Utilization of ubiquitous technology among engineering undergraduates

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ABSTRACT – The use of ubiquitous technology among undergraduates is increasing day by day, and technology is used to accomplish specific tasks in their lives, especially in teaching and learning aspect. Hence, this study is to identify the types of ubiquitous technology that are used among Engineering undergraduates and represent the use of ubiquitous technology at the higher institution. The result obtained will assist the university's administration in preparing a path towards implementing a ubiquitous learning environment. The data of this study is gathered through a 5-point Likert scale questionnaire, with the reliability of 0.901 for types of use. The sample is undergraduates studying at Engineering faculties at one of four Malaysian Technical Universities and statistical analyses of data collected are performed by SPSS 25. Results show that the central type of ubiquitous technology use is for inquiry and general use, followed by communication use, expression use and construction use.

1. INTRODUCTION

In this techno-centric world, it seems that there is no one perfect technology which is suitable for young people, including the students; the one suits for their learning or leisure purposes. Some want to carry only one device around, in which case a multi-functional mobile phone is the best bet. Others want to watch movies on a larger screen, which means a different type of technology is called for. There are a number of different technologies which are being used by students which include web-enables wireless phones (e.g., smart phones), web-enabled wireless handheld computers (e.g., tablet), wireless laptop computers and Personal Digital Assistants (PDAs). However, the most often technologies used in learning environments are wireless laptop computers, smartphones and tablet [1].

The types of use of ubiquitous technology either for learning or leisure purposes will open to a thousand possibilities for the engineering students, in creating an open environment and connecting classes around the world and providing more individualized instruction for students [2]. Nevertheless, to integrate technology into educational system is not an easy task. Starting with the infrastructure, and then working its way through the possibilities and challenges and finally understanding the acceptance and its impact on learners.

Furthermore, technology can help facilitate the knowledge-constructed classroom. A number of researchers perceive technology such as smartphone and laptop as an influential one that may affect teaching and learning outcomes. They stated that with the use of these technologies, learning environment would focus more on student-centered and individualized learning. In the student-centered learning environment, with the aid of the relevant technology as aforementioned, students are able to collaborate, use critical thinking, develop certain generic skills like lifelong learning skills and problem solving skills [1,2,3,4].

As the development of fast-paced technology, the number of technology sold at the market was sky-rocket as they offered a reasonable price, so the buying power among undergraduates will also increase, therefore the importance of ubiquitous technology in educational system and integration was magnified. There were many opportunities in using ubiquitous technologies in the classroom; from connecting classes around the world to provide more individualized instruction for students, engage and occupy students with the system and active learning environment while in or outside classroom environment [5].

Technology will not conform to any particular user but, rather, users acquire technological essence only when they envision or act towards the technology as a means of accomplishing something [6]. This implies that although technology themselves are continually evolving; it is the actual use that people put in the technology to which will determine if the technology are truly innovative. Therefore, for this study, the use of technology refers to the purpose of using ubiquitous technology and it has been categorized into four categories; namely, i) technology for inquiry and general use, ii) technology for communication use, iii) technology for expression use and iv) technology for construction use.

1.1. Technology for General Use and Inquiry

The general use of technology term refers to a common use for certain technology; or a common action that is applied by user in using certain technology which is not being modified for a particular purpose or function [7]. Meanwhile, technology for general use is a technology that can be applied or used to any content area and for general purposes [8].

1.2. Technology for Communication

The connectedness comes through the immediacy and interpersonal nature of online communication. Face-to-face instruction in a traditional classroom is often public communication, conversely online interaction is more similar to interpersonal communication than other types of communication [9]. This interpersonal nature is

what gives the potential for informal and personal communication in these learning situations.

1.3. Technology for Construction

Technology for construction was defined as using ubiquitous technology for learners to develop new ideas, products and even projects prior to their existing knowledge and achievement in academic context. However, the ideas, products and projects are not being developed for grading purposes. It is for the sake of expressing their personal feeling and fulfilling their leisure time with something good [10].

1.4. Technology for Expression

Technologies can also be used as media for learning through expression. The online journaling, for example, engages students' intra personally. Students who do blogging, seem to share the feeling that their communication allows them to develop self-identity and expression [11].

2. OBJECTIVE AND RESEARCH QUESTION OF THE STUDY

The objective of this study is to determine the types of ubiquitous technology utilization. The research question of this study: What is the types of utilisation level of ubiquitous technology among the undergraduates?

3. METHODOLOGY

For the purpose of this study, a quantitative approach was employed to answer the research questions. This study was conducted at one technical university in Malaysia and the accessible population was selected from the third-year undergraduates. In this study, data was gathered through the use of a set of questionnaire. The proportional stratified sampling was used as the sampling technique in this study and a total of 102 students had answered the questionnaire given.

The questionnaire in this study was developed based on literature review in related studies and adapted according to objectives of this study. The questionnaire was divided into two sections, (i) Section A: Demographic information, (ii) Section B: Ubiquitous technology utilisation.

4. DATA ANALYSIS

This section describes undergraduates' demographic characteristic, namely gender.

Table 1: Demographic Data of Undergraduates

Demographic Data	Frequency (f)	Percentage (%)
Gender		
Male	55	54
Female	47	46

From Table 1, the gender distribution was almost equal among undergraduates; male (n=55, 54%) and female (n=47, 46%).

Next, the section explains findings on the ownership of u-tech namely, laptops, smartphones and tablets among the undergraduates.

Table 2: Ubiquitous Technology Ownership

Ownership	Frequency/Percentage		
	Gender		
	Male	Female	Total
Laptop			
Yes	55 (100%)	47 (100%)	102 (100%)
Smartphone			
Yes	55 (100%)	47 (100%)	102 (100%)
Tablet			
Yes	10 (18%)	10 (21%)	20 (20%)
No	45 (82%)	37 (79%)	82 (80%)

From Table 2, all undergraduates (n=102, 100%) owned laptops and smartphones, whereas 71(18%) undergraduates did not own them. Meanwhile, a majority of undergraduates (n=82, 80%) did not own tablets.

From Figure 1, results showed that in terms of hours in using u-tech, most undergraduates used smartphones approximately for 12 hours, followed by laptops for ten hours and tablets for five hours per day.
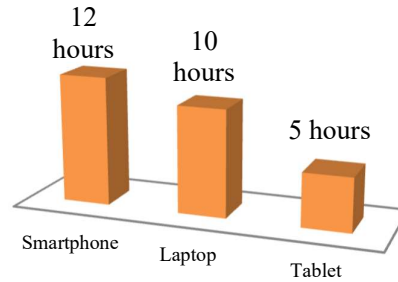

Figure 1: Usage Hour of Different U-Tech in a Day

According to Table 3, there were four types of use that obtained mean of 4.00 and above; namely, technology used for completing assignment (mean = 4.90, SD= .691) and downloading notes (mean = 4.89, SD= .834), which felt under the inquiry category. Meanwhile, online chatting; which felt under communication category (mean = 4.78, SD= .808) and as a medium to save file; general category (mean =4.74, SD= .787). Result also showed that students shared ideas and they were willing to express their thoughts by posting online comments and using ubiquitous technology for capturing and recording, both were at (mean= 4.60, SD= .922 and .821).

Students also used ubiquitous technology for analyzing data, such as using a spreadsheet, building graph and also collaborating with certain software in certain courses while in the university. Then, the usage of ubiquitous technology was not limited to only inquiry purposes, but it has been used for entertainment and expression too, such as for playing

online games (mean= 4.43, SD= .871). Finally, from the table, result showed that the least types of technology use were for construction purposes; like constructing music (mean = 4.35, SD= .884) and creating new innovation (mean= 4.24, SD= .781). This has shown that the usage of ubiquitous technology for higher thinking order was at higher level among Engineering undergraduates and perhaps was due to their competency in using the ubiquitous technology.

Table 3: The Technology Use

Purposes	Mean/ SD	Category of Technology Use
Complete assignment	4.90 / .691	Inquiry
Download lecture notes	4.89 / .834	Inquiry
Chat online	4.78 / .808	Communication
Save files	4.74 / .787	General
Post comment online	4.60 / .922	Expression
Capture and record picture	4.60 / .821	General
Read online books/newspaper	4.55 / .848	Inquiry
Watch live broadcast	4.54 / .863	General
Find location of	4.46 / .903	Communication
Analyze data	4.44 / .797	Inquiry
Play online games	4.43 / .871	Expression
Write personal diary	4.40 / 1.029	General
Construct music	4.35 / .884	Construction
Express feeling in blog	4.30 / .951	Expression
Shop online	4.25 / 1.057	Construction
Create new innovation	4.24 / .781	Construction

5. CONCLUSION & RECOMMENDATION

The study found that the ubiquitous technology was used fully among the Engineering undergraduates. Majority of the undergraduates perceived that the ubiquitous technology as a useful technology that might help them to attain benefits in their job performance and learning process. This could be due to their awareness, competency as well as the need of this technology for 21st century. In other word, technology can be presented at every stage of educational process from the introduction, research, project making and presentation.

However, an in-depth research is required to investigate on the factors that influence the levels of the use of ubiquitous technology among ICT undergraduates and to find out what are other significant parameters that discriminate the levels in using technology. More efforts are needed to determine the students' actual use of ubiquitous technology and propose a framework that relatively portrays engineering or perhaps undergraduates from all fields.

6. ACKNOWLEDGEMENT

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