

E-Service Quality in Higher Education and Frequency of Use of the Service

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Abstract

Universities have been at the forefront of online service provision. Regular evaluations and appraisals of its e-services provided to students are regularly improvised to keep pace with the rapid changes of learning technology and competitiveness of its services provided. There is a dread of research works investigating e-service quality supporting learning, research and communication and how it is related to student's frequency of use from various sources of e-service provided to students. Data were collected from 210 students through questionnaire surveys through a structured random sampling method and analyzed statistically. The dimensions for frequency of use of e-service are from learning and research, administration, coordination, evaluation and contents storage sources. This research work has developed a single dimension comprising six elements to measure the quality of e-service in higher education namely in areas of learning, research and communication support. These elements are: 1) e-service is always available, 2) overall it is very convenience to use, 3) the user interface has a well organized appearance, 4) makes it easy to find what is needed, 5) the e-service has met needs and experience, and 6) e-service assures schedule flexibility. This study has also provided empirical evidence that there are relationships between the level and frequency in the use of e-service quality supporting learning, research and communication.

Keywords: E-service quality, higher education, learning, education

1. Introduction

Universities have been at the forefront of online service provision. E-services such as enrolment, course delivery, course support, and library lending are rapidly becoming standards within the education sector (Sutarso & Suharmadi, 2011). Most universities offer web portals with an integrated front end support to provide information and applications to their stakeholders. They also ensure that these services meet quality requirements as it is essential to ensure management operations and stakeholder satisfaction. The development of electronic-based services to students was initially borne out of a need to automate and thereby optimize the process of delivering learning and administrative services more efficiently and effectively than manual. There is an increasing demand to share the process with students so that they could easily perform activities themselves and reduces university workload and involvement. Jalali, Islam, and Ariffin (2011) reported that academic work covers work outside the classroom too. Quality services offered to student places emphasis not only on studying and reasoning alone. It also includes practical or technical skills to achieve the competitive elements of a university. Electronic-based services, therefore, is a win-win situation for universities and students alike (Sutarso & Suharmadi, 2011).

2. Literature Review

Technology adoption seems extremely important in providing up-to-date information to meet students' needs. Internet has enabled universities to shift in its approach to serve students in much better and more creative manners. It is not only a channel for education and learning as it is also an administrative services channel. At Electronic service tools and sources provided in the university can include an information resource, such as an online and off-line database e.g. WebCT, Blackboard as an e-learning tool, or a service, such as a virtual help desk, provided via a network, such as a local area network, intranet, or the Internet (Mirza & Mahmood, 2012; Abbasi, 2011; Dadzie, 2005). According to Sutarso and Suharmadi (2011), the shift to the use of electronic

devices has also make student services more economical and better delivery with sharper accuracy. With better quality assurance system, more effective e-learning in organizations is expected. This has increasingly drive educators and trainers, professional, researchers, and expertise providers to focus their attention on electronic services (Ozkan & Koseler, 2009; Jara & Mellar, 2010). Obviously, systematic quality assessment has become necessary to ensure the quality delivered at the correct level to support e-learning requirements is fulfilled and accepted (Ozkan & Koseler, 2009).

E-learning behaviors are affected by the quality of information, service and system (Ho, Kuo, & Lin, 2010). Innovation Diffusion Theory has been applied to explore consumers' e-service adoption. Cao and Mokhtarian (2005) explained that generally the cumulative adoption of an innovation follows a sigmoid curve, with adoption growing slowly in its initial years, growing steeply as it reaches its half-way point, and growing slowly again as it nears its saturation level. Dimensions of quality of e-services measures are mostly used in the commercial business sector and not that common in the education sector. Reviews by Kim-Soon and Ahmed (2012), and Carlson and O'Cass (2011) revealed that measures on quality of e-service are developing and works need to focus on measurement and operationalizing this measure. This is especially so for e-service for University. Kim-Soon and Ahmed (2012), and Engelland, Hopkins, Workman, and Singh (1998) revealed that scholars neglected on the study of usage frequency of e-service and its possible relationship with service quality perception. This lack of researches on these issues is even more evident in the higher education environment (Kim-Soon & Ahmed, 2012; Al-Mushasha & Nassuora, 2012). Thus, this empirical research work aims to fill this gap. It will empirically determine the quality level of e-service provided by the University to students, the level of frequency of use of e-service sources by students and investigate whether there is a relationship between the qualities of e-service with the frequency of use of this service. The research questions formulated for the study includes: What is the dimension of e-service quality measurement supporting higher education? What is level of e-service quality provided to students at Universiti Tun Hussein Onn Malaysia (UTHM)? What is the level of frequency of use of e-service by students at UTHM? Is there a relationship between quality of e-service and the frequency of use of the service by students?

3. Research Methodology and Findings

3.1 Research Framework

The constructs of this study is based on the Innovation Diffusion Theory (IDT). This construct for studies have been used in examining e-shopping behavior. In this research work, the independents variables are the quality of e-service supporting learning, research and communication. The frequency of use from the e-service sources for learning and research, administration, coordination, contents storage and evaluation are the dependent variables.

3.2 Questionnaire Design and Measurement

The survey questionnaire designed for this study is made up of three parts. Part A consists of questions requiring respondents to answer about their background. Part B comprises of questions related to frequency of use of the respective sources and tools of e-service available inside the Campus. Part C is questions requiring them to rate the degree of quality of e-service from the respective categories of uses of e-service inside the campus. The questionnaire was first checked with the University Information Technology Centre to confirm that all the sources and tools available in the university are stated in section B. As for Section C, discussions were held with lecturers and IT personnel and checks were also carried out on search websites relating to e-services provided at the university used by students. Basically, students use the e-services as support in areas of learning, research and communication. Therefore, the quality of e-service items is geared to measure these areas. The questionnaire developed was pilot tested with a sample of 20 respondents to analyze the reliability of the items of Part B and Part C of the questionnaire and were further refined prior to data collection.

3.3 Scope of Study and Profile of Respondents

This study was conducted inside the campus of a Malaysian university. Data from a total of 210 students were collected through questionnaire survey by structured random sampling method. Students from the various faculties, different races and gender, years of studies and seniority were selected randomly for this survey. All the duly completed questionnaires were used in the analysis. The profile of the respondents is tabled in Table 1.

3.4 Goodness of Measures

Factor analyses (Principle Component Analysis with Varimax Rotation), tested for significant of KMO (Measure of Sampling Adequacy) with outliers of loading of less than 0.5 removed to achieve clearer separation of factors, and only Eigenvalues of more than one accepted (Hair, Anderson, Tatham, and Black, 1998) were run separately using SPSS for the sets of sources of e-services available inside UTHM campus for frequency of use and the

quality of e-service supporting learning, research and communication. The factors for frequency of use are as tabled in Table 2.

There are five factors in the set of sources and tools of e-services available inside UTHM campus for frequency of use. The frequency of use from the online database, e-journals, UTHM webmail and WEBOPAC are for learning and research, and therefore named as frequency of use for learning and research. The second component is frequency of use for administration and is made up of registration, examination result and graduation audit. The third component is on coordination and these are social network, group classmate and social email (yahoo, gmail, hotmail). The component of frequency of use for evaluation is made up of evaluation of lectures (SPARK) and channel for receiving complaint and proposal center (SACAD) and the final factor is contents storage.

Table 1. Profile of the respondents (N = 210)

Demographic	Categories	Frequency	(%)
Gender	a. Male	105	50
	b. Female	105	50
Age (years)	a. 19 to = <20	27	13
	b. 21 to = <25	148	70
	c. > 26	35	17
Faculty	a. FPTPK	35	16.7
	b. FSKTM	35	16.7
	c. FKMP	35	16.7
	d. FKKEE	35	16.7
	e. FKAAS	35	16.7
	f. FPTV	35	16.7
Course Pursuing At UTHM	a. Diploma	20	9.5
	b. Degree	141	67.2
	c. Master Degree	37	17.6
	d. PhD	12	5.7
Seniority at UTHM at the level of Course you are taking	a. Year 1	56	26.7
	b. Year 2	63	30.0
	c. Year 3	52	24.8
	d. Year 4	39	18.6
Race	a. Malay	91	43.5
	b. Chinese	41	19.5
	c. Indian	33	15.7
	d. International Student	35	16.7
	e. Others	10	4.8
Level of Website visits in one Week	a. = < 4 times	22	10.5
	b. 5 to 8 times	22	10.5
	c. 9 to 13 times	72	34.2
	d. > = 14 times	94	44.8

Factor analyses (Principle Component Analysis with Varimax Rotation), tested for significant of KMO with outliers of loading of less than 0.5 removed to achieve clearer separation of factors, and only Eigenvalues of more than one accepted (Hair et al., 1998) were run separately for the components for quality of e-service

supporting learning, research and communication. Eliminating the non-common items among the three measures, the items that are common to all these three measures comprise of 6 elements and they are: e-service is always available, overall it is very convenient to use, the user interface has a well organized appearance, makes it easy to find what I need, the e-service has met my needs and experience, and e-service assures schedule flexibility. The KMO of quality of e-service supporting learning, research and communication are 0.90, 0.84, and 0.80 respectively with significant Bartlett's tests at $p < 0.001$ for all the factors and the total variance explained by the factors are respectively 43.54%, 42.57 and 44.52%.

The results of reliability analyses for the various variables with their respective mean and standard deviation values are tabulated in Table 3. Cronbach's alpha coefficient ranges in value of from 0 to 1 and is used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales. The higher the score, the more reliable the generated scale is. Hair et al., (1998) have indicated that value of 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. This shows that there is internal consistency for the elements of the respective variables as measurement instrument.

Table 2. Component for frequency of use from the e-service sources and tools

Sources and tools of e-service available inside UTHM Campus	Component				
	1	2	3	4	5
1. Online Database	.773	.227	.019	.002	.080
2. E-Journals	.738	.121	.132	-.069	.246
3. UTHM Web mail	.677	.204	.005	.311	-.123
4. WEBOPAC (web online public access catalog, e.g. finding books)	.542	.042	.214	.363	-.026
5. E-learning using the AUTHOR	.401	.365	.110	.051	.299
6. Examination (Examination result)	.158	.793	.128	-.184	.026
7. Activity /program/club/association record.	.266	.612	.156	.178	.222
8. Graduation Audit	.184	.600	.171	.193	.020
9. Registration	.378	.580	-.039	.259	-.109
10. Social email using Hotmail, Yahoo mail and Gmail	.101	.083	.753	-.114	-.060
11. Group classmates co-ordination	.044	.039	.645	.318	.202
12. Social network	-.101	.394	.615	.225	.058
13. Searching engine (e.g. Google, Yahoo)	.206	.079	.544	-.286	-.074
14. SACAD (Channel system of complaints and proposals)	.283	.003	-.080	.753	.125
15. E-evaluation of lectures (SPARK)	.069	.421	.080	.651	.023
16. Contents Storage (e.g. Notes, Photos and Pictures)	-.004	.077	.006	.098	.884

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 7 iterations. KMO = 0.84 with Bartlett's significant at $p < 0.001$. Total variance explained by the five factors = 58.43%

Table 3 tabulates the levels of frequency of use and quality of e-service of the University. It is observed that the levels of quality of e-service supporting learning and research, and the frequency of use from the e-service sources and tools for coordination are very good. The levels of quality of e-service from supporting communication and the frequency of use from the e-service sources and tools for learning and research, administration, contents storage and evaluation are all rated as good.

Table 3. Reliability, mean of variables and levels of frequency and quality performance

Variable	Element	No. of Element	<i>Cronbach's Alpha</i>	Mean	Std. Dev.	Level of freq/perf
Quality performance of e-service	Learning	6	0.75	3.72	0.59	Very Good
	Research	6	0.77	3.67	0.63	Very Good
	Communication	6	0.80	3.63	0.68	Good
The frequency of use from the e-service sources and tools	Learning and Research	4	0.75	3.46	0.81	Good
	Administration	4	0.71	2.69	0.60	Good
	Coordination	4	0.60	4.04	0.75	Very Good
	Contents Storage	1	-	3.62	0.94	Good
	Evaluation	2	0.57	3.59	0.97	Good

(N=210); Range is based on Likert Scale of 1 to 5 where 1.00-2.33 = Low; 2.34 - 3.66 Good and 3.67-5.00 = Very Good.

3.5 Levels of Frequency of Use and Quality of E-Service

3.5.1 Correlations Analysis

Table 4 tabulates the correlations results among the variables studied. The results revealed that correlation exist between quality of e-service from supporting learning, research and communication with the frequency of use from sources and tools of e-service for learning and research, administration and evaluation ($p < .01$). Quality of e-service from supporting communication is only correlated with frequency of use from source for coordination at ($p < .05$). Correlation does not exist between quality of e-service from supporting learning, research and communication with frequency of use from tool for contents storage.

Table 4. Pearson correlations (N = 210) among variables

Factors	Learning and Research	Administration	Coordination	Evaluation	Storage information (e.g. Notes, Photos and Pictures)	Quality of e-service supporting learning	Quality of e-service supporting research	Quality of e-service supporting communication
Learning and Research	1	.522**	.199**	.391**	.069	.324**	.308**	.295**
Administration	.522**	1	.398**	.397**	.145*	.274**	.262**	.329**
Coordination	.199**	.398**	1	.183**	.123	.161*	.111	.109
Evaluation	.391**	.397**	.183**	1	.154*	.296**	.280**	.228**
Contents Storage (e.g. Notes, Photos and	.069	.145*	.123	.154*	1	.015	.075	.030

Pictures)								
Quality of e-service supporting learning	.324**	.274**	.161*	.296**	.015	1	.712**	.606**
Quality of e-service supporting research	.308**	.262**	.111	.280**	.075	.712**	1	.702**
Quality of e-service supporting communication	.295**	.329**	.109	.228**	.030	.606**	.702**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

3.5.2 Regression of Quality of E-Service with Frequency of Use

Table 5 tabulates the models summary of quality of e-service with the frequency of use from the sources and tools for learning and research, administration, coordination, evaluation and contents storage.

Table 5. Models summarizing quality of e-service with frequency of use

Model No.	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.373 ^a	.139	.127	.755	.139	11.110	3	206	.000	1.99
2	.291 ^a	.085	.071	.578	.085	6.349	3	206	.000	2.07
3	.211 ^a	.044	.030	.738	.044	3.190	3	206	.025	1.73
4	.312 ^a	.097	.084	.935	.097	7.415	3	206	.000	1.82
5	.096 ^a	.009	-.005	.945	.009	.632	3	206	.595	1.40

a. Predictors: (Constant), Quality of e-service supporting learning, research and communication areas

b. Dependent Variable:

- i. Model No. 1-Frequency of use for learning and research.
- ii. Model No. 2-Frequency of use for administration.
- iii. Model No. 3-Frequency of use for coordination.
- iv. Model No. 4-Frequency of use for evaluation.
- v. Model No. 5-Frequency of use for contents storage.

The results of regression of quality of e-service at the university with frequency of use from sources and tools for

learning and research, administration, and evaluation indicate that R² change is .139, .071, and .084 respectively and the all these relationships are significant at $p < 0.001$. This implies that all the three factors of quality of e-service explained a total of 13.9%, 7.1% and 8.4% of variation on the enhancement of frequency of use of the respective tools and sources of e-services available inside the University Campus.

As for result of regression of quality of e-service with frequency of use from sources and tools for coordination, the R² change is .030 with significant at $p < 0.05$ implying that the three factors of e-services supporting the areas of learning, research and communication explained a total of 3.0% of the increase in frequency of use of e-services from the sources and tools for coordination. The regression model for quality of e-service with frequency of use from tools for contents storage does not shows significant relationship. The Durbin Watson values of 1.40 to 2.07 of the models suggest that the results of all the respective regression models are all valid.

4. Discussion

An important focus of strategic technology management process is the identification and development of an institution's technological capabilities (Betz, 1993). Communication and information technology development has enhanced service quality for students with regard to the learning process, communication and administrative services. Universities keeping up with development are managing their services electronically as e-service is the key to the future of higher education and is a critical factor for the future of services development and competitiveness. The young generation is savvy at using the Internet and are adapting well to the use of e-services. Globally, the need for structural changes within institutions e-learning and e-administrative policy is supporting education policy development. Demand for learning has intensified in line with the necessity of broadening of geographical scope in learning is stimulating centers of higher education to offer e-learning initiatives (Hismanoglu, 2011).

As On-line services are continuously changing and evolving, it is crucial to ensure sustainable and competitive services are provided to students. Electronic services system would increase value to their organization by saving time and money, reducing paper work, offering quick delivery of information to students and staff, and better control and management of information (Ndou, 2004).

4.1 E-Service

Service quality is defined as an overall evaluation of service performance (Santos, 2003). Electronic service is accessible with electronic networks and is accessible by a person through the Internet. It is an interactive, content-centered and Internet based customer service driven by the customer and integrated with related organizational customer support processes and technologies with the goal of strengthening customer service provider relationship (Rust & Kannan, 2002). This means users have to rely entirely on information technology in an e-service encounter (Zeithaml, 2000). At UTHM, the tools and sources of electronic services provided for student include SMAP online which supports registration service, student webmail, graduation audit, examination management, student's activities, programmes, clubs and association, e-learning, e-library which provides e-books, online database, e-journals, Web online public access catalogue for books etc., the search engines and e-mail which include google, yahoo etc., blogs, e-networks, e-evaluations, channel for receiving complaint and proposal, and contents storage.

Factor reduction analysis done on the frequency of use from the sources and tools resulted in five factors or groupings of sets of tools and sources of e-services available inside UTHM campus. The frequency of use from the online database, e-journals, UTHM webmail and WEBOPAC are for learning and research, and therefore named as frequency of use for learning and research. The second component is frequency of use for administration and is made up of registration, examination result and graduation audit. The third component is on coordination made up of social network, group classmate and social email (yahoo, gmail, hotmail). The component of frequency of use for evaluation is made up of evaluation lectures (SPARK) and channel for receiving complaint and proposal center (SACAD), and the final factor is contents storage.

It is observed that one of the tools for learning and research, "e-learning using the AUTHOR" dropped out from the group frequency of use for learning and research. One reason could be because this service is new and was only introduced lately and there could be many respondents who are not aware of this service. Another reason could be that the post-graduates students use less of it. The survey questionnaire on categories of uses of e-services for students at this University is grouped basing on its supports to learning, research and communication areas.

Reviews of items of dimensions of quality of e-services measures are mostly used in researches carried out for the business sector. Carlson and O'Cass (2011) reviewed that measures on quality of e-service is developing and

recent works are focusing on measurement and operationalizing the measure. In this study, discussion with lecturers, IT personnel and checks on the search websites that are related to providing e-services to student supports and needs at universities revealed that there are three main areas of supports, and these are in the learning, research and communication areas. Thus, the instrument for measures of these three areas of quality of e-service in the student context inside the university campus were conceptualized and constructed with reference to the items of past studies. A pilot test of the questionnaire and refinement of the questions were carried out. The quality of e-service measure instrument that has been developed uses the same questions to measure the quality from all these 3 different supporting areas to student. In this case, the six elements of measure are common for measuring quality of e-service supporting learning, research and communication respectively. The elements of measure are: 1) e-service is always available, 2) overall it is very convenience to use, 3) the user interface has a well organized appearance, 4) makes it easy to find what is needed, 5) the e-service has met needs and experience, and 6) e-service assures schedule flexibility. Students rated the degree of agreement of the statements on a Likert 5-point scale of each statement of quality of e-services support of the respective areas. It is found that these elements basically have similar elements with the core ESQUAL dimensions developed by Parasuraman, Zeithaml, and Malhotra (2005) for the commercial business domain except it is without the item on privacy. ESQUAL is the name of the scale for the core dimensions for measure of quality of e-service with dimensions of efficiency, system availability, fulfillment, recovery and privacy. Thus, this means a single dimension with a six elements measure has been developed in this study for measuring quality of e-service quality for education sector supporting learning, research and communication.

4.2 Quality of E-Service and Frequency of Use Levels

Quality of service is about how well the delivered level of service matches user's expectations. The levels of quality of e-service supporting learning and research, and the frequency of use from the e-service sources and tools for coordination are very good. The levels of quality of e-service supporting communication and the frequency of use from the e-service sources and tools for learning and research, administration, storage and evaluation are all rated as good. This indicates that the provider for student e-service has provided good effort in serving the students. This could be a result of user regular feedback and service provider's customization efforts. According to Rowley (2006), service customization in an organization can be achieved through data collection and analysis to offer improved services offered by an organization. Pather and Usabuwera (2010) pointed out that service quality in e-commerce is crucial in determining the way information systems perform. They added that in order to achieve the desired level of e-service performance in commerce, it is necessary to align the e-service elements surrounding the information system with that of the business within the system.

The model construct of this study is derived from the Innovation Diffusion Theory (IDT) on disaggregate basis where such construct for studies have been done on e-shopping behaviour (e.g. Carlson and O'Cass (2010)). User adoption of technology is based on IDT (Rogers 1995), which posits that innovation diffusion is achieved through users' acceptance and use of new ideas or things (Zaltman & Stiff, 1973). The correlation results revealed that correlation exist between quality of e-service from supporting learning, research and communication with the frequency of use of e-service for learning and research, administration, evaluation and coordination. Correlation does not exist between quality of e-service supporting learning, research and communication uses with frequency of use for contents storage. These results are consistent with that of regression analyses done between the two sets of variables. Thus, the findings of this study assert that the quality of e-service is related to the frequency of use of the services. Carlson and O'Cass (2010) found that positive evaluations of e-service quality influence positive levels of consumer satisfaction, consumer attitudes toward the website, and behavioural intentions within the specific service context of content-driven professional sports websites in the commercial business domain. Thus, basing on this finding and under the higher education industry context, it implies that evaluations of quality of e-service is important for sustainable supports to learning, research works and communication through efficiency, system availability, fulfillment, fast delivery and recovery of e-services provided to student. Ramayah and Lee (2012) find that service quality is a significant factor influencing user satisfaction in using an e-learning system. This indirectly supports the finding of this current research work.

5. Conclusion and Future Works

This research work has developed a single dimension with six elements measurement for measuring quality of e-service supporting learning, research and communication in the education sector. These elements are: 1) e-service is always available, 2) overall it is very convenience to use, 3) the user interface has a well organized appearance, 4) makes it easy to find what is needed, 5) the e-service has met needs and experience, and 6) e-service assures schedule flexibility.

The levels of quality of e-service from supporting learning and research areas, and the frequency of use from the e-service sources and tools for coordination are at very good level in UTHM. The levels of quality of e-service from supporting communication, and the frequency of use from the e-service sources and tools for learning and research, administration, contents storage and evaluation are all rated as good.

Relationships exist between quality of e-service supporting learning, research and communication with the frequency of use of e-service from tools and sources for learning and research, administration, coordination and evaluation. There is no relationship between quality of e-service supporting for learning, research and communication with frequency of use for contents storage. Generally, quality of e-service is related to the frequency of use of e-services provided by the University.

On-line services are continuously changing and evolving. It is crucial to ensure sustainable and competitive e-services are provided to student. It is necessary to improvise regular evaluations and appraisals of the e-service provided by university to monitor its performance. Gikandi, Morrow, and Davis (2011) have suggested further study to explore on how sources of services can assist in the achievement of optimum level of online learning interactions and experiences. Future work should delve into in-depth qualitative methods to investigate the underlying elements examined in the current work, while there is also potential to replicate the work in other institutions, universities and countries.

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