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Perception of students on services at the computer laboratory: a case study at the School of Mathematical Sciences, Universiti Kebangsaan Malaysia

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Abstract

In this study, we investigate the perception of students on the services provided by the computer lab at the School of Mathematical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia. The main aim of the study is to measure the levels of importance and satisfaction on the services according to the perspectives among the students. In addition, the study also identify the reasons why the students use the computer lab, frequency of usage per student per semester, and the type of mathematical sciences software that are often used. The analysis shows that for all the factors considered, the mean satisfaction scores are lower than the mean importance scores. This implies that the facilities at the computer lab should be upgraded for items that have been given low satisfaction scores. The results and the responds recorded are important to the management of the labs in terms of planning and carrying out immediate improvement to the facilities provided in order to facilitate teaching and learning in the computer labs.

Keywords: Computer lab; importance; mathematical sciences; satisfaction; teaching and learning

1. Introduction

Economic stimulus and government support are major factors in the direction of Higher Education Institutions (HEIs) to become leading institutions of higher learning. High qualities HEIs will produce excellent quality graduates that are competitive in at higher level of the job market as well as globally. In higher education, students are treated as customers and they need a conducive environment in order to have a good teaching and learning environment.

The quality of education services provided by institution of higher learning can be gauged through the perspective of students who are engaged the various services and activities in the campus. One of those services is

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the services provided by a university's computer labs. Effective management of computer labs is a common goal to ensure the customers, i.e. the students are always provided with good infrastructure to support their learning activities. Therefore, various approaches have been employed to ensure that these goals are achieved.

An environment that is conducive to teaching and learning coupled with good infrastructure were found to be helpful to the process of teaching and learning. Studies by Selamat et al. (2004) shows that, on average, respondents agreed that a conducive learning environment would increase their motivation. The finding is in line with Newby and Fisher (1998) which states that the environment of the computer lab has a significant influence on students' attitudes towards computers and courses of study. Selamat et al. also suggested that the state of computer software and hardware must to be taken into account when planning for training or coursework in computer labs. In addition, in order to meet customer needs, i.e. the students, concept and philosophy of Total Quality Management in the management of computer labs has been investigated by Swanson and Phillips (1998). Salleh et al. (2010) investigate the effect of environment and layout in the computer labs on social interaction and students' innovativeness during practical session in the class.

The objective of this study is to assess the level of importance and satisfaction on the services provided at the computer labs in the School of Mathematical Sciences (PPSM) according to the perspective of the students. In addition, the study also identify the reasons why the students use the computer labs, frequency of usage per student per semester, and the type of mathematical sciences software that are often used. The gap between the mean satisfaction and mean importance scores for each attribute will also be evaluated.

2. Methodology

Data for this study is collected through questionnaires distributed to students who use the computer labs at PPSM. The study focused on four key dimensions that contribute to students' interest and satisfaction. The dimensions are the laboratory environment, laboratory facilities, laboratory safety and quality of service from the lab staff. Attributes of the four dimensions form the variables that are used to assess the quality of services provided according to the perception of the students.

A total of 140 questionnaires were distributed around February to March 2011, through the cooperation of lab staff and lecturers. A total of 129 students have filled out the form but only 116 are verified complete and used for the analysis. Due to the short period of students availability before the long semester holiday, respondents were chosen based on stratified and simple random sampling technique. Stratification was done based on courses and the software used. In this survey, scores of customer satisfaction and the importance of a service-dimensional element are measured using a 7-point Likert scale. For the measuring customer satisfaction, a score of 1 indicates 'very dissatisfied', whereas a score of 7 indicates 'very satisfied'. Similarly, for measuring importance, a score of 1 indicates 'very unimportant', whereas a score of 7 indicates 'very important'. The data was analyzed using descriptive analysis, gap analysis (Ismail et al. 2007), analysis of the means, and *t*-test.

Analysis was done using the SPSS package version 17.0 (Carver & Nash 2009; Coakes et al. 2006). The questionnaire was first tested through a pilot study. Results of the reliability analysis show that the questionnaire used is sufficiently reliable.

3. Results and Discussion

Respondents consist of students who used the computer labs at PPSM. Table 1 displays the demography or the background information of the respondents which were obtained from analyzing Part A of the questionnaire.

Generally, the respondents are mostly female students, i.e. 69% (80 persons), compared to male students 31% (36). A total of 51.7% (60) of the respondents are Malay, 46.6% (54) Chinese and 1.7% (2) others. Most of the respondents are undergraduate students, i.e. 81% (94), whereas graduate students are at 19% (22). The majority of the students are in Year 3 or higher, which is 65.5% (76), followed by Year 1, 20.7% (24), and second year students, 13.8% (16). Descriptive analysis by programs of study shows that 32.8% (38) of the respondents are from actuarial science, followed by 31.9% (37) are from mathematics, and 22.4% (26) are from statistics.

Figure 1 shows the frequency of usage of the computer lab per student per semester. The highest percentage, 62.9% (73) of the students reported that they use the lab 2-4 times a week, followed by 32.8% (38) students use the lab once a week, 3.4% (4) once a month and 0.9% (1) use the lab only once per semester. Overall, more than 95%

(111) of the students use the labs at least once a week. This implies that the labs are a necessity for majority of the students in PPSM.

Figure 2 shows the main purpose of using the labs according to the students' preferences. In this section, students were asked to indicate the main purpose of using the lab based on five predefined options. A total of 51.7% (60) of the students chose 'to attend classes/tutorials' as the main purpose of using the lab. This was followed by 21.6% (25) who used the lab because of 'surfing the internet to find information for learning/research', and 11.2% (13) in order to use 'a specific software for analysis'. Next, 9.5% (11) is because of 'browsing internet during leisure', and 6% (7) because of 'Attending courses/workshops/seminars' as their first choice. Since the figures show that about half of the respondents use the labs for 'attending lectures/tutorials', it is vital that the equipment and facilities at the labs are always in good condition to ensure that teaching and learning are going on smoothly.

Next, the respondents were asked to pick the mathematical sciences software that are often used in the lab. The software listed are statistical and mathematical software packages that are installed in the computer labs in PPSM. Respondents were allowed to select more than one software, and even to recommend new software, if any. This information is important to the lab management for renewal of software annual licenses, or purchase of more licenses and new software packages.

Figure 3 shows the percentage of software usage by students in the computer labs. Respondents can choose more than one software. SPSS and C++ were chosen as the most commonly used software packages by the students. SPSS is widely used software in various fields, especially the social sciences. Since SPSS is widely used in various faculties, institutes or departments, the annual license renewal is fully managed by the Information Technology Centre (PTM), Universiti Kebangsaan Malaysia. Similarly, the purchase and licensing of C++, a popular object-oriented programming language derived from C which is widely used particularly in science and engineering, is also managed by PTM. Our findings show that the renewal of these software packages should be on schedule as the demands are high and important for teaching and learning in PPSM.

Table 1: Profile of Respondents

Variable	Frequency	Percentage (%)
Gender		
• Male	36	31
• Female	80	69
Race		
• Malay	60	51.7
• Chinese	54	46.6
• Indian	0	0
• Others	2	1.7
Study		
• Undergraduate	94	81
• Postgraduate	22	19
Year of study		
• Year 1	24	20.7
• Year 2	16	13.8
• Year 3 and above	76	65.5
Major		
• Mathematics	37	31.9
• Statistics	26	22.4
• Actuarial Sciences	38	32.8
• Others	15	12.9

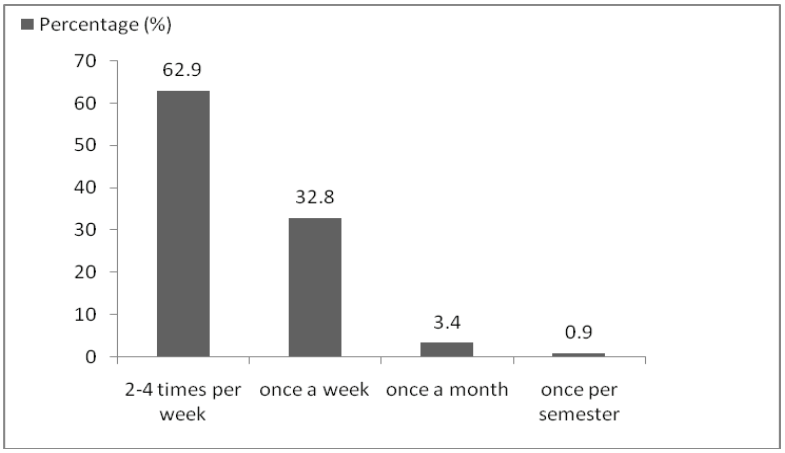

Figure 1. Distribution of frequency of usage of computer lab per student per semester

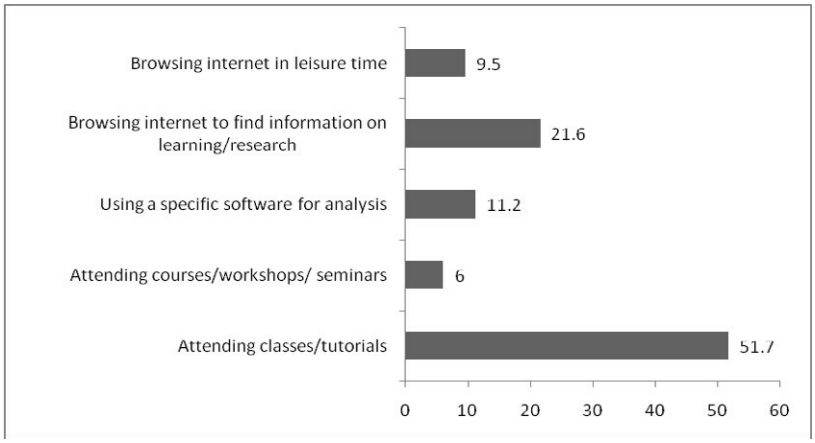

Figure 2. Main purpose of using the computer lab by respondents' preferences

Maple, popular mathematical software, recorded the third highest percentage of usage and should be given priority by the management. This software is used extensively in the field of numerical analysis and fluid mechanics, and has gained an important place among the postgraduate students of PPSM. Further analysis shows that postgraduate students in mathematics are the main users of Maple. Other software packages acquired by the School, i.e. Eviews, Matlab and Mathematica, have recorded reasonable percentage of usage and should be given attention as the software are needed by certain courses at PPSM

Based on the popularity of SPPS and C++ as reported above, these packages should be installed in all computer labs in PPSM. More SPSS licenses should be allocated if need to, as during this survey in the Second Semester of Academic Session 2010/2011, not all computer labs were equipped with SPSS and C++. Ability to access to any of the four computer labs is important as a few of the computer labs are also used for teaching and tutorial at certain times of the day. For the software purchased by PPSM, renewal of licenses should be continued to ensure that the current version of the software are used in accordance with the latest trend in teaching and learning, and the job market.

Statistics on usage of the four computer labs by students are shown in Figure 4. Beta Lab received the highest percentage, i.e. 36%, followed by Gamma Lab at 32%, Alpha Lab at 30%, and Delta Lab at 2%. Delta Lab received the lowest percentage because the lab is a research lab reserved for postgraduate students only, and is relatively new to the students. For the Beta Lab, the highest percentage recorded was for teaching as the lab is equipped with a number of licensed software such as Maple, Matlab and Mathematica. As the usage of the three labs is high, facilities at these labs should be given more attention than those in the Delta Lab.

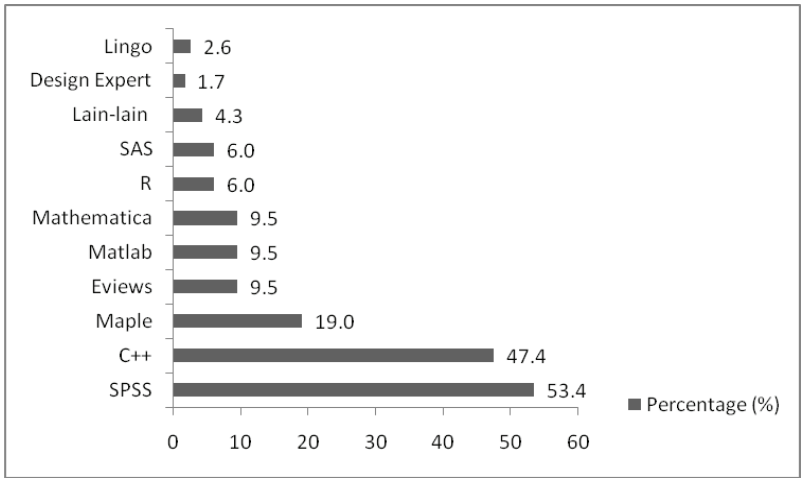

Figure 3. Distribution of software usage by respondents' preferences

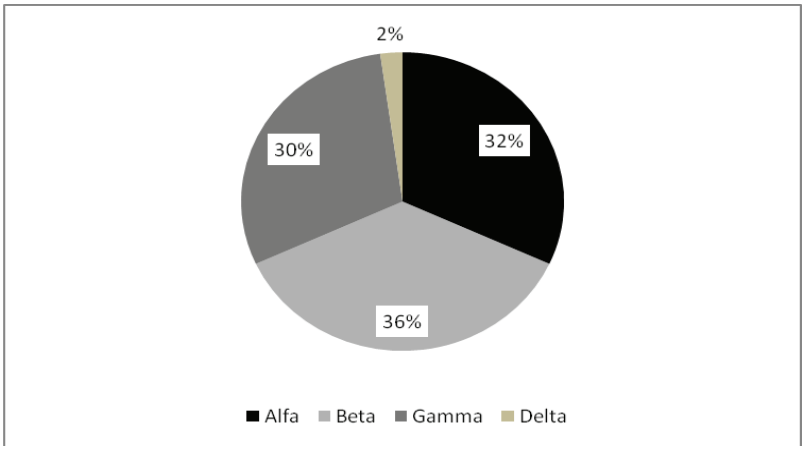

Figure 4. Distribution of usage of computer labs by respondents' preferences

Further to the descriptive information, respondents were asked to make assessment on the level of importance and satisfaction for each of the four dimensions of service, that are Laboratory Environment, Laboratory Facility, Laboratory Safety, and Quality of Staff Service. Tables 2 shows the mean scores of importance and satisfaction for each of the attributes in the four dimensions of service. Overall mean scores of importance and satisfaction are 6.19 and 5.36 respectively. Attributes 2a, 2d, 2g, 2h, 2i, 3c and 4c have mean scores of importance that are even higher than 6.19 and mean scores of satisfaction that are below 5.36. This indicates that respondents rated these attribute as highly importance, but satisfaction is low. Consequently, these attribute should be the main focus of the lab management for further improvement.

On the other hand, attribute 1a shows the smallest gap between mean scores of satisfaction and importance. Attribute 2l also shows a low difference in the mean scores between satisfaction and importance. Attributes that have gap greater than 1.00 are 2a, 2d, 2g, 2h, 2i, 3c and 4b. Most of the large gaps with negative value (mean gap < –1.0) are attributes from the dimension of Laboratory Facility. Attributes that shows large differences between the mean scores of importance and satisfaction should be given more attention by the lab management.

Overall, each of the dimensions considered recorded lower mean satisfaction score than mean importance score. This shows that all the dimensions do not meet the minimum level of the students' expectations. Results from *t*-test in Table 2 show that most of the calculated gaps (satisfaction – importance) for the items are statistically significant, except for the items 'Layout of chair, desk and computer' and 'Shoe racks provided'. The gaps between the mean

scores of satisfaction and importance are presented graphically in Figure 5 to further facilitate evaluation of the results.

Table 2. Gap analysis showing mean satisfaction scores, mean importance scores and gap of the mean scores

Code	Attributes according to the dimensions	Mean Score of Satisfaction	Mean Score of Importance	Score Gap
	LABORATORY ENVIRONMENT			
1a	Layout of chairs, desks and computers	5.57	5.60	-0.03
1b	Laboratory cleanliness	5.76	6.22	-0.46*
1c	Temperature	5.64	6.06	-0.42*
1d	Lighting	5.68	6.22	-0.54*
1e	Front screen display	5.42	6.14	-0.72*
1f	Clear direction to the computer lab	4.98	5.78	-0.80*
1g	Environment in the laboratory can develop my intellectual	5.05	5.65	-0.60*
1h	If given a choice, I am comfortable to stay in the lab for a long period	5.36	5.75	-0.39*
	Dimension 1 (mean)	(5.43)	(5.93)	(-0.50)*
	LABORATORY FACILITY			
2a	Computers provided are sufficient	5.34	6.35	-1.01*
2b	Computer desk provides a comfortable work space	5.41	6.30	-0.89*
2c	Comfortable seats	5.47	6.22	-0.75*
2d	Computer hardware (computer, mouse and keyboard) in good condition	5.28	6.41	-1.13*
2e	LCD projectors and screen display in good condition when used	5.48	6.27	-0.79*
2f	Mathematics / statistics software provided	5.57	6.42	-0.85*
2g	Anti-virus software is available	4.79	6.39	-1.60*
2h	Computer speed to process information / data	4.84	6.47	-1.63*
	Speed of Internet access			
2i	Laboratory doors open on time	4.48	6.47	-1.99*
2j	Computer lab operation hours in accordance with	5.47	6.41	-0.94*
2k	the needs of students	5.48	6.47	-0.99*
	Shoe racks provided			
2l		5.89	6.00	-0.11
	Dimension 2 (mean)	(5.29)	(6.35)	(-1.06)*
	LABORATORY SAFETY			
3a	User safety while in the laboratory	5.86	6.33	-0.47*
3b	Safety of user personal belonging	5.67	6.40	-0.73*
3c	Emergency facilities are available (first aid box & fire extinguisher)	5.16	6.26	-1.10*
3d	The use of smartcard to enter the lab	5.44	6.02	-0.58*
	Dimension 3 (mean)	(5.53)	(6.25)	(-0.72)*
	QUALITY OF STAFF SERVICE			
4a	Laboratory personnel placed at each laboratory	5.15	5.97	-0.82*
4b	Laboratory staff are accessible	4.94	6.09	-1.15*
4c	Laboratory staff ready to help when needed	5.34	6.27	-0.93*
4d	Laboratory staff provide good service when providing assistance	5.58	6.32	-0.74*
	Dimension 4 (mean)	(5.25)	(6.16)	(-0.91)*

Code	Attributes according to the dimensions	Mean Score of Satisfaction	Mean Score of Importance	Score Gap
Overall Mean		5.36	6.19	-0.83

* Significant at the 0.05 level

4. Conclusion

This study shows that the computer labs at PPSM are equipped with the necessary mathematical software packages and attract students to come to labs even though about half of the respondents have chosen 'attending classes/tutorials' as the main reason for using the lab. More than 95% of the respondents use the lab at least once a week. The popularity of the software chosen indicates that renewal of licenses by PTM for software like SPSS should be on time to avoid unnecessary interruption to teaching and learning. In addition, software such as Maple, Eviews, Mathematica and Matlab, even though the usage is relatively moderate, the annual subscription is important as the software are used in the postgraduate classes. Maple, for example, has gained popularity among the postgraduate students. In terms of mean satisfaction scores for the services provided, all the dimensions considered do not meet the minimum level of expectation of the students. Attributes under the dimension of Laboratory Facility recorded the highest gap between mean scores of satisfaction and importance, and therefore should be the focus of the lab management to plan for improvement. Planning and improvement should be made continually to ensure that the process of teaching and learning in the computer labs at PPSM is running smoothly, and that the software used are up to date in accordance with the latest trend in teaching and learning, and the job market.

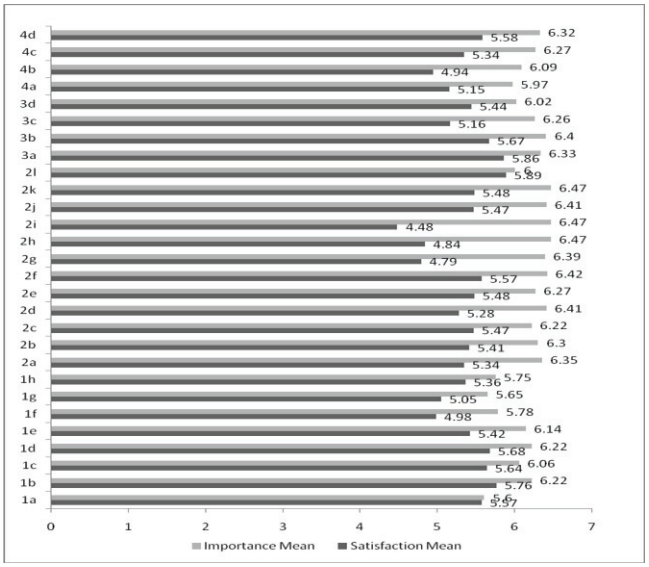

Figure 5. Importance and Satisfaction Mean Based on Attributes

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References

Carver, R.H. & Nash, J.G. (2009). D*oing data analysis with SPSS version 16.0*. Belmont CA: Cengage.

Coakes, S.J., Steed, L. & Dzidic, P. (2006). *SPSS version 13.0 for windows: Anaysis without anguish*. Milton: John Wiley & Sons.

Ismail, W.R., Zalina, M.A., Nur Riza, M.S. & Mohammad, R. (2007). Measurement of customer satisfaction of the service quality of municipal council: A case study of the Ampang Jaya Municipal Council. *Journal of Quality Measurement and Analysis*, 3(1), 131-147. (*In Malay*)

Newby, M. & Fisher, D. (1998). *The association between computer laboratory environment and student outcomes*. Paper presented at the Annual Meeting of the Australian Association for Research in Education, Adelaide, South Australia, Australia.

Salleh, N., Mohd Ayub, A.F. & Zainal Abidin, N. (2010). Perception of students on physical environment of computer laboratory: Comparison of two different computer layout. *Journal of Techno-Social,* 1(2), 59-74. (*In Malay*)

Selamat, R., Ungku Ahamd, N., Abd Razak, N.Z., Ali, L., Sheikh Ahmad, F. & Ahmad Khalid, A. (2004). *An investigation into the teaching-learning environment of the Faculty of Management and Human Resource Development: Towards the establishment of an optimal environment for the pursuit of excellence in teaching and learning*. (Research Vote No. 75012). Skudai: Universiti Teknologi Malaysia. (*In Malay*)

Swanson, D.A. & Phillips, J.A. (1998). TQM in a computer lab. *Proceedings of the 31st ASCUE Summer Conference* (pp. 114-121). North Myrtle Beach, SC.