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# Integrating Information and Communication Technology (ICT) into University Teaching and Learning: A Case Study

Chan Yuen Fook  
Gurnam Kaur Sidhu  
Universiti Teknologi MARA (UiTM), Shah Alam

## ABSTRACT

*Over the past decade the push for academics to develop competencies in the use of information and communication technologies (ICT) in teaching and learning has increased. Within the Malaysian context unfortunately, until now there has not been a holistic and conclusive study on the integration of ICT in higher education. This exploratory study examined the integration of ICT among academics for the enhancement of university teaching and learning. A descriptive-correlational research methodology that employed a survey questionnaire was used in this case study. The data was analyzed using means, standard deviation, t-test, ANOVA, and correlation. The findings indicated that the ICT facilities in the higher institution left much to be desired and the usage of ICT in teaching among the academics was not at a satisfactory level. Even though a majority of the academics are aware of the many benefits of ICT there still exists academics who hold firm to the importance of face-to-face interaction and the didactic role of the instructors. The findings also revealed that the integration of ICT into the classroom focuses mainly on teaching and learning rather than the technical know-how about computers themselves and how this technology helps support users to participate in the integration of ICT into teaching and learning. However, most of the respondents have shown a keen*

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*willingness to adopt ICT in their future teaching and learning processes once proper training and relevant technical support are provided. The findings, in general, can help lecturers, IT staff and university management to manage the integration of ICT in university teaching and learning in a more organized manner. The findings also would enable the faculty to be more responsive to the needs of staff and students to effectively address the critical problems related to the integration of technology into university teaching and learning in ways that are both contextualized and authentic.*

**Keywords:** *Information and Communication technology (ICT), ICT readiness, higher education, improving university teaching and learning*

## **Introduction**

Information and communications technology (ICT) are the computing and communications facilities and features that variously support teaching, learning and a range of activities in education (Kent ICT, 2009). According to Wikibooks (2009), ICT stands for information and communication technologies and are defined, for the purposes of this primer, as a “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information.” These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony (Wikibooks, 2009).

The purpose of ICT in education is generally to familiarize students with the use and workings of computers, and related social and ethical issues (Wikipedia, 2009). ICT has also enabled learning through multiple intelligences as ICT has introduced learning through simulation games; this enables active learning through all senses. Hence, the integration of ICT helps learning institutions to be more innovative and this gives them the edge to stay highly competitive in the current global shift in education. In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings (Wikibooks, 2009).

Today ICT is seen as the tool for knowledge acquisition and knowledge dissemination and sharing which can help improve the quality of courses, curricula, and students’ learning. Many ICT experts (Smaldino,

Lowther & Russell, 2007; Shelly et al., 2008; Fillion et al., 2006; Sharp, 2005) have pointed out the importance and efficacy of the integration of ICT into teaching and learning. According to them, online learning technologies can transform and extend students' learning experiences by a significant improvement in student/student, student/lecturers, and student/material interactions. Newhouse (2002a; 2002b) further strengthen his assertion that ICT has a significant impact on students, their learning environments, teachers and pedagogy, schools provision of ICT capacity, school and system organization, and policy and practice.

## **Integration of ICT into Education**

In recent times, the integration of ICT in teacher education programs has become a topic of much debate (Larose et al., 1999). Ololube (2006) notes that teacher education programs have come under increased pressure to integrate ICT in their teaching and learning in a move to equip the new generation of teachers with the knowledge and skills required by global citizens for the 21st century. Newhouse (2002a; 2002b) notes that ICT literacy has not only enabled opportunities for individualized instruction but has also enhanced classroom teaching and learning via a dynamic, interactive, and engaging content that can promote experimentation, innovation and best practices. Furthermore, UNESCO's strategic objectives in education highlight that information and communication technologies (ICTs) should be the key tools to bring about a 'revolutionary' impact on the quality of education through the diversification of contents and teaching methods (UNESCO, 2002; UNESCO, 2005).

It is also pertinent to note that teachers and lecturers today are educating students who will most probably spend a large portion of their adult lives in a technology-rich society. Realizing this critical need, Malaysia, under the ICT Master Plan in 2001, outlined various initiatives to facilitate the integration of ICT in education and training programmes. The main aim of the ICT Master Plan is the preparation of a technologically literate and thinking workforce that will enable Malaysians to function as keen and competitive global players of the 21<sup>st</sup> century. As such the Ministry of Education (MOE) stressed that integration of ICT should not only be viewed as a tool to enhance teaching pedagogies and revolutionize student learning but more importantly to produce richer curricula leading to more effective organizational structures in schools (Tian, 2004).

To further help schools and universities to better educate students, the Malaysian government at all levels (federal, state and district) is spearheading massive funding efforts to equip classrooms with computers, connectivity to networks, and access to the Internet and the World Wide Web. The Malaysian MOE has earmarked 30 per cent of its annual budget (approximately MYR 4.2 billion) to connect a number of rural schools to the Internet and putting in place PSTN lines, and VSAT connections (ITU, 2002; 2004). More recent data from the MOE reveals that improvement in ICT use has exceeded the 2000 figures and in early 2003, almost all educational institutions had at least one computer laboratory equipped with Pentium class PCs. The UNESCO Meta-survey on the use of technologies in education in Malaysia indicated between 75 and 90 per cent of schools and 100 per cent of all universities had access to the Internet and these facilities would without doubt increase the integration of ICT in teaching and learning as well as in education management (Tian, 2004).

Furthermore, the vision and mission of teacher education in Malaysia is to develop a system of education that is on par with world standards in producing teachers who are constantly striving to achieve excellence and who are willing to work diligently towards fulfilling the aspirations of the nation (Teacher Education Division, 1999). Both Macchiusi, and Trinidad (2000) and Shelly et al., (2008) stress that educators in today's ICT era must be prepared to utilize both current and emerging computer technologies. In an effort to increase ICT use within classrooms, the Malaysian Ministry of Education (MOE) requires all teachers to undergo basic informatics courses at both teachers' training college and university. Besides that, MOE also provides intensive and continuous ICT training for all teachers. The UNESCO Meta-survey on the Use of Technologies in Education in Malaysia reveals that between 1996–2000, close to 30 per cent of the teachers received some form of ICT training (Tian, 2004).

Despite the many efforts to integrate ICT in teaching and learning, the full potential of ICT in many learning organizations leaves much to be desired. For example, the UNESCO Meta-survey on the Use of Technologies in Education in Malaysia reveals that though technological inputs such as personal computers have been in Malaysian schools since the late 1980s, the full capabilities of these technologies have not been fully utilised in the school (Tian, 2004). In many cases the computers have been used mainly as audio-visual aids and as supplements to traditional practices. Furthermore, another study conducted in Malaysia

earlier (Teacher Education Division, 1999), exhibited that the computers were more often than not placed in a special room and used mainly for teaching computer literacy or in some cases for remedial and enrichment activities. As such, it was hardly ever integrated in everyday classroom instruction. Moreover, teachers remained virtually the sole providers of knowledge and skills, leaving technology at the periphery of mainstream teaching and learning. These findings further emphasized that teachers failed to maximize the full potential of technology in the teaching and learning classroom.

It is also interesting to note that ICT experts like Smaldino, Lowther and Russell (2007); Marshall and Taylor (2005), and Shelly et al. (2008) highlight that despite the rapid growth of technology; educationists have been slow in adopting this technology. They are of the opinion that though educationists are aware of the many benefits of computer technology to effect significant change in the learning classroom, computer technology is not only under-utilized but it is also not used in creative and effective ways. Mumtaz (2000) feels that the slow uptake of ICT could be due to reasons such as a lack of teaching experience and a lack of financial support provided to teachers who utilize computers in their teaching. Besides that, other hindering factors include the lack of teachers' ability to integrate ICT-related skills they have learned into their teaching activities. Both the UNESCO Meta-Survey (Tian, 2004) and the report of UNESCO (2003a; 2003b) also indicate other obstacles including the cost of Internet access and hardware.

The many challenges faced by educationists in integrating ICT and embracing the emergence of new technologies call for a need to assess the readiness of teachers / lecturers to integrate ICT into teaching and learning and what implications it holds for teacher education. Only then can relevant measures be taken to provide suitable training to develop and access ICT learning situations that complement face-to-face environments. What educationists need most is to adapt and change with the times and include relevant ICT tools into their everyday teaching and learning. More importantly, educationists must also plan and manage the learning setting to ensure that their students are both challenged and successful. Therefore this paper discusses the findings of a case study that was carried out to examine the extent of the use of ICT in a university setting.

## **The Method**

The study employed a descriptive-correlation approach where a survey questionnaire and semi-structured interviews were conducted in the data collection process. The purpose of this study was to investigate the integration of ICT in a faculty located in a public university in the state of Selangor in Malaysia. Specifically, the objectives of the study were to examine the readiness for integrating ICT into the teaching and learning process and it included aspects such as learner readiness, student readiness, management readiness, content readiness, and cultural readiness. This study endeavored to answer the following research questions:

1. What is the level of ICT integration in university teaching and learning in terms of:
  - Lecturer's readiness
  - Students' readiness
  - Management readiness
  - Content readiness
  - Cultural readiness
2. Are there any significant relationships between the variables of readiness?
3. Is there any significant difference between gender and academic qualification in terms of ICT readiness?
4. What are the challenges faced by academics in integrating ICT into university teaching and learning?
5. How can the integration of ICT into university teaching and learning be further enhanced?

The instrument involved a search of the demographic data and readiness of respondents toward ICT in education - an instrument specifically designed to establish baseline data about teaching staff at a Faculty of Education in a public university in Malaysia with regard to the use of ICT in their teaching. The relationships of these variables were also tested. In addition, the study also looked into some demographic variables that may be related to ICT readiness. Besides that, lecturers' opinions, perceptions and suggestions relating to integrating ICT into university teaching and learning were also sought.

Data was obtained through the use of a questionnaire, which was administered once. The survey questionnaire was administered to 40 full-time academic teaching staff at the chosen faculty during the period

of two weeks with a return rate of 34 questionnaires (85%). Data was obtained through the use of a questionnaire, which was administered once. In the questionnaire, items on the readiness of the academics in integrating ICT were based on the following 4-point Likert Scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. In this study, an average mean of above 2.5 indicates a positive perception from respondents. The SPSS version 11.5 WIN was used to statistically analyze the collected information. This method of analysis included descriptive and inferential statistical analysis. Frequencies and descriptive procedures were performed in examining the accuracy of the raw data as the initial step. Descriptive statistics employing measures of central tendency: the mean and measure of dispersion or standard deviation were used to obtain an accurate measurement of ICT readiness.

However, t-test and ANOVA were conducted to identify the differences between/among the readiness variables with some of the demographic factors. Correlation analysis was also conducted to identify the association among the readiness variables. The data obtained may help identify variables for future studies that could lead to the uncovering of the readiness of lecturers towards the integration of ICT in university teaching and learning. Before a t-test and ANOVA can be conducted, there are three assumptions that need to be met: interval or ratio data; normally distributed data and; homogeneity of variance (Coakes, Steed & Dzidic, 2006). The first assumption was met as the data of the study are in the form of interval. The study used a normal probability plot to test the second assumption graphically. The result displayed a normal probability plot of the data of the study. The data were normally distributed as the significance level of all independent variables were bigger than 0.05. All the normality plots confirmed the normal distribution of the data. The third assumption is homogeneity of variance. Levene's test for equality of variance in SPSS was used to check whether the different groups came from population with equal variances. Results show that all the variables of different groups are not significant ( $P > .05$ ). In other words, the variances are homogeneous; hence, the third assumption is fulfilled.

Furthermore, a semi structured interview schedule was also administered to allow the researcher to gain an insight into the awareness of the ICT culture among the respondents. The interview schedule was carefully linked to the individual responses from the survey database, which allowed the researcher to personalize each individual interview. This enabled the researcher to clarify and consolidate certain survey



responses made by the respondents. The following key issues were addressed in the interview:

- Understanding of ICT
- Awareness of ICT in education
- Use of ICT in university teaching and learning
- Challenges in integrating ICT into university teaching and learning
- Suggestions to improve the integration of ICT into university teaching and learning

The interviews were conducted by the researchers over a period of two weeks with seven lecturers. Each interview ranged between 30 to 45 minutes.

## **Findings**

An analysis of the 34 samples of this study indicated that 19 of the respondents were females (56%) as contrasted to 15 males who accounted for about 44% of the sample. Regarding the age groups, the results indicated that 15 of the respondents (44%) were in the age group of 41-50 whereas 12 of the respondents (35%) were in the age group of 31 to 40. On the other hand, five of the respondents (15%) were above 51 whereas only two of them (6%) were below the age of 30. Looking into the ethnicity of the sample, a total of 26 of the respondents (76%) were Malays, followed by five Indians (14.7%) and two Chinese respondents who accounted for 5.9%. The remaining one respondent was a Sikh (2.9 %). In terms of academic qualifications, almost all respondents have a postgraduate degree. A majority of the 25 lecturers, accounting for 73.5% of the sample possess a master degree while the remaining seven lecturers (20%) have a doctorate degree and only two lecturers (6.5%) possess a bachelor degree.

## **Descriptive Analysis of ICT Readiness**

One aspect investigated in this study was the lecturers' reasons for using a computer. Results indicated that the following were some of the main reasons for using ICT: information (91%), research (88%), email (82%), application software (74%), on-line shopping/reservation/banking (47%) and for downloading software (44%). Other than that, more than one-third (38%) of the respondents used a computer for listserv/newsgroup

and e-discussion/e-forum while another one-third (32%) used it for chatting or instant messaging and e-library. Surprisingly, only a small proportion of the respondents (24%) used the computer for file-sharing. Only a minority (6%) indicated using the computer for network games.

Interview sessions also indicated that the poor response to the use of computers for file-sharing was due to the “poor and unreliable Internet connection” at the faculty. Other on-line facilities such as shopping, banking and making reservations could be conducted elsewhere. However, three of the seven respondents interviewed indicated that they did not trust making such transactions on the net as there was always a fear of computer hacking and they “did not feel safe keying in personal information into the computer as it could fall into the wrong hands”. Two respondents interviewed admitted to limited technical know-how to operate certain ICT facilities. One has to realise that to improve the ICT readiness among respondents more activities should be planned to encourage the use of computer and ICT in their teaching process.

The survey instrument also looked into the kind of computer programs that lecturers used in their every day teaching. Results revealed that 25 of the respondents (76%) integrated Microsoft PowerPoint while 22 of the respondents (65%) integrated Microsoft Word in their teaching. A total of 12-13 respondents integrated the use of Microsoft Excel (38%) and World Wide Web (32%) while less than one-fifth integrated Microsoft Publisher (21%), Educational Portal (21%), Newsgroup (15%), and email (15%) into their teaching. Only one respondent integrated Microsoft Access/DBMS (3%), e-discussion (3%), and other programs into their teaching.

Table 1 shows the mean and standard deviations of lecturer readiness sub-scales for respondents at the faculty. The results indicated the positive effect of ICT (mean = 3.35, SD = .77) and commitment to ICT (mean = 2.94, SD = .81). The result also indicated lecturers’ low commitment to integrating ICT into their teaching (mean = 2.28, SD = .72) and they hardly use computers on a regular basis in their teaching practice (mean = 2.59, SD = .99). Besides that, the result indicated that not many respondents (mean = 2.28, SD = .72) had incorporated ICT in their teaching. Interview sessions indicated that this was mainly due to the unreliability of Internet connection and lack of expertise in ICT. The findings show that respondents were unable (mean = 2.35, SD = .78) to provide technical help to their students or overcome technical problems themselves. Interview sessions showed that respondents being academics did not see this as a necessary skill to acquire or as a prerequisite for their current job description.

Table 1: Lecturer Readiness (n = 34)

Items	Mean	SD
I believe ICT will have a better effect on university teaching and learning	3.35	.77
I am willing to spend my time, energy and money on searching Internet material for my teaching	3.06	.74
I am committed to ICT	2.94	.81
I use computer in my teaching very frequently	2.59	.99
I can overcome most of the technical problems myself	2.53	.99
I am willing to invest my time, energy and money in developing ICT material	2.48	.84
I use the Internet in my teaching very frequently	2.47	.99
I am able to provide technical help to my students	2.35	.78
I like to integrate ICT into my teaching	2.28	.72
I am able to construct my own Web pages for teaching and learning	2.21	.98

Scale used: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4

Even though the findings indicated that the respondents were willing to spend time, energy and money searching Internet materials (mean = 3.06, SD = .74), the willingness to develop ICT materials (mean = 2.48, SD = .84) is still at an unsatisfactory level. Respondents also displayed little enthusiasm (mean = 2.21, SD = .98) in constructing their own web pages for teaching and learning. Respondents in interviews sessions expressed that the need to set up web pages was not of great concern as the majority of the students did not have Internet access at home or in their hostel. Hence the use of new technology to conduct collaborative on-line discourse between students and lecturers though often envisioned was not practical at the moment due to such constraints.

The survey questionnaire also examined the respondents' perception of student/learner readiness (Table 2). The findings indicated that students learned better when lecturers incorporated ICT (mean = 4.17, SD = .54) into the teaching and learning process. The results showed students' commitment towards ICT (mean = 3.06, SD = .67). Students are comparatively more interested in learning when the lecturers use ICT in their teaching (mean = 3.06, SD = .75). Even though, respondents agreed that their students possessed good computer skills (mean = 3.00, SD =

.67), they were still skeptical regarding their students' readiness for ICT (mean = 2.49, SD = .73). They felt that this was probably due to their students inadequate computer skills and limited English language proficiency (mean = 3.39, SD = .85). These findings were also corroborated by the respondents during the interview sessions. The respondents felt that their students were held back because a large number of them did not have Internet access at home or at their hostel.

Table 2: Student Readiness (n = 34)

Item	Mean	SD
My students learn better when I use the computer in the teaching and learning process	4.17	.54
Limited English language proficiency hinders ICT adoption by my students	3.39	.85
My students are committed to ICT	3.06	.67
My students are more interested in learning when I use computer in my teaching	3.06	.75
Most of my students have good computer skills	3.00	.67
My students are ready to go for ICT	2.49	.73

Scale used: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4

Findings in Table 3 show that respondents felt their faculty had a vision and mission on ICT (mean = 3.00, SD = .62). Even though respondents were of the opinion that their faculty provided sufficient training on how to support ICT (mean = 3.75, SD = .11), there were still some who either lacked confidence or were skeptical towards the integration of ICT into teaching and learning (mean = 2.69, SD = .69) and the implementation of ICT (mean = 2.37, SD = .87). This was probably due to the unsatisfactory level of infrastructure (mean = 2.63, SD = .79), staff development (mean = 2.59, SD = .88), availability of dedicated instructional designers (mean = 2.56, SD = .95) and technical assistance (mean = 2.50, SD = .72). The findings also revealed that the faculty lacked a strong IT team of experts (mean = 2.37, SD = .87), ICT Master Plan (mean = 2.50, SD = .72) and an ICT training center in the faculty (mean = 2.00, SD = .80) to implement ICT.

Table 3: Management Readiness (n = 34)

Items	Mean	SD
My faculty provides training on how to support ICT	3.75	.11
My faculty has a vision/mission on ICT	3.00	.62
My faculty is ready to integrate ICT into teaching and learning	2.69	.69
My faculty provides the necessary infrastructure for ICT	2.63	.79
My faculty has a staff development plan for ICT	2.59	.88
My faculty has a team of dedicated instructional designers	2.56	.95
My faculty has formulated an ICT Master Plan for the coming years	2.50	.72
My faculty provides technical assistance to staff and students	2.50	.72
My faculty is ready for ICT	2.50	.72
My faculty has a team to implement ICT	2.37	.87
My faculty has an ICT training center	2.00	.80

Scale used: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4

However, results exhibited that there was a high level of ICT content readiness in the faculty (Table 4). A majority of respondents find that there are a variety of ICT materials to choose from the Internet (mean = 3.35, SD = .72). The data showed that a majority of respondents agreed that the existing content for ICT was useful (mean = 3.00, SD = .65), appropriate (mean = 2.88, SD = .56), sufficient (mean = 2.82, SD = .74) and there are adequate online content support for their needs (mean = 2.76, SD = .49). Interview data also revealed that most of the lecturers felt that over the semesters they had improved their ICT skills and this was visible in their teaching Power Point presentations. Overall, the findings displayed that a majority of the respondents indicated a high level of content readiness for ICT in the faculty.

Table 4: Content Readiness (n = 34)

Item	Mean	SD
There are a variety of ICT materials to choose from the Internet	3.35	.72
Existing content in the Internet is useful for my students	3.00	.65
Existing content in the Internet is appropriate for the needs of my students	2.88	.56
Existing content in the Internet is sufficient for ICT	2.82	.74
There is adequate on-line content support (e.g. library, tutorials, e-discussions, educational portals, WWW, on-line collaboration projects, telecommunication projects, etc.)	2.76	.49

Looking at the results in Table 5, we notice that a majority of the respondents perceived ICT as an efficient means of disseminating information (mean = 3.24, SD = .65) and an advanced mode in teaching and learning (mean = 3.00, SD = .69). They believed that ICT can enable students and lecturers to communicate and interact better with one another (mean = 3.06, SD = .81). Despite having such a positive view towards the use of ICT in the teaching and learning process, respondents displayed a rather contradictory result when a majority of them indicated that the most effective method of learning was still “face-to-face” interaction (mean = 3.24, SD = .89). Similarly a majority of respondents also revealed that though “chalk and talk” was not the most efficient method of teaching (mean = 2.00, SD = .78), the teacher remains the best information provider (mean = 3.00, SD = .69). However, the results also showed that only an above average mean was achieved regarding the feasibility of collaborative learning (mean = 2.94, SD = .74) and communication skills (mean = 2.76, SD = .82) through ICT.

Table 5: Cultural Readiness (n = 34)

Items	Mean	SD
The most effective method of learning is ‘face-to-face’ interaction	3.24	.89
ICT is an efficient mean of disseminating information	3.24	.65
ICT enable students and lecturers to communicate and interact better with one another	3.06	.81
ICT is an advanced mode in teaching and learning	3.00	.69
The teacher is still the best information provider	3.00	.92
Collaborative learning can be enhanced through telecommunication projects	2.94	.74
Email and chat enhance students’ communication skills	2.76	.82
Discussions via the Internet make learning more meaningful	2.47	.86
The most efficient method of teaching is ‘chalk and talk’	2.00	.78

Scale used: strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4

### **Intercorrelations among the ICT Readiness Variables**

An analysis of the findings presented in Table 6 reveals the zero order correlations among the readiness variables. Learner readiness ( $r = .56, p < .001$ ), management readiness ( $r = .67, p < .001$ ), content readiness

( $r = .74, p < .001$ ) and cultural readiness ( $r = .29, p < .05$ ) indicated a significant positive relationship with lecturer readiness. These results suggest that a good lecturer should be a content expert and one who is able to establish a good relationship with the management, understand the cultural differences and have a friendly and cordial relationship with students to ensure the success of the integration of ICT into teaching and learning. It is also interesting to note that learner readiness had a positive association with management ( $r = .45, p < .001$ ), content ( $r = .68, p < .001$ ), and cultural readiness ( $r = .30, p < .05$ ). These results imply that students who want to manage their own learning must be familiar with the ICT learning environment, management system and the cultural system. Correlation analysis also indicated the significant positive relationship between management readiness with content ( $r = .38, p < .001$ ) and cultural readiness ( $r = .27, p < .05$ ).

Table 6: Correlation among the Readiness Variables

Readiness Variables	Lecturer	Learner	Management	Content	Cultural
Lecturer	1.00				
Learner	.56**	1.00			
Management	.67**	.45**	1.00		
Content	.74**	.68**	.38**	1.00	
Cultural	.29*	.30**	.27*	.26*	1.00

\*  $P \leq .05$ , \*\*  $P \leq .001$

Notes: Lecturer = Lecturer Readiness, Learner = Learner Readiness, Management = Management Readiness, Content = Content Readiness, Cultural = Cultural Readiness

The result suggested that a good management system would encourage lecturers to prepare ICT materials and attempt to integrate ICT into teaching and learning. The relationship between the content and cultural readiness ( $r = .26, p < .05$ ) further indicated the importance of customizing the content according to the different cultural environments. These findings also reveal that students who study in an ICT aided environment will definitely learn better. From the correlation analysis, we can see that the success of the integration of ICT into teaching and learning is not solely dependent on lecturers' competency, but there are many other factors at play such as students' competency, classroom facilities, management and technical support, relevant content and the

awareness of the cultural differences that also need to be taken into consideration.

These results were further analysed based on variables such as gender and the academic qualification of the lecturers. T-test analyses indicated significant gender differences in all the readiness variables (see Table 7). Males reported higher mean scores than females on the lecturer readiness ( $M = 2.84$  vs  $2.44$ ,  $SD = .80$  vs  $.72$ ) and content readiness;  $M = 3.14$  vs  $2.93$ ,  $SD = .66$  vs  $.65$ ). However, females reported higher scores for management readiness ( $M = 2.80$  vs  $2.50$ ,  $SD = .70$  vs  $.72$ ), learner readiness ( $M = 3.24$  vs  $2.67$ ,  $SD = .64$  vs  $.66$ ) and cultural readiness ( $M = 3.05$  vs  $2.68$ ,  $SD = .80$  vs  $.79$ ). T-test analyses indicated significant differences in all the readiness variables between males and females. Overall, the study implied that male lecturers were more competent than female lecturers and were more ready to upload their materials onto the websites. However, the female lecturers were more people-centred compared to their male counterparts as they were more concerned with the management supports, students' readiness and cultural differences in the integration of ICT into teaching and learning.

Table 7: t-test Results by Gender

Variable	Gender	Mean	SD	T	p- value
Lecturer	Male	2.84	.80.	2.13	.000**
	Female	2.44	.72		
Learner	Male	3.14	.66.	2.87	.000**
	Female	2.93	.65		
Management	Male	2.50	.72	2.35	.000**
	Female	2.80	.70		
Content	Male	2.67	.66	2.78	.000**
	Female	3.24	.64		
Cultural	Male	2.68	.79	2.89	.000**
	Female	3.05	.80		

An ANOVA was also conducted to evaluate the relationship between each readiness variable and academic qualification. However, no significant difference was observed (see Table 8), suggesting that ICT readiness variables are not related to academic qualification.



Table 8: ANOVA Results by Academic Qualification

Variable	Academic qualification	Mean	SD	F	p- value
Lecturer	Doctorate	2.65	.80	2.45	.076
	Masters	2.64	.77		
	Bachelor	2.63	.72		
Learner	Doctorate	3.04	.69	2.89	.087
	Masters	3.02	.66		
	Bachelor	3.01	.65		
Management	Doctorate	2.66	.72	2.35	.058
	Masters	2.59	.70		
	Bachelor	2.61	.70		
Content	Doctorate	3.00	.67	2.78	.065
	Masters	2.96	.66		
	Bachelor	2.94	.63		
Cultural	Doctorate	3.00	.78	2.57	.085
	Masters	2.89	.79		
	Bachelor	2.85	.80		

### Qualitative Data of ICT Readiness

The data analysis also included the mean scores of the respondents’ overall comments based on a scale of 1 to 10. A score of 1 indicated strong disagreement and a score of 10 displayed strong agreement. The results indicated that a majority of the respondents perceived that their students (mean = 6.65, SD = .56) and they themselves (mean = 6.53, SD = .73) were ready for ICT. However, respondents expressed moderately low concern for issues related to the economy (mean = 5.74, SD = .66), efficiency (mean = 4.97, SD = .85) and effectiveness (mean = 4.79, SD = .49) of the integration of ICT into the faculty teaching and learning.

Open ended questions in the survey questionnaire also explored issues such as respondents’ understanding of the term “ICT” and examples of ICT activities respondents carried out in their everyday teaching practice. Given below are some definitions put forward by respondents:

- The delivery of learning, training and education programs by electronic means (Respondent 3).
- Teaching and learning via computers and the Internet (Respondent 12)
- The use of technology to enhance teaching and learning (Respondent 27)

- Using ICT in teaching and learning (Respondent 29)
- Learning electronically (digitally) through computer network (Respondent 34)

The above findings indicate that a majority of the respondents have a good understanding of the term ICT but very few are able to articulate the versatility that lay behind “ICT” such as on-line collaborative learning and the use of educational portals and learning management systems. Both interviews and the survey questionnaire also sought to get respondents’ opinions regarding the integration of ICT into university teaching and learning. A large majority viewed such integration positively and agreed that it would enhance the teaching and learning process and “provide more flexible learning to take place”. Some stressed that if local universities wanted to become global partners in education, integration of ICT should be seen as the “way forward” towards achieving world-class university status.

Respondent 32, agreed to the many benefits ICT could bring to the learning classroom but emphasized that “traditional methods of learning like having library skills were still very much needed and should not be ignored”. However two respondents voiced concern. Respondent number 23 had this to say:

*I don't think we should go overboard. The computer is not the end; only the means to an end. The lecturer needs to be clear about the function of ICT in the teaching and learning process. ICT should not be used as an excuse for the lecturer to go missing or reduce his/her teaching responsibilities. As I see it the integration of ICT actually makes the lecturer's role more challenging.*

Asked to comment on some of the challenges faced when integrating ICT into university teaching and learning, a large majority of the respondents expressed that the poor and unreliable Internet connection at the university had somehow “slowed and dampened lecturers’ motivation and enthusiasm to integrate ICT into university teaching and learning”.

A number of respondents also voiced concern that expert technical support was sadly lacking and regular maintenance by the technical team was not carried out. Respondents expressed that they had to wait for quite a while before expert assistance could be provided to alleviate their ICT problems. A few respondents pointed out that “their computers

were too old” and they stressed the need to upgrade PCs on a regular basis with the latest software to combat new viruses. Some complained that their PCs were functioning “too slow” which made the integration of ICT into teaching rather “frustrating”.

Finally respondents were asked to make suggestions as to how the integration of ICT into university teaching and learning could be further enhanced. A large majority again voiced the need for universities to build a network system and a better server that could be relied upon at all times. A number of the respondents felt broadband facilities should be installed for all lecturers. Some proposed the set-up of a separate server for each faculty so that the problem of “over-load” could be overcome.

A number of the respondents also called for better technical support. Some claimed that the technical personnel lacked expert IT knowledge. Hence steps would have to be taken to “ensure expert technical support is always at hand when problems arise”. The need to increase technical staff was also another suggestion put forward by a few respondents. One respondent stressed that “a number of students also need technical support and if universities are to integrate ICT, both students and lecturers must be provided with the technical support and the relevant infrastructure”. Hence there was a call for better computers and more space for the building of up-to-date computer laboratories.

## **Discussion, Implications and Recommendations**

The findings in this study indicate that academics are aware of the many benefits ICT integration can bring into the field of university teaching and learning. A majority of the respondents (> 80%) also agrees that ICT based teaching and learning are self-paced, learner-centric, learner-controlled, interactive and interesting. Despite the great potential of ICT, academics are still cautious in implementing ICT into their classroom teaching.

At the individual level, a majority of the teaching staff at the faculty can be said to be at the exploratory stage where the integration of ICT is concerned. They are just beginning to use ICT in their teaching and learning due to the increased emphasis at a global level of the ICT technologies such as the Internet and email. There is sufficient evidence (Detya, 2000) that ICT applications have not penetrated university teaching at much more than a superficial level, and that the level of expertise and practice is not yet sufficient to ensure that their wider use

is considered viable by all academic staff. Inferential statistics also indicated that effective lecturers should be ICT literate, able to establish a good relationship with the management, understand the cultural differences and integrate ICT into teaching and learning. Similarly, the findings also reveal that a good management system will encourage lecturers to prepare ICT materials and attempt to integrate ICT into teaching and learning. As such, students who study in an ICT aided environment will definitely learn better. This study also supports findings from other studies elsewhere around the globe which indicate that academic staff at university level use ICT more for personal tasks than in their teaching and learning (Macchiusi & Trinidad, 2000).

Though feedback from lecturers in this study is generally positive and indicates the level to which people have been willing to try something new, there are still some cultural concerns. They are prepared to give ICT a try but at the same time want to maintain a tight control on what is happening, particularly how (and what) learning might occur. This group of academics doubts the effectiveness of ICT and believes that the teacher is still the best information provider and guide to student learning. Yet all these academics are familiar and agree with the rhetoric behind the push for increased competency in using ICT. It is evident that the integrated use of ICT in university teaching perhaps calls for a change in the mindset of all academics and the giving up of some (traditional) control of the learning process. This finding supports the versatility of teaching proposed by Smaldino, Lowther and Russell (2007). According to Smaldino, Lowther and Russell (2007: 334), the digital teacher's instruction includes presentations that are media-rich and interactive. Live digital videoconferences bring historians, novelists, and content experts into the classroom. Notes and concept maps from brainstorming sessions are captured on electronic whiteboards and instantaneously emailed to students. Instructional presentations seamlessly integrate streamed digital video and audio from Internet-based files that range from short clips demonstrating specific concepts to full-length documentaries. Teachers instantaneously go to a specific section of a DVD and show a segment in slow or fast motion, or still shot to reinforce the targeted student outcomes. PowerPoint presentations integrate animations, sounds, and hyperlinks to digitized information.

The findings also suggest that effective integration of ICT into university teaching and learning requires a high-impact change among the profession of academics. Such a change must come from both within and outside the individual. More importantly, the management must take

on a more positive role in providing training programs that range from the very basic to more complex applications such as how to make a webpage or portal and more extensive programs such as learning how to use shared workspaces. Additionally, the management needs to be aware that ICT in university teaching and learning has to be more contextualised. According to IT Preneur (2004) such ICT endeavors have to be:

- just in time - available for the users when they need it to complete the task;
- on-demand - available when they need it, not in a couple of days time, or a week or a month;
- bite-sized - available in small chunks that take only a short time to complete, i.e. 15-20 minutes

Finally, the high cost of ICT is always one of the major concerns of anyone wanting to integrate ICT into their systems. Effective, efficient and economical integration of ICT into university teaching and learning calls for adequate on-going finance budgets that can provide for continual upgrading of software, proper infrastructure and reliable Internet access. Together with successful ICT integration, there is a demand for a good technical support system and professional expert IT personnel. These results also reveal that students who want to manage their own learning must be familiar with the ICT learning environment, the management system and the cultural system.

## **Conclusion**

This study corroborates with the fact that the integration of ICT into university teaching and learning provides attractive and meaningful learning experiences. Both academics and the management at the faculty acknowledge the great potential of ICT that simultaneously enables the accessibility of ICT into university education. While ICT provides an array of choices, academics are not only cautious but also slow in keeping up with the fast pace of changing technologies available in today's high-tech markets. At such a juncture, perhaps what is needed is a shift in the mindset of university academics towards ICT. Academics must be willing to try and achieve strategic ICT outcomes and look for ways to respond to the pedagogical needs and opportunities that encourage involvement from both students and other members of the faculty. Academics must

practice what they preach and use the latest innovations in ICT in such a way that both academics and students alike will benefit, making university education more enriched and flexible.

If ICT is to be seen as an integral part of university teaching and learning process, then university management needs to ensure ample computer access and projection facilities in all teaching classrooms so that everyone can take full advantage of the flexibility of ICT. More importantly, if universities want to profile themselves as being “techno savvy”, a synergic working relationship requiring communication at all levels at the university needs to be formed to address critical issues and problems related to the integration of ICT into university education. There is no doubt that once the necessary support systems and proper infrastructure are provided for a common electronic environment, much more can be achieved towards making ICT a reality in university education.

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