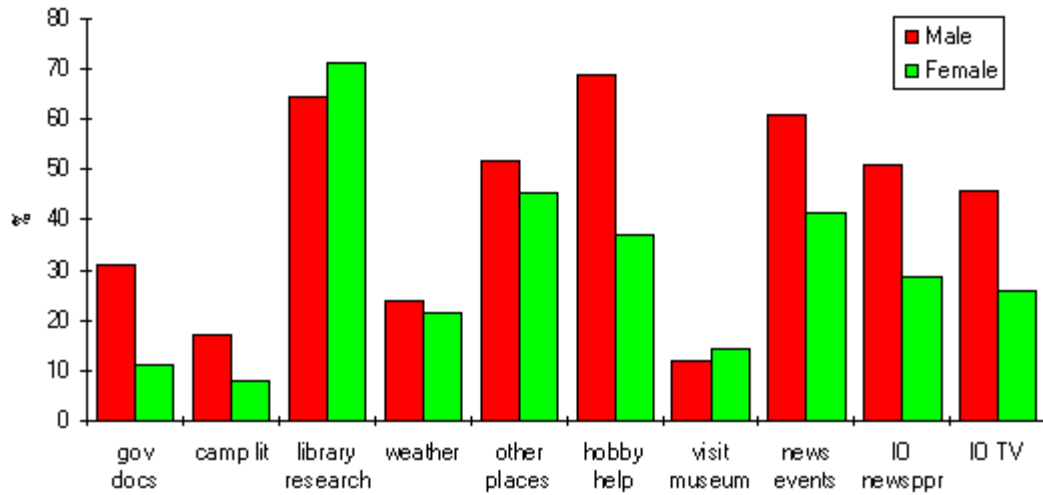
Returning to the discussion of sex, the data does not suggest that there is no difference in Internet usage patterns due to sex. The questions that asked about using the specific applications of the Internet suggest that men were more likely to use more its technical applications, whereas women used the applications that corresponded most directly to specific functions, like emailing.

	email	newsgroups	WWW	CUSEeMe	Gopher	MUDs, etc.
Male	97.0	48.5	84.8	4.5	40.9	12.1
Female	98.6	35.2	83.1	1.4	33.8	4.2

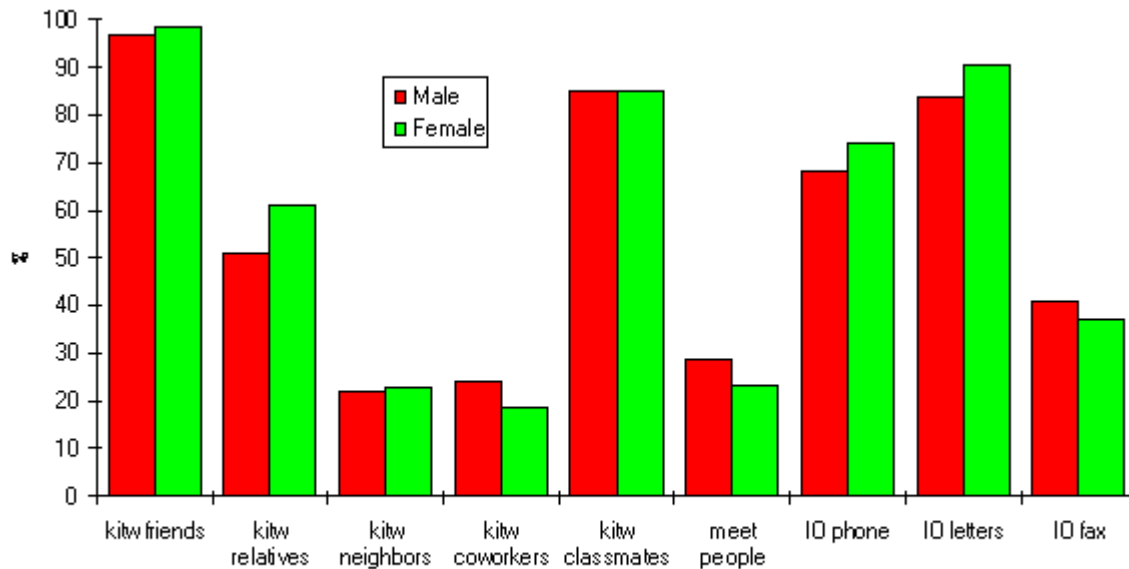
	IRC	finger	ping	telnet,etc	FTP	Talk	Mail lists
Male	25.8	45.5	12.1	45.5	36.4	45.5	19.7
Female	9.9	39.4	1.4	33.8	8.5	47.9	16.9

Table 6 - % of each gender that uses each Internet application

The questions that asked about specific Internet uses reveal similar predispositions based on sex. From the following graphs one can see that men are generally more likely to use the Internet as an information resource, whereas women prefer to use the Internet for inter-personal communication:



Graph 7 - % of each gender that uses the Internet for these information resources



Graph 8 - % of each gender that uses the Internet for these communication purposes.

[NB: "KITW" = Keep In Touch With; "IO" = Instead Of]

The predisposition for women to use the Internet for inter-personal communication has historical precedent in the literature chronicling the diffusion of the telephone. According to Fischer [1992], study after study on the use of the telephone reported that women were more likely to have them and use them for conversation. Even when the telephone was first being integrated widely throughout the society, the more adult women in the household, the more likely it was that the household would have a telephone. Fischer cites three plausible answers for this sex disparity:

“First, modern women have been so isolated from adult contact during the day than men, so they have grasped the telephone as a device for breaking that isolation. Second, married women’s duties have usually included the role of social manager - making appointments, preparing events, staying informed about kin and friends and keeping them informed about the family, and the like; men neglect those tasks. Indeed, by many accounts, a wife typically maintains the family’s communications with the husband’s kin as well as with her own. As Rakow puts it, ‘telephone talk is work women do to hold together the fabric of the community...’ Third, North American women are more comfortable on the telephone than are North American men because they are generally more sociable than men.”

It is not likely that the first two explanations apply to this Internet study sample, but the third explanation may in some respect.²¹ The idea that women are more sociable can explain why women like to use the Internet for inter-personal communication. However, the above chart shows that men appear to be equally sociable. Thus the male predisposition to use the Internet for social purposes appears to be relatively unprecedented when compared to the diffusion of other technologies, like the telephone.

A closer look however shows that there may be differences in types of inter-personal communication. For instance, women are more predisposed to use the Internet to keep in touch via email with people they already know, while males are more willing than women to use it in more anonymous social situations such as MUDs or newsgroups. These same types of distinctions were also observed in the FIND/SVP study. It reported that:

“The survey confirms that men are much more likely than women to use the worldwide web and such specialized applications as FTP and the Usenet. However, women are slightly more likely than men to use Internet email and to participate in Internet mail lists, underscoring a strong predisposition among women toward Internet communications features.”

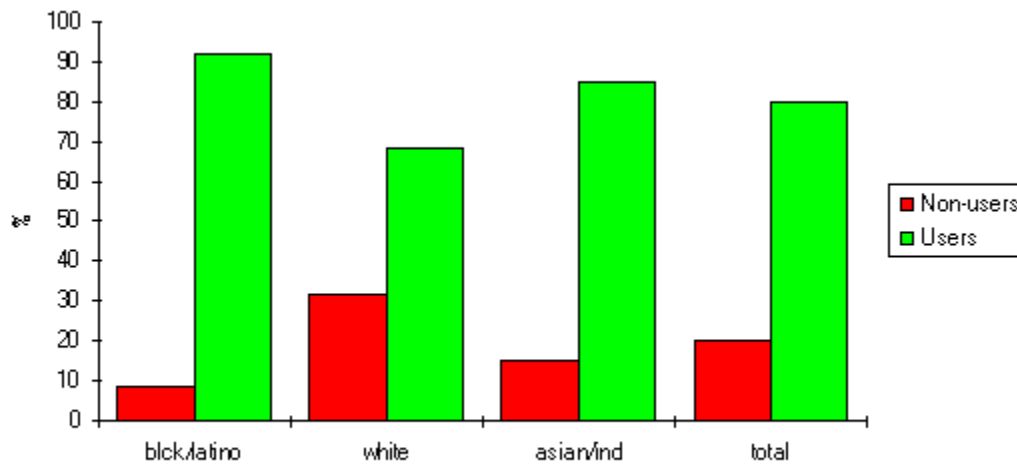
Overall the data is suggesting that people, regardless of sex, adopt the Internet as they would any other technology, constructing its uses around their own preferences or needs. To the extent that preferences and needs vary by sex, so does Internet usage.

Race

If sex seems to be a defining characteristic in determining Internet usage, then it is worth looking at other characteristics to see if they have a similar influence in shaping usage habits. Towards that end racial groupings were examined to see how likely individuals with different racial identities were to use the Internet. The following figure shows that while whites in the sample

²¹ 2017 note: the second explanation may have seemed inapplicable because the women in the sample were likely still single due to their age. However, it may have been presumptuous to assume that, even so, their organizational habits did not follow the patterns earlier noted by the accounts Fischer cited.

were more likely than not to use the Internet, and Asians and Indians were more likely than that, blacks and Latinos were the most likely of all to use the Internet.

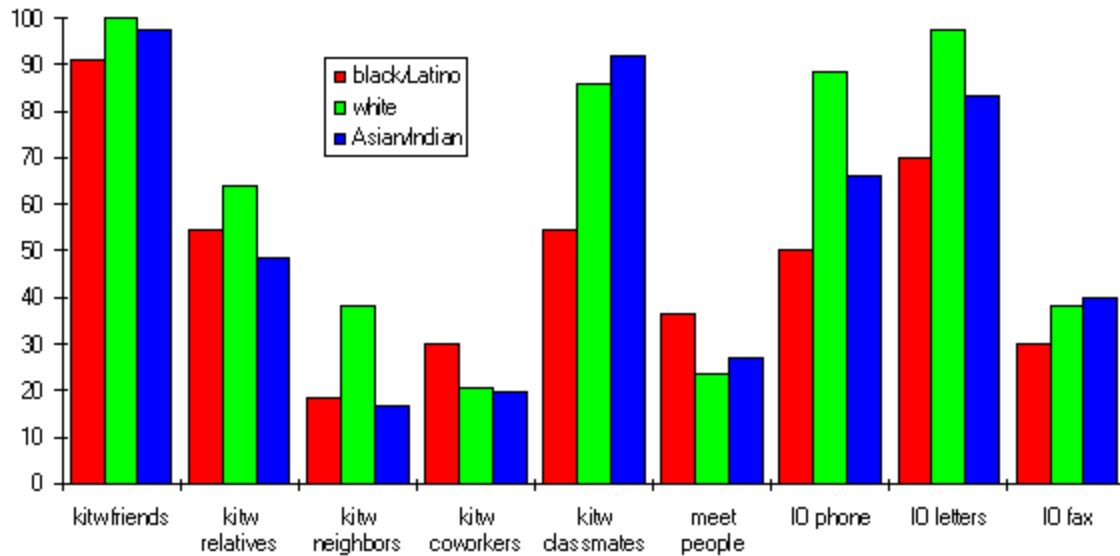


Graph 9 - Proportion of Users and Non-users within each race group

Returning to the idea of the Knowledge Gap, we might have expected the smallest proportion of Internet users to be found within the black/Latino category, not the largest. To the extent that minority status correlates with poverty,²² blacks and Latinos should have had the least exposure to computers previously. History on the diffusion of the telephone also shows that minorities were less likely than whites of comparable income levels to have telephones. [Fischer, 1992]

These assumptions were not born out by the study. Moreover, the responses from blacks and Latinos did not seem to be influenced by economics. For instance, they are the most likely of the three ethnic groupings to use the Internet to keep in touch with co-workers. At the same time, they are the least likely to use the Internet as a cost-saving measure over using of the telephone or writing letters.

²² 2017 note: This section lacked a citation as written originally. Data from a more recent Pew study suggests, however, that the assumption is sound. See, e.g., <http://www.pewresearch.org/fact-tank/2014/12/12/racial-wealth-gaps-great-recession/>.



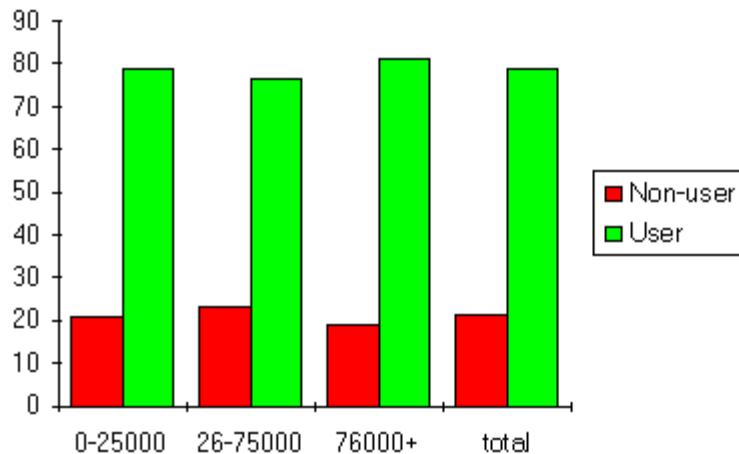
Graph 10 - % of users in each race group that use the Internet for these communication purposes

[NB: “KITW” = Keep In Touch With; “IO” = Instead Of]

On the other hand, the minorities in the sample may not be typical representatives of their racial categories. It could be possible that because they are at the University, that fact and whatever reasons prompted them to be there significantly change their motives and tendencies for using the Internet.

Income

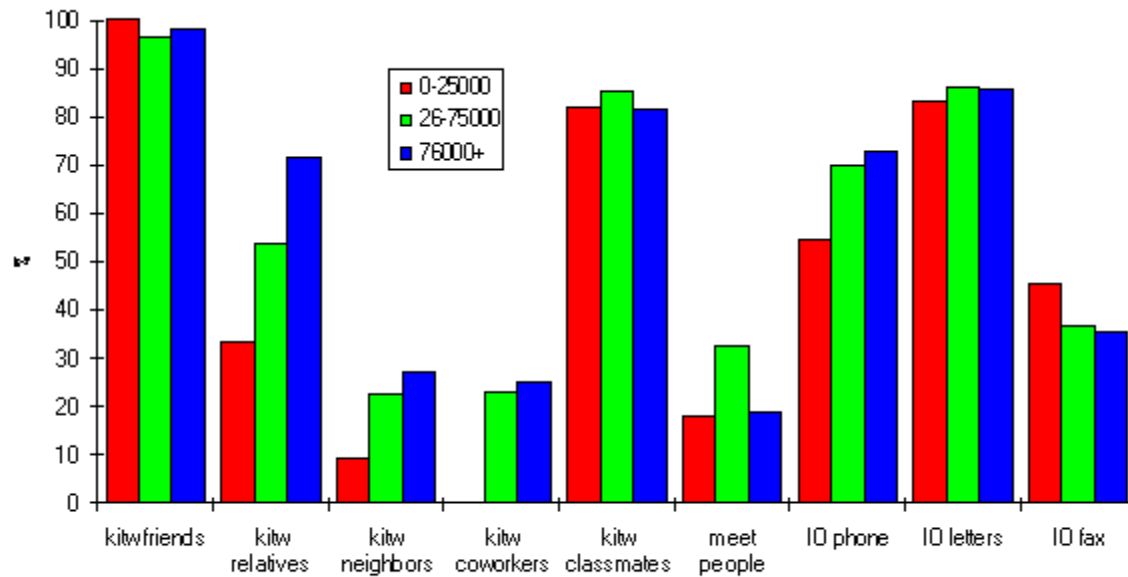
The influence of economic background across the entire sample is notably negligible. There appears to be no greater disposition within any income category to use the Internet. This result would seem to support the idea that people initially adopt the Internet as it serves current purposes and not based on any particular background characteristics.



Graph 11 - Proportion of Internet Users and Non-users within each income category

However, while economic background is not a defining factor, other data shows that financial considerations such as cost do have an effect on usage patterns. Using the Internet instead of the phone, postal mail, or a fax machine is much cheaper since the user doesn't have to pay toll or postage charges. While owning a computer may be expensive, once access to one is established there is little subsequent cost in using it for Internet communications. To this end, the University access equalizes the influence of cost as a usage barrier since for the students all the possible costs of using the Internet are eliminated, including access to a computer (through computer labs) from which to communicate.

Economic background does become a factor however when one considers that communication via the Internet can only be had with people who have also made the investment in becoming connected. People in the \$0-25000 background range used the Internet least frequently of the income groups to keep in touch with relatives, most likely because their relatives were the least likely to have been able to afford the necessary equipment to communicate that way. Here is a good example of how the University can only minimize the influence of cost on Internet adoption to a certain degree, since it can only minimize the cost of usage for its students but not their family and friends.



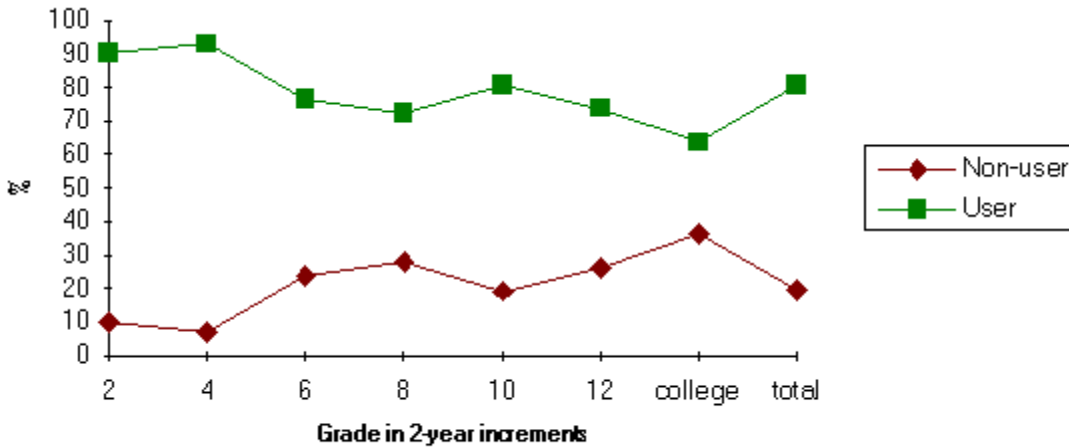
Graph 12 - %of users in each income group that use the Internet for these communication purposes

[NB: “KITW” = Keep In Touch With; “IO” = Instead Of]

Age and education

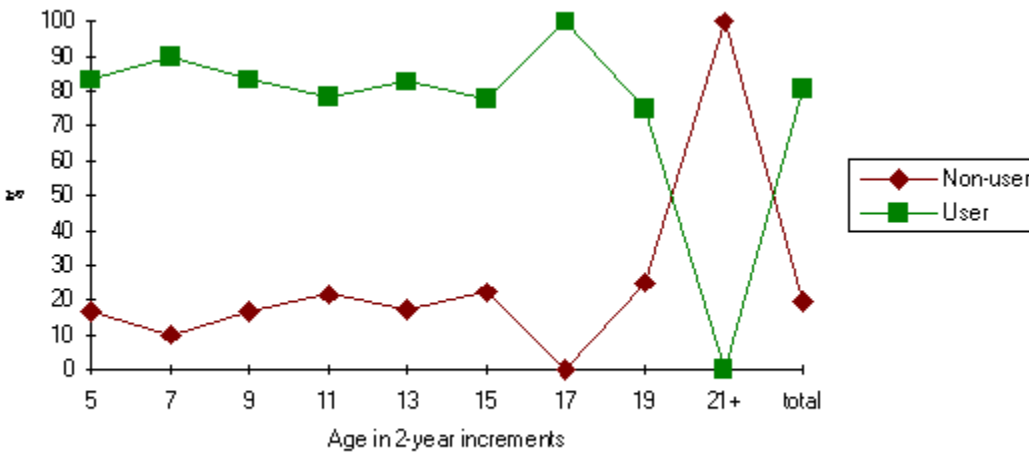
Education should be a key factor in Internet adoption because the Internet is dependent on the use of computer technology. While telephone users simply had to learn how to operate a telephone and adjust to speaking to someone they could not see (a task that initially may have been somewhat difficult given its lack of precedent), the Internet requires a certain amount of computer literacy before it as an information/communication medium can be used.

The University does offer computer classes teaching anything from basic computer literacy to specific instruction in how to use various Internet applications. However, the data on age shows that if one’s first exposure to computers came in college, it was too late to be much of an influence on Internet adoption.



Graph 13 - % of users and non-users by the grade they first used a computer at school.

Early exposure to computers at school did apparently influence later propensity to adopt computer technology, however. The data on first exposure to a computer at home is less clear, although for those who did not experience it until at least age 19 the percentage of non-users increases sharply.



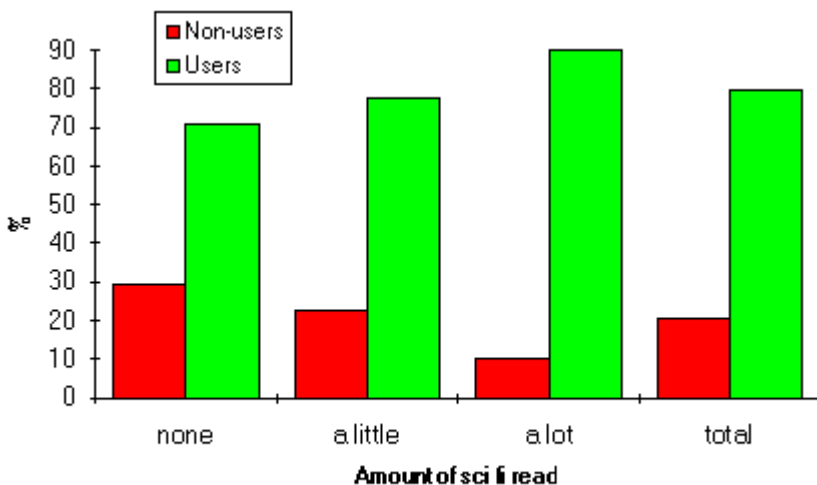
Graph 16 - % of Internet users by age they first used a computer at home

Overall the data shows that those born later were more likely to use the Internet. This can easily be understood in that computing technology has only been recently affordable for home and schools, with greater availability beginning when these younger students were in primary

school.²³ Also, the younger the student the more years they had to use computers in their primary schools.

But because early exposure at home does not seem as important as it does within an educational setting, that educational setting may be key. As discussed earlier, it is worth further study to see what type of early computer use is correlated with later propensity to use computer technology.²⁴ Merely exposing a child to technology does not seem to automatically predispose them to later comfort with computers. Perhaps this disconnect is because using a home computer as a personal arcade or simple typewriter without any instructional guidance is probably not enough to give the child comfort with using computing technology as a general tool that can be adapted to various other uses. Further study would be warranted to see if the type of functions people used computers for during childhood had any influence on expanding their imaginations as to what computers might be useful for in the future.

The importance of expanding a child's imagination with respect to technology can perhaps be seen by examining the influence of reading science fiction as a child:



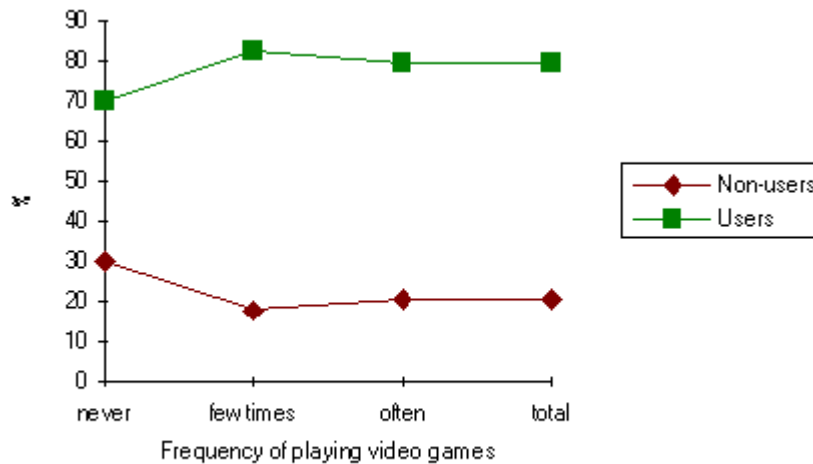
Graph 14 - Tendency of sci fi readers to use the Internet

²³ For instance, the Apple Macintosh was only first introduced in 1984, though its Apple II series was introduced a few years prior.

²⁴ Because the questions that asked about how computers were used at school and at home asked for free responses, rather than pre-populated multiple choices, in order to get an overall idea of the range of possibilities, it was difficult to categorize and rank the results. However, popular responses that were not mentioned earlier as "intensive uses" included using the computer for games, for typing practice, as a word processor, and as a vehicle for general education mostly in the form of educational games.

Although not reading science fiction does not preclude one from using the Internet later, those who read the most were the most likely to use it.

Still, the importance of early exposure to computer technology in general cannot be completely discounted. While the amount of video games one played did not increase the later tendency to use the Internet, those who never played them were without a basic familiarity with computer technology that appears to have put them at a disadvantage for using the Internet later.



Graph 15 - Tendency of video game players to use the Internet

There are limits to what can be gleaned from the age data, however. While the telephone is a completely diffused and established medium, the Internet (and computers in general) is in an extremely rapid state of evolution. Any study undertaken within the past few years and into the next few will quickly become obsolete because this type of demographic data only shows who has already adopted the Internet, not who will. Predictions can still be made, though, if one bears in mind the types of needs different people will have.

The trick is to be able to contextualize the data. For instance, the results of this study suggest that younger people are more likely to use the Internet, but their propensity to adopt may not be as dependent on their chronological age as much as it may be dependent on the types of opportunities they would have had due to their age. In the case of sex, care should similarly be taken when using older studies as gauges to judge the validity of more recent data. For instance, there was a study performed in 1994 that showed that women were only 10% of the Internet-using population. However, it has been documented that women on the whole first came to use the Internet in 1995 [Plotnikoff, 1996], which can explain how the numbers for this study showed much more equality between the sexes.

Krendl's arguments about sex disparity are similarly dated. Women may have been unlikely to use computing in the mid-80s, but by the mid-90s enough may have changed to affect their propensity to adopt it. Thus to the extent that the results of this study are out of step with previous studies, rather than discrediting this study, this evolution only goes to confirm the main conclusion of this paper that people adopt technology when and how it suits them.

Usage influences

This study also tried to measure why people first used the Internet. While being university-educated appears to be a significant characteristic of Internet users according to the various marketing studies, in the case of this study the propensity to use the Internet has very little to do with any overt influence by the University itself to make its students go online. Of the 204 respondents, nearly half said they never needed to use the Internet for classes. Nor was it the influence of jobs or high school classes that first got people to use the Internet, what with 87% and 94%, respectively, of the sample reporting never needing to use the Internet for them.

The most pervasive influence that inspired people to first use the Internet was that of friends, with 73% saying they first used the Internet to keep in touch with them. A 72% majority said that “most” of their friends used the Internet, with 27% reporting that only “a few” of them did. (Only 1% reported that none of their friends used the Internet).²⁵ Keeping in touch with family was the second most compelling influence that inspired use of the Internet, with 23% saying they had first used the Internet for that purpose.²⁶ (However, even though keeping in touch with family was the second most important influence to inspire Internet use, that influence was not automatic, given that 51% of respondents reported having family that used the Internet, a much smaller portion of the sample that reported family being what influenced them to use it.)

Also, even among the respondents who qualified for being considered “Internet users” there were differences in how entrenched the Internet had become in their lives. Question 27 asked how their lives would be affected if the Internet disappeared tomorrow. For a few the result would be devastating because their lives (academic disciplines, jobs, etc.) were dependent on the Internet. However, most of the responses were more blasé, with their estimations ranging anywhere from “no effect” to acknowledging a minor inconvenience but believing it would not be too serious. The biggest potential inconvenience respondents worried about was what would happen if they lost their email – a result that is consistent with the idea that people use the Internet for interpersonal communication. People worried they would lose touch with friends and family if they couldn’t keep in contact with them cheaply and easily with the Internet or that they would have to pay a lot more to stay in contact.²⁷

²⁵ *2017 edit:* These numbers appear to include non-users (but not missing cases) because they may have used the Internet and then just not continued to use it, but something prompted them to at least initially try it.

²⁶ An apparent methodological problem with the study suggests an additional inference to draw from it. The problem is that many reported several influences behind their first use of the Internet. The multiplicity suggests that people who use the Internet often found it served many needs simultaneously. It also suggests that some influences were more influential than others.

²⁷ Because the responses were all different, it is difficult to present an accurate tally of each type of response. However, phone bills were explicitly mentioned eight times across 73 different responses, and the number of references to the loss of contact via email was even greater.

Applied Theory

Uses and Gratifications

The various marketing surveys to date have found that the people most likely to use the Internet are those with a college education. Given that the most likely places to get access to the Internet are either at an educational institution or at one's job, and the types of jobs most likely to offer access to the Internet are the types that require college educations [Ducker, 1993], this finding is not surprising. However, this study has also shown that (a) the influence of the University on Internet adoption is not clear, predictable, or overt, and (b) that mere access to the Internet itself is not enough to elicit adoption. Whether the Internet will be used or not is based entirely on characteristics of the individual.

The audience/user-centered theoretical approach used by the Uses and Gratifications theory thus extends well to modern communications technology. One of the important takeaways from this theory is that the media/technology does not necessarily create the need for itself. The novelty of a communications technology may entice people to use it, and it may entice enough people to use it that others will decide they need to use it as well based on peer pressure (a notable result from this study was how many friends of the respondents used the Internet), but the mere existence of a communications medium does not automatically create the societal need for it. Even historically this was true: for instance, the telephone was originally intended to broadcast concerts. And yet, even though that's what the medium was there to do, that's not what people ultimately ended up using it for. It was only because people found it fulfilled a different need (letting them talk to people far away) that it grew into the inter-personal communications medium it is today. A similar pattern of evolution appears to be true for the Internet. The Internet's technology can do any number of things, but in the future Internet applications are going to be based on the types of uses people have already found for it. For instance, if no one is using finger, then finger will never be included in the Internet software packages.

Another important idea rooted in Uses and Gratifications theory is that the relationship between the medium and the individual is unique to the extent that the individual is unique. For instance, to the extent that women are the same as each other they tend to follow the same adoption patterns for the Internet, but their patterns are not the same as those for men to the extent that women and men are not the same.

The theory also recognizes that every medium competes with every other medium. People have needs, such as a need for news. The TV competes with the newspaper and the radio to satisfy this need, and now all three are competing with the Internet. This study revealed that the Internet has not usurped the role of the traditional media because respondents generally doubted that the Internet could satisfy their need for news as adequately as the other media.²⁸ Of course, this finding may result from respondents not being aware of the full range of the Internet's capabilities. If they approached the Internet first because they heard about email, they may have

²⁸ 2017 note: citation, or actual data, apparently missing.

learned email and stopped there without further exploring what else the Internet can offer. Such is also a consequence of the University not requiring students learn more about the Internet.

The Uses and Gratifications theory also recognizes that an audience chooses to use a medium based on three criteria: the content of the media itself, the exposure to the media, and the social context surrounding the exposure.²⁹ With the Berkeley sample, for instance, women preferred the content they and their friends made themselves, while men were more interested in informational content created by others. Regarding the second criteria, exposure to the medium came from there being access to it through the University and students also having a reason to use that access, which in this case was generally because their friends were also using the Internet. (It was not as though the respondents were otherwise required to use the Internet). As for the third criteria, the characteristics of the individual, such as being female or being rich, shaped the social context with which the Internet could be experienced.

One final aspect from Uses and Gratifications theory that applies to this study has to do with needs. There were very few respondents who expressed an absolute need for the Internet. (The few who did usually had employment as Internet consultants and stood to lose their livelihood if there were no Internet.) Notably, there is also nothing completely new about the Internet: everything it could offer could be had in some other form, be it from the telephone, a newspaper, or a real visit to the library. There will rarely be a case where an individual has a specific need that can only be addressed by the Internet. However, Elliott talks about the difference between “deficiency needs,” which there aren’t present in this study, and “growth needs.” Growth needs are needs that are learned. [Elliott, 1974]. In other words, people, after being introduced to the Internet, can decide if it satisfies their needs better than any other medium. Having been exposed to what the Internet can do, the individual might come to invent some new needs, just because the Internet can satisfy them.

Evidence of this dynamic in the Berkeley sample appeared when people discussed what would happen if the Internet disappeared and many speculated that their phone bills would go up. It was not as if they were necessarily dependent on the Internet to stay in touch with other people, but they found that it suited them better than anything else and therefore it came to satisfy a need. This example shows how there is a point at which people adopt the Internet such that it starts shaping their behavior. But the important takeaway is that these changes stem from the *gratifications* resulting from the use of the medium and are not what drove the initial uses.

Diffusion of Innovations

Rogers’s [1995] work on the diffusion of innovations parallels some of what was explained in terms of the Uses and Gratifications model. In his model for the “Innovation-Decision Process” there are several stages that must be reached before an innovation is adopted by an individual. The first is the *knowledge* stage. This is where the characteristics of the audience/individual are

²⁹ These elements are listed in Chapter 1 of Blumler & Katz, 1974. They cite Lundberg and Hulten, 1968.

most important. These characteristics include socioeconomic status, personality variables, and communication behavior and shape the individual's need for an innovation or at least their inclination to find out more about it.

There is some debate as to which comes first: the need for an innovation or the awareness of one. However, in the Uses and Gratifications discussion it was demonstrated how, as far as this study was concerned, the knowledge of the innovation came first. This conclusion is confirmed by the non-users who knew the Internet existed but felt satisfied even though they did not use it themselves. The conclusion was further buttressed by the fact that there were no respondents who expressed having felt a need of the sort the Internet can satisfy and then happening to come upon the Internet. Rather, they first found out about the Internet and then were in a position to decide if it was useful for them to adopt.

The second stage is the *persuasion* stage. It is at this point when the individual gathers input to decide whether to adopt the technology. Factors that influence adoption include its *relative advantage* ("Will the Internet be better than what I already use, like the telephone?"), *compatibility* (in this case, the Internet had to be compatible with their prior comfort with computers), *complexity* (here the Internet deters its own acceptance by being too difficult for some to grasp), *trialability* (giving students the opportunity in classes to try out the Internet increases the chances that they will continue to use it afterward, having already seen some of its potential), and *observability* ("Is 'everyone' using the Internet? Are all my friends?").

At this point the individual is at the third stage and ready to decide whether to adopt or reject the innovation. In this study, while many chose to adopt the Internet and thus became "Internet users," the degree to which they adopted it was reflected by stage four, *implementation*. Even though the Internet offers so many possible uses, when people adopted it they tended to adopt it for its specific purposes and not as a holistic medium that could be used in many ways.

The fifth stage is *confirmation*, where the individual re-evaluates whether to keep using the innovation. For the most part the respondents in this study had not reached the fifth stage. The responses to the hypothetical question asking how their lives would be affected if the Internet disappeared showed that even people who had adopted the technology were prepared to re-evaluate their decision adopting it should it become necessary.³⁰ This idea of re-evaluation is important if, after the students graduate and the school no longer provides access to them, these users suddenly revert to being non-users.

Conclusions

The Internet has not yet been diffused, but the marketing surveys suggest it is rapidly becoming more so. Because of the Internet's nature, it is the type of medium that derives its greatest value when it is most thoroughly diffused. Marketers know this: Internet service providers can't promise to connect future subscribers "to the world" if most of the world isn't using the Internet. Thus it might seem, at first, alarming that there are difference in usage propensity between races and particularly sexes because these variances suggests that parts of the world are not being

³⁰ 2017 note: citation, or actual data, apparently missing.

connected. In fact, the Internet may become a lot less valuable if there are significant segments of the population who aren't using it.³¹ Furthermore any potential the Internet might have to be a social equalizer would be lost. So far the Internet shows great potential in this regard given the affordability of the Internet (other than buying a computer, the monthly charges for using it are less than phone and cable charges), in the anonymity afforded by the Internet (physical discrimination is impossible – at least right now – because no one can tell if anyone else is black or white or tall or even what sex they are), and the way that everyone has an equal ability to acquire information or expose their own ideas to the world since their ability to do so is not subject to external gatekeeping as it would be with other media. There is no off-line example that can match all of the Internet's potential.

It may not be problematic if the propensity for certain Internet uses varies between personal characteristics like sex. That women may not (at least currently) tend to use the Internet for getting information will not keep those informational aspects from being further developed since plenty of other people do use it in this way. Because the Internet is such a comprehensive medium with so many different uses all rolled up into one technology, they can use it now in the ways they prefer and still have the option to change their minds and start using the Internet for other purposes in the future. As time goes on, those types of Internet uses may become “growth needs,” meaning that people will eventually come to perceive that they have these new needs and use the Internet to satisfy them.

However, while it may not be an immediate problem that Internet usage is not more uniform, it is nevertheless unexpected and potentially concerning to see that the University has not been more of an influence to get its students to start using it. The argument has been that Internet usage depends on the needs of the individual, but using the Internet because the school requires it would qualify as a need. Furthermore, as Rogers pointed out, before there can be adoption the innovation needs to be initially introduced to the prospective adopter. Given that these students have the advantage of a University education, they should not be forced to rely on their friends to tell them about how they could use the Internet.

Therefore, steps the University³² could take are to increase Internet adoption include potentially requiring the Internet to be used in more classes. There is no reason why curricula should not demand it because the Internet can be a powerful learning tool, both as an information resource

³¹ There is a counter-argument here, that when too many people use the Internet it gets too slow to be of much interest to anyone. However, these sorts of bandwidth issues are a mundane, technical detail that can easily (if not cheaply) be corrected with higher bandwidth connections. If the upgrading doesn't happen then the gridlock will be a deterrent to more people adopting the Internet, but all the companies with a vested interest in profiting from the Internet will likely make the investment to eliminate the traffic problem.

³² These recommendations apply to any university like UC Berkeley that doesn't require use of the Internet. Schools like Dartmouth that make the Internet an important part of undergraduate life would likely have had much different results if this survey had been administered there.

and as a way to keep in touch with classmates and professors.³³ The University could also equalize the access more. Currently the portion of the campus community who wants access needs to rely on their own initiative to find it. But as this survey has shown, initiative varies from person to person. An individual with less initiative, less perception of need, will not take advantage of the Internet. This will put that individual at a disadvantage if, sometime after they graduate, the Internet does become more completely diffused throughout society and a more integral part of modern life. While their University education should have put them at an advantage, instead they will find themselves at a disadvantage to perhaps less educated people who have had Internet experience.

Or perhaps this means the marketing studies will be wrong. While they attribute the greatest proportion of Internet users to affiliation with a university in some sense, if the Berkeley sample is at all typical then perhaps the bright prognosis for the expansion of the Internet made by those studies will not come to pass. If people like these respondents are the predominant population of Internet users and yet they can't (or won't) integrate its various functions more fully into their lives, then perhaps the future of the Internet will not become the unprecedented, open media it stands to be and instead will be relegated to simply being an esoteric tool. Such an outcome would be a shame because the Internet is far too revolutionary with far too much potential to end up shunted aside.

³³ The University is obviously aware of the advantages of the Internet given the proliferation of on-line scholastic resources such as the library catalogs, the Berkeley homepage, etc.

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This survey is designed to assess the use of the Internet among undergraduates at the University of California at Berkeley.

Please answer as completely and thoroughly as possible. Circling all applicable answers or write in your own. Please answer all questions unless otherwise instructed. Additional comments are always welcome. "Don't know" or "Not relevant" are acceptable answers to any question.

1. Gender: **M** **F**
2. What year were you born? _____
3. How much was your family's annual income when you were in high school?
\$0-25,000 **\$26-50,000** **\$51-75,000** **\$76-100,000** **\$100,000+**
4. When others are asked to describe you, which term might they use?
Black **White** **Asian** **Indian** **Latino**
Other: _____
5. What was your first semester at Cal (i.e., Sp 96) _____
5a. Did you study anywhere else after high school? **Y** **N**
5b. If yes, where and for how long? _____
6. What is your [intended] major[s] _____
7. How often do you [indicate (A) for never, (B) for 1-3 times a month, (C) for 1-3 times a week, or (D) for 1-3 times a day]:
7a. Read a magazine? **A** **B** **C** **D**
7b. Read a newspaper? **A** **B** **C** **D**
7c. Watch TV? **A** **B** **C** **D**
8. How much science fiction did you read as a child?
None **A little** **A lot** **Don't remember**
8a. What was your favorite book or author? _____
9. How often did you play video games as a child?
Never **A few times** **Often** **Don't remember**
10. How old were you when you first used a computer at home? _____
10a. What did you use it for? _____
11. What grade were you when you first used a computer at school? _____
11a. What did you use it for? _____
12. Do you currently own your own **PC** **Mac** **Other computer:** _____ **No computer**
12a. Does it have a modem? **2400 or 9600baud** **14,400** **28,800** **none**
- 13a. If you have a computer, what is the main reason you do?
School **work** **Starting a business** **Convenience** **Games**
Wanted to learn to use one **Other:** _____
- 13b. If you don't have a computer, what is the main reason you don't?
No use for one **Cost** **Don't know how to use one**
Have access to another **Other:** _____
14. How often do you use a computer for [indicate (a) for never, (b) for 1-3 times a month, (c) for 1-3 times a week, or (d) for 1-3 times a day]:
14a. Word Processing **A** **B** **C** **D**
14b. Databases or spreadsheets **A** **B** **C** **D**
14c. Programming **A** **B** **C** **D**
14d. Games **A** **B** **C** **D**
14e. Telecommunications **A** **B** **C** **D**
14f. Other: _____ **A** **B** **C** **D**
15. What best describes how you learned to use a computer?
Can't use **Self-taught from manuals** **Self-taught through trial and error**
Took a computer class **Parents taught** **Friends taught**
Learned from a non-computer class at Cal **Required in high school**
Other: _____

16. How familiar are you with the Internet?
Never used Used once or twice Beginning to use it more Frequent User

17. What year did you first use the Internet? _____

18. Do you want to use the Internet more? **Y N**
 18b. Why or why not? _____

19. Do you have an Internet account? **Y N**
 19a. Is your account on (circle all that apply)
Uclink1 Uclink2 or 3 Uclink4 soda.csua ocf
garnet, violet, or CMSA another campus server: _____
An Internet service provider (i.e., Netcom): _____
A commercial service (i.e., Prodigy, AOL): _____
 19b. Is your account a temporary class account? **Y N**

20. Is your account strictly for email? **Y N Don't know**

21. Do you have a SLIP, PPP, or Ethernet connection? **Y N Don't know**

22. Do you have a homepage? **Y N Don't know**

23. What do you use or think you would use when you use the Internet (circle all that apply)?
email newsgroups World Wide Web CUSeeMe Gopher
MUDs, MOOs, etc. IRC finger ping telnet, rlogin FTP
Talk Mailing lists Other: _____

24. If you do use the Internet, please indicate how often you use it for each of the following [indicate (A) for never, (B) for 1-3 times a month, (C) for 1-3 times a week, or (D) for 1-3 times a day]:
 If you don't use the Internet, please indicate what you use instead:

24a. look at government documents	A	B	C	D	_____
24b. read campaign literature	A	B	C	D	_____
24c. buy anything	A	B	C	D	_____
24d. sell anything	A	B	C	D	_____
24e. keep in touch with friends	A	B	C	D	_____
24f. keep in touch with relatives	A	B	C	D	_____
24g. keep in touch with neighbors	A	B	C	D	_____
24h. keep in touch with co-workers	A	B	C	D	_____
24i. keep in touch with classmates	A	B	C	D	_____
24j. do library research	A	B	C	D	_____
24k. renew library books	A	B	C	D	_____
24l. visit museums	A	B	C	D	_____
24m. find out about news events	A	B	C	D	_____
24n. find out the weather	A	B	C	D	_____
24o. find out about other places	A	B	C	D	_____
24p. help with your hobbies	A	B	C	D	_____
24q. meet people	A	B	C	D	_____
24r. How do you use the Internet for this? _____					
24s. instead of the telephone	A	B	C	D	_____
24t. instead of a newspaper	A	B	C	D	_____
24u. instead of watching TV	A	B	C	D	_____
24v. instead of writing letters	A	B	C	D	_____
24w. instead of a fax machine	A	B	C	D	_____

25. How else have you used the Internet? _____

26. If you see a URL in an ad or a commercial, do you
Always check it out Sometimes check it out Usually ignore it
Not know what a URL is

27. If the Internet disappeared tomorrow, how would your life be affected? _____

28. What year did you first hear about the Internet? _____
 28a. From whom or where?
Friends Family Teachers TV, newspapers, etc. Other: _____
29. Did you first use the Internet because you heard it being talked about in mass media? **Y N**
30. How many classes have you had at Cal that required using the Internet? **0 1-2 3+**
 30a. Did you need (circle all that apply if different for multiple classes)
Only email Email and newsgroups
Email, newsgroups, world wide web exploration
All of the above and to make your own homepage Other: _____
- 30b. Was there adequate instruction? **Y N Yes, but didn't need it**
- 30c. Were these classes your first exposure to the Internet? **Y N**
- 30d. If yes, did you continue to use the Internet? **Y N**
- 30e. Why or why not? _____
31. How many classes did you have in high school that required using the Internet? **0 1-2 3+**
 31a. Did you need (circle all that apply if different for multiple classes)
Only email Email and newsgroups
Email, newsgroups, world wide web exploration
All of the above and to make your own homepage Other: _____
- 31b. Was there adequate instruction? **Y N Yes, but didn't need it**
- 31c. Were these classes your first exposure to the Internet? **Y N**
- 31d. If yes, did you continue to use the Internet? **Y N**
- 31e. Why or why not? _____
32. How many jobs have you had that require using the Internet? **0 1-2 3+**
 32a. Did you need
Only email Email and newsgroups
Email, newsgroups, world wide web exploration
All of the above and to make your own homepage Other: _____
- 32b. Was there adequate instruction? **Y N Yes, but didn't need it**
- 32c. Were these jobs your first exposure to the Internet? **Y N**
- 32d. If yes, did you continue to use the Internet? **Y N**
- 32e. Why or why not? _____
33. How many of your friends use the Internet?
None A few Most
- 33a. Do you have a friend you can go to for computer help? **Y N**
- 33b. Do friends come to you for help? **Y N**
- 33c. Did you first use the Internet to keep in touch with friends? **Y N**
- 33d. If yes, did you continue to use the Internet? **Y N**
- 33e. Why or why not? _____
34. Does your family use the Internet? **Y N**
 34a. Who uses it and for what? _____
- 34b. Did your family teach you to use the Internet? **Y N**
- 34c. Did you teach your family to use the Internet? **Y N**
- 34d. Did you first use the Internet to keep in touch with your family? **Y N**
- 34e. If yes, did you continue to use the Internet? **Y N**
- 34f. Why or why not? _____
35. If there was another reason that you first used the Internet, what was it? _____
- 35a. Did you continue to use the Internet? **Y N**
- 35b. Why or why not? _____

