

Preparing for the Future: How we are maximizing our Technology Labs

Kelli Kleindorfer
Educational Technologist
College of Arts and Sciences
Drake University
2507 University Avenue
Des Moines, Iowa 50311
515-271-2877
kelli.kleindorfer@drake.edu

Introduction

In spring of 2005, the College of Arts and Sciences at Drake University recognized a problem with the student computer labs across campus. The College of Arts and Sciences Technology Planning Committee determined that there was a need to analyze the lab situation and create a clear cut path for the future. Previously, decisions for lab computer replacements were based on proposals provided by the departments. The labs that did not have a submitted proposal were not considered. The technology committee found that this was not an optimal practice as some of the worst labs were ignored due to a lack of submissions. A determination was made that it was time to analyze the College of Arts and Sciences' lab situation so a more uniform and fair distribution of technology funds could be reached.

About Us

Drake University is a private accredited institution in Des Moines, Iowa that houses six colleges and schools including Law, Pharmacy, Business, Education, Journalism and Mass Communications and Arts and Sciences. It has over 70 areas of study with both undergraduate and graduate students. The College of Arts and Sciences is the largest degree granting college with the largest campus representation of students and faculty. The College of Arts and Sciences houses seventeen different departments with over 3,000 students taking courses for 43 different bachelor degrees, 49 minors and five pre-professional interest areas. With such a wide range of learning, the college is very diverse.

History

Prior to 2005, no computer inventory was kept for the College of Arts and Sciences. The Dean's Office maintained a faculty computer inventory used to plan for faculty machine upgrades. Machines reached the labs by either being purchased with student technology fee money or by using the old faculty replacement machines that have aged at least three years. If departments wanted lab upgrades, a proposal was submitted to the College of Arts and Sciences Technology Planning Committee for review and distribution of funds. If the proposal met the guidelines for a technology fee disbursement, the committee recommended the proposal for full or partial allocation based on the amount of the proposal.

In the past, departments found space and computers to procure a lab themselves. There was no communication between other departments, nor was there any desire to collaborate computer labs. Most departments worked alone to get their computers from faculty replacement machines or other schools on campus. Faculty members were in charge of the labs, not because of want or

interest, but rather because they required them to be in functional condition for classes and no one else took responsibility. Depending on what problems occurred, the faculty lab coordinator would call the HelpDesk or the Campus Computer/Network Technician. If these two groups could not find an answer, the problem did not get solved. Outside technicians were contracted to help solve problems. Faculty members involved were not members of IT, nor did they have any idea how to adhere to university-wide standards. Many of the problems resulted from the lack of a contact in Arts and Sciences to assist with problems.

This was the situation in spring of 2005. Students were frustrated with the labs. There was failing equipment and equipment that did not even function properly when it arrived. There was software that only worked on a small number of computers and software that had not been upgraded since its initial purchase. Each department knew there were problems with the labs but there was no one to turn to in the college. These labs were a source of contention across campus. The technology planning committee determined that it was time to start evaluating all labs to determine how to fix problems. The first priority was to make an overall plan, rather than applying small fixes for larger problems. The technology committee determined that an analysis of the situation needed to be made in order to maximize the money available and its resultant effect.

Lab Analysis

Creating Inventory

By talking with the instructors, the many departmental labs hidden around campus started appearing. There were 22 Arts and Sciences computer labs. After identifying where all the labs were, an inventory was created to find the status of the equipment. Information was gathered on the number of computers, their specs and software. This information provided an understanding of the condition of the labs in age and functionality. It also helped in planning the number of computers that may potentially need to be replaced. All of the collected data was gathered into an active college-wide database for use.

Figure 1: Number of Labs and Computers by Department

Department	Number of Labs	Total Computers
Physics and Astronomy	5	39
Psychology	3	40
Biology	3	22
Math and Computer Science	2	20
Environmental Science	2	9
Open Access	2	6
Art and Design	1	30
Language Acquisition Program	1	25
Music	1	16
Theatre	1	15
Culture and Society	1	4
Total	22	232

Functional Requirements

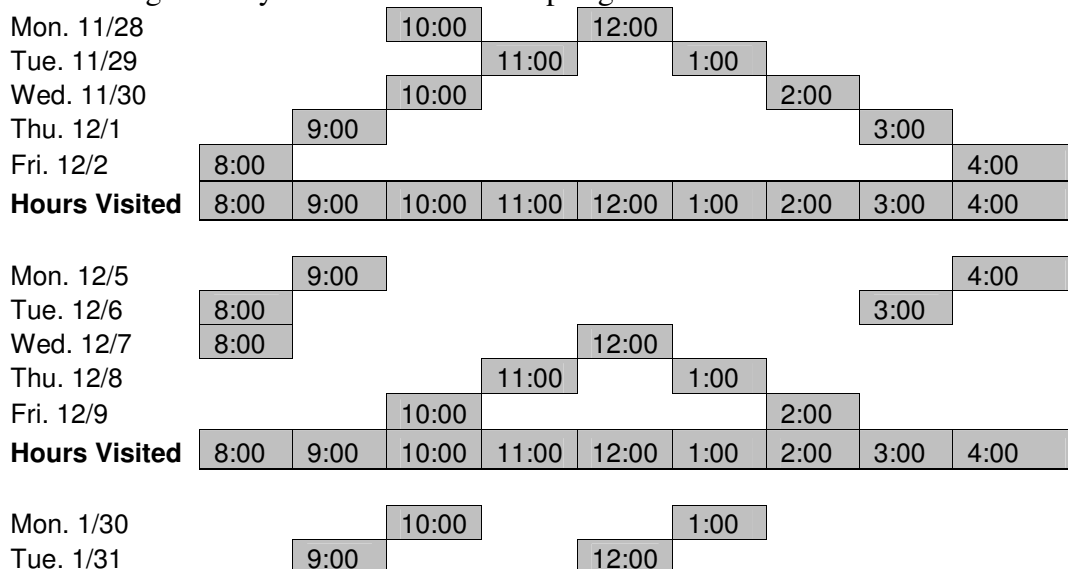
With inventory completed, functional requirements were next determined with two questions. First, find out why the lab was created in the first place. Second, find out if it was still needed for the same purpose. In the Art & Design department, a lab was created for a functional classroom environment. In the Environmental Science department, a lab started as a place for students to run analyses on data, but transformed into a lab classroom space and computer lounge for science students. The Culture and Society department's need for computers came with the hire of three new faculty members who all wanted students to take interviews for classroom projects and make movies of their findings. Upon finding the functional requirements for the lab, several overlaps were seen and it was clear that changes needed to be made to make the labs into what the faculty required them to be to enhance student learning.

Lab Usage

A determination needed to be made about whether these labs were being utilized by students. There are many methods that could have used to provide this data. In lab environments in other colleges, a student logs in with a unique identifier to use the computers. This is not the case in Arts and Sciences. To prevent additional problems with login and rights to software, the networking staff created one login per lab. Students did not have to log in and out of the computers every time they were used. If this was possible, it could have saved time in finding lab usage. Another method of surveying the usage is using sign in sheets for each lab. Two labs attempted this technique without success. In most circumstances, one could walk in and see ten students, but not one name on the sign in sheet. Self reporting was not going to be accurate in this case.

For a more accurate result, a sampling survey was used to discover the trends in lab usage. The surveyor sampled each lab during a random time throughout a two week period to find how many students frequent them. Sampling was avoided during finals week and the first week of classes as labs are not scheduled during these times. A visit was made in the morning and in the afternoon. Every hour was targeted throughout the week to get a picture of usage. Figure 1 shows the planned visits for the two weeks in the fall and spring semester. Each round took 45 minutes to accomplish.

Figure 1: Lab Usage Survey Schedule: Fall and Spring



Wed. 2/1	8:00						2:00		
Thu. 2/2				11:00				3:00	
Fri. 2/3		9:00							4:00
Hours Visited	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00
Mon. 2/6	8:00						2:00		
Tue. 2/7			10:00						4:00
Wed. 2/8				11:00	12:00				
Thu. 2/9		9:00				1:00			
Fri. 2/10			10:00					3:00	
Hours Visited	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00

Class Usage

Drake University uses scheduling software for room reservations on campus. Each class or event is entered into a master schedule. From this online system, information was gathered about the number of classes scheduled in each lab for the semester and a count of the students enrolled in the class. Information regarding the number of courses scheduled for the semester, the number of students in each course and the number of times the course was scheduled throughout the week was entered into a spreadsheet for each lab. This information provided the total number of student bodies that will enter a room for the week for class computer use.

Student Interviews

A random sampling was done when conducting student interviews. Interviews were informal. All interviews took place outside of class time in the lab being discussed. Only eleven labs were discussed in student interviews. The interviews were based on predetermined questions, but there was deviation from these questions to delve further into understanding their lab requirements. A total of 40 students were interviewed using these questions as a base-line.

1. Do you use this lab outside of class?
2. How does the lab work during class?
3. What do you like about the lab?
4. What problems have you run into with the lab computers or other equipment?
5. Have you lost class time due to technology problems?
6. If you do use this lab outside of class, what do you use it for?
7. What suggestions for improvement do you have for the lab?

Students were eager to talk about the lab they were working in. Students' compliments of the labs included that labs were in a centrally located area and easy to log into. The complaints ranged from broken equipment, no system to report problems, and the lack of a projector for the instructor to use during class. Seven students mentioned their instructor losing class time due to technology failure. Most students said that if something did not work, the instructor would abandon or postpone the activity. Sixteen students shared problems about software and hardware not working. They wanted these things fixed so they did not have to wait for a working computer to become available.

Faculty Interviews

Faculty interviews were conducted with department chairs and faculty members that maintain the labs. Departments without labs were questioned on their needs for one. Questions included the following:

1. How many classes are taught in the lab?
2. Why was the lab created?
3. Does the lab meet the needs for the courses?
4. Does the lab have available open hours for students to use?
5. What is your ideal lab upgrade schedule?
6. What is your minimum lab upgrade per year?
7. What software needs does the lab have?
8. What type of computers do you want in the lab?
9. How do you typically fund your lab upgrades?
10. Are there any additional labs on the horizon?
11. Can you combine or create a dual purpose lab?
12. Do you have any ideas on how we can maximize the usage of the labs?

Faculty members were eager to share their ideas. Their frustration was apparent. Many had new ideas of what they wanted to pursue, but did not have the time, energy or resources to do anything about them. Many were frustrated with the lack of campus-wide support. They saw the way other college's had their labs working and were envious of the environment they had created for the students. Several faculty members wanted someone to come in and take control so that they would not need to worry about technology for their classes. A few departments were completely satisfied with their lab situations. They only wanted someone to serve as a consultant if help was needed.

Problem Responses

After analysis on the data, these problems were identified:

1. Multiple labs serving the same function
2. Lack of consistency between computers
3. Lack of computer organization with files and folders
4. Inability to share files with students or other faculty members
5. Problem reporting
6. Lab Preparation Time
7. Lack of computer upgrades

The following approaches were determined as responses to the problems. The lack of consistency between computers, disorganization, the inability to share files and lab preparation problems could be solved by purchasing a server. By developing a problem reporting method, students would have a means to communicate problems to the appropriate person. By using combined buying power and creating a lab upgrade schedule, lab upgrades could be done more frequently. Using these methods, a plan was set in motion to begin maximizing the technology potential of the Arts and Sciences' labs.

Server

The first response for improving labs was to purchase a Windows 2003 Server. This helped maximize several aspects of the computers labs. It provided file share and imaging space. File share space will be available for individuals and groups that need to share information in an efficient manner. Organization of files and folders will no longer be an issue as all items will be saved to the student's storage space. Centralized data imaging will be done for quick restores when problems arise. This will help minimize maintenance of the labs and reduce the amount of technician time in front of the computer. Creating one image will also provide greater consistency between the computers and a quicker turnaround time in lab preparation. To make such a large purchase the support of the Dean of Arts and Sciences was needed. The dean supported the server and the technology committee arranged to purchase it with technology fees during the spring semester of 2006.

Problem Reporting

The next issue to address was creating a lab problem reporting system. There are now signs posted in all labs with instructions on whom to email. Once this person receives the email, they will determine where the problem can be best handled. The current avenues for support are the campus-wide computer technician for hardware, the faculty lab coordinator for software or a building manager for room issues. Currently, problems are being emailed and the method provides the student with a procedure to follow.

Buying Power

Previously, computers were purchased year round when money became available. Departments would often purchase computers whenever need appeared and then pick the cheapest ones available. When these low quality machines resulted in problems after two years, they would purchase additional low end computers. Arts and Sciences was throwing money away by not using the buying power they had. Drake's primary purchasing agents are through Dell and Apple. Discussions with vendors began about other methods that could be used to harness the college's buying power more efficiently.

The college also looked into leasing machines from Apple using a fair market lease or a dollar buyout lease. Machines were discounted, which allowed for replacement of one-fourth of the equipment every year based on cost projections. Leasing also provided the value of having a protection plan on the machines for computer maintenance. Prior computers did not have the protection plan and several of them have needed costly repairs that could not be done because no funds were available for maintenance. After concerns from other departments on campus, this option was abandoned and focus came back to purchasing machines.

After speaking with an account representative, Drake's vendors agreed to provide unit discounts based on volume purchases. All purchases come through the budget director in Arts and Sciences. Purchasing was delayed until enough systems were ordered to receive a price break. For the 2005 technology fee purchase, all computers were bundled into one purchase and thus \$1,100 was saved by having a bulk order. Over the summer, technicians from two colleges came together and saved \$3000 for faculty computers in Arts and Sciences alone.

Combining Labs

The numbers from the student lab usage survey were computed to find out which labs had the largest student volume. Also computed was the number of classes scheduled and number of students in the class to determine higher usage labs. These figures provided a look at what labs may not warrant upgrades based upon the usage. The functional requirements warranted lab space, but there were spaces where labs could be combined. Combining labs allowed for the functional requirements to still be met but save money by not duplicated machines.

A recommendation was made that three Biology labs with 22 desktop computers be combined into one mobile lab with twelve laptop computers. The mobile lab will provide flexibility between rooms and more lab space as counters are not covered with permanent desktop computers. It was also suggested that Biology partner with Environmental Science for an open lab. Biology and ENSP were eager to do this as it gave the benefits of upgraded machines and provided one location for science students to collaborate.

Also recommended was making four of the physics labs into a mobile station with Dells and Apples. Physics has five computer labs at this time that have sprung up out of faculty replacement and other college's older machines. The recommendation was keeping one open access PC lab and combining four labs into one or two mobile carts. The four labs currently have sixteen Macs and thirteen PCs. The recommended mobile lab would have nine Macs laptops and nine PCs laptops for the cart. A determination has not been made on whether the department will accept the proposed plan. Until a decision is made, technology fee monies are only supporting the one open access lab.

Another recommendation was made to combine two Psychology labs into one lab. There is currently scheduling problems that are not allowing this to happen. One lab is more highly utilized than the other, making it difficult to fit additional class periods into the lab. If this combining of the labs occur, this reduces the two labs down from 34 computers to one lab with 23 computers.

Upgrade Schedule

Information gathered during the analysis phase came together to create an upgrade schedule. All the information from the faculty interviews on the ideal hardware, number of computers and software was entered into a spreadsheet. The spreadsheet was set up so that all the labs were listed on the left hand side and the years were listed across, with the total number of computers at the end. Figure two illustrates the ideal replacement schedule.

Figure 2: Ideal Replacement Schedule

	2006	2007	2008	2009	2010	Total	
Art and Design	8	8	8	8	8	32	One fourth replacement every year with total lab replacement after four years.
Language Acquisition Program	6	6	6	6	6	25	One fourth replacement every year with total lab replacement after four years.
Psychology	0	11	11	1	0	23	Half lab replacement over two years with total lab replacement after four years.
Music	16	0	0	0	16	16	New lab every four years

Theatre	5	0	0	5	5	15	One third replacement every year with total lab replacement after five years.
Biology Cart	0	6	6	0	0	12	Half lab replacement over two years with total lab replacement after four years.
Culture and Society	4	0	0	0	4	4	New lab every four years
Computer Science	0	0	0	0	0	10	No Upgrade Plan for Tech Fees
Math	0	0	0	0	0	10	No Upgrade Plan for Tech Fees
Physics and Astronomy Open Access	3	3	3	3	3	9	One third replacement every year with total lab replacement after three years.
Biology and Env. Science Open Access	8	0	0	0	8	8	New lab every four years
Physics and Astronomy Cart	0	9	9	0	0	18	Half lab replacement over two years with total lab replacement after four years.
Total Per Year	50	43	43	23	50	182	

After the ideal upgrade schedule was created, the next step was looking at the cost. First, a standard machine was determined for each lab with a generic price point. Focus was primarily on the costs of upgrading the hardware, as most software programs utilized by the college are not costly, aside from Arts and Design software. Each year was multiplied out by the price point and added up for a total. In previous years, the College of Arts and Sciences Technology Committee devised a formula for how to distribute money for projects. Of the money allotted, the committee determined that one-third would go towards lab upgrades, one-third would go towards classrooms and one-third would go towards new projects. Any funds that would not be used in a category would go towards lab upgrades. Using projected figures based upon allotments over the last several years, a number was devised that was a good estimate for basing figures. This estimated figure was used as the planned dollar amount for each year's upgrades. Years that totaled over the projected figure of technology fee allotment were revised. The goal was to get each year close to the baseline figure allotted. Figure three shows the lab upgrade as the end result.

Figure 3: Final Lab Upgrade Schedule

	2006	2007	2008	2009	2010
Art and Design	8	8	8	8	8
Language Acquisition Program	6	6	6	0	6
Psychology	0	8	8	6	0
Music	8	8	0	0	8
Theatre	5	0	0	5	5
Biology Cart	0	4	4	4	0
Culture and Society	4	0	0	0	4

Computer Science	0	0	0	0	0
Math	0	0	0	0	0
Physics and Astronomy Open Access Lab	3	3	3	3	3
Biology and Env. Science Open Access Lab	8	0	0	0	8
Physics and Astronomy Cart	0	0	9	9	0
Total Per Year	42	37	38	35	42

Acceptance

After the lab upgrade schedule was determined, the schedule was presented to the College technology committee. The committee accepted the plan and a goal was set of using it for lab purchasing in 2006.

Results

The server was purchased with technology fee money for 2006. Currently, it is being configured for campus use. The anticipated date for imaging space use is June 1, 2006. Storage space for groups is anticipated for a go-live date in fall of 2006 and individual storage space by January 2007.

An online problem reporting form has been created. It is currently under development and testing. The new form will determine where the email notification is sent based on responses from the user. The determination of all contacts for each lab has yet to be decided. Plans exist to make the form a standard link on all computer lab desktop machines. The form is planned for a go-live date of fall 2006 with the links to it appearing on the desktop of computers as all labs are set up over the summer.

Technology fee purchases in 2006 brought coordination between three different colleges and saved Arts and Sciences \$4,600 by combining the college orders together. Several different computer configurations were agreed upon and ordered in bulk. Arts and Sciences ended up with higher end machines than planned and more money to put towards other projects.

Several changes were made to the initial upgrade plan. The largest and mostly costly lab for the college did not want upgrades this year, but wanted software upgrades instead. Overall, purchasing was successful in what the plan had set out to do. Unfortunately, this year technology fee allocation was less than speculated; therefore the upgrade plan needed modification. The committee decided to postpone the music lab from being upgraded this year and push it to next summer. A small amount of funding is generally available to be used for summer projects. The committee determined that if money became available, it would be used towards this lab to stay on track with the original lab upgrade schedule for the next fiscal year.

Figure 4: Planned versus actual lab upgrades for 2006

	2006	Actual 2006
Art and Design	0	0
Language Acquisition Program	6	5
Psychology	0	0
Music	16	0
Theatre	5	5
Biology Cart	0	0
Culture and Society	4	4
Computer Science	0	0
Math	0	0
Physics and Astronomy Open Access Lab	3	3
Biology and Env. Science Open Access Lab	8	8
Physics and Astronomy Cart	0	0
Total Per Year	42	25

Future Plans

One new initiative will be introduced to the college for upgrades. Three purchasing dates will be allowed for computer purchases in the College of Arts & Sciences. The proposed windows are June/July for faculty purchases, December for miscellaneous purchases and March/April for technology fee purchases. All other purchases initiated outside of these windows will wait until the next window. There is interest in making this campus-wide to save additional money, but nothing has been initiated. As of now, Arts and Sciences' purchasing dates will be shared with the rest of campus in an effort to partner on purchases.

The college is also interested in creating a student satisfaction survey for the College. This may entail academic related questions, but would also highlight a portion on technology satisfaction. It is often difficult to get to students to voice their likes and dislikes of labs and a survey would be beneficial in gathering feedback. There is much optimism about the survey as a way to receive data much like the student interviews, only over a larger number of people.

Conclusion

This is the first year that the College of Arts and Sciences has done any type of technology planning. Labs are now being questioned on the basis of overall need rather than being created on one need. The assistance provided to the labs this year demonstrates the college's support for the labs and a commitment to improving the student experience. Each year will bring on different challenges, different needs and the need to be optimal in the approach since there are so many different users to service. The College of Arts and Sciences is working to maximize the fullest potential the labs have through planning and organizing in an effort to make every Drake student's lab experience an exceptional learning environment that they need for success.