

# **Report of the ITICC sub-committee on the IT public computing labs.**

## ***DRAFT***

### **Introduction**

The committee was charged by Dean Hudleston to assess the operation of the IT public computing labs, to review their usage and to make recommendations for changes. The motivation for this review was the recognition that there have been significant technological changes since the labs were inaugurated ten years ago. The committee's charge can be found in the [October 10, 2005](#) ITICC meeting minutes.

The committee members were Prof. T. Chase (Mechanical Engineering), Robert Edman (Mathematics Graduate Student), Prof J. Konstan (Computer Science), Prof. R. Rusack (Physics, Chair) and Lucas Veverka (ITSB, AEM/ME).

To conduct this review the committee made use of several sources of information to make their assessment. A survey of the fee-paying students was distributed by e-mail to all fee-paying IT students; it was completed by 1339 students and about five hundred written responses were also submitted. Each departmental representative in ITICC was asked to discuss with their faculty colleagues their use and ideas for changes in the IT public lab system. The managers from ADCS and Computer Science met with the committee to explain their operations. Committee members met with representatives from departments where usage of the labs was central to their teaching missions.

This report is organized into eleven sections. In the first we discuss the general observations that can be drawn from the survey; in the second we discuss the current management structure of the labs, followed by an explanation of how the funds from ITICC are distributed. There are then separate sections on equity, usage, trends, perceptions and environment. In each of these, where relevant, we present our findings and recommendations. These are then followed by the committee's overall findings and recommendations. At the end of the report we include 2 appendices covering the demographics of the students in IT and the questions in the survey.

### **General Observations from the Survey.**

The survey was completed by 1339 students over the first four weeks of the spring semester 2006. It was completed by 185 and 195 freshman and sophomore students, 323 and 336 junior and seniors, 287 graduate students and 13 who classified themselves as other. The students were from all but three departments with the most coming from ME (207), followed by EE (169) and computer science (156).

The results of the survey produced many interesting results. In particular, more than half (767) said they had “no idea” what the computing fee is used for and only 45 thought that they were getting their money’s worth. Another interesting set of figures was that 99% of students have a computer for their own personal use and 37% own a laptop computer and 26% own both a PC and a laptop and ninety percent of students have a high speed internet connection where they live.

Besides responding to questions students were asked to submit written comments about the use to which the student lab fee is put and 500 responses were received. These are now all posted on the ITICC website and can be found [here](#).

## Public Lab and Departmental Lab Usage:

### *Observations:*

In the survey 55% of students said that they used the public labs either never or only once or twice per semester while 49% said the same for their departmental computers labs.

Selecting only the responses of the upper division and graduate students, of these (959) 54% use their department’s computing facilities at least once a week and 19% never use them, while for the use of the IT public labs the corresponding figures are 42% and 28% respectively.

To try to better understand which students were using the individual public labs, we selected on the upper division students who use a particular lab either frequently or occasionally. In the Civil Engineering public lab, CE230, the use is almost entirely by students from that department. The distribution of the students by department is shown in Figure [1] below.

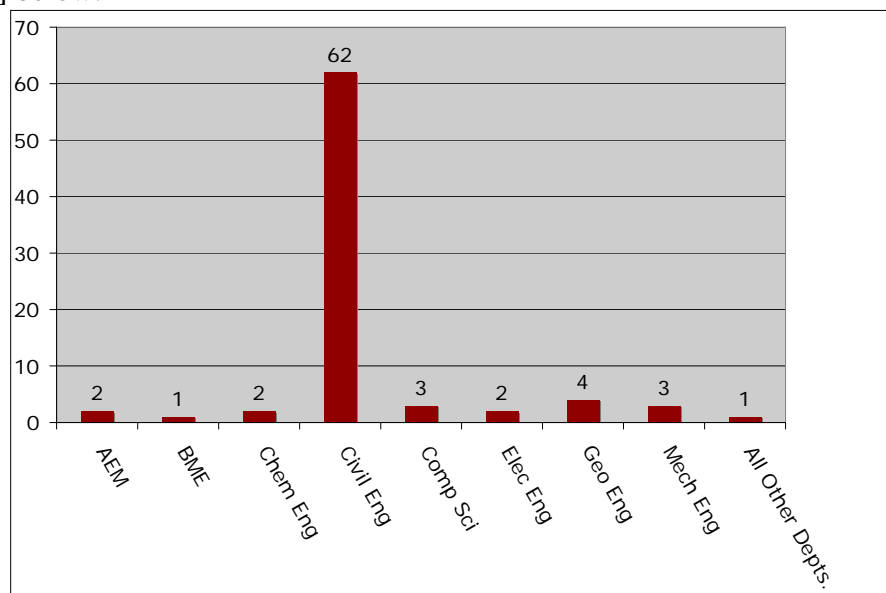


Figure 1. Upper division students who use the CE230 lab occasionally or frequently.

For the other public labs the usage is less striking. For ME308 the situation is more balanced the distribution is shown below.

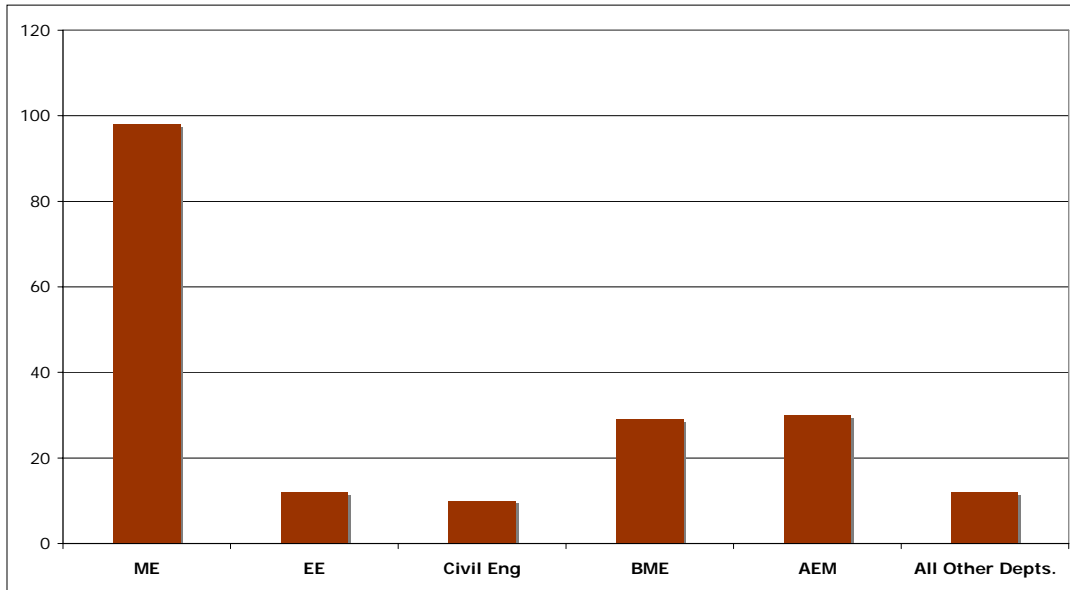


Figure 2. Upper division students who use ME308 occasionally or frequently.

For students using the two public labs in EECS the distribution is similar and shown in Figure 3.

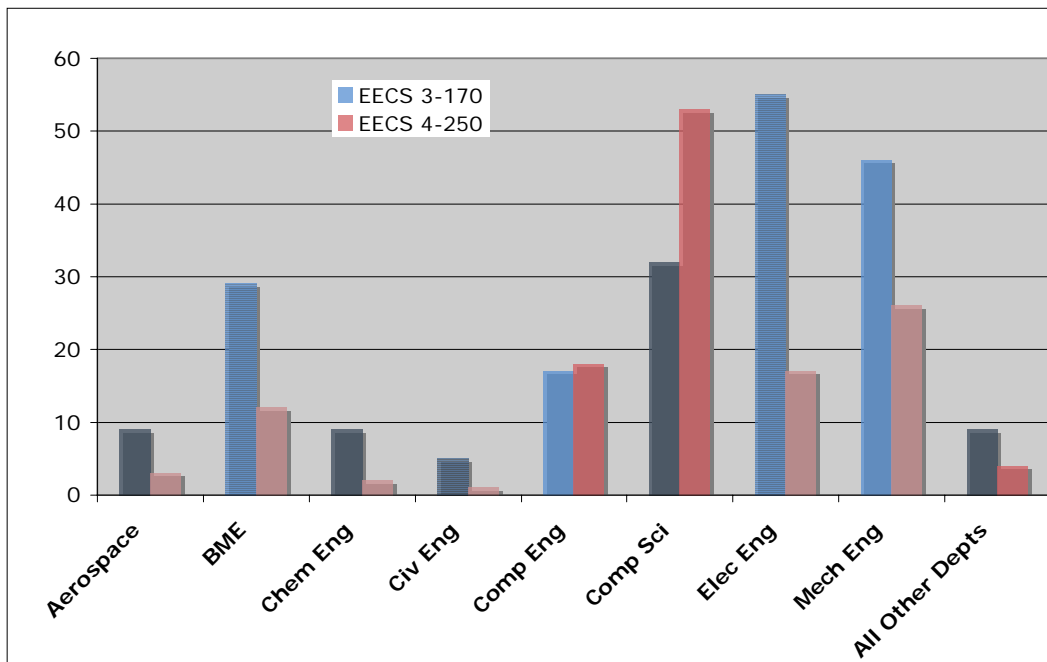


Figure 3. Upper division students who use the EECS labs occasionally or frequently.

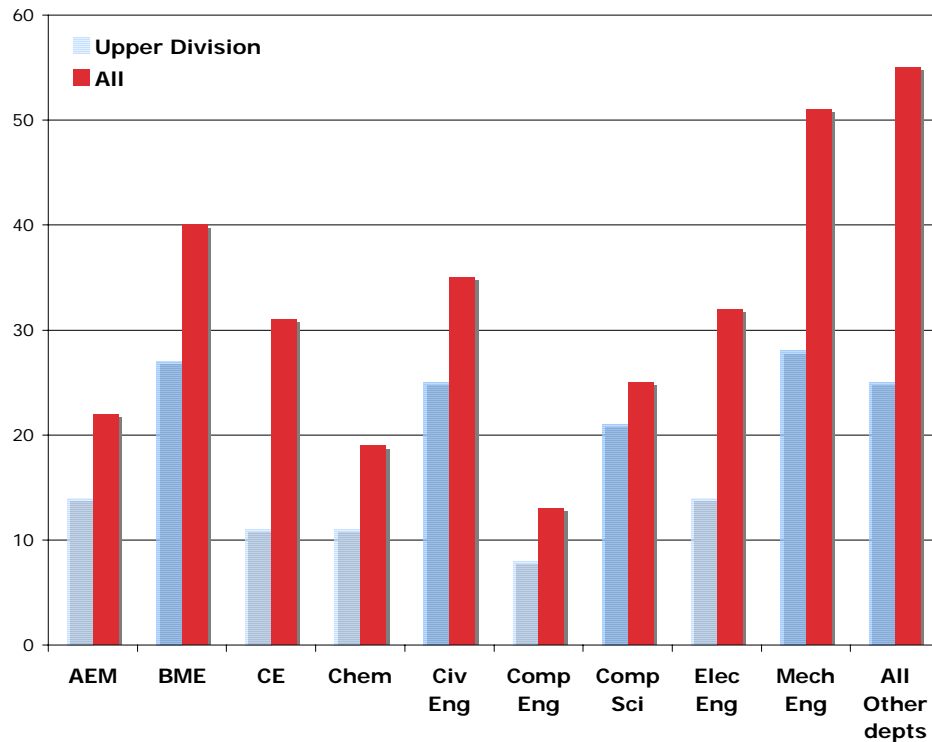


Figure 4. Students (upper and all divisions) who use the Walter Lab occasionally or frequently.

From the survey data it was evident that Walter 103 is a useful lab for students in IT from students in most of the IT departments. The departmental affiliation of students who use Walter 103 either frequently or occasionally is shown in Figure 4 for both upper division and all students. Currently the only IT computers in Walter are running UNIX.

The comment from one of the departmental representatives on ITICC that “almost all of the juniors and seniors have their own computers and almost all of them regularly use the computers in our department’s undergraduate computer lab.”

## Management and Personnel:

### Observations:

The management of the public labs is divided between the EE/CSci dept. and ADCS.

The responsibilities of ADCS are:

1. The recruiting, training and organization of the lab attendants,

2. Providing technical support in the form of one FTE staff and one 50% TA for the computers running Windows.
3. General lab operations.

The cost of these are respectively \$86,640, \$96,000 and \$64,295. In addition there is a management and general operations charge of \$55,741 for management oversight and clerical support. This is further supplemented by a general charge of \$11,500 for IRS tax (\$4,500) and other general charges. The budget for the ADCS side of the lab management is \$368,722.

The responsibilities of the EE/CSci management are the management of the UNIX systems, the network, accounts, software and hardware maintenance, system security, maintenance of class web pages and user support. Fifty percent of the salaries of the eight IT staff in EE/CSci FTE staff is paid with IT funds as well as half of the manager's salary. IT student computing funds are used for are used to pay half of the system operators. The 05/06 budget for the EE/CSci part of the lab management is \$484k which is divided as \$423k for management and staff and \$55k for operators and \$5k for staff training.

**Findings:**

The committee finds that the dual-track organization of the public labs is inefficient.

**Recommendations:**

The committee recommends that ITICC should remove the dual-track management and thereby significantly reduce the cost of operations.

**Budget:**

Every undergraduate student in IT is assessed a fee of \$170 each semester. All IT graduate students who are taking classes are also required to pay the fee. The total revenue expected for 2005/2006 from graduate and upper division IT students is \$1,423k. The college supplements these funds with an additional amount of \$440k that comes from instructional funds. This is further supplemented by \$180k from fees collected from lower division students in IT and by \$30k from printing revenue. The total anticipated income is then \$2,073,030 for 05/06. Twenty-five percent of the fees collected (estimated \$466k) is distributed between the departments on a *pro-rata* basis. The remainder, \$1,607k is used for operations and maintenance of the IT public labs.

Of these \$1,007 are spent on operations and \$600k is spent on equipment. The division of the operating funds is shown in table 1.

Table [1] Operational costs for the public labs.

TASK	BUDGET
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ADCS operations	\$391k
EE/CSci Operations	\$489k
Software	\$36k
EE/CSci Network	\$12.5k
Miscellaneous expenses	\$28k
Contingency	\$50k
Equipment	\$600k
Total	\$1,607k

The funds that are distributed to the departments are only allowed to be spent on equipment and software, no support staff may be charged against these funds.

## **Equity**

### **Observations:**

Non-IT students, in particular those taking courses in Computer Science, complain about the IT Labs fee assessed when they take a course that uses the labs (even if they, themselves, have their own PC where they could do the work). Lower division students pay the IT fee (in addition to their collegiate fee) when enrolling in courses such as CSci 1001 (while they do not pay fees for lower division Chemistry or Physics courses that receive support from the lower division fee). Upper division and graduate students pay the full fee for enrolling in a single course listed as "using the labs".

Survey results and individual student comments suggest particular dissatisfaction among part-time students (both undergraduate and graduate) who pay full fees for a much longer period than full-time students. This is particularly the case for part-time students taking lab-using courses who pay full fees even if enrolled for only one course.

Graduate students expressed, in the survey and outside, particular dissatisfaction with computing fees not being included in tuition remission as part of assistantships.

Survey results indicated that there is considerable dissatisfaction with the value for money obtained with the fee. Comments like:

- "I don't think it is very fair to charge \$170 to people that have no intention of ever setting foot in an IT computer lab"
- "Charge those who use the facilities"
- "The students in areas of study e.g. Mathematics, which are not focused on computer use, seem to get much less out of the fee than, say, the students in computer science."

### **Findings:**

The current fee structure is unfair to non-IT students taking introductory lower-division, and upper-division/graduate courses, as well as to part-time IT students. It also creates a financial disincentive for students to enroll in IT public lab-using courses within IT.

### **Recommendations:**

Adopt a new fee structure to incorporate the basic principle of fairness agreed to by the committee:

Full-time IT student: \$170 per semester  
includes undergrad registered for 9+ credits  
includes grad registered for 9+ credits, but prior to 24 credits  
(note: same fee is paid whether or not in a lab-using course)

Part-time IT students:  
registered for 1-4 credits: \$75 per semester  
registered for 5-8 credits: \$135 per semester  
(note: same fee is paid whether or not in a lab-using course)

Non-IT students:  
only in non-lab-using courses: no fee  
in 1xxx and 2xxx courses with labs  
supported by ITICC: \$25 per course.  
in 3xxx to 8xxx lab-using courses: \$85 for one course  
\$170 for two or more courses

Fee-exempt grad student (over 24 credits):  
to open an IT public labs account (for any purpose): \$85 per semester

### **Usage:**

Observations:

*Operating systems:* The IT Public Laboratories use a variety of operating systems, with the largest number of systems running Windows and Linux, and additional systems running Solaris. There has been an evolution away from Solaris (and earlier IRIX) as the most significant software packages (mostly CAD tools) have been designed to perform best on Windows and Linux systems. Student opinion is notably divided, with different students preferring one OS, the other, or having no preference.

*Instructional usage:* The major users of the IT labs for instruction are ECE and ME/AME. ECE requires the seats that are licensed with CADENCE (a VLSI design package which has many add on components), HSPICE and SONNET. The approximate number of students who need these packages are 120, 60 and 30 each semester. For these programs, several versions are required to be installed since different instructors use

different versions or variants of the software. ME/AME requires for students at the graduate and undergraduate level the use of ProEngineer (ProE). The number of students who need to use this package as part of their education is approximately 500 student-semester each year.

The ECE software mostly runs on the UNIX stations and ProE is now exclusively used run on the Windows. ECE also uses PSPICE and ORCAD at the 2XXX and 3XXX levels, which run in Windows environment.

While it used to be true that the ProE and Cadence required high end machines to run on this is no longer the case at the level that is required for instruction, though fast response with good graphics is still important.

Both CADENCE and ProE are packages that are widely used by industry and are made available to the College at a greatly reduce cost with strict license restrictions to prevent misuse that prevent remote usage.

## **Trends**

The charge of the subcommittee included addressing the question "How has the use of computers by IT students taking IT classes changed with time?"

An overwhelming majority (98%) of IT students now have computers for their personal use. Of those 65% have laptop computers. Looking at the class distributions we further find that within younger classes there is more use of laptop computers, whereas older students have desktop computers. Further, students by in large came with a great deal of computer experience, having previously used word processing, mail, and web browsers, but with less experience in numerical software or computer programming.

In the survey 90% of the students said they have access to high speed internet. In many cases this includes wireless internet access, a service students are increasingly coming to rely on. Access to high speed internet and wireless internet access will both become increasingly common in future years.

These changes in the computing resources available to students (both the hardware and the network access), are changing how and why students use the IT public labs. With the availability of powerful computers at home, students increasingly use the IT labs out of convenience, or for tasks which cannot be done on their home PCs. In many cases they avoid working in the labs because they find the labs unpleasant, dirty, slow, or otherwise ineffective study areas. Another thing which prevents students from using the computer labs are their locations. Many students (in particular, lower division students) simply don't know where the labs are located.

## Perceptions

*Fee* – 95.9% of students have little or no understanding of what the fee is used for and feel they would benefit from easier to access and more clear information on this topic.

*Understanding of Labs Purpose* – Only 3.4% of students feel they are really getting their money's worth from the IT computer labs. As this is very close to the same percentage that doesn't understand what the fee is used for, it could be explained by a lack of awareness of the existence of the labs. It could also be explained by the fact that many students own their own machines and do not need the labs for anything other than the specialty software like ProE, CADENCE and Mathematica that is only available there. The committee feels that both explanations apply.

*Attendants* – Only 15% of students think lab staff service is good. Students believe from their comments that they would benefit from more knowledgeable lab staff that could help with specific software problems, but in general rate lab staff as being adequate.

*Printing* – Students are unhappy with the current printing system and would like to see a system where they can print without having to run to a Cash-to-Card machine as was pointed out in many students comments. 80.7% of students print less than fifty pages per semester.

*Departmental* – Between different departments the perceived utility of the public labs for their teaching missions varies greatly. There are some, like ECE and CSci and ME for which the access to the public labs is essential, while others departments perceive the student fee to be a burden placed on their students for which there is no evident benefit.

## Improvements:

### Observations:

Student surveys pointed to wireless access as one of the most valued, and most complained-about services in IT. Many students complained about poor wireless access in various parts of IT buildings and classrooms.

Student surveys suggested that training in general software use should be supported from the computing fee.

Department representatives indicated a shortage of classroom space that could be reserved in appropriate chunks (e.g., advance reservation at start of term).

Over 60% of students would use group workspaces a part of IT labs. Faculty also have suggested that such spaces would be useful.

A large number of students complained in surveys about the poor classroom environment (in many classrooms) for student use of (laptop) computing. Among the challenges are network coverage, power, and desk/table size.

Considering the trend towards high-capability student computing (either portable or home machines), one of the main remaining purposes of public labs is the provision of software that cannot be accessed remotely, which is mostly CAD software. While we have not determined the details of the contracts, we know that other engineering schools do provide remote access to CAD software for students. Other software that is currently only available to IT students in laboratories can already be licensed for individual use (e.g., Phil Kachelmeyer of ADCS indicated that Mathematica and Matlab could be licensed for all IT fee-paying students for approximately \$10,000 per software package.

Historically, public labs were places where course TAs could "hang out" and have students find them, and were places where on-site support was readily available. The wide dispersion of students among the labs, reduction in on-site support, and low level of attendant training have largely undermined that function of the labs. Technological systems, versions of which are already in use in the library, can help replace that lost function.

### **Findings:**

- Increased investment in wireless networking service throughout IT would improve student satisfaction.
- Access to system staff expertise (training, access to help) is a valuable resource that could improve student perception of the value they get for the fee.
- Faculty forego use of computer classroom labs due to reservation difficulties.
- Group workspaces would enhance use of the IT Labs.
- Some classes would benefit from more laptop-friendly classrooms.
- Students would be well-served and lab costs would decrease if seat-locked software could be accessed remotely.
- IT public labs no longer serve as a direct source of assistance for students.

### **Recommendations:**

The committee makes the following recommendations:

- There should be an increase investment in wireless access; collect information on weak and dead spots from students; work to ensure full coverage.

- There should be short training courses run on general purpose software such as Unix, Excel, Mathematica and MatLab.
- The teaching Lab reservation policies should be revised to better match instructor needs. After a year under the new policies, ITICC should study whether total classroom laboratory space is adequate.
- ITICC should fund the creation of several group workspaces. Such spaces should include single-shared-display facilities (with hookups for laptops) as well as multiple machine rooms (which could also be reservable by TAs to assist students during office hours). Reservation policies should be developed and evaluated.
- ITICC should work with the Office of Classroom Management to develop a standard for "computing intensive" classrooms, to inventory and if needed upgrade classrooms to meet this standard, and to make such classrooms requestable as part of classroom reservation. ITICC should also poll departments to collect a set of best-practices for effective use of laptops in classes.
- ITICC should continue to press for the rights to set up CAD software for remote access. ITICC should pursue licenses for student use of Mathematica and Matlab on personal computers.
- ITICC should explore acquisition or development of messaging systems that can connect students (whether in the labs or at home) with course TAs or with Q&A bulletin boards).

## **Environment:**

The survey brought to light several opportunities to improve the environment of the public labs. The two most common concerns were: 1) cleanliness of the equipment and workspace and 2) the air quality. Specific opportunities include:

- Cleaning mice, keypads, monitors and cubicles on a regular schedule is suggested. Multiple students reported very dirty mice and keyboards.
- Several of the labs apparently have an odor problem when they are crowded. (A specific comment addressed dirty air ducts in ME 308.) Checking the condition of the ventilation systems regularly is recommended.
- Non-functioning computers should be clearly labeled and repaired promptly.
- Most of the labs are crowded with equipment and furniture. Walking behind people at workstations can be difficult. If the number of workstations in the public labs is to be reduced, increasing open space in the labs is desirable.
- Several comments were received on the difficulty of finding outlets for personal computers, especially in classrooms and lounges, but also in the labs.
- Enforcement of a "quiet rule" was requested to eliminate distractions due to cell phone conversations and group discussions.

- Students reported difficulty in reaching the labs after 9 PM due to locked building doors.
- Concerns were expressed about students logging on to multiple computers and “locking out” computers.
- Better lighting in Lind 24 was requested.
- The computers in Walter Library are reported to be slow.

## **Findings:**

There is much dissatisfaction among the students with the system with only a few feeling that they are getting their money’s worth. The instructional needs of some of the larger departments are being met, but representatives from other departments felt that the public lab systems is not benefiting their students.

There are many remedies which ITICC should consider. One of the first is to better advertise the labs and their availability to the students and to better advertise what services are being paid for with the fee. Another is to broaden the type of service that is provided outside of the labs like improved wireless access. Using the fee to provide training to students in UNIX, Mathematica, MatLab would be a welcome service.

ITICC needs to address the lack of service to the students in the departments that do not need the public labs. ITICC is spending \$1M per year on the management of the public labs. These funds could be used to benefit the whole instructional mission of IT and not just the public labs.

## **Recommendations:**

The committee makes the following general recommendations for the use of the IT student computing fee.

- 1) Work to increase the student awareness of how the IT computing fee funds are being used. This should include sending an e-mail every semester to all fee paying students briefly explaining the breakdown of the fee usage. This should include information about the labs, their locations, software available in the labs, and where they can go for more information.
- 2) The committee recommends that ITICC should remove the dual-track management and significantly reduce the cost of operations.
- 3) The committee recommends that the current focus on the support of the public labs should shift from just operating the IT public labs to providing information technology support to all departments. The scope of this support should be part of the management contract that ITICC negotiates should cover not just the

management of the public labs, but this more general support. Items like short courses on commonly used software, student bulletin boards for all classes and other departmental needs for information technology support across the college should be included.

- 4) The committee recommends that ITICC replace the lab attendant positions with remote monitoring and that hot-line phones should be placed in the labs for students to contact operators. In addition the possibility of stationing the operators in the labs during the hours of heavy usage should be considered.
- 5) Provide students with an allowance of 250 pages of printing every semester at no additional cost.
- 6) Part of the labs should be converted to workspaces equipped with a table, hook-up and monitors.
- 7) Set up reservable spaces for TA's and student workspaces in the labs.
- 8) Both Unix and Windows machines connected to the IT labs should be made available in Walter 103.
- 9) The disks of the public lab computers should be accessible from the departmental labs.
- 10) ITICC should take the necessary actions to keep the public labs clean.

## Appendix 1: Student demographics in IT.

Student populations by department in fall 2004:

	L. Div.	Upper Div.	Grad	Total
AERO ENGR	163	136	67	366
ASTRO PHYS	21	16	22	59
B.AG ENGR	2	19	12	33
BIO PR ENGR	1	0	0	1
BIOM ENGR	168	115	82	365
CHEM	52	118	263	433
CHEM ENGR	222	206	144	572
CIVIL ENGR	164	195	134	493
COMP SCI	207	301	344	852
CPTR ENGR	151	123	73	347
ELEC ENGR	173	335	468	976
GEO PHYS	4	0	5	9
GEOL	11	15	54	80
GEOL ENGR	10	13	1	24
HIST SCI	0	0	28	28
INDUS ENGR	4	0	27	31
MAT SCI	16	23	79	118
MATH	52	119	141	312
MECH ENGR	317	434	223	974
PHYS	44	49	137	230
SCI CPTG	0	0	17	17
STAT	9	15	93	117
Undecided	317	0	0	317
Total	2108	2232	2414	

## Appendix 2 Survey Questions.

### **IT Student Lab Use Survey-working model.**

Created by: Lucas Veverka, 2005, for the ITICC Ad Hoc committee

As part of your tuition and fees, you are paying a fee to support instructional computing facilities maintained by the Institute of Technology.

1. What is your current status in school?
  - a) Freshman
  - b) Sophomore
  - c) Junior
  - d) Senior
  - e) Graduate Student
2. What is your major?
  - a) Undeclared
  - b) Aerospace Engineering and Mechanics
  - c) Astrophysics
  - d) Biomedical Engineering
  - e) Biosystems/Agricultural Engineering
  - f) Chemical Engineering
  - g) Chemistry
  - h) Civil Engineering
  - i) Computer Engineering
  - j) Computer Science
  - k) Electrical Engineering
  - l) Geological Engineering
  - m) Geology
  - n) Geophysics
  - o) History of Science
  - p) Industrial Engineering
  - q) Materials Science
  - r) Mathematics
  - s) Mechanical Engineering
  - t) Physics
  - u) Scientific Computing
3. How well do you feel that you know what the IT Instructional Computing fee is used for?
  - a) Well
  - b) Have an understanding
  - c) No idea
4. Do you feel that you are getting your money's worth from the IT Labs fee??
  - a) Very much so
  - b) Somewhat
  - c) Not really
  - d) Not at all
  - e) Do not know
5. How often do you use the computing facilities in your department?
  - a) Never
  - b) Daily
  - c) Weekly
  - d) Monthly
  - e) Once or twice per semester
6. How often do you use the IT computer labs (In the labs and remote access)?
  - a) Never
  - b) Daily
  - c) Weekly
  - d) Monthly
  - e) Once or twice per semester
7. How often do you use each of the following IT Public Laboratories?
  - v) Software Engineering
  - w) Statistics
  - x) Other (please specify)

	Frequently	Occasionally	Never	Don't Know
EE/CS 2-170 or 2-172				
EE/CS 3-170				
EE/CS 4-250				
ME 308				
CE 230				
Walter 103				
Lind 24				
Remote use of labs from elsewhere				

8. What is your average wait time to get on an IT lab computer?

- a) No wait
- b) Less than 15 minutes
- c) Between 15 minutes and 1 hour
- d) More than 1 hour

9. How often do you use computers in the IT Public Labs for each of the following purposes (either in-person or remotely)?

	Frequently	Occasionally	Never	Don't Know
Class assignments that can only be done on IT computers				
Class assignments that could be done on a home PC (e.g., typing papers, spreadsheets)				
Research and independent study				
E-mail, internet, and other non-assignment activities				

10. What operating system do you use in the IT computer labs?

- a) Windows
- b) Unix (including Linux, Solaris, etc.)
- c) Both
- d) Don't know

11. How would you rate the service provided by the lab staff?

- a) Good
- b) Adequate
- c) Poor
- d) No opinion

12. How many pages do you print per semester in IT computer labs?

- a) 0-49
- b) 50-99
- c) 100-499
- d) 500 or more
- e) Don't know

13. Some students have requested docking stations in the IT Public Labs. These stations would allow you to connect a personal laptop to the network, and would provide a large display,

keyboard, mouse, and power outlet. If we provided these facilities, how often do you expect you would use them?

- a) Daily
- b) Weekly
- c) Monthly
- d) Once or twice per semester
- e) Never
- f) Don't know
- g) Other (please specify)

14. Some students have requested group workspaces in the IT Public Labs. These spaces would have a large screen and table around which 4-6 students could work together on an IT Labs computer or their own laptop(s). If we provided these facilities, how often do you think you would use them?

- a) Daily
- b) Weekly
- c) Monthly
- d) Once or twice per semester

17. When attending classes at the University of Minnesota, how often do you use a notebook computer to:

	Frequently	Occasionally	Never
take notes or access class materials during class?			
access other information online during class?			

18. When you entered the University of Minnesota, how much expertise or experience did you have with each of the following?

	A great deal	Some	Very Little	None at all
word processing				
e-mail				
spreadsheets and other calculating software				
web browsing				
programming in any programming language				

- e) Never
- f) Don't know
- g) Other (please specify)

15. What type of computer do you have for your personal use?

- a) Laptop computer
- b) Desktop PC
- c) Both
- d) Do not have a computer for personal use
- e) Prefer not to answer
- f) Other (please specify)

16. Do you have high speed internet access for your personal use?

- a) Yes
- b) No
- c) Don not have a computer for personal use
- d) Prefer not to answer

19. How would you evaluate the amount of instruction on general computer usage as part of your curriculum at the University of Minnesota?

- a) Too much
- b) Just about right
- c) Not enough
- d) Don't know
- e) Don't care

20. Do you have any comments or recommendations for improvement in the IT computing facilities paid for with funds from the computing fee? (e.g., IT public laboratories)