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Computers have become an integral part of the lives of university students. Although originally envisioned simply as a tool to enhance the educational experience, computers now are used in all facets of students' lives. Campus computer labs share a similar history. Their original goal was to give students access to computers for academic reasons. Now labs are used for a variety of other purposes. The goal of this project was to discover how much usage of computer labs at UNC-Chapel Hill was related to academic, social, and personal purposes. The results show that while students frequently use personal computers for non-academic use, computer lab tasks are predominantly academic in nature. This finding held true across all groups despite some differences in lab activities based upon class year and gender.

Headings:

Surveys – Computer laboratories

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DETERMINING COMPUTER LAB USAGE FOR ACADEMIC, SOCIAL AND
PERSONAL PURPOSES

by
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Approved by

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INTRODUCTION

Colleges and universities these days are expected to provide a bounty of computing resources to their students. College ranking services include these aspects in their ranking discussions. Frequently, admissions departments will include this information in their recruiting literature. Computer labs are a key part of a university's technology offerings and one of the primary ways that technology is put in the hands of students.

Despite the importance of computer labs, few people outside of lab management have spent much time trying to actually understand labs and their users. The purpose of this study is to understand why computer labs were developed and discover how current students are utilizing them. By understanding the past and present of computer labs, management will be better equipped to make decisions about their future.

A Brief History of Student Access to Computers

Computers first began appearing on university campuses in the mid-twentieth century. During these early stages, computers were large, expensive, and had limited availability. For campuses that were lucky enough to have a computer, the machine's resources were typically devoted to crunching numbers derived from complex mathematical and scientific research. The possibility of widespread, common use was such a far-reaching concept that in 1943 Thomas J. Watson, head of International

Business Machines (IBM), allegedly proclaimed that “there is a world market for maybe five computers.”¹

Through the following decades, computers became more common and accessible to academics. By 1965 over one-third of institutions of higher learning (707 of 2,219) had some sort of computer facilities (Hamblen, 1971). Yet, despite their growing contributions to academic and corporate institutions, computers were still not considered to be an item from which the mainstream public would benefit. In 1977 Ken Olson, president and founder of Digital Equipment Corp., stated that “there is no reason anyone would want a computer in their home.”

By the 1980s, universities were able to start providing computer access to more and more students. Equipment had become smaller, lighter, and more affordable. In addition, computers were now being utilized for more everyday tasks in academia rather than being reserved for only complex research projects. Word processing, information storage, and spreadsheets are just a few of the ways that faculty and students could use them to make academic life easier.

At this point, most computers available to students were owned and managed by individual academic departments. Often computers were kept in classrooms and were utilized by courses, such as computer programming, that required students to perform in-class work on the computers (Steinberg, 1979). While classes were not being held, students could use the machines for their academic studies. In some cases, this meant that students in smaller, less affluent departments did not have an opportunity to benefit from this technology. To remedy this issue, central Information Technology departments

¹ Although this quote has been widely circulated no direct documentation can be found to confirm that Mr. Watson said this. (Maney, 2003)

started establishing computer labs that were open to all students at their respective campuses.

At the University of North Carolina at Chapel Hill the first microcomputer labs open to the general student population were established in the fall of 1985.² These labs were established across campus in whatever available rooms could be found to provide ease of access to as many students as possible. The two primary labs were placed in Caldwell Hall, an academic building, and R. B. House Undergraduate Library while eight mini-labs with two computers each were created in residence halls in close collaboration with the UNC-CH Department of Housing. Leaders in these organizations saw the benefits that students could obtain through access to technology and established computer labs to help enhance their academic studies.

During the early years of the UNC-Chapel Hill computer labs, most students were using the workstations for wordprocessing and data analysis. The computers were standalone machines that did not communicate with any other computers. This lack of communication limited the types of tasks that could be completed on them.

In 1987 the computer labs on campus started being connected through coaxial cable into local networks. Workstations were connected to campus file servers allowing students to store their work in central file repositories for security and to easily share data with others. The computer labs were not only making academic work easier for individuals but also bettering academic collaboration among students. Starting in 1991 the labs would become an even better tool for research and learning. At this time the computer labs gained access to the World-Wide Web. Websites were being posted

² Information concerning UNC-Chapel Hill computer lab history comes from an interview with Linwood Futrelle, former Director of Distributed Support in Information Technology Services at UNC-Chapel Hill.

containing information that may not have been easily accessible otherwise and students could access it from campus computer labs. Students' academic resources were not bound by the physical confines of the university.

The World-Wide Web provided students with access to more than just academic resources. In the mid-1990s the Web was becoming very popular for commercial and social purposes. Websites for products, homepages for personal expression, and email and instant messaging for communication started to become common. Students began to utilize the Internet access in computer labs for more than academic work. As years have passed, both of these trends have continued. Instant messaging has become a primary means of communication and social networking websites are some of the most visited websites on the Internet. According to Nielsen//NetRatings the top 10 social networking sites in April 2006 reached 45% of all active Web users (Bausch & Han, 2006). A significant amount of college students use the Internet for these non-academic purposes.

Understanding the popularity of computer and the Internet for non-academic purposes, it is reasonable to believe that a fair amount of these activities take place in university computer labs. Very little, however, has been done in an attempt to determine just how much is taking place. Schools will sometimes gather feedback about the labs either in surveys exclusively about labs or as part of surveys concerning the overall Information Technology environment at a college.³ These surveys will often only focus on topics such as user satisfaction, software preferences, or favorite locations.

This study aims to fill the gap in knowledge about the purposes for which students are using university computers labs. Results should indicate how academic, social, and

³ Examples may be found at the University of Texas (http://www.utexas.edu/its/surveys/2004/lab_groups.html) and Oklahoma State University (<http://osu-ns03.cis.okstate.edu/Okstate/evp/cis/Survey.nsf/Survey%203?OpenForm>).

personal/entertainment uses of the labs relate to one another. This information, in conjunction with the types of information already existing, should provide a more complete picture of lab usage on university campuses in the 21st century.

LITERATURE REVIEW

The history of computer labs at colleges and universities is an ill-documented one. Books, articles, and websites can be found documenting the first mainframes put in place and the early years of computer science education. Computer labs, however, are rarely found described in the literature about computing in higher learning. Even less scholarly attention has been given to how students have used these labs. In some ways it appears the labs have quietly settled into the middle areas between personal computers and supercomputers as well as between class use and in-home use. Lab computers offer access to personal computing software and high-end specialized software. They are also utilized for academic needs similar to in-class use and entertainment like much computer use at home. Yet, while studies have been focused on computer use at the ends of these two spectrums, the university computer lab has unceremoniously bridged the gaps without garnering much attention.

Understanding the background for this particular study requires a look into three subject areas: how students use computers to fulfill academic needs, how computers have become a part of social lives of students, and how entertainment and other personal tasks are being completed using computers. Knowing these patterns of general computer usage will help provide a reference when looking at how computers in university labs are used.

Student use of computers began as a way to make academic work more effective and efficient. Internet use has become a staple of almost every type of academic endeavor these days although its effectiveness in educating students might be debated by

some professors. Oftentimes, students' primary resource for an assignment will be a commercial Internet search engine or general web surfing "instead of using more reliable points of access such as library databases or their library's home page" (Thompson, 2003, p. 262). Despite opinions of some faculty members, students feel that these methods are working well for them. Seventy-five percent of students reported that they are successful in finding the information that they need for academic assignments (Thompson, 2003).

These research methods seem to have an impact on the citations within student papers. Davis and Cohen (2001) conducted a bibliometric analysis of citations in 1996 when the Internet was first being used as a research tool and 1999 when it was well established. Their data indicates that citations of websites increased while citations of books decreased. Magazine and journal citations remained fairly stable which may be related to their availability in online journals and article databases.

The academic use of computers and the Internet is much more diverse than simply doing online research. The most basic use is in word-processing. The ability to quickly type legible documents, save them for later use, and easily edit their contents has made writing for classes much easier and efficient. Similarly, applications like Microsoft Excel have made it easy to create tabular data and perform simple calculations. Presentation software such as Microsoft PowerPoint and Apple Keynote allow students to make professional-looking multimedia presentations for classes.

"The Internet Goes to College" by the Pew Internet and American Life Project provides some good insights into how students are using computers in a variety of academic ways. According to the study, 94% of online teens use the Internet for research on school projects. In fact, almost 75% of college students admit to using the Internet

more than the library (Jones et al., 2002). Given the prevalence of at-home Internet access, this could be due to students simply looking for the easiest access to information or because they do not see the benefits that library resources offer.

Technology has also diversified the avenues of academic communication. Email provides the opportunity for students to easily communicate with professors and peers. Email can make it easier to ask questions for those students too shy to raise a hand in class or visit the professor face-to-face during office hours. Students can also send email with questions whenever they think of them (even at 3am) rather than having to wait until the professor is available to be asked. While most student-teacher communication is still face-to-face, 46% of college students state that they can express thoughts to instructors over email that they would not have in class (Jones et al., 2002).

Email also enhances a student's learning with people other than faculty. Students can easily discuss ideas in individually addressed emails or with entire groups of fellow students on electronic mailing lists. Opportunities like this allow students to continue class discussions outside of the classroom or review class materials with others for clarity. More than two-thirds of college students have reported belonging to at least one of these academic electronic mailing lists (Jones et al., 2002).

Recently many schools have deployed course management systems like WebCT and Blackboard that allow professors to create course websites with advanced functionality. Course notes and presentations can be posted for students to review. Discussion boards can be started to promote thinking about class material outside of the prescribed class time. Instructors can even enter an online chat room at a pre-determined time to communicate with students and hold "virtual office hours".

Students now use computers in virtually every aspect of their academic work from taking notes to turning in assignments, researching topics to questioning professors. These advances have been well received by students who seem to find that they are more effective using these tools. In the Pew study, “Nearly four-fifths of college students (nearly 79%) agree or strongly agree that Internet use has had a positive impact on their college academic experience” (Jones et al., 2002).

Computers and the Internet have become part of society’s everyday methods of communication. This is particularly true for university environments where technology trends tend to be adopted more quickly than among older users. Email was the first such computer communication medium that became mainstream among college students. Boase et al. studied communication between subjects and their social networks to see how the Internet assisted them in maintaining social ties. In this study, the increasing use of email as a percentage of communication was related to geographical distances between contacts, the ability to control the time commitment of communication, the asynchronous nature of email, and the growing size of a user’s social network (Boase, Horrigan, Wellman & Rainie, 2006). All of these would point towards students becoming more dependent on email for social needs. Attending college typically involves students moving to a new geographic location and meeting many new people resulting in a larger social network. At the same time, time demands often increase which makes the flexibility of email’s time commitment appealing. All of these reasons contribute to the high use of email for social purposes. According to a study by Jones et al., 95% of all college students report using email at least once a week for social communication (Jones et al., 2002).

Instant messaging (IM) has become another popular social tool of students. Shiu and Lenhart's research (2004) showed that 62% of Internet users born after 1977 use instant messaging for communicating with others. In fact, according to their data 57% of the IM users in this age group communicate more often via IM than email. Additionally, 35% report that on a typical day they spend about an hour chatting with others on IM.

The latest trend in social use of computers is the proliferation of social networking websites. A study by Nielsen//NetRatings showed that the top 10 social networking sites in April 2006 had grown 47% as a whole over the previous year (Bausch & Han, 2006). These sites, such as Facebook and MySpace, allow users to create a page on which they can share their thoughts, interests, and pictures. In addition, users can search for other users based on a variety of characteristics. Interest groups and organizations are also created that participants can add themselves to. A report by the Pew Internet & American Life Project showed that 48% of youth ages 12 to 17 years old visit social networking sites at least once per day (Lenhart & Madden, 2007). These sites served as vehicles for not only socializing but also planning and coordinating activities with groups.

The popularity of social networking seems to currently be at its highest levels among college undergraduates. Stutzman's survey (2005) of college students revealed that 71% of his participants indicated that they participated in a social network community. Undergraduates had an even higher participation rate at 90%. In *The Chronicle of Higher Education*, Van Der Werf (2007) relays an estimate that 90% of all undergraduates have created Facebook pages on campuses where it is available.

Computers and the Internet have become critical pieces in the social communication for youth. For this reason, easy access to computing resources is a great enabler for students to keep in touch with friends. Computer labs on campus provide this access so it would be expected that these computers would frequently be used for this purpose.

Computers have also become a common place for students to turn to for their news and entertainment needs. Common sources of diversion, such as newspapers, magazines, television, and radio, have been replaced with computer activities. In his 2002 report, Jones stated that 78% of Internet users in college have reported going on the Internet at times simply to browse for fun (Jones et al., 2002). It is reasonable to assume that this percentage has probably significantly increased since then given that Internet usage in almost all areas seems to have been on the rise.

According to Lenhart, Madden, and Hitlin (2005), 76% of teen Internet users gathered the news and current event information online. Interestingly, while the Internet may have replaced the television as the medium by which students receive the news, the source from which information is sought has remained steady. Among high school Internet users, 66% received their news from Internet portal pages that aggregate headlines from major news organizations and 45% actually went directly to the news sites of national television companies (John S. and James L. Knight Foundation, 2006).

The largest personal use of computers and the Internet seems to be web browsing for pleasure and recreation. With a seemingly endless amount of websites, students are virtually assured of finding something interesting online to occupy their time if they look. Often the sites visited follow along with traditional hobbies and interests. For example,

84% of online teens visit websites about movies, television shows, music groups, or sports stars that they are interested in (Lenhart, Madden & Hitlin, 2005).

Users can also find plenty of recreational games online to occupy and intrigue them. These range from role-playing adventures to crossword puzzles to arcade-type games. Lenhart, Madden, and Hitlin's survey (2005) showed that over 80% of teens who visit the Internet played some type of online game. This was an increase from only 66% just four years earlier. Sometimes these games are simply used to briefly fill some time with no commitment while others may involve an ongoing character that users develop over multiple years.

Students are also frequently turning the Internet to perform routine, everyday tasks. Online banking has become so convenient that many people never even have to set foot in a financial institution. Between 2002 and 2004 online banking saw a 47% increase in the number of users (Fox, 2005). Spending money online is just as easy as managing it. Students can make purchases at the online versions of traditional brick-and-mortar stores like Wal-Mart and Target or online-only stores like Amazon. The web has even provided a vibrant market for users to sell to each other through sites like Ebay.

Computer activities have become a common way for students to find entertainment, stay current with news, and complete their daily personal tasks. With the convenience of computer labs, it is expected that student would utilize these resources to find diversions during free time. This study will help us discover how much of lab usage is for these types of tasks.

METHODOLOGY

The objective of this research project was to determine the purposes for which students used the campus computer labs at the University of North Carolina at Chapel Hill. To achieve this goal, a survey was developed to poll students on their activities. This type of information had not been gathered previously so no survey instruments existed to serve as a model for this study. The understanding of computer usage patterns in this area had previously been based on informal observation of students by lab staff.

The student population at UNC-Chapel Hill at the start of the 2006-2007 school year was approximately 27,500.⁴ Since all students are eligible to use the campus computer labs this number was used as the total population size that the project was studying.⁵ The university's computer lab manager was approached for assistance in obtaining the number of respondents necessary to achieve significance. The lab manager agreed that once an online survey was created, an image would be placed on the background of each computer in the labs directing users to a shortcut that would take them directly to the survey. This approach allowed the study to be advertised to everyone within the user community and provided an equal opportunity for participation.

The survey was designed to be short and easy for students to complete quickly. Questions were kept closely focused on the research question and some demographic

⁴ Data from <http://www.unc.edu/news/compendium.shtml>

⁵ Data was unavailable on what percentage of total students actually utilized the computer labs.

information to help understand how use may vary across user attributes.⁶ Year in school, major, and gender were the three characteristics that were chosen for inclusion.

Students were then asked to complete a table about their activities during this particular lab visit. Students were to list each activity on a different line. Students had the choice of five descriptions by which to classify their activity. Three of these choices were based upon the results of the Pew Internet & American Life Project. In this study, the top teen uses of the Internet could be broken down into web browsing, email, and instant messaging.⁷ Added to these choices were Microsoft Office productivity applications (Word, Excel, Access, and PowerPoint) and use of specialized software that is installed on the lab computer such as SAS, Mathematica, and others.⁸ This software is intended to give students access to expensive programs that can enhance their learning but that they may not otherwise be able to use. As Benjamin Brown, a student at the University of Maryland at College Park stated, “They (computer labs) have expensive programs that I don't want to buy” (Carnevale, 2006, p. A32).

Once students provided a description of the type of activity, they were instructed to classify the purpose of the activity that they had performed. Purposes were broken into Academic, Personal/Entertainment, or Social. In *Do Internet users have more social ties?*, Zhao (2006) provided some support for this way of classifying activities. This article divides activities

“into two main types: (1) solitary activities that do not involve direct contact with other people, e.g., web surfing and news reading, and (2)

⁶ A question was included that was not directly related to the central research question at the suggestion of the computer lab manager. This question was intended to gauge the primary task for which lab users visited the lab. The hope was to determine to what extent printing was a primary motivator of lab usage.

⁷ For our purposes, playing games online would be grouped with web browsing. Stand-alone games cannot be installed on lab computers so any game playing must be done through web browsers.

⁸ See Appendix A for full list.

social activities that involve direct contact with other people, e.g., the use of email, listservs, bulletin boards, and chat rooms.”

The following guidelines were thus provided to participants as part of the survey instructions to assist them in understanding the classifications:

Academic: Activities relating to your academic work including research, communication with instructors and fellow students, checking grades, etc.

Personal/Entertainment: Activities involving information gathering for personal purposes or for entertainment including reading news, finding movie reviews, checking bank accounts, etc.

Social: Activities intended to communicate with friends or family including emailing family, reading Facebook or MySpace updates, blogging, etc.

The final piece of information requested was the amount of time the subject spent performing each task. This piece of data allowed lab usage to be examined in terms of not only numbers of activities performed for each purpose but also the amount of time for each purpose.

The survey was shared with a few different groups in order to gather feedback about its design and effectiveness before it was launched. The computer lab manager was involved with question selection and design. Utilizing her expertise and experience from years of lab management was important to make sure that the survey measured useful information and was reflective of how students used the computer labs. The survey process and instrument were also reviewed by a survey design consultant with the Odum Institute for Research in Social Science at UNC-Chapel Hill. Finally, the survey was given to a small group of student volunteers to review. This pre-test was of particular importance given the fact that the validity of the survey depended on the

participants' understanding of the Academic, Personal/Entertainment, and Social classifications.

An incentive was offered to encourage participation in the survey. Upon completion, subjects were given the opportunity to enter into a drawing to win one of two \$25 gift certificates. Students could only enter the drawing once and notice was provided that their answers to survey questions would in no way influence their chance of winning. This was done in order to minimize the influence of the incentive on the actual data that was being collected.

The survey was posted on computers in the ITS computer labs at UNC-Chapel Hill for one week in March 2007. A total of 1,271 surveys were submitted by students.⁹ Since the survey was completely voluntary, participants were given the option to omit some of the questions. This caused some of the submitted surveys to be incomplete. For consistency in analysis, responses were removed from the dataset if they did not contain information for all three of the characteristics of tasks: type, purpose, and time spent. This provided a final dataset of 1,006 surveys consisting of 2,700 tasks. In all, the surveys covered 44,683 total minutes of computer lab activity. For this level of response, the study's margin of error is 3% with a 95% confidence interval.

⁹ ITS computer labs do not track unique visitors to labs only total logins. Due to this limitation, an accurate response rate could not be calculated.

RESULTS

Respondents

The first section of the survey gathered information about the student completing the survey. Approximately two-thirds of the responses were from females which is higher than the percentage of female (58%) students at UNC-Chapel Hill.¹⁰ Respondents were fairly evenly spread across all the range of years in school. Surveys were submitted by students having over 100 different majors. The largest representations were Biology, Psychology, and Journalism and Mass Communications. More than 50 responses were received from students in each of these majors. The large diversity of majors caused low totals for many departments with a median of only 3 responses. These low numbers meant that any statistics generated for individual majors would have a high unreliability. For the purpose of analysis, individual majors were collapsed into four more general categories: humanities, professional, science, and social science.

Table 1: Respondents by Gender

	N	%
Female	659	65.5
Male	341	33.9
Missing	6	0.6
Total	1006	100

Table 2: Respondents by Year in School

	N	%
Freshman	146	14.5
Sophomore	218	21.7
Junior	232	23.1
Senior	213	21.2
Graduate	192	19.1
Missing	5	0.5
Total	1006	100

Table 3: Respondents by Major

	N	%
Humanities	126	12.5
Professional	307	30.5
Science	225	22.4
Social Science	263	26.1
Missing	85	8.4
Total	1006	100.0

¹⁰ Data from <http://www.ais.unc.edu/ir/factbook/fb2006-2007/student/fb06tbl2.html>.

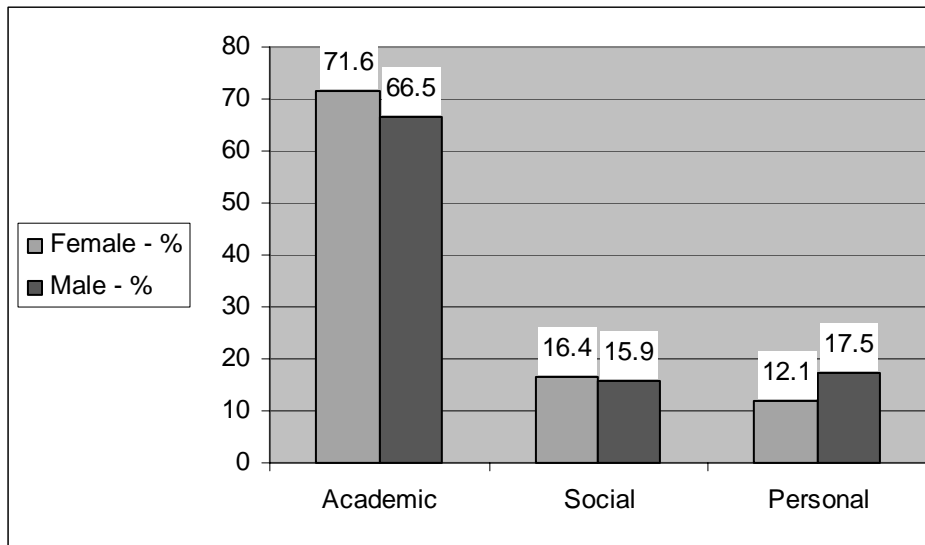
The characteristics of lab visits varied greatly among the 1,006 responses. Overall, students completed an average of 2.7 tasks per lab visit. The average task took 16.5 minutes to perform while the length of visits averaged 44.6 minutes.

Purposes of Tasks

Each task was classified on surveys as relating to Academic, Social, or Personal/Entertainment purposes. Academic-related tasks greatly outnumbered others. Almost 70% of the tasks were described as Academic-related. Social and Personal were more evenly distributed. Task purposes were also examined in reference to the gender of the respondent. Compared to males, females performed more Academic tasks and fewer Personal tasks while Social remained fairly similar. A chi-square analysis was performed on the cross-tabulated table which was significant at the 0.01 level demonstrating a relationship between gender and task purpose. The trend stated above matches how the categories relate to the expected values computed during the chi-square calculations.

Table 4: Tasks by Purpose

	N	%
Academic	1888	69.9
Social	436	16.1
Personal	376	13.9
Total	2700	100

Figure 1: Percentage of Tasks by Purpose and Gender**Table 5: Tasks by Purpose and Gender**

	Academic		Social		Personal	
	N	%	N	%	N	%
Female	1258	71.6	288	16.4	212	12.1
Male	618	66.5	148	15.9	163	17.5
$\chi^2 = 15.394, df = 2, p < .01$						

Additionally, task purposes varied across year in school. While Academic was the dominant classification across all years, the percentage decreased from freshmen to juniors and then reversed trends and increased through graduate students. Social task percentage decreased as years increased until the Graduate level where it increased. Conversely, Personal task percentage increased as years increased but decreased for the Graduate level (also the lowest Personal percentage for all years). Using the chi-square to examine the data more closely allows for more understanding. Purpose and years were

found to be related to a significance level of 0.01. Academic tasks were below the amount expected by chance for sophomores through seniors. Social tasks were above expected until senior year. Finally, for personal tasks, all classifications were below expected values except junior and seniors.

Figure 2: Percentage of Task Purposes by Class Year

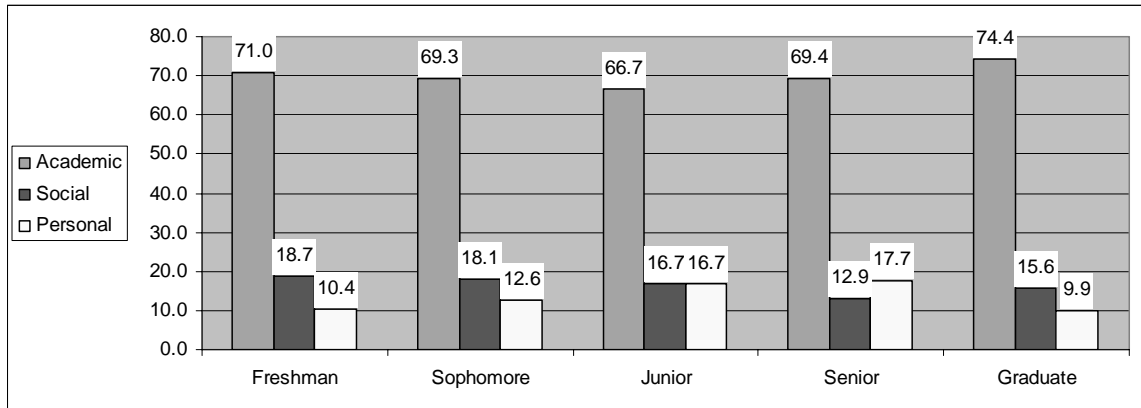


Table 6: Task Purposes by Class Year

	Freshman		Sophomore		Junior		Senior		Graduate	
	N	%	N	%	N	%	N	%	N	%
Academic	274	71.0	384	69.3	436	66.7	419	69.4	367	74.4
Social	72	18.7	100	18.1	109	16.7	78	12.9	77	15.6
Personal	40	10.4	70	12.6	109	16.7	107	17.7	49	9.9
Total	386	100	554	100	654	100	604	100	493	100
$\chi^2 = 28.922, df = 8, p = .01$										

Class year also plays a role in the total amount of time that students spend on each purpose during lab visits. From sophomore through graduate years the average length of time for tasks of Academic and Personal nature seems to increase while the length of Social tasks fluctuates. This relationship was significant at the 0.01 level for Academic purposes but Social and Personal purposes were not significant.¹¹ For Academic tasks,

¹¹ Academic: ($\chi^2 = 31.754, df = 12, p = .01$);

Social: ($\chi^2 = 10.068, df = 12, p = .01$);

Personal: ($\chi^2 = 10.117, df = 12, p = .01$)

freshmen had more visits than expected by chance that lasted less than 10 minutes and less than expected for time ranges greater than 10. The line between more than expected and less is about 30 minutes for sophomores. Seniors and graduate students were on the other end of the spectrum with less visits than expected lasting under 20 minutes and more visits over.

Figure 3: Average Time (in minutes) Spent on Task Purposes by Class Year

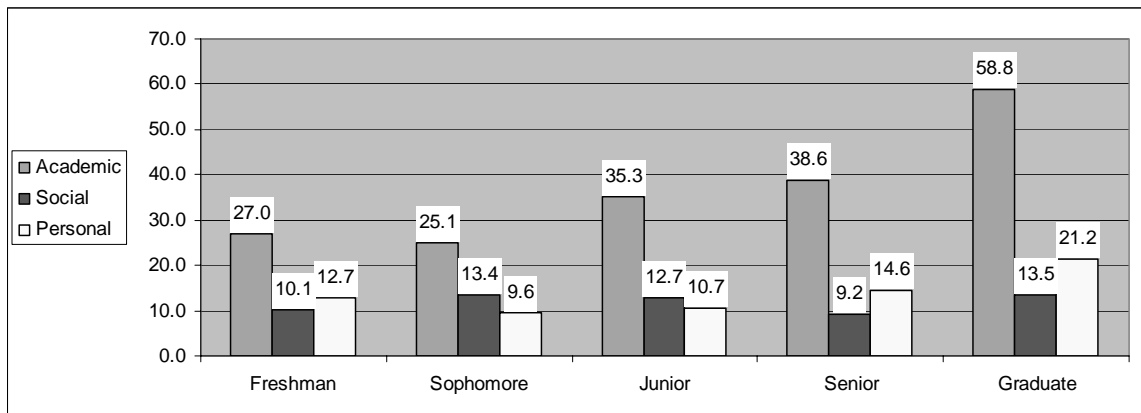


Table 7: Average Time (in minutes) Spent on Task Purposes by Class Year

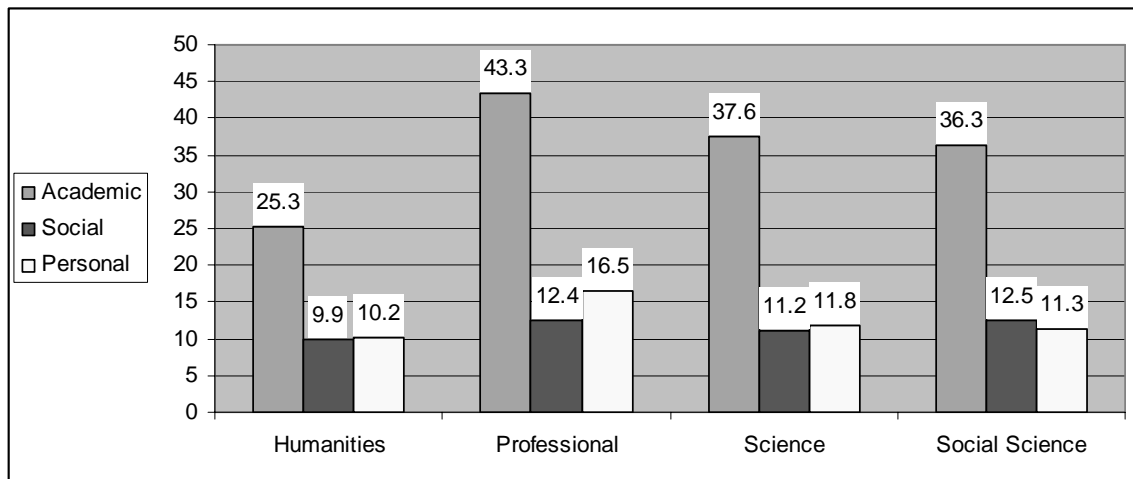
	Freshman	Sophomore	Junior	Senior	Graduate
Academic	27	25.1	35.3	38.6	58.8
Social	10.1	13.4	12.7	9.2	13.5
Personal	12.7	9.6	10.7	14.6	21.2

The purposes of tasks did not vary much across the categories of student majors. The percentages for all four groupings declined from Academic to Social and then Personal. Any relationship between majors and task purposes was found to be statistically insignificant.

Table 8: Task Purposes by Major

	Academic		Social		Personal	
	N	%	N	%	N	%
Humanities	219	67.0	58	17.7	50	15.3
Professional	567	70.8	124	15.5	110	13.7
Science	443	68.6	107	16.6	96	14.9
Social Science	497	70.2	112	15.8	99	14.0

Like year in school, the students' majors also had a relationship to time devoted to Academic purposes. This correlation was significant to the 0.05 level for Academic but was not significant for Social and Personal tasks.¹² Students in the Humanities tended to have more Academic tasks that lasted less than 10 minutes and fewer that lasted more than 30. Tasks of Professional majors, however, lasted fewer than 10 minutes less often than chance would have predicted. The 20 minute mark was the tipping point for Social Science students as the 0-10 and 10-20 groupings had less tasks than expected while more were reported in the 20-30 and 30+.

Figure 4: Average Time (in minutes) Spent on Task Purposes by Major

¹² Academic: ($\chi^2 = 17.673$, $df = 9$, $p = .05$);

Social: ($\chi^2 = 5.732$, $df = 9$, $p = .05$);

Personal: ($\chi^2 = 7.549$, $df = 9$, $p = .05$)

Table 9: Average Time (in minutes) Spent on Task Purposes by Major

	Humanities	Professional	Science	Social Science
Academic	25.3	43.3	37.6	36.3
Social	9.9	12.4	11.2	12.5
Personal	10.2	16.5	11.8	11.3

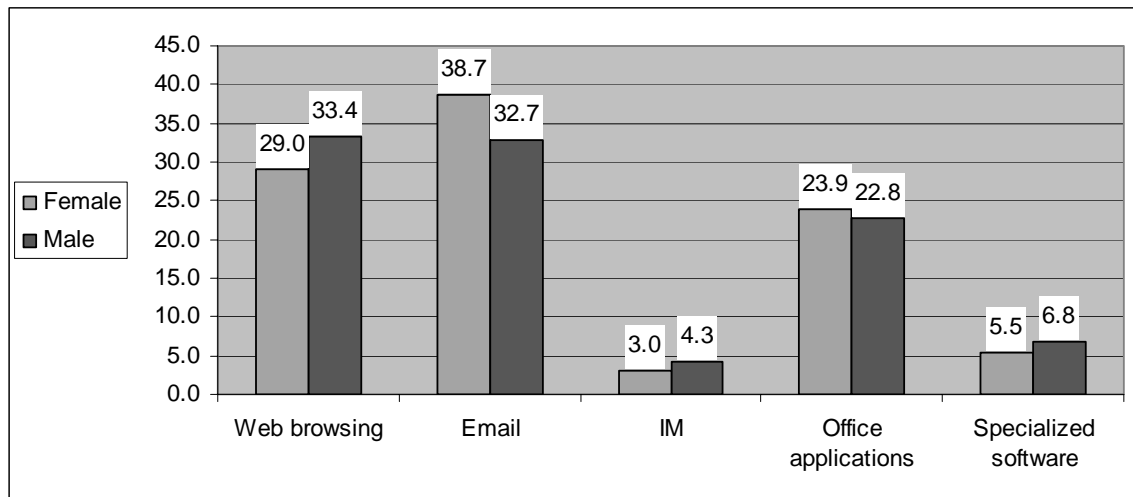
Types of Tasks

Respondents were asked to describe the type of each computer activity that they completed during their lab visit. The choices were web browsing, email, instant messaging (IM), using Microsoft Office applications (Word, Excel, Access, or PowerPoint), and using specialized software (SAS, MatLab, etc.). Email was the most frequent type of task with web browsing and Office applications were also heavily used. Specialized software and instant messaging were lightly used.

Table 10: Types of Tasks

	N	%
Web browsing	825	30.6
Email	986	36.5
IM	92	3.4
Office applications	637	23.6
Specialized software	160	5.9
Total	2700	100

Differences in the types of activities performed by each gender emerged when the data was examined. Males had higher rates of web browsing, instant messaging, and use of specialized software while females led in email and use of Microsoft Office applications. The chi-square values showed that these relationships were at the 0.01 level and would not have come from chance alone.

Figure 5: Percentage of Task Types by Gender**Table 11: Task Types by Gender**

	Web browsing		Email		IM		Office applications		Specialized software	
	N	%	N	%	N	%	N	%	N	%
Female	509	29.0	680	38.7	52	3.0	421	23.9	96	5.5
Male	310	33.4	304	32.7	40	4.3	212	22.8	63	6.8
$\chi^2 = 15.123, df = 4, p = .01$										

The task type data was also broken down by year in school. The data shows a downward trend for web browsing after sophomore year. At the same time, email's proportion tended to increase as years increased. The clearest trend appears to concern specialized software. Its use increased between each year. Using chi-square again to the 0.01 significant level showed a significant relationship between the proportions of task types and year in school. Email was more likely to be above expected values as years increased with the exception of juniors. Instant messaging increased relative to expectations until junior year and then fell sharply to 70% below expectation for graduates. Specialized software use was below chance until seniors but was well above chance for graduate students.

Table 12: Type of Tasks by Year in School

	Freshman		Sophomore		Junior		Senior		Graduate	
	N	%	N	%	N	%	N	%	N	%
Web browsing	116	30.1	180	32.5	211	32.3	190	31.5	123	24.9
Email	132	34.2	203	36.6	224	34.3	222	36.8	204	41.4
IM	14	3.6	24	4.3	29	4.4	20	3.3	5	1.0
Office application	107	27.7	120	21.7	156	23.9	135	22.4	116	23.5
Specialized software	17	4.4	27	4.9	34	5.2	37	6.1	45	9.1
Total	386	100	554	100	654	100	604	100	493	100
$\chi^2 = 38.725, df = 16, p = .01$										

The type of task was also affected by the student's major with a chi-square significance value 0.05 significance level. Those in the Humanities performed more web browsing but less use of specialized software than would occur by simply chance. In contrast, Social Science students did less web browsing while utilizing the specialized software more frequently. Science majors and Professional majors were also opposite each other. Students in Science did less email, more instant messaging, and more use of specialized software. The inverse was true for Professional majors in all three for all three of those task types.

Table 13: Type of Tasks by Major

	Humanities		Professional		Science		Social Science	
	N	%	N	%	N	%	N	%
Web browsing	106	32.4	244	30.5	205	31.7	206	29.1
Email	121	37.0	313	39.1	215	33.3	254	35.9
IM	11	3.4	15	1.9	32	5.0	25	3.5
Office applications	77	23.5	190	23.7	148	22.9	172	24.3
Specialized software	12	3.7	39	4.9	46	7.1	51	7.2
Total	327	100	801	100	646	100	708	100
$\chi^2 = 22.848, df = 12, p = .05$								

Relationship Between Type and Purpose

Task type and task purpose were examined in relation to each other. The first result that is apparent when looking at the purposes for each task is the fact that Academic use dominated the survey finishing as the top purpose for each task except instant messaging. Over 50% of web, 70% of email, and approximate 97% of Office applications and specialized software tasks were Academic in nature. The significant exception was instant messaging where 72% was Social, 23% Personal, and only 5% Academic.

Table 14: Task Types by Purpose

	Web browsing		Email		IM		Office applications		Specialized software	
	N	%	N	%	N	%	N	%	N	%
Academic	445	53.9	664	67.3	5	5.4	619	97.2	155	96.9
Social	147	17.8	213	21.6	66	71.7	9	1.4	1	0.6
Personal	233	28.2	109	11.1	21	22.8	9	1.4	4	2.5
Total	825	100	986	100	92	100	637	100	160	100

Further information about the relationship can be gathered by dividing each purpose into its constituent task types. Academic tasks had the greatest spread with email and Office applications each in the 30% range, web browsing in the 20% range, and specialized software at 8%. Social tasks were more focused with email, web browsing, and instant messaging all over 15%. Personal tasks were most focused as only email and web browsing were greater than 6%. For both Academic and Social tasks email was the greatest percentage of tasks.

Table 15: Task Purposes by Type

	Academic		Social		Personal	
	N	%	N	%	N	%
Web browsing	445	23.6	147	33.7	233	62.0
Email	664	35.2	213	48.9	109	29.0
IM	5	0.3	66	15.1	21	5.6
Office applications	619	32.8	9	2.1	9	2.4
Specialized software	155	8.2	1	0.2	4	1.1
Total	1888	100	436	100	376	100
	$\chi^2 = 694.364, df = 8, p = .01$					

The relationship between task type and purpose was significant at the 0.01 significance level. Web browsing is more related to Social and Personal use than chance would expect. Email is more related to Social and less to Personal use.¹³ Instant messaging was closely related to Social purposes but surprisingly not to Academic. Email is used regularly for Academic use so it would have been reasonable to believe that instant messaging would be also. Additionally, IM was used more for Personal tasks than chance would predict. This may be reflective of services that offer news and games via instant messaging. The use of Office applications and specialized software was also tied strongly to Academic tasks and not others.

¹³ This relationship seems fairly obvious as email is a communication medium so by nature typically involves others as opposed to being a solitary effort.

DISCUSSION

Any conclusions drawn from studies must be understood in terms of the characteristics and limitations under which the study was conducted. The 1,006 usable surveys provide a solid basis for analyzing student use of computer labs at UNC-Chapel Hill. Given a population size of 27,500, we can calculate that results may have a margin of error of 3% with a 95% confidence interval. The responses were also spread well across all class years. The responses are predominantly from females but this should not raise any concerns given that over 58% of all students are female at UNC-Chapel Hill.

Computer labs were originally developed to provide students access to technology to enhance their academic studies. Despite all of the ways in which people now rely on computers for social and personal purposes, the results of this study show that the large majority of tasks performed in computer labs are still for academic reasons. For this reason decisions about the future of computer labs have the potential to greatly impact the academics at the University.

It is clear from the data that students tend heavily towards lab use for academic purposes. This is surprising since the existing literature clearly showed a high rate of Internet adoption for social and personal use. Of particular note is the low utilization of instant messaging despite its heavy use as a communication medium among teens. Since IM is strongly related to socializing and not academics, it is possibly that student see computer labs as strictly related to academic endeavors and do not feel comfortable using them for these other purposes. It is also possible that students typically use labs for

important activities that “need” to be done and wait until they are at their personal computer for “casual” Internet use.

One of the most direct ways of applying the results of this study is by using the data in the design and management of computer labs. Lab managers have recognized from the early days of computer labs that the design of a lab can and will impact who uses it and how it is used (Harris, 1990). Data from this survey may be able to help managers shape future labs to support the uses of students and organize existing computer labs in order to increase their efficiency.

One way to increase efficiency is by customizing different labs to their natural clientele. The survey results showed that the length of time for a lab visit increased as the year in school increased. For this reasons labs that are in areas of campus geared towards underclassmen may be designed for short-term use and high turnover rates for users. More workstations may be set on taller tables without chairs so that students can walk up, quickly complete their task, and move along. Labs for upperclassmen and graduate students, whose visits tend to be longer, may contain stations where it is easier for them to sit down and unload their books and bags.

Similarly, specialized software does not appear to be used much until students get further along in their academic studies. If such software has associated costs, such as per-computer licensing or additional hardware requirements, it may not be wise to have it available in all labs. These items could be targeted to labs in areas frequented by upperclassmen or even centralized in only a few labs given their low amount of usage.

These results should also be considered when discussing the physical layout of lab space. Modern spaces with music, ambient noise, and food are some of the more recent

trends in the design of technology spaces in colleges and universities. Administrators have discovered the reliance on computers by students for social and entertainment activities. Coffeehouses with free wireless Internet have also become a popular place for college students to take their laptops and relax for a while. These two trends have led to efforts to innovate and meet needs by mimicking this type of setting. New projects for technology spaces are much more likely to have these characteristics than traditional rows of computers.

Designers, however, should keep in mind that these results show that academic usage is still the most prevalent. Since different types of students have different types of optimal learning conditions, different technology environments should be available. Just as five labs with rows of computers will not meet everyone's needs, neither will five cafes with Internet access. Ideally, a balance in technology offerings can be found that will provide the multi-tasking, multi-distraction environment that some desire as well as the quiet room with computers and rigid chairs that others need.

The exact uses to which this data will be put is ultimately in the hands of the reader. This study has been successful in capturing a snapshot of the tasks that students perform in computer labs at UNC-Chapel Hill. However, the usefulness of this type of information is not limited to this institution. Interesting opportunities for further research include replicating this study at other schools. For instance, do the results differ at schools that do not have computer requirements like UNC-CH does? Or would results vary at a technical school as opposed to a liberal arts college like UNC-CH? Can we expect similar data if the study was conducted at a peer school with similar characteristics? These types of questions would provide insight into how much of this

information can be generalized for use in other contexts where its benefits could be expanded.

Additionally, this research project has focused on how students are using the existing computer lab infrastructure and offerings. This data could serve as the foundation for future exploration into why students are utilizing labs in particular ways and not others. Is the tendency of computer tasks to be mostly academic-related a function of the lab environment or is this characteristic of all student computer use regardless of where it takes place? This survey also did not tackle the issue of what students would like in a computer lab. The vision and goals of lab management and of the student body may or may not match. The answers to these types of questions would help provide a direction for future lab growth and evolution. This study provides a baseline of current usage but leaves the opportunity for much more exploration.

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Appendix A

Lab Software

Information Technology Services, UNC-Chapel Hill

<http://its.unc.edu/labs/software.php>

Teaching and Learning

Software in ITS Computer Labs

Table of Contents

[Windows Applications:](#)

[Chemistry Applications:](#)

[Computer Science Applications:](#)

[GIS Applications:](#)

[HPAA Applications:](#)

[Law School Applications:](#)

[Math Applications:](#)

[Statistical Applications:](#)

[Remote Services:](#)

[UNC Courseware:](#)

The PC's found in the ITS Labs are currently running Windows XP Professional. All PC lab users must use their [ONYEN](#) (User ID) to access these machines.

If you have special needs in our computer labs, please submit an [Online Request for Help](#) and we will try our best to meet your needs.

Windows Applications:

MS Office 2003 (Word, Excel, Access, Powerpoint, Publisher, FrontPage)

WordPerfect 11.0 (Only in Law Library Computer Lab)

Symantec Antivirus

Acrobat Reader 7.0

Dreamweaver 4.0

Chemistry Applications:

Pasco DataStudio

Spinworks

Computer Science Applications:

jGRASP

Turing

GIS Applications:

ArcGIS (includes arcinfo and arcview)

Erdas Imagine

HPAA Applications:

Medmodel

WinQSB

FirstClass

Law School Applications:

Cali

Math Applications:

Maple 10

Mathematica 5.2

MatLabR2006

WinPlot

Statistical Applications:

SAS 9.1

SPSS for Windows 14.0

Splus 7

StataSE 9.0

DBMS copy 8.0

Remote Services:

Secure CRT

FireFox (browser only)

Internet Explorer

WS-FTP

X-Win 32

UNC Courseware:

Epi Info

RefWorks

Final Draft

Finale Notepad

Appendix B

Recruitment Background on UNC-CH Computer Lab Computers

Express Yourself!

Your help is needed to better understand
computer lab usage.

*Please complete the 2-3 minute survey to
the left.*

*You could win 1 of 2
\$25 gift certificates*



Appendix C

Online Survey of UNC-CH Computer Lab Users

Thank you for participating in this survey so that we may better understand how computer labs are used. **The survey will take approximately 2-3 minutes.** Clicking the [>> button](#) at the bottom of this page will take you to the survey.

University of North Carolina-Chapel Hill
Information about a Research Study

IRB Study #07-0503 Consent Form Version Date: 02-22-07

Title of Study:How Students Use Computer Labs
Principal Investigator: Matt Howell
UNC-Chapel Hill Department:School of Information and Library Science
Faculty Advisor: Dr. Barbara Moran
Study Contact telephone number / email: 919-962-7740 / matt-h@ils.unc.edu

What is the purpose of this research study?

We want to understand the purposes for which students use campus computer labs.

How many people will take part in this study and for how long?

If you decide to be in this study, you will be one of hundreds completing the survey for this research project. Each survey will last approximately 2-3 minutes but you can choose to stop the survey at any time.

What will happen if you take part in the study?

The survey will ask you to list the activities you perform during your computer lab visit and classify them appropriately. It is completely voluntary and anonymous. You do not have to answer any questions that you do not wish to answer, for any reason.

What are the possible benefits/risks/privacy concerns in this study?

Your participation is important to provide understanding of how students use computer labs but you may not benefit personally from being in this research study. In addition, we do not think you will experience any discomfort or risk from the survey. You are not required to submit any personally identifying information. Email addresses volunteered for the drawings will be kept completely separate from other information and will be disposed of after the drawings.

Will there be costs or compensations for your participation?

There are no costs for being in the study. You will have the opportunity to enter yourself in a drawing for 1 of 2 \$25 gift certificates.

What if you have questions about this study?

You have the right to ask, and have answered, any questions you may have about this research. If you have questions, or concerns, you should contact Matt Howell at 919-962-7740 or Dr. Barbara Moran at 919-962-8067.

What if you have questions about your rights as a research participant?

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113

or by email to IRB_subjects@unc.edu.

Thank you for your help with this study.

>>

Please select your year in school.

Freshman

Sophomore

Junior

Senior

Graduate

Please list your major, if decided.

Please select your gender.

Female

Male

What is your primary purpose for this visit to the lab?

- Instant messaging
- Printing
- Email
- Word / Excel / Access / PowerPoint
- Web browsing
- Using specialized software

For each task that you perform during this lab visit, please identify the type of task, classify the purpose of the task, and state how long you spent performing it. The following guide may be useful.

Academic: Activities relating to your academic work including research, communication with instructors and fellow students, checking grades, etc.

Personal/Entertainment: Activities involving information gathering for personal purposes or for entertainment including reading news, finding movie reviews, checking bank accounts, etc.

Social: Activities intended to communicate with friends or family including emailing family, reading Facebook or MySpace updates, blogging, etc.

Please use the options below to describe each activity that you perform during this visit to the computer lab.

	Type of task? Choose 1 of 5					Purpose of task? Choose 1 of 3			Length of time (in minutes)?
	Web browsing	Email	Instant messaging	Word / Excel / Access / PowerPoint	Using specialized software	Academic (School-related)	Social (Friend-related)	Personal / Entertainment	
Task 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Task 9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

>>

Thank you for participating in the survey!

To be entered in the gift card drawing, please enter your Onyen below.

Guidelines:

- **One entry per person:** You may complete a survey for each lab visit but each Onyen will only be entered once in the drawing.
- **Winners will be contacted at the Onyen email address.**
- **Winners will have a choice of a \$25 gift certificate from Best Buy, Student Stores, Target, or Wal-Mart.**

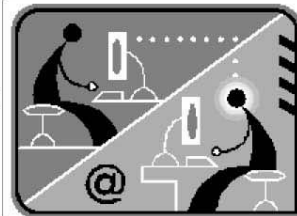
Onyen:

Submit



UNC
SCHOOL OF INFORMATION
AND LIBRARY SCIENCE

Matt Howell
Student,
MS-Information
Science
matt-h AT
ils.unc.edu



Thank you for participating in the survey!

To be entered in the gift card drawing, please enter your Onyen below.

Guidelines:

- **One entry per person:** You may complete a survey for each lab visit but each Onyen will only be entered once in the drawing.
- Winners will be contacted at the Onyen email address.
- Winners will have a choice of a \$25 gift certificate from Best Buy, Student Stores, Target, or Wal-Mart.

Your Onyen has been entered in the drawing.

Winners will be contacted by email once the study has concluded.

Feel free to complete the survey again on your next lab visit.



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