ICT in Student–Supervisor Communication: A Case Study at a Public Institution of Higher Learning in Malaysia

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Abstract

This study examined the use of ICT among postgraduate students and supervisors at University of Science Malaysia, Penang with special focus on student-supervisor communication. It employed a cross sectional survey design utilising an online questionnaire as data collection instrument. Students' and supervisors' competence in using the common MS Office programs, data analysis packages, and communication tools were gauged. Apart from that, their perceptions on the usefulness of ICT in student-supervisor communication were measured according to the following aspects: improves communication; strengthen student-supervisor relationship; add value to face to face interaction; and optimize student learning. A total of 81 students and 70 supervisors participated in this study. The results show that both students and supervisors were either intermediate or advance users as far as the basic Microsoft Office programs are concerned but not many of them have good knowledge on other programs such as data analysis packages. As for the open source applications, significantly higher percentage of supervisors (76%) use Moodle compared to students (42%), however the percentage of student users were significantly higher for Wiki, Facebook, Blog, and Friendster. All supervisors and students surveyed used email as the major communication tool, while considerable percentage of supervisors (64.3%) and students (79%) used SMS. On the perception towards the usefulness of ICT, the supervisors' ratings range from 4.32 to 5.44 on a scale of 1 to 7. The highest rating was for "ICT improves communication" while the lowest was "ICT add value to face-to-face interaction". Female supervisors have a more favorable perception compared to male on all the four aspects assessed (p < 0.05). Supervisors with less then 10 years in USM gave significantly higher rating on the following aspects: 'ICT improves communication' and 'ICT optimizes students' learning', whilst students' ratings range from 4.84 (ICT add value to face to face interaction) to 5.55 (ICT improves communication). Students' demography did not have any bearing on their ratings. The t-test analysis indicated that supervisors' and students' ratings on the usefulness of ICT significantly differed only for "ICT strengthen student-supervisor relationship" aspect (p = 0.021); students' rating was higher than the supervisors'.

Keywords: post digital literacy, online learning environment, communication tools and technology, postgraduate students and supervisors

Introduction

Digital literacy is the ability to use digital technology to locate, evaluate, use and create information. It covers a wide range of areas to ensure everyone gets the most out of their engagement with technology without abusing its use. These include e-safety and wellbeing, collaboration and communication, rights and responsibilities, ethical and environmental issues, commercial practices, privacy and security, digital identity and citizenship (Williams, 1995). Glister (1997) defined digital literacy as "a set of skills to access the Internet; find, manage and edit digital information; join in communications; and engage with online information and communication network" (Glister, 1997, p.290). With digital literacy, one will be able to determine the digital information needed, access the digital information effectively and efficiently, evaluate digital information sources and services critically, and use digital information effectively to accomplish a specific purpose (Jonassen, 1999). With this backdrop, this paper reports the competency level of postgraduate students and supervisors at Universiti Sains Malaysia on the use of information and communication tools and technology, and

their perception towards the usefulness of these communication tools and technology in enhancing student-supervisor communication.

Research Foundation

Since the early 1960s, a new trend has emerged and dominated teaching and learning, especially at the tertiary level. During that period, educators began considering new technologies to enhance teaching and learning. The rapid development of microcomputer technology, increased research in instructional procedures, and the invention of new devices and equipments have contributed significantly to this dramatic evolution especially in education for individuals with special needs (Blackhurst & Morse, 1996). In general, the development in educational technology can be broadly classified into the following areas: technology of teaching, instructional technology, and assistive technology (Blackhurst, Hales, & Lahm, 1998; Blackhurst & Edyburn, 2000; Blackhurst & Lahm, 2000). The main objective of these inventions is to enhance efficiency and effectiveness of teaching and learning.

The development in telecommunication systems, particularly the Internet and its World Wide Web has redefined education in total, especially the open and distance learning (Williams, 1996). The wide range of computer software systems and networking capabilities opened up new perspectives to manage the delivery of instruction via the Web especially at the tertiary level. In the last decade such systems have been successfully used in teaching of undergraduate and graduate programs by universities around the globe.

Communication tools can be broadly categorized into *Asynchronous* and *Synchronous*. The Synchronous communication tool allows communication to take place both ways simultaneously between the users, whilst the Asynchronous communication tool allows two way communications but not simultaneously. The most popular asynchronous tool is email, others include listservs (automated email lists), bulletin boards (where users can see the entire list of postings on a browser), newsgroups, blogs, and wikis (Kuehn, 1994). Asynchronous tools can support teaching strategies which do not require real time communication.

Web-based synchronous communication, where online communication occurs in real time, has become popular over the last decade. A number of commercial "chat" has taken central stage in formal and informal synchronous communication (Kuehn, 1994). Course management software also provides chat functions which allow for the transmission of images, simultaneous viewing of "whiteboard" drawings, and shared Internet browsing as well as text-based communication. Of late, synchronous tools allowing audio and video transmission have become more widespread. In addition, video and audio conferencing, shared editors, and imaging programs are available to support synchronous communications (Carliner, 1999). Thanks to the technological advancement for making communication a real time experience. These capabilities are able to almost replace the face-to-face instruction which was held highly once.

Integration of ICT to enhance teaching and learning at USM

USM was established in 1967 and started its operations in 1969. The off-campus programme was initiated in the early 1970s. It is noted here that USM is the first local university to start the distance-learning program, which was popularly known as off-campus programme. In the off campus mode, students received print-based materials in modular form and are required to attend regular face-to-face tutorials at different centres. These tutorials were conducted by lecturers from qualified academic institutions who were employed by the university on part-time basis. Apart from that, students were also required to attend full time courses in campus during their final year.

The advent of Internet in the early 1980s had brought about the shift in the distance-learning concept. The e-learning or web-based learning is seen as an effective mode of teaching and learning, especially

in overcoming the limitation of geographical separation. However, due to lack of internet coverage and stability, institutions of higher learning did not take drastic initiatives to introduce on-line learning aggressively until late 90s. Another reason for the lack of enthusiasm in e-Learning is, the face-to-face teaching and learning was preferred compared to the virtual interaction. The face-to-face method of teaching and learning was seen as the most effective way of imparting knowledge by both the society at large and a considerable number of professional educators.

USM started its e-Learning initiatives in the early 80s. Computer Aided Instruction and Computer Based Learning (CAI/CBL) were among the first initiatives to be introduced and were utilised as stand alone courseware for USM's internal use. The use of ICT was confined to teaching and learning at the campus. This was mainly due to the lack of internet coverage and unstable connectivity. Only in the late 90s and early 2000, efforts have been taken to experiment and implement the integration of ICT in a big way.

The ICT infrastructure in USM has four major components, namely the Learning Management System (LMS), virtual library, blended mode pedagogy (web-based instruction and face-to-face), and ICT helpdesk. All these components were built on a reliable network infrastructure or the so-called e-Learning server farm or LAMP ─ the acronym for Open Source Linux, Apache, MySQL, and PHP. This network also supports off-campus students nationwide. The Centre for Knowledge, Communication and Technology provides the technical support. With the latest emerging technologies, USM has embarked in using some of the multimedia Learner Management System (LMS) as a creative option to widen its reach to the learners. However, the successful implementation of ICT depends not only on the infrastructure but more on how well these technologies are used in all aspects of teaching and learning.

Methods and Material

This is a cross sectional survey using an online questionnaire. E-mails with the *url* for the site as well as usernames and passwords for this electronic questionnaire were sent to randomly selected supervisors and postgraduate students. The questionnaire has four sections; i) the demographics ii) users' competence on some commonly used applications iii) usage of some common open source applications, and iv) users' perception on the usefulness of ICT in student-supervisor communication. Users' perceptions on the usefulness of ICT in student-supervisors communication were classified into the following aspects: *ICT improves communication; ICT strengthen student-supervisor relationship; ICT add value to face to face interaction*; and *ICT optimize student learning.*

Findings

A total of 81 students and 70 supervisors participated in the study. All supervisors and students claimed that they use e-mail to communicate, while 64.3 % of the supervisors and 79% of the students surveyed also use SMS. Only a small percentage of supervisors (4.3%) and students (7.4%) use VOIP (e.g. Skype, Yahoo). A general assessment was done on respondents' competency in using some of the common programs. The results show that majority of the supervisors and post graduate students were either intermediate or advanced users with regards to the basic MS Office programs, but not so with data analysis and editing programs that are commonly used in academic work. In terms of data analysis package, the SPSS is more popular among students and supervisors compared to E-Views and SAS as well as software for qualitative analysis (refer to Table 1).

Table 1: Users' competency on selected software

Supervisors									
Knowledge Level	MS Words Freq. (%)	MS Excel Freq. (%)	MS PPT Freq. (%)	SPSS Freq. (%)	E-Views Freq. (%)	SASS Freq. (%)	NVIVO Freq (%)	NUD Freq (%)	E.Note Freq (%)
No Knowledge	8 (11.4)	12 (17.1)	8 11.4	38 (54.3)	66 (94.3)	65 (92.9)	64 (91.4)	65 (92.9)	40 (57.1)
Beginner	3 (4.3)	14 (20.0)	4 (5.7)	14 (20.0)	1 (1.4)	3 (4.3)	5 (7.1)	5 (7.1)	14 (20.0)
Intermediate	18 (25.7)	23 (32.9)	26 (37.1)	12 (17.1)	2 (2.9)	1 (1.4)	1 (1.4)	0 (0.0)	9 (12.9)
Advance	41 (58.6)	21 (30.0)	32 (45.7)	6 (8.6)	1 (1.4)	1 (1.4)	0 (0.0)	0 (0.0)	7 (10.0)
Students									
No Knowledge	13 (16.0)	16 (19.8)	14 (17.3)	39 (48.1)	76 (93.8)	75 (92.6)	75 (92.6)	74 (91.4)	45 (55.6)
Beginner	0 (0.0)	4 (4.9)	1 (1.2)	22 (27.2)	3 (3.7)	6 (7.4)	5 (6.2)	7 (8.6)	21 (25.9)
Intermediate	24 (29.6)	36 (44.4)	31 (38.3)	20 (24.7)	2 (2.5)	0 (0.0)	1 (1.2)	0 (0.0)	13 (16.0)
Advance	44 (54.3)	25 (30.9)	35 (43.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.5)

As for the open source applications, higher percentage of supervisors (76%) use Moodle compared to students (42%) but the percentage of student users were higher for Wiki (students 67%; supervisors 22%), Facebook (students 52%; supervisor 12.3%), Blog (57%; supervisors 12%) and Friendster (77%; supervisors 14%).

In general supervisors have positive opinion on the use of ICT for communication with students. The overall mean scores for supervisor' perceptions on the four aspects of ICT usefulness in student-supervisor communication range from 4.33 (add value to face to face interaction) to 5.44 (improves communication). The results of the t-tests indicate that the mean scores for all aspects except "Add value to face to face interaction" were significantly higher than 4.0 (the mid-point of the scale) (refer to Table 2).

Table 2: Supervisors' Perceptions on ICT as student-supervisor communication tool

Aspects	N	Minimum	Maximum	Mean	Std. Deviation
Improves communication	70	2.13	7.00	5.4411*	1.34927
Strengthen Student-Supervisor relationship	70	1.00	7.00	4.8102*	1.42851
Add value to face to face interaction	70	1.00	7.00	4.3286	1.23097
Optimize student learning	70	1.67	7.00	4.8381*	1.20351

Mean score is significantly higher than 4.0 at $\alpha = 0.05$ (2-tailed)

Further comparisons were made according to gender, citizenship, years in USM, and supervisory role. As shown in Table 3, generally the female supervisors have a more favorable perception towards the usefulness of ICT in student-supervisor communication. Their ratings were significantly higher on all

four aspects assessed. As for the citizenship, both Malaysians and expatriates did not differ significantly in their ratings. Supervisors with less than 10 years in USM were found to have a more favorable perception on the benefits of ICT in improving student-supervisor communication as well as optimizing students' learning. The co-supervisors assigned a more favorable rating for ICT as strengthening student-supervisor relationship compared to main supervisors.

Table 3: Mean difference for supervisors' ratings according to demography

Aspects	Gender Male (41) Female (29)	Citizenship Malaysian (43) Expatriate (27)	Years in USM Less than 10 (44) 10 and above (26)	Supervisory Role Main Supervisor (39) Co Supervisor (31)
Improves communication	-1.711*	0.231	1.762*	-0.323
Strengthen Student-Supervisor relationship	-1.745*	0.311	0.425	-1.625*
Add value to face to face interaction	-1.735*	0.376	0.326	-0.432
Optimize student learning	-1.763*	0,219	1.722*	-0.273

- *indicates significant difference at $\alpha = 0.05$ (2-tailed)*
- *Mean difference is defined as mean score of 1st (upper) minus 2nd (lower)*

The supervisors and the postgraduate students concurred that the use of ICT in student-supervisor communication has a positive effect. The mean scores for students' ratings on the aspects assessed range from 4.84 (add value to face to face interaction) to 5.55 (improves communication). The t-tests show that the perception scores were significantly higher than 4.0, the middle point of the 7 point Likert-Scale. This implies that in general students' have positive perception regarding the usefulness of ICT in student-supervisor communication. Table 4 shows the results.

Table 4: Students' Perceptions on ICT as student-supervisor communication tool

	N	Minimum	Maximum	Mean	Std. Deviation
Improves communication	81	2.25	7.00	5.5478*	1.01002
Strengthen Student-Supervisor relationship	81	2.57	7.00	5.2698*	1.09800
Add value to face to face interaction	81	2.50	7.00	4.8436*	1.08056
Optimize student learning	81	1.00	7.00	5.0288*	1.29443

Mean score is significantly higher than 4.0 at $\alpha = 0.05$ (2-tailed)

Further analysis was also performed to explore students' perceptions according to gender, citizenship, mode of learning, financial sponsorship, and level of study. All students regardless of their demographic differences gave similar ratings on the usefulness of ICT in student-supervisor communication. The only significant difference observed in this multi facet comparison was the perception between doctoral and masters students regarding "ICT improves communication between student and supervisor". Students in the doctoral programs seem to have a more favorable perception compared to those in masters programs. Table 5 summarizes the results.

Table 5: Mean difference of students' ratings according to demography

Aspects	Gender *Male (48)* *Female (33)*	Citizenship *Malaysian (52)* *Expatriate (28)*	Study mode *Full time (51)* *Part time (29)*	Sponsorship *Sponsored (30)* *Self Funded (50)*	Study Level *Doctorate (29)* *Master (50)*
Improves communication	*-0.08*	*-0.20*	*-0.14*	*0.06*	*1.32**
Strengthen Student-Supervisor relationship	*0.13*	*-0.34*	*-0.05*	*-0.05*	*0.39*
Add value to face to face interaction	*0.10*	*-0.14*	*-0.14*	*-0.11*	*0.24*
Optimize the use of available ICT infrastructure	*0.11*	*-0.23*	*-0.18*	*-0.21*	*0.26*

- ** indicates significant difference at α = 0.05 (2-tailed)*
- *Mean difference is defined as mean score of 1ˢᵗ (upper) minus 2ⁿᵈ (lower)*

To gauge whether students and supervisors share similar views, students' perceptions were compared with those of the supervisors'. The results, as presented in Table 6, indicate that students generally gave higher ratings on all aspects; however the significant difference is only for the aspect of "ICT use strengthens student-supervisor relationship". The mean score for students' perception was 5.27 while the mean score for supervisors' was 4.81.

Table 6: Comparison between students' and supervisors' ratings

Aspects	Designation	N	Mean	Std. Deviation	p-Value
Improves communication	Supervisor	70	5.4411	1.34927	0.581
	Student	81	5.5478	1.01002	
Strengthen Student-Supervisor relationship	Supervisor	70	4.8102	1.42851	0.027
	Student	81	5.2698	1.09800	
Add value to face to face interaction	Supervisor	70	4.3286	1.23097	0.070
	Student	81	4.8436	1.08056	
Optimize the use of available ICT infrastructure	Supervisor	70	4.8381	1.20351	0.351
	Student	81	5.0288	1.29443	

Discussions

The Ministry of Higher Education (MoHE) has granted USM with Accelerated Programme for Excellence (APEX) status in August 2008 in recognition of its sustainable-led growth development plan in tertiary education. With this, the university is in a better position to attain world-class status and expand its operation. To its' advantage, USM has readily available infrastructure and technologies (ICT) which the university started developing since the early 80s. In its endeavor to capitalize on these capabilities, the university is faced with another big challenge, 'How ready are the staff to effectively use the ICT in providing quality education?'

For any university the pinnacle of quality education is reflected in the postgraduate programs. In producing quality graduate students, the education process, which calls for greater self-directed learning, plays a vital role. One of the major components of postgraduate studies is academic research where supervision plays a significant role. In supervision, face-to-face meeting has been favored all

along. The development in ICT has paved ways for more effective student-supervisor communication by lifting the geographical barriers which can be a hindrance to face-to-face meeting. By creatively capitalizing the ICT, student-supervisor communication can be enhanced and this can be an impetus for producing quality graduates.

In this study, it is evident that there is much room for improving postgraduate students' and supervisors' literacy in ICT, especially in the use of data analysis and editing tools as well as communication platforms (e.g. blog, Friendster, Skype). As such, the university must initiate appropriate strategies to address this issue.

On the whole, supervisors have favorable perceptions on the use of ICT as student-supervisor communication tool; this is evident from the fairly high mean scores on all the four aspects of ICT usefulness in student-supervisor communication. Even though ICT is seen as an effective communication tool, the supervisors felt that it should only complement face to face meeting not completely replacing them. Students' perceptions on ICT use in student-supervisor communication were also favorable. All students, regardless of their demographic compositions, have similar perceptions. Comparison between students' and supervisors ratings demonstrated that the two categories of respondents do not differ significantly in their perception except for the aspect of 'communications with ICT strengthen student-supervisor relationship' where students subscribes to a more positive perception.

In order to capitalise on the ICT capabilities and the positive attitude of supervisors and students regarding the use of ICT in student-supervisor communication, the university should bridge the literacy gap among users and create an environment that will foster the use of ICT more extensively. Among the initiatives to be considered are trainings on ICT use, proper communication scheduling, enhancing ICT infrastructure and facilities, and creating awareness on the use of ICT as communication tool. The findings show that in general the supervisors believe that ICT can be a good complement to face-to-face meetings but the later cannot be replaced with purely ICT. While there is some truth in this belief, we should not forget that the real time communication tools like Skype can be a good choice when the face-to-face meeting is not feasible.

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