



Chaminade University

Sullivan Library

A Study

Spring 2003

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Sullivan Library Computer Use Study

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Executive Summary

Sullivan Library exists to serve students in a quest for information resources and encourages an environment of serious library research, independent quiet study and general reading. It is the only library at Chaminade University, a private Catholic university with around 2500 students.

Sullivan Library serves approximately 550 patrons each day and many of these patrons use the library to do computer work. The Sullivan Library librarians expressed concern that students are unable to use the computers due to lack of availability. They would like for students to be able to conduct research, do academic work, and use the Internet effectively in the library.

A perception exists that computers in the library are used for chatting and game playing; librarians have observed these activities occasionally. These activities are prohibited by the current computer use policy in the library. It is believed that these activities prevent patrons from using the computers for appropriate work.

Computer logs provided by the Chaminade IT department, as well as the self-reporting surveys, conducted by our team, indicate that computers are used for academic purposes, which includes Internet research, word processing, and e-mail. Although formal observation done by the Sullivan staff during the survey period have not verified that all computers are engaged at any one time, patrons reported on the survey that there are times when all are in use. Librarians have also noticed that there are times when all computers are engaged and patrons have departed immediately. This would indicate that at peak usage times it would be impossible to accommodate more patrons without more terminals available.

Patron comments indicate a demand for more computers in the library, while the assistant director of IT has declared that use/demand rises to fulfill facilities provided. This demand is not currently being met. If periodicals are becoming electronic then the trend needs to be access through computers, in proportion to growth of the media as well as

student need. The policies for appropriate use of computers on campus are being observed and do not seem to contribute any obstacle to effective use.

It is therefore recommended that the library provide more computers for students. Regular maintenance and oversight of the computers should be enforced. In addition, making more use of the university's wireless network would encourage patrons to bring their own computers, relieving the demand on the library's computers. This includes promoting the wireless system and providing more power sources and desk space for laptops in the library. A study should be conducted to track the troubleshooting issue. A determination of the root problems, whether searching issues, hardware, software, printing, etc. would indicate the best way to relieve librarians of trivial work. Finally, we recommend that the library develop a strong mission statement to provide consensus about appropriate use of information technology between the computer lab and the library as well as among all library staff. A clear written statement about the technology services in the library will inform the patrons, help promote the library, and assure that the rules are clear.

Background and Environment

Chaminade University

Chaminade University is a private, coeducational university, located near the University of Hawaii, on Oahu. Chaminade was established in 1955 by the Society of Mary (Marianists), a Catholic order dedicated to the education of leaders. The core curriculum at Chaminade University is liberal arts, with an emphasis on career preparation. At any one time, there are 2,200-2,700 students enrolled in a range of daytime and evening classes. Approximately 45% of the full-time undergraduates are from Hawaii; 45% are from the U.S. Mainland; and 10% are from countries other than the United States. Approximately 20% of the courses in the Accelerated Undergraduate Program are on-line. The distance education program delivers instruction via e-mail and the World Wide Web to approximately 600 student enrollments per term. Almost all of the students enrolled in these classes live on O'ahu and the neighbor islands, though a few reside in the continental United States or overseas on military installations.

Sullivan Library

Sullivan Library is centrally located in Henry Hall. The librarians encourage an environment of serious library research, independent quiet study, and general reading. Three full time librarians assist patrons.

The Sullivan library contains about 68,250 volumes. Book buying is limited with priority going to books for the graduate programs and the reference collection. The library subscribes to over 1350 periodicals in either paper or electronic format. There are about 600 video and audio titles in the collection, including those restricted for instructional purposes. Additional media resources are purchased and kept by individual academic disciplines.

The library has recently undergone departmental and staff changes and now belongs to the Department of Information Services and Library. In July 2000, the Technical Services Librarian resigned and in September 2000, the Director of Academic Support Services retired. A Dean of Information Services and Library has been hired and started in August 2001. However, this is still a new department and has not yet developed a cohesive

vision and work strategy.

In Fall 2000, at a planning session of the academic division directors, the directors voted unanimously to make the library and technology the top two priorities in academic budget planning, placing them ahead even of their own programs. The academic community of Chaminade noted that the library is a central concern for the University's ability to offer a high quality education and is envisioned fulfilling both the traditional role of library as the heart of the university and as the center of an electronic network that will reach throughout the campus and beyond.

“Unlike a traditional library, Chaminade's center will be designed for maximum flexibility and continuous reengineering as technology changes. Learning technologies housed in the center will facilitate the exchange of ideas and collaboration between faculty and students, and make the resources of the world available to Chaminade's students and faculty.”

System Overview

Sullivan Library has nine personal computers and five Internet-only computers. On-campus, there are classroom computers for curriculum use only and one computer lab with around fifty computers for student use. The information services staff maintains all on-campus computers, including those in the library. The University has also increased Internet connectivity in the residence halls and instituted a wireless network to alleviate some of the load on the library and lab facilities. Wireless computer cards are made available for purchase to a limited number of dormitory residences.

The library has an appropriate use policy that has been derived from the computer lab policy. This policy is posted on each computer (Appendix C). No chatting or game playing is allowed at anytime. Currently, the computer lab has a general usage statement that limits patrons to academic computer use only from opening until 3:00PM (Appendix B). This academic use does not include chatting. After 3:00PM, patrons may engage in non-academic work. The college's main web page has a link to a chat room (Appendix B). It appears from this that the issue of chatting as an unacademic use is yet unresolved amongst college policy makers.

Librarians have noticed that some chatting and game playing takes place in the library and worry that library patrons who wish to use the computers for academic purposes are being denied opportunities. Librarians also feel that they spend too much time monitoring usage and troubleshooting computer problems.

Methodology

Data collection began with an initial interview of all three librarians and the computer lab assistant director. Results can be viewed in Appendix D and E. Follow-ups were conducted as questions arose. These were all informal interviews, questions were formed and a general script was followed, but each interview was unique.

Based on the interviews, an overview of the system and the problem were defined. Then, a survey was designed to investigate patron views of computer use in the library as well as actual patron usage. This self-reporting survey was posted on all library computers for a two-week period (Appendix G). It was also placed at the circulation desk and participation was solicited in scheduled team visits to the library. Comments written by patrons on survey were also collected and noted (Appendix K). The team also conducted scheduled observations in the library.

In addition to these more direct methods of investigation, the team conducted a review of on-line and print literature about the library, the computer lab, and the university.

Other data collected by outside parties was also used in this investigation. Usage logs from computers in both the lab and library were obtained from the computer assistant director (Appendix F). These usage logs provided opinions from patrons on computer use in the categories of academic, web use, e-mail, library research, and non-academic use (Appendix J). Turnstile counts from the library exit provided a count of daily patron visits (Appendix H) and formal observation of patron activities conducted by the library staff (Appendix I) offered more data about patron behavior.

Analysis

Summary of Data Collection Methods

Interviews

- Interviews with all librarians.
- Interview with key member of Information System team.

Observations

- Observations conducted while meeting in the library.
- Observations conducted while monitoring the survey.
- Observations conducted by librarians
- Observations conducted by IT people

Documentation

- Chaminade University website.
- Sullivan Library and computer Lab information.
- Campus computer use policy.

Survey/Questionnaire

Summary of Data Analysis

The first step of data analysis conducted was content analysis of documentation:

1. Review of Chaminade University website.
2. Review of Sullivan Library and computer Lab information.
3. Review of Campus computer use policy.

The second step of data analysis was the statistical analysis of:

1. Computer usage survey conducted by LIS647 group,
2. Library usage observations conducted by library staff.
3. Computer usage statistics collected by information services.
4. Survey results collected by another team, the Sullivan Library interior design students. (Appendix K)

In this second step of data analysis, a general statistical analysis method and the special statistical χ^2 testing method were used. The following collected data were included in the analysis:

- 228 Surveys on computer usage in the Library collected by LIS647 group.
- 2173 Observations of the Library usage collected by librarians.
- 7441 Observations of computer usage in the Lab collected by IT people.

After the second step of data analysis, the following results were derived:

- Comparing the average daily body counts of patrons using computer in the library and the patrons entering the library clearly shows that an average of 33% of patrons go to the library to use a computer.
- Comparison between the stated patron intent of computer use activity and the actual computer use logs shows that most patrons claim to email or surf the web, actually doing academic work.
- Each day of the week shows different levels of the various computer activities, however on weekends patrons prefer to exclusively do academic work. This result passed the χ^2 testing and can therefore be trusted at a 95% confidence level.
- Non-academic activity is less than 10% of total computer usage.
- The peak day of the week for computer use in the library is Tuesday, while in the lab the peak day of the week is Wednesday. Monday is the second busiest day in both places.
- The peak hours for computer use in the library are between 10:00AM-12:00PM. The second busiest time is from 1:00PM-2:00PM.
- The computers are not being used to full capacity. Out of 14 computers in the library, no more than 5 computers (daily average) are used in any given hour.
- More than 50% of patrons in the library can find an available computer.
- The duration of most patron computer sessions is 30 minutes. However, patrons who do not own a computer state they intend to use the computer longer. These results also passed the χ^2 testing and so can be trusted at a 95% confidence level.

- More than 60% of responding library patrons who live on campus own a computer.
- More than 60% of library patrons would prefer to use a computer in the library rather than in the computer lab.
- More than 60% of patrons would return the library if a computer was not currently available and this is not related to whether they own a computer. Again, this result was proved by the χ^2 testing.
- Over 90% of responses indicated a need for more computers on campus.

Problem Definition

Investigation shows that over the entire campus academic computer use is the norm on all the available computers. On-campus and in the library, space for computers is limited and budgets may not allow for acquiring more computers. However, patrons and librarians would like even more access to computers for academic work, Internet searches, and e-mail.

Investigation also shows that most patrons in the library are able to use a computer if they desire. However, patrons expressed a desire for more access to computers as well as maintained and well-running computers. Maintenance of the computers appears to be a problem. Troubleshooting is time consuming for librarians and is not currently part of their assigned duties.

Computer logs from the library reflect 85% of all patron use is academic use, which includes web searches, word processing, and library catalogue. Survey results indicate the same use. The correspondence of these findings shows this percentage to be reliable. Word processing alone is a consistent 50% of usage, while Internet research comprises 86% of the patrons' activity as expressed in the survey. E-mail activity, also allowed in the policy, is consistent throughout the week at about 40% of patron activity. This shows that the problem of patrons inappropriately using computers is less serious than originally thought.

Results show that peak days, or days when the computers in the library are used the most, are Tuesday and Thursday. 12% of all activity on any day of the week is email or other web activity and all activity increases before school vacations. Tuesday and Thursday are also the days when the highest non-academic use takes place, though this is only 12% of all total activity. These may be important days to consider, as they are times of high activity when patrons may be turned away.

Computer logs and the patron observation results indicate that there is always an open computer available. However, the self-reporting survey showed 17% of the patrons claiming no computer was available at the time they visited the library. This may be the

result of reporting on a previous visit since the survey was at each terminal and not posted at the entrance of the library. In addition, when students were asked if they would check back in the library later after finding all computers currently occupied, only 40% said they would. This is a considerable number of students who are discouraged easily and may not be able to utilize the library's services.

Characteristics of Sullivan Library patrons show that there is an overall desire to use computers in the library, and that the current system is not meeting the reported need of the patrons. These characteristics also indicate trends in patron use that can be used to tailor the library computer system to best suit the patrons. Sixty-eight percent of patrons claim to come to the library to use the computers without checking the computer lab first. The comments collected from patrons in the library indicate a desire for more computers, or better performing computers. Similarly, 95% of users in the computer lab say there is a need for more computers. A major constituency, 32% of library patrons, who were surveyed do not own a computer. When students were queried if they would check back for computer availability, only 50% said they would. This is a disturbingly high number of patrons disenfranchised. If these are the same students who do not have personal computers, we have a formidable number of students discouraged easily and not utilizing the university's services.

Alternatives Considered and Rejected

1. Use of filtering software to inhibit non-academic use of computers.

- No strong need since 85% of usage is academic.
- Would affect entire school system.

2. Time limits on computer use.

- Impedes the flow of study and student needs.
- Greatly impacts students who do not own a computer, those most in need.

3. Use of pop-up policy screens to enforce patron agreement.

- Considered ineffective and annoying, while policy seems to be followed.

4. Designate someone to monitor computers in the library.

- No strong need since academic usage is the norm.
- Costly to staff.

Recommendations

1. Provide more computers.

The patron preference is to use the computers in the library, patrons have expressed that the computers in the library are faster than the ones in the lab. 95% percent of patrons thought there was a need for more computers in the library. More computers will address this problem. If 32% do not own a personal computer, the library provides their only access to research. To keep costs lower, consider purchasing more internet-only computers. Most patrons use the computer for email or web access.

2. Promote the use of laptops and the wireless system.

This will reduce the demand for computers in the library and promote technology on campus. It is recommended that this availability be advertised and power sources in the library be provided. The stated 2000 planning session mission is to keep the library flexible and fluid to technological change. If patrons provide their own laptops budget can go towards other needs such as access to databases, boasting server power, and education.

3. Promote or publish off peak times.

This will encourage patrons to use the computer during slower times. More computers will be available and the patrons will have a more relaxed work environment. Peak usage times will need to be constantly reviewed, because class schedules will be changing. Currently, Wednesdays and Fridays are the best times to find a free computer. Computers will also be easily available on weekends. On any day, after 2 PM presents the best opportunities to find a free computer.

4. Use a wait list or use a simple reservation system.

Implementing a simple wait list, where patrons can sign up to indicate they are waiting, along with an enforced session time limit can help smooth the flow of patrons using the computer and accommodate more patrons. This can be enforced with the minimum of effort, such as relying on signage and the patrons honor. During peak hours, consider

implementing a reservation system, where patrons must sign up ahead for designated session times. Again, this can be self-monitored, but provides opportunity for those who do not have a personal computer.

5. Clarify the policy and state no downloading of programs.

Clarifying the policy and having a uniform policy with the computer lab can help increase awareness about appropriate use. The specific inclusion of policy about downloading or modifying computers can help the computer run more smoothly. A request form for certain unavailable software could be made available. Encouraging students to use personal laptop computers would alleviate this problem.

6. Enforce a regular maintenance/care program of library computers.

The current responsibility lies with the IT staff. The stated maintenance duties should be enforced and the computers should be monitored and checked regularly and frequently and at the very least daily. Once again, personal laptop computers would reduce need of troubleshooting.

7. Develop and post mission statement.

The library has recently undergone organizational restructuring. There have been changes in personnel and administration. All stakeholders need to come together to develop a common vision and mission statement to develop consensus. This mission statement should be posted for patrons and staff alike. This will help clarify what information technology service is offered in the library and what the philosophy of this service is. The patrons will know what to expect and how to behave.

Conclusion

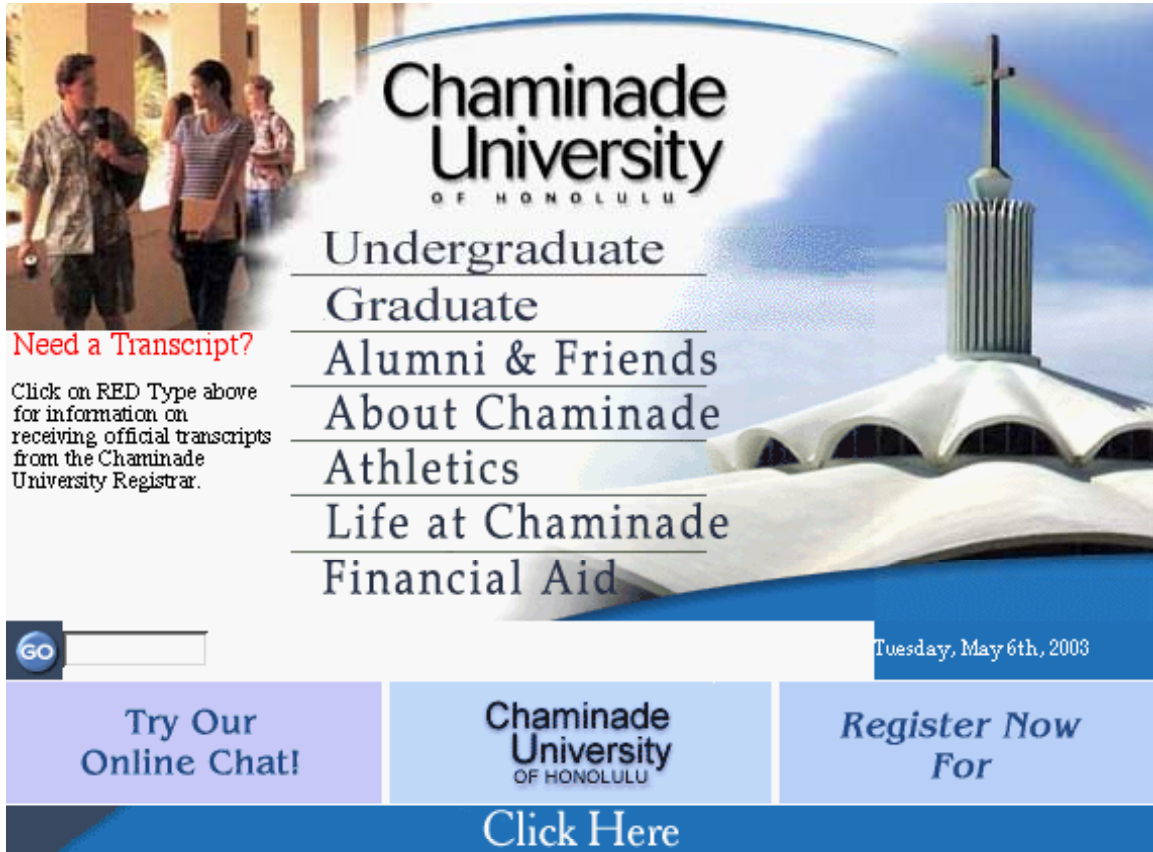
The academic division directors have stated that the library should go beyond the traditional role of library, and be designed for maximum flexibility and continuous reengineering as technology changes. The library should bring the latest in information technology to students of the university in a cost efficient way. The Sullivan Library librarians have adopted a motto of “access rather than acquisition,” according to the Fall 2000 planning session.

Empowering students through access to information can be best accomplished with an increased number of computers. Non-academic usage is not an issue, although awareness of a clear policy could be increased.

Implementation of less costly measures can be accomplished immediately. Since space is limited, promoting the wireless network and encouraging students to carry laptops would increase access to computers with a negligible impact on facilities. Creating an efficient and friendly environment for these wireless patrons would be another part of promoting the wireless network. This solution is not only cost effective, but allows for computing tailored to the patron and relieves the library of maintenance. Other effective measures are recognizing peak times and implementing honor system waitlists and session time limits.

Finally, developing consensus within the newly formed department is important. A new mission statement reflecting the computer and information needs of the patrons can be developed. This can provide the foundation for encouraging an active academic community that has all its technological needs met and that views the library as an effective and pleasant work environment.

Appendix A: Chaminade University Homepage

The banner features a background image of a university building with a prominent cross on top, set against a blue sky with a rainbow. On the left, a group of students is walking. The university's name and logo are centered at the top. Below the logo is a vertical list of navigation links, each underlined. A red text link is positioned to the left of the first two links. At the bottom left is a search bar with a 'GO' button. At the bottom right is the date. The footer consists of three blue buttons with white text, and a dark blue bar with white text at the very bottom.

Chaminade University
OF HONOLULU

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Need a Transcript?

Click on RED Type above for information on receiving official transcripts from the Chaminade University Registrar.

GO

Tuesday, May 6th, 2003

Try Our Online Chat!

Chaminade University
OF HONOLULU

Register Now For

Click Here

Appendix B: Computer Use Policy in the Computer Lab

(stick, Hardcopy)

Appendix C: Computer Use Policy in the Library

A Reminder

Installing programs (ex. AIM and ICQ) on any Lab Computer is not allowed. Anyone caught installing programs may risk losing their lab privileges.

Personal computer files and programs should not be copied to or run on the lab systems. A limited amount of file storage is available on your H: drive for short-term use.

RULES FOR USE OF COMPUTERS

These computers are to be used for academic purposes.

DO NOT use the computers for activities such as conducting private businesses and doing outside job-related computer work. Game playing is permitted but if people are waiting to use the computers for academic purposes, then you will be asked to relinquish the system.

New Chat Room Policy

Due to high computer demand and abuse of chatting privileges by some users, we must restrict the use of chat rooms. The use of these chat rooms is prohibited between the times of 8:00 a.m. and 3:00 p.m. weekdays and anytime there are evening classes scheduled in the Lab. Also the use of these chat rooms in the Library is prohibited at ALL times. Anyone chatting during these restricted times will be asked to leave the Computer Lab / Library immediately.

Appendix D: Librarian Interview Summary

Librarian I

Perceived Problem:

- Computers are being used for non-academic work.
- Monitoring is time consuming.

Goal:

- All computers used exclusively for academic work.

Obstacles:

- Computers are the responsibility of IT department.

Librarian II

Perceived Problem:

- Inadequate number of computers; usage control might help.

Goal:

- Have enough computers for all in library and attract more patrons to library.

Obstacles:

- Not sure what usage actually is, so it is difficult to enforce academic use policy.

Suggested solutions:

- More computers
- Filtering software.

Librarian III

Perceived Problem:

- Insufficient access to computers by patrons.
- Librarians waste time monitoring.

Goal:

- All patrons have immediate access to computers.

Suggested solutions:

- Filtering software
- Student IT worker to monitor computers.

Appendix E: Computer Lab Assistant Director Interview Summary

Academic Computer Lab (Henry Hall 124) Monday –Thursday: 7:30 AM To 10:00 PM, Friday 7:30 AM To 6:00 PM, Sat. Noon To 6:00 PM, Sunday 2:00 PM To 10:00 PM.

The Sullivan Library and the Academic Computer Lab are the only student computer access locations on campus beyond the dorms.

Since need was so high and space so limited, an airport system was installed to accommodate laptops in the dorms. The students provide their own computer but Chaminade supplies the airport cards and access.

The Lab is busy on a regular basis. The policy is that computers are for academic use only, with the exception of chatting after 3 PM. During final exams and the week preceding, even chat is not allowed. This is basically administered by an honor system.

Before a student is given an account he/she is given a copy of the computer usage rules. These are also on the counter in the lab.

During the peak use time, during exam period, logs on each computer are reviewed to determine usage. It has been found that at least 85% of the use is academic.

Placing a security program to control usage would affect the whole Chaminade system and is therefore not an option.

Computer laboratory administrator feels that placing a pop-up screen with reminders of computer rules would be a waste since no one would pay attention to them.

Lab workers are to check the computers in the library once an hour for just general working conditions. If there is a major problem the librarian is to file a report. The workers in the Lab, two at a time, are there to assist the students in the lab and library.

Administrator feels that if the Lab was larger with more computers it would be utilized by students, the demand is constant.

Appendix F: Computer Logs (provided by Chaminade Computer Lab)

Date	Total for the day Games/Chatting	Total for the day Email/Web	Total for the day MS Offc/Acad	Total Use for the day (ALL)
10/23/2002*	24	78	58	160
10/24/02	20	45	69	134
10/25/02	18	91	59	168
10/28/02	20	97	96	213
10/29/2002*	9	43	53	105
10/30/02	16	90	60	166
10/31/02	14	52	104	170
11/1/2002*	13	65	69	147
11/2/2002*	1	10	2	13
11/4/02	18	100	99	217
11/5/02	21	81	78	180
11/6/02	19	110	80	209
11/7/02	4	64	97	165
11/8/02	13	76	83	172
11/9/2002*	4	10	9	23
11/10/2002*	1	7	18	26
11/12/02	8	109	121	238
11/13/02	21	122	88	231
11/14/02	20	94	83	197
11/15/2002*	19	64	54	137
11/16/2002*	2	13	28	43
11/17/02	3	33	35	71
11/18/02	11	118	106	235
11/19/02	25	96	138	259
11/20/02	16	123	127	266
11/21/02	13	85	140	238
11/22/02	15	91	95	201
11/23/02	5	13	25	43
11/24/02	12	27	55	94
11/25/02	31	132	193	356
11/26/2002*	11	67	79	157
11/27/02	25	103	101	229
11/30/2002*	0	6	15	21
12/1/02	2	18	146	166
12/2/02	10	196	221	427
12/3/02	2	127	198	327
12/4/02	9	127	252	388
12/5/02	5	134	261	400
12/6/02	11	98	212	321
12/7/2002*	4	20	37	61
12/8/2002*	6	22	39	67
12/9/02				0
12/10/02				0
12/11/02				0
12/12/02				0

Appendix H: Turnstile Count at Sullivan Library

Sullivan Library Statistics

Exit Count

Month/Year: Apr-03

Total Count

10120

Date	Beg. Count	End Count	Total
1-Apr	77008	77491	483
2-Apr	77491	77935	444
3-Apr	77935	78387	452
4-Apr	78387	78725	338
5-Apr	78725	78787	62
6-Apr	78787	78881	94
7-Apr	78881	79437	556
8-Apr	79437	80031	594
9-Apr	80031	80511	480
10-Apr	80511	80993	482
11-Apr	80993	81371	378
12-Apr	81371	81446	75
13-Apr	81446	81507	61
14-Apr	81507	82052	545
15-Apr	82052	82520	468
16-Apr	82520	83010	490
17-Apr	83010	83571	561
18-Apr	83571	83571	CLOSED
19-Apr	83571	83656	85
20-Apr	83656	83730	74
21-Apr	83730	84306	576
22-Apr	84306	84820	514

23-Apr	84820	85348	528
24-Apr	85348	85939	591
25-Apr	85939	86346	407
26-Apr	86346	86411	65
27-Apr	86411	86534	123
28-Apr	86534	87128	594
29-Apr	87128	87712	584
30-Apr	87712	88334	622

Highest Count	594	8	-Apr
Lowest Count	61	13	-Apr

Appendix I: Library Computer Logs

Provided by librarians.

(Stick, Hardcopy)

Appendix Ib: Hourly Patron/Computer Use Log

Provided by Library.

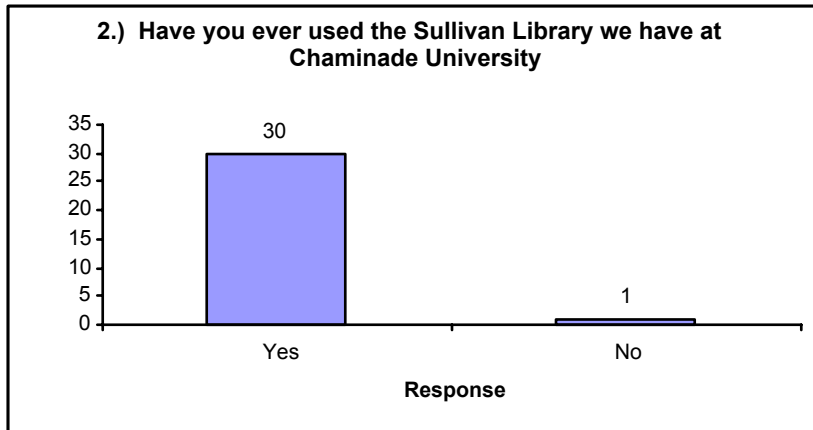
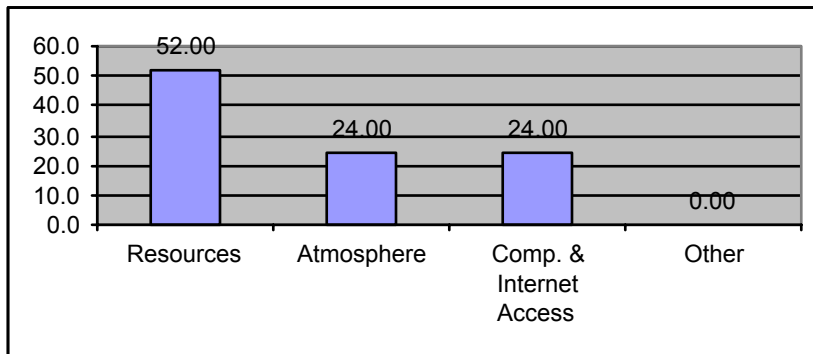
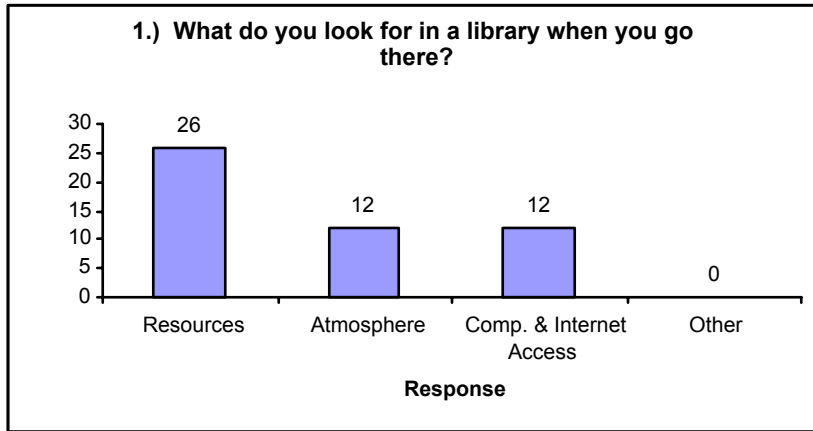
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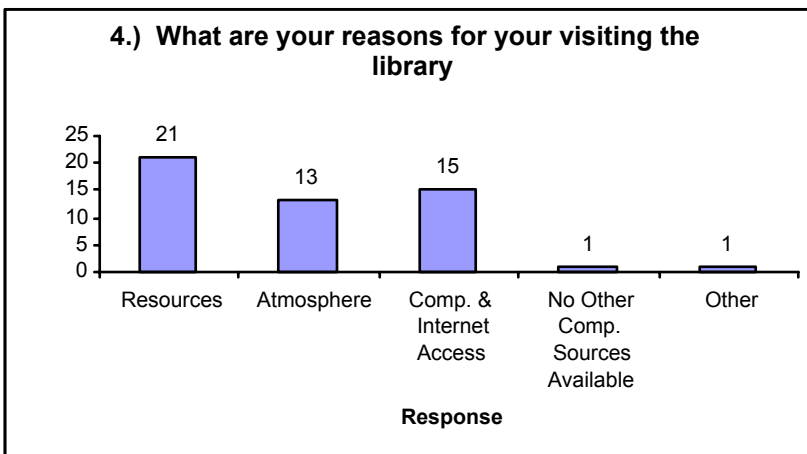
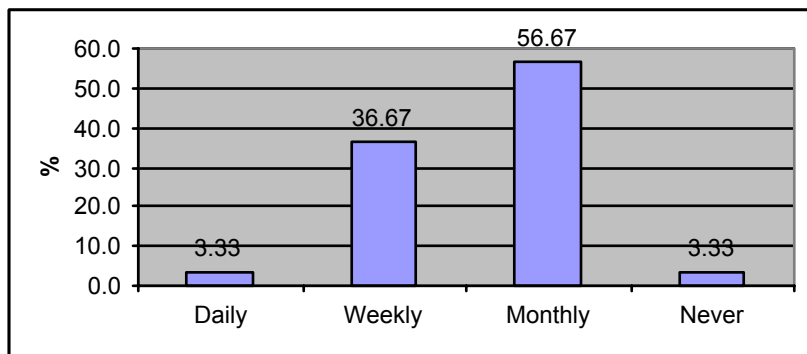
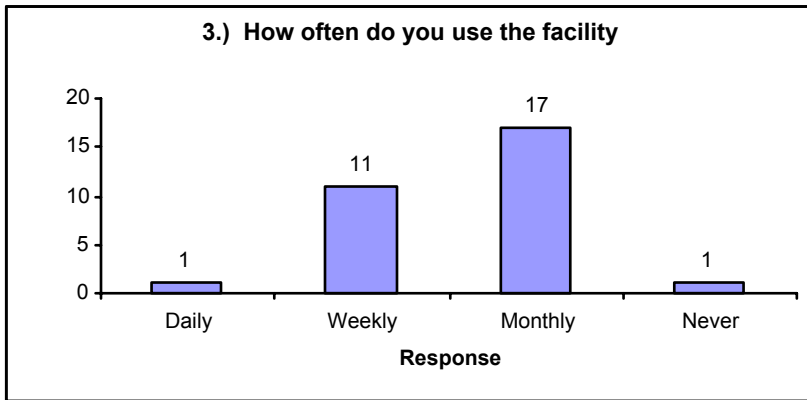
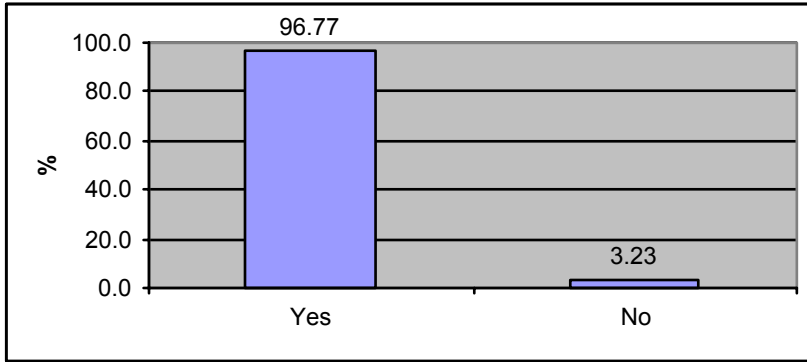
Appendix J: Patron Comments

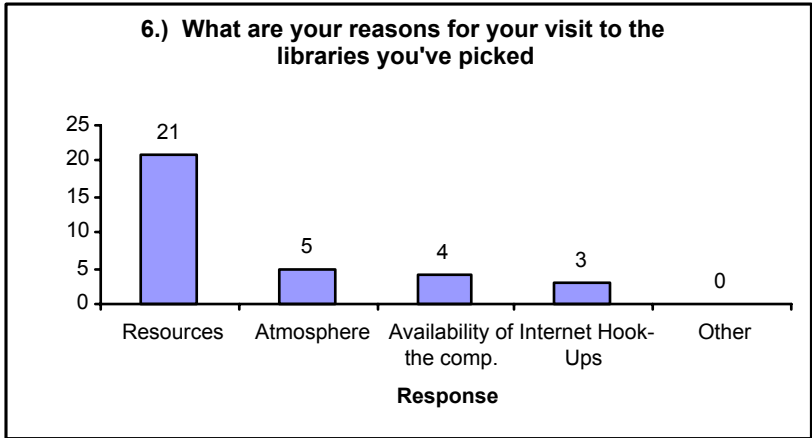
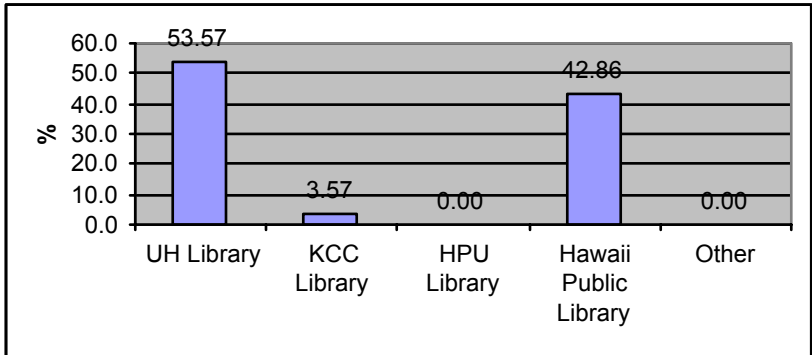
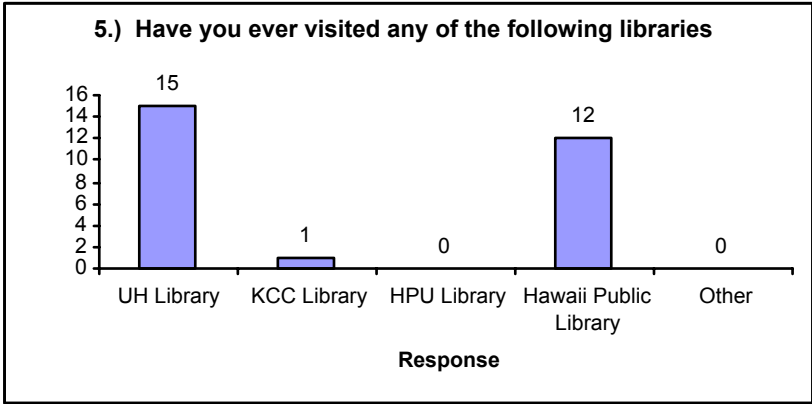
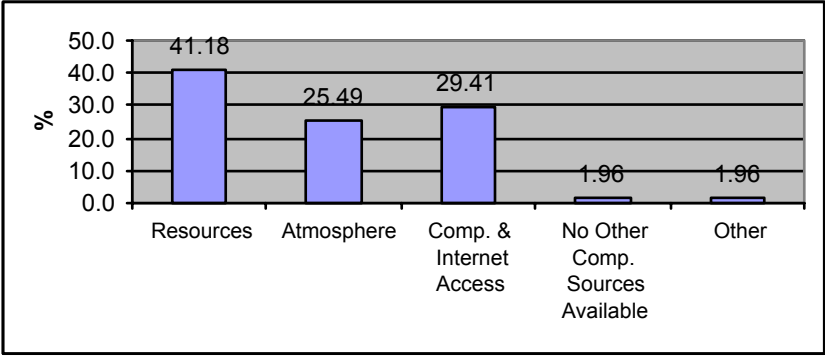
- Perhaps put up firewalls or pop-ups, or use stricter rules so that students don't download random programs or applications.
- More computers on campus. Also, the wireless Internet connection for people with laptops who want to use it on campus, like what UH has.
- More computers, faster computers, more print credits
- Do a better job of not letting people download dumb things.
- More computers in the library; they could be upstairs.
- I like the library computers better, faster. Make the hours more accessible for students. Open at 7AM or stay open later than 10, either the library or the lab.
- Computer lab slower than my dial-up at home. Computer staff blows.
- Computers in lab are really slow and risky to use.
- Much rather use the library ones. The chairs in the lab are all screwed up. Let's get some new ones.
- Need newer and better computers. Extra time is needed because you never know if the computer you use will lose your work.
- They don't work most of the time
- This mouse is weird.
- There might not be a need for more computers if students' personal computers worked.
- Need more computers all around campus.
- More computers.
- More computers.

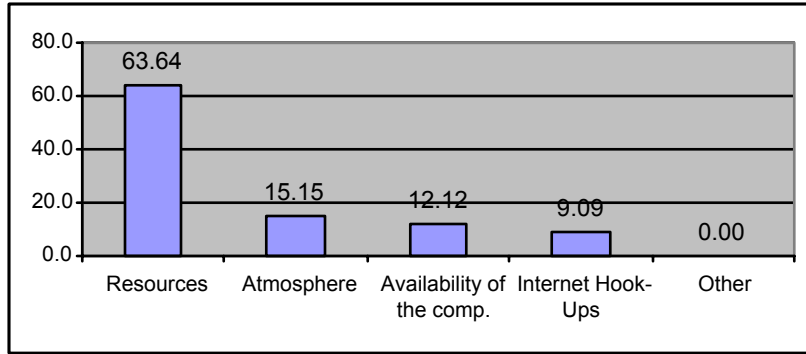
Appendix K

Survey conducted by interior design class at Chaminade.









Appendix L: Statistical Data Analysis

General statistical analysis method and the special statistical χ^2 testing method are used in the data analysis.

I. General Statistical Analysis

General statistical analysis is gathering statistics from the collected data, such as how many computers are used in a week, in a day, how long are they used, etc. The following collected data are included in the analysis:

- 228 Surveys on computer usage in the Library collected by LIS647 group
- 2173 Observations of the Library usage collected by librarians
- 7441 Observations of computer usage in the Lab collected by IT people.

Figure 1 shows data by time coverage during the semester by days and weeks. Figure 2 shows hourly use throughout the day., derived by survey and figure 3 shows hourly use as derived from library observations over six weeks.

- The peak day of computer usage in a week is Tuesday in the Library and Wednesday in the Lab. However, Monday is the second peak day in these two places.
- The peak hour of computer usage in the Library is between 10:00-12:00AM. The second is 1:00-2:00PM.

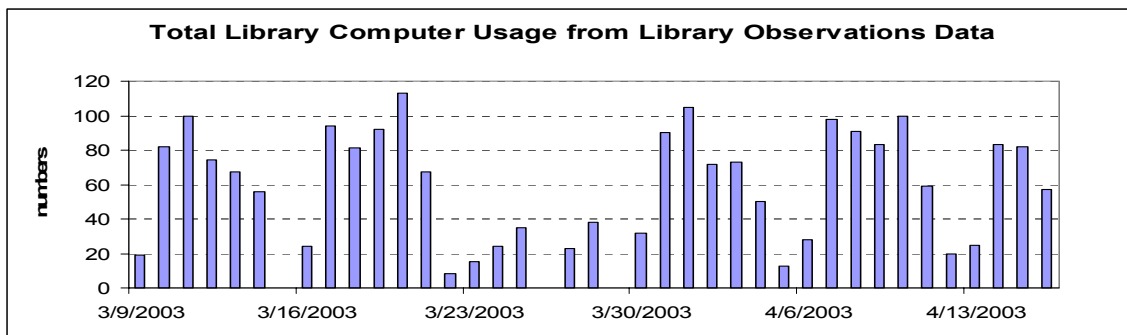


Figure 1

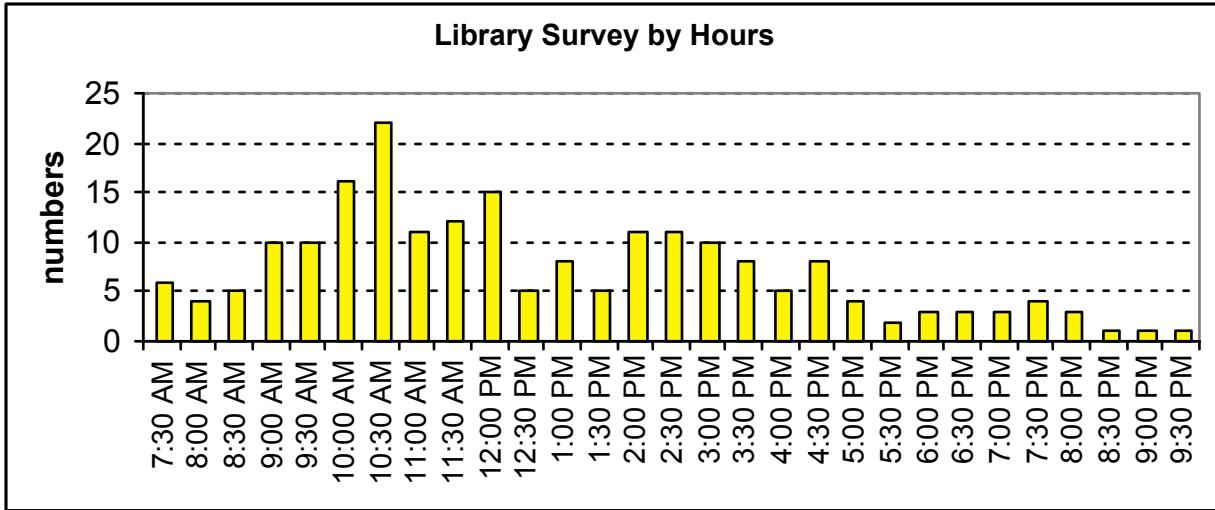


Figure 2

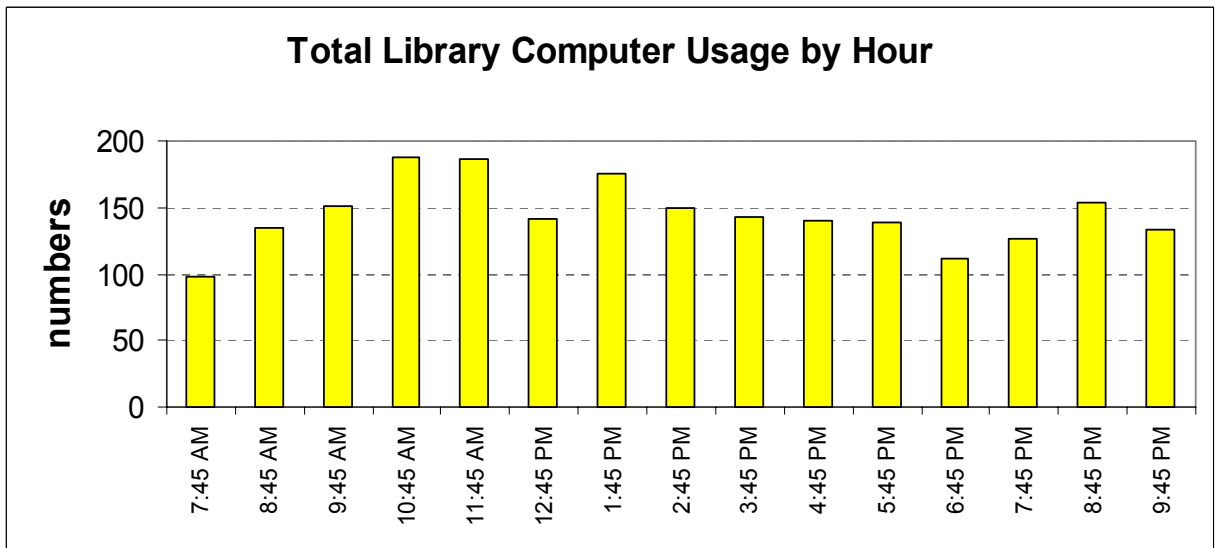


Figure 3

How the computers are being used is the most important question in our project. We divide it into three parts:

- 1) How are the computers being used?
- 2) How efficient is the computer use?
- 3) How long are the computers used?

Figures 4a, b, and c show the percentage of intent for computer use and the actual

computer use by patrons. Analyzing computer usage by categories of academic, office, library, email, web, and game/chatting, we can conclude that:

- The patron's intent for academic work using email/web is actual.
- Non-academic activity is about 10% of total computer usage.

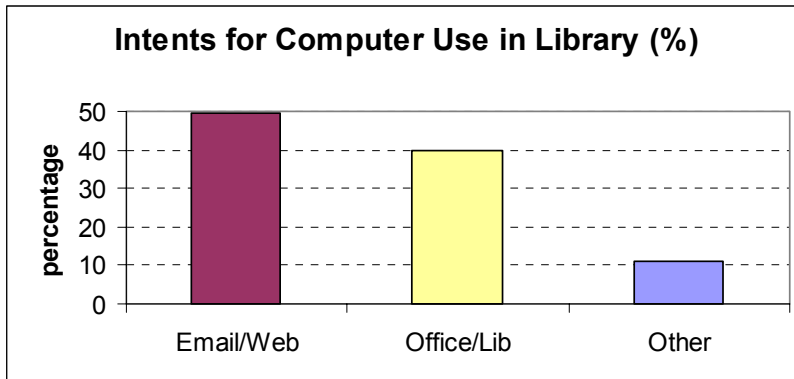


Figure 4a. Intent as indicated on survey.

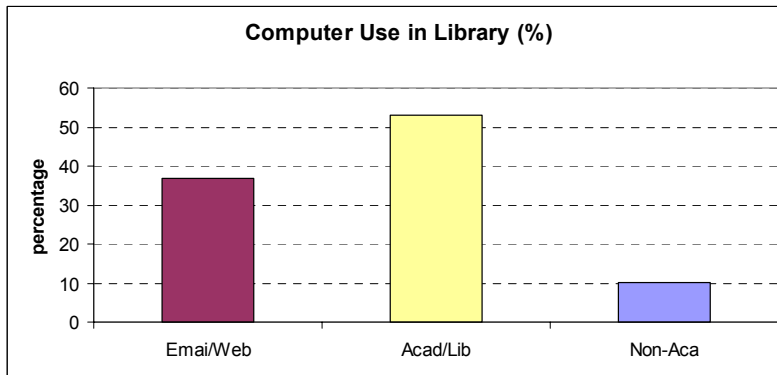


Figure 4b. Actual use derived from Librarian observations.

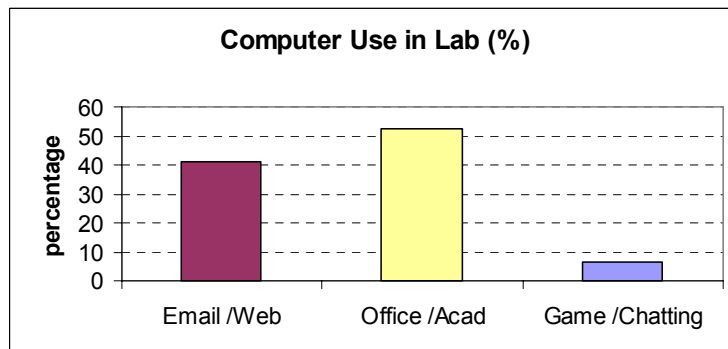


Figure 4c. Computer use derived from computer lab logs.

Figure 5a and b shows three types of computer use in a week from the observation data in the Library and the Lab, respectively. This shows that academic use is prevalent with unacademic use falling at week end.

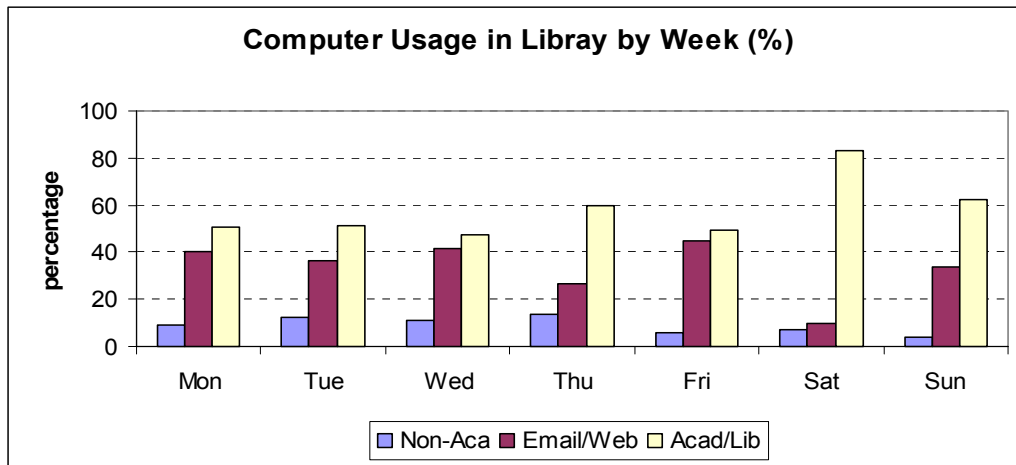


Figure 5a The Library computer usage in a week (from observations by librarians)

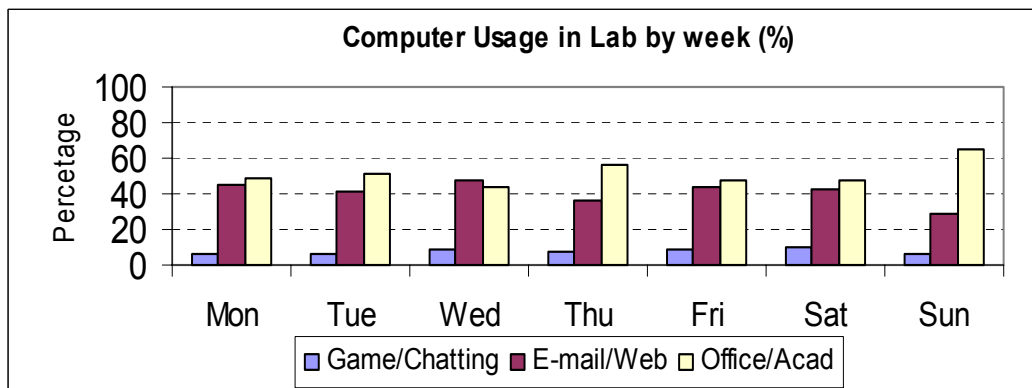


Figure 5b The Lab computer usage in a week (from computer logs from IT people)

The result of the survey question “is there a computer available in the library now” shown in Figure 6, and find that more than 50% people in the library can find a computer available.

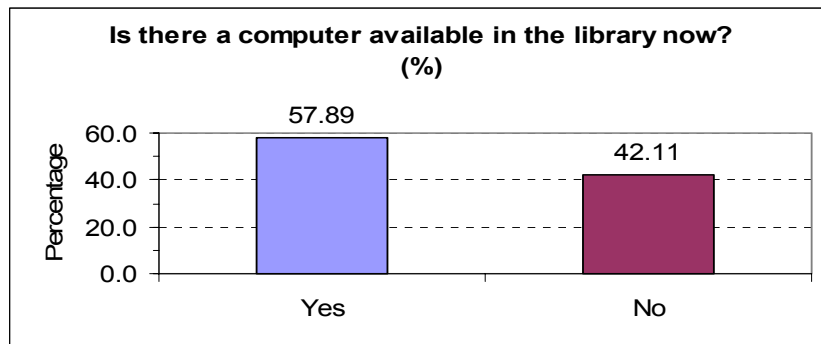


Figure 6. Computer availability.(from survey by LIS647)

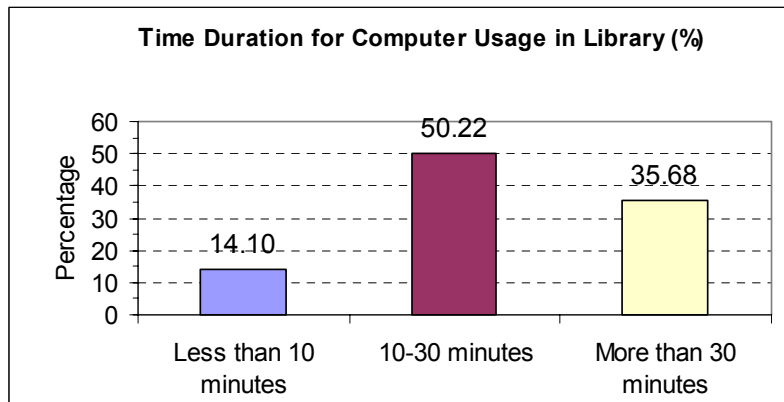


Figure 7. The time durations of computer use in the library (from survey by LIS647)

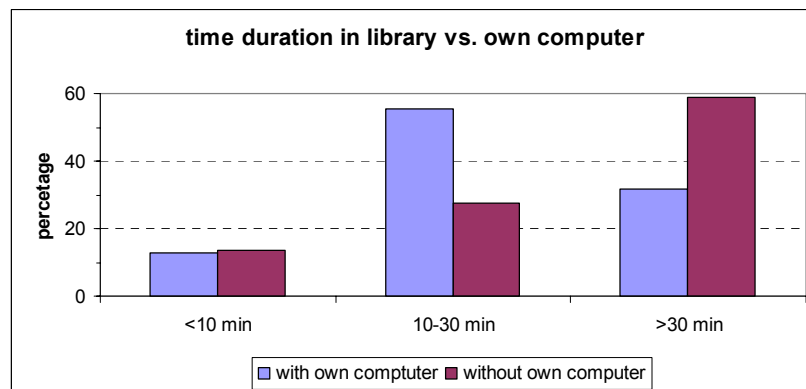


Figure 8. The time durations of computer use of those who own a computer (from survey by LIS647)

Figure 7 provides durations of computer use in the library. We further investigate

whether the time duration has any associated with people who own computer. Figure 8 shows the comparison between time durations of computer use in the library and patrons who own a computer. It shows there is different between people who own computer and who do not. Finally, we use the χ^2 testing to prove that this association is statistical significant over 95% confidence level. Therefore, we can conclude that

- The most time duration of computer use is 30 minutes.
- People without own a computer intend to use computer longer.

Figure 9 shows patron's returning behavior if there is not a computer available (from survey by LIS647). It is seen that more than 60% people would return to the library if a computer is not available.

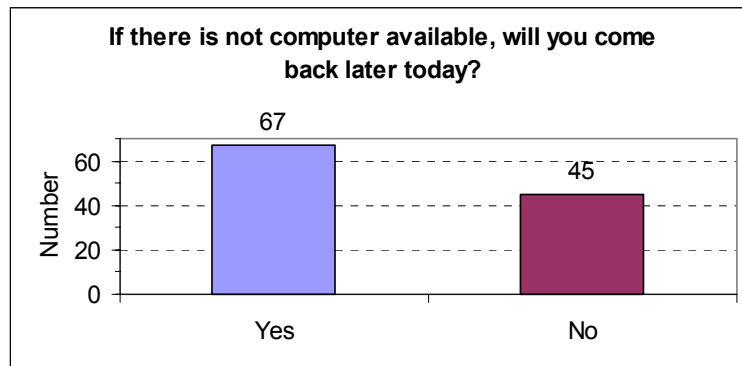


Figure 9. The returning behavior if there is not computer available (from survey by LIS647)

Figure 10 shows there is a little difference in returning behaviors between people own a computer or nor. After the χ^2 testing, it is proves that the returning behaviors are not associated with whether or not they own a computer.

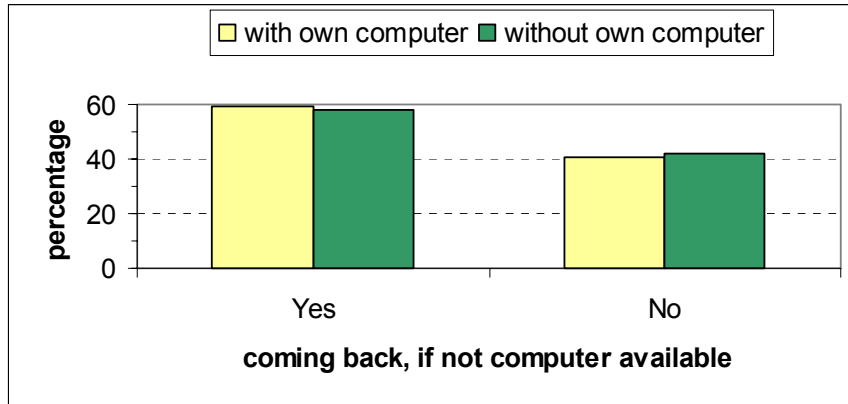


Figure 10. The different returning behaviors between people own a computer or not (from survey by LIS647)

Figure 11 shows that when people want to use a computer, more than 60% of them go to the library directly without checking the Lab, which implies most of people prefer to use computers in the library than in the Lab.

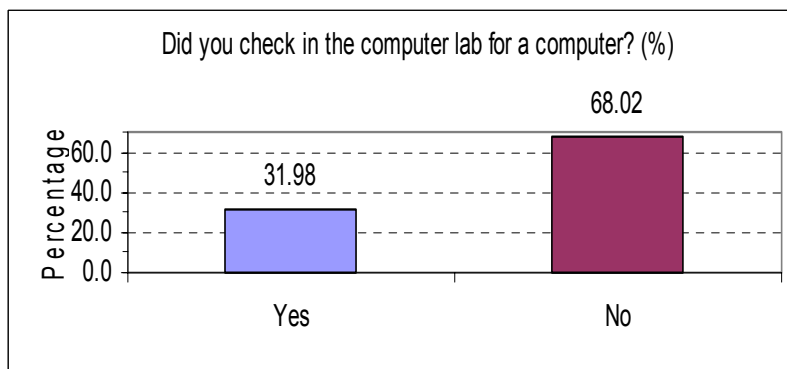


Figure 11

Results from the survey also show:

- More than 68% people own a computer. Conversely, 32% do not own a personal computer. (Figure 12)
- Over 90% people would like to have more computers on campus (Figure 13)

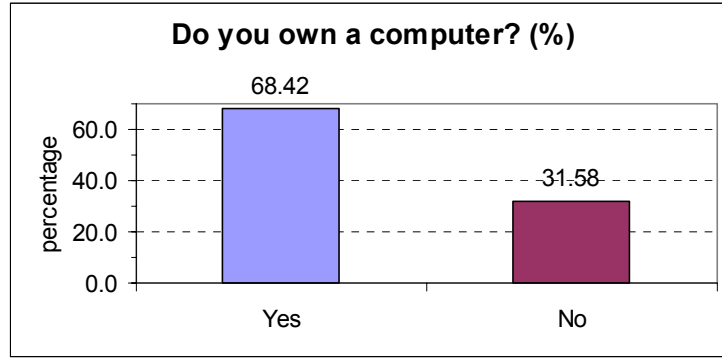


Figure 12

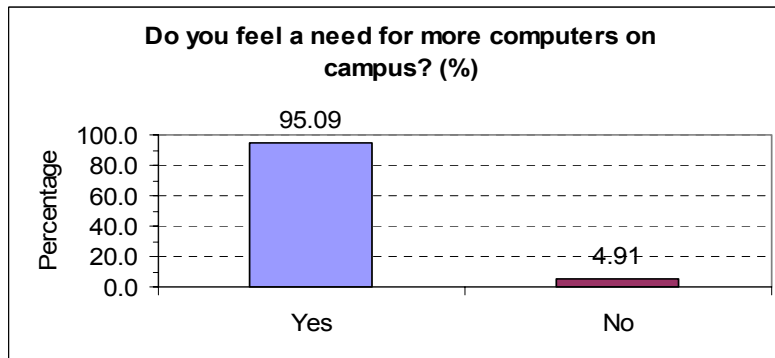


Figure 13. The demands on more computers on campus.

II. Statistical χ^2 Testing

Statistical χ^2 testing is testing whether the variables in the cross-table have a relationship in a given significant level. It can omit the effect of sample size. In this project, we conduct three χ^2 testing:

- Testing the association between computer usage types and weekdays
- Testing the association between computer usage time and owning a computer (from survey)
- Testing the association between come back and own computer (survey)

2.1 Test on Computer usage types and weekdays

A. Data from Library Observations by librarians

Types	Mon	Tue	Wed	Thu	Fri	Totals
Non-Aca	43	61	41	52	16	213
Acad/Lib	238	252	180	224	133	1027
Email/Web	190	181	157	100	121	749
Totals	471	494	378	376	270	1989

Hypothesis: There is no association between "Computer usage types" and "Weekdays"

P-value (significance level) = $1.63E-05 < 0.05$ CI (95% confidence level)

The degree of freedom: $df = (5-1)(3-1)=8$

Therefore, the above hypothesis is **rejected**. In other words, there is an association between computer usage types and weekdays.

B. Data from Lab Observations by IT people

Types	Mon	Tue	Wed	Thu	Fri	Totals
-------	-----	-----	-----	-----	-----	--------

Game/Chatting	90	76	130	76	89	461
MS Office/Acad	715	667	766	754	572	3474
Email/Web	643	523	753	474	485	2878
Totals	1448	1266	1649	1304	1146	6813

Hypothesis: There is no association between "Computer usage types" and "Weekdays"

P-value (significance level) = $2.79E-07 < 0.05$ CI (95% confidence level)

The degree of freedom: $df = (5-1)(3-1) = 8$

Therefore, the above hypothesis is **rejected**. In other words, there is an association between computer usage types and weekdays.

2.2 Test on "Computer usage time" from Survey Data by LIS647 group

A. "Computer usage time" vs. "availability of own computer"

duration	with own computer	without own computer	total
<10 min	14	10	24
10-30 min	61	20	81
>30 min	35	43	78
total	110	73	183

Hypothesis: There is no association between "Computer usage time" and "availability of own computer"

P-value (significance level) = 0.000455448 < 0.05 CI (95% confidence level)

Therefore, the above hypothesis is **rejected**. In other words, computer usage time in the library computer lab is associated with availability of owning a personal computer.

B "Computer usage time" vs. "availability of internet access"

duration	with internet access	without internet	total
<10 min	8	16	24
10-30 min	49	32	81
>30 min	32	46	78
total	89	94	183

* without internet means with computer but no internet, and without computer

Hypothesis: There is no association between "Computer usage time" and "availability of the Internet"

P-value (significance level) = 0.013452307 < 0.05 CI (95% confidence level)

Therefore, the above hypothesis is **rejected**. In other words, computer usage time in the library computer lab is associated with availability of the Internet on personal computer.

2.3 Test on “coming back” from Survey Data by LIS647 group

A. “coming back” vs. “own computer”

coming back	with own computer	without own computer	total
Yes	38	22	60
No	26	16	42
Total	64	38	102

Hypothesis: There is no association between "Coming back" and "availability of own computer"

P-value (significance level) = 0.883237985 > 0.05 CI (95% confidence level)

Therefore, the above hypothesis is **accepted**. In other words, coming back the library is not association with availability of own computer.

B. coming back vs. internet access

coming back	with internet access	without internet access	total
Yes	25	35	60
No	19	23	42
total	44	58	102

*without Internet access means with computer but no Internet, and without computer

Hypothesis: There is no association between "Coming back" and "availability of internet access"

P-value (significance level) = 0.720023004 > 0.05 CI (95% confidence level)

Therefore, the above hypothesis is **accepted**. In other words, coming back the library is not association with availability of Internet access.