Defining the Characteristics of Digital Natives among Malaysian Technical University Networks' Students

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***Abstract*—This research builds upon the discourse surrounding digital natives. Digital natives is generation of students, who was born between 1980 and 1994, has grown up with technology from a very young age. They are hypothesized to possess sophisticated knowledge and skills in using technology and are highly motivated to learn digitally. Thus, this implies a need to change the knowledge content and methods of delivery in universities to cater to the students' needs. However, many studies have revealed that the 'digital natives' use of technology is neither extensive nor diverse. No substantial studies have been undertaken particularly among the Malaysian Technical University Network's (MTUN) students to support or refute such claims. This study, undertaken only at one MTUN, used a questionnaire to investigate students' patterns in using technology and perceptions on the factors that contribute to the use of technology. The findings revealed that even though students' reception towards use of technology was very positive, there was a lack in diversity and sophistication.**

Keywords—Digital Natives, Malaysian Technical University Networks, Technology Use

I. INTRODUCTION

The term 'digital natives' was popularised by Marc Prensky and there has been an on-going discussion and evaluation of the term and idea. The idea that has gained traction in the educational circle is the notion that students (those born after 1980's) presently studying in institutions of higher learning are more technologically savvy than the previous generation as they have been brought up in the Internet age, in an environment surrounded by technologies. Proponents of this idea speculate that these students labelled as digital natives [31] or Net generation [42] have a number of homogeneous traits. They are described as being highly literate in multiple media, having the aptitude to multitask and process online information rapidly, capable of adopting and adapting technologies for their personal use, having a low tolerance for lectures, having a preference for active rather than passive learning, and relying on telecommunication tools to access information and for social contact [29, 31, 32, 42]. These claims have stirred much attention and researchers have also been mixed in their stand regarding the digital ability of today's students and its influence on their ability to learn. The direct implication is that there needs to be major educational changes to accommodate or even further enhance the technological ability of these digital natives.

However, reported that there is "growing theoretical and empirical evidence that casts doubt on the idea that there is a defined new generation of young people" (p. 724) [22].. Studies undertaken in various parts of the globe have revealed a lack of uniformity in terms of access to technologies and usage of technologies among these young technology users. For instance, study found that first year South African university students from diverse backgrounds possessed differing levels of access to and use of both entrenched and newer technologies [1]. This was also revealed by [2,3] study which also uncovered similar findings among first year Australian university students. While majority of these students were technologically savvy, there were considerable variations in access and use of the other tools beyond the more commonly-used technologies and tools. These findings indicated that these students' experience with technology were not as a homogenous population with homogenous traits as claimed by the proponents of digital natives.

Research further showed that university students used technologies for a host of activities which were not necessary related to learning. For example, revealed that American students generally used basic office computing skills for academic purposes and email, instant messaging and Internet surfing for personal purposes [17]. He further found that high levels of use and skills were evident but there was no indication of a preference for increased use of technology in the classroom. A study further found that Australian students varied with regard to their ability and access of technology [14].

II. THE MALAYSIAN SCENE

In Malaysian context where this study is situated, efforts to promote technology use have been undertaken at all levels. The Malaysian Education Blueprint 2013-2025 unveiled recently, reinforced the Ministry of Education's (MoE) plans to inculcate

In 2009, the investigation on the perceptions of students in a Malaysian public university towards an online course was conducted [41]. They found them to be very receptive towards it and they professed that the course had helped them to improve their reading skills and strategies, autonomy and motivation. Despite that, they indicated that they preferred a mixed approach i.e. a course with both a face-to-face component and an online component. This is further supported by a study which found that the use of blogs was able to develop students' skills in terms of writing in learning English subject [18]. Additionally, study demonstrated that students from the same university felt that blogs assisted them in enhancing their L2 skills, self-confidence and communication skills [7]. Other study revealed online forums, another social medium, were well-received by Malaysian university students who expressed that the online forums provided them with the necessary language and content knowledge [6] .

However, studies on actual technology use in learning have generally been discouraging. A study undertook an investigation into computer usage and perceptions of accounting students in a Malaysian university [41]. The results uncovered a low level of computer usage both for academic-related purposes and in their daily lives. They also had low perceptions of computers and did not view its use as easy and enjoyable. Later, results of the study that found very contrasting findings. They revealed that Malaysian youths used various communication and media tools in the daily lives. These findings are corroborated by those found in recent studies [35, 36, 37, 38]. However, a study revealed that the students in a Malaysian public university still preferred face-to-face discussions over online communication for learning purposes [40]. Thus, at this juncture it is possible to put forth the hypothesis that technology use in the Malaysian context is generally welcomed by students but usage is limited to commonly-used technologies such as emails, computers and mobile phones and not new or more advanced technologies such as social networking and blogs.

CONTRIBUTING FACTORS

In the context of engineering and technical education, technology competency is interpreted as the perception of skills, abilities, knowledge and other characteristics displayed by students [30]. Technology competency is also considered as the most important skill that should be acquired by the engineering graduates before they enter the workforce. This is important, because the students are expected to deal with and be involved in technical skills while in the workforce, which require them to handle and utilise a wide array of technologies and machines [21].

Other studies were conducted among university students in public universities in Malaysia [10, 1]. Findings indicated that a majority of the students agreed that having an adequate basic knowledge of technology was important in influencing them to use Internet effectively [10]. In other words, the students who perceived themselves as competent users reported higher levels in Internet utilisation compared to the incompetent students. In addition, the competent students were also reported to have a more positive perception towards technology use such as laptops and mobile phones compared to the inept ones.

The next contributing factor is performance expectancy, which refers to the degree to which learners perceive that using the technology would help them achieve desired goals in learning [12]. Research in the Malaysian context on the use of laptops was conducted by [11, 13] found that the use of educational computer games (ECG) using laptops among students in one private university was regarded as useful. The students agreed that laptops were very useful and practical tools due to their exciting and engaging features. The results of the study indicated that the use of laptops will remain vital whenever students' perceived performance expectancy as one of the salient factors that influences their utilisation. Moreover, the students viewed the ECGs as useful and believed that ECGs were capable of improving their performance in learning.

The next factor is effort expectancy, which refers to the perception that using u-tech is easy and effortless; this could be due to the characteristics of the technology [7] such as in terms of its technical specifications [12], special elements [45] and functionality [33]. Among the engineering students in Malaysia, studies were conducted by [19]. They found that tablets were viewed as an excellent tool as they were easy to use. In their study, the students concurred that while using the tablets, they did not have to put much effort in understanding and handling them. Besides that, students were able to use the dictionary and thesaurus apps both online and offline without having the difficulty of bringing along their bulky dictionaries all the time. With the portability offered by tablets, students were able to set up a keyboardless and wireless writing station. Due to these benefits, students were encouraged to use tablets not only in their engineering and technical subjects but also to expand its utilisation pattern as a tool for research purposes, for example to capture facts and figures especially for data analysing as well as for filling out forms that focused on categorical information.

Then, followed by the facilitating conditions factor. It refers to the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of technology as a learning tool [5]. A study conducted by [40] among students in one private university in Malaysia concluded that the constructive support from the university administrators and help from the experts inside the university or the helpdesk had significantly influenced the students' utilisation of their university learning portal via smartphones.

According to the study, the numerous problems related to non-usage of smartphones was due to the lack of technical people supporting and maintaining the functionality of the technology. When students received sufficient support and help, they would fully use their university learning portal.
Social status or social influence is another factor that is able to influence the utilisation of new technology [39, 44, 43]. Social status is regarded as the degree to which an individual perceives the importance of others believing he or she should use the technology [35]. In the modern world, the possession of new technology such as smartphones and tablets are seen as a status symbol among students in higher learning [24, 25]. Results from two studies conducted at two different public universities in Malaysia by [15] and [18] found that students enjoyed showing off their technology devices, because it made them feel important and trendy. A study also expounded that students agreed that the feeling of respect they gained from lecturers and friends had directly influenced their usage of technology [35]. A study also indicated that social status or influence had significantly had a bearing on the use of the new technology introduced to students [20].

The final factor is behavioural intention which defined as a 'person's conscious or deliberate intention to engage in either positive or negative behaviour' [34]. A study conducted among users in Malaysia asserted that no matter how capable the technology was, the effective usage of technology was still dependent upon users' behavioural intention in using that technology [41].

III. OBJECTIVES

This study intends to investigate to what extent the students, the so-called 'digital natives' are using technology and the determine the factors that contributed to the use of technology. Specifically, it seeks to find answers to the following research questions:

i. What are the level of students' use of technology?

ii. What are the factors that contribute to the use of technology?

IV. RESEARCH METHODOLOGY

This study employed a quantitative approach using a questionnaire. A total of 100 questionnaires were distributed to a new intake of diploma students. Majority of them were born on the year 1996, which reflect the idea of the criteria of a digital native. The questionnaire comprised two sections. Section 1 of the questionnaire contained items that gathered students' background information. Section 2 consisted of two parts. For the Part A, students were required to indicate their ownership and use of technology tools. A Likert scale was used for this part and the choices were: 1 for 'never', 2 for 'seldom', 3 for 'sometimes', and 4 for 'frequently'. While, Part B investigated students' perception on the factors that contribute to the usage of technologies. For this part, the choices were: 1 for 'strongly disagree', 2 for 'disagree', 3 for 'neutral', 4 for 'agree', and 5 for 'strongly agree'. To ensure that the students understood the content of the questionnaire accurately, it was prepared bilingually (Bahasa Malaysia and English language). Statistical analysis was undertaken using Statistical Package for the Social Sciences (SPSS) version 20. The mean score of each item was calculated and the following statistical procedures were undertaken: frequency analysis as well as item analysis.

V. RESULTS

OWNERSHIP OF TECHNOLOGIES

Item analysis was carried out to identify the technology tools that are most and least used by the students. The frequency analysis revealed that all students own at least one technology. A majority of them also possess a laptop (90.3%), smartphone (88%), tablet (30%) and the least was a mobile/feature phone (12%). The reason for the high ownership of laptops and smartphones may be due to the multi-functionality of these two technologies which allow for incorporation of many of the features found in media players, digital cameras and games consoles.

USAGE OF ELECTRONIC TOOLS

The usage of technology tools such as emails, blogs, social networking sites, online forums, learning management systems and others either for learning or social pirposes was next considered.

Technology Tools	**Percentage (%)**
e-Learning websites provided by the university	90
Online discussion groups	70
Virtual/Real Time Chat Facility	60
Video Conferencing	30
Online assessments (e.g. Multiple choice quizzes)	50
Tablet	58
Smartphones	88
Laptops	95
Mobile/feature phones	11
Wikipedia	51
Google scholar	30
E-mails	59
Social Networking Sites (such as Facebook, Twitter)	88
Skype	20
YouTube	88
MP3 player	23

PERCEPTION ON THE FACTORS THAT CONTRIBUTE TO THE USE OF TECHNOLOGY

Items in this section explicated on the factors that contributed to the use of technology.

Perception in using technology	**Frequency/Percentage (%)**					**M**
	SD	**D**	**N**	**A**	**SA**	
Using technology in learning is helpful.	4 (1%)	8 (2%)	12 (3%)	92 (23%)	284 (71%)	4.61
Using technology enables me to accomplish academic tasks quickly.	4 (1%)	4 (1%)	8 (2%)	92 (23%)	292 (73%)	4.66

Using technology may increase my understanding in learning.	-	8 (2%)	24 (6%)	160 (40%)	208 (52%)	3.98
Using technology is compatible with all aspects of my studies.	4 (1%)	8 (2%)	8 (2%)	104 (26%)	276 (69%)	4.60
Perception in using technology	**Frequency/Percentage (%)**					**M**
	SD	**D**	**N**	**A**	**SA**	
The technology is easy to use.	8 (2%)	20 (5%)	4 (1%)	208 (52%)	160 (40%)	4.23
Learning to handle and operate the available technology is easy.	4 (1%)	10 (3%)	18 (4%)	168 (42%)	200 (50%)	4.40
To take technology wherever I go is easy, because it is light.	8 (2%)	8 (2%)	4 (1%)	100 (25%)	280 (70%)	4.59
University should provide necessary facilities to encourage the use of technology.	20 (5%)	4 (1%)	4 (1%)	164 (41%)	208 (52%)	4.34
University should provide a specific person or group (e.g. Helpdesk) to assist students	-	48 (12%)	80 (20%)	176 (44%)	96 (24%)	3.80
University should provide workshops and training on how to use and handle technology.	40 (10%)	120 (30%)	52 (13%)	80 (20%)	108 (27%)	3.24
University should reward students who use technology for learning purposes	80 (20%)	84 (21%)	44 (11%)	108 (27%)	84 (21%)	3.08
To use technology makes me feel more appreciated by friends, lecturers and community	8 (2%)	20 (5%)	40 (10%)	176 (44%)	156 (39%)	4.13
Lecturers have influenced me a lot in using technology.	8 (2%)	40 (10%)	80 (20%)	132 (33%)	140 (35%)	3.89
Family has influenced me a lot in using technology.	60 (15%)	80 (20%)	80 (20%)	100 (25%)	80 (20%)	3.15
I affirm that using technology is a good effort that should be followed by other students	4 (1%)	20 (5%)	24 (6%)	136 (34%)	216 (54%)	4.35
I am looking forward to attend training to learn on the usage of technology in depth	-	12 (3%)	40 (10%)	196 (49%)	152 (38%)	4.22

VI. DISCUSSION

The study set out to explore the idea that digital natives are more technologically inclined and comfortable with the use of technology either in their learning or leisure purposes. The findings reveal that students generally have positive views with regard to the use of technology. Access to technology is fairly equitable and a high proportion of these students either own or have access to multi-functional and less expensive tools like laptops, and smartphones. However usage seems to be limited to commonly used technology tools with usage for recreation purposes outweighing that for academic purposes. Social networking technology tools like Facebook, emails and blogs are used on a daily basis by the students for recreation purposes but less regularly for academic purposes. The findings support those from studies in the Western contexts that point to the use of less technology in academic settings [1] and its limited range of use [36]. The findings suggest that if students only see these tools as tools for communicating socially, their adoption in class may not necessarily have the desired effect.

A very interesting phenomenon is this new students belief that technology is essential and beneficial to learning and their indication of a preference for a technology-enriched classroom despite not attempting to use more technology academically. This clearly suggests that technology can enhance the learning in MTUN if steps are undertaken to assure that they are used effectively by taking into consideration students' interest and needs.

With regard to students' perceptions on the factors that influence their use of technology, it was found the factors namely, performance expectancy, technology competency, facilitating conditions, behavioural intention, social status, and effort expectancy are highly in influencing the use of technology among the students in MTUN.

In this study, the results indicate that the success in technology usage depends strongly upon on the students' perception of the usefulness of the technology. The utilisation of technology was deemed to improve learning when used appropriately. The results also demonstrated that the students perceived usefulness as one of the most important elements in technology, as it would lead to the effective and continuous use of the technology.

Technology competency also play as a salient factor that influences the use of technology among MTUN students. In other words, when MTUN students were equipped with adequate skills and knowledge in handling technology, they would undoubtedly use them continuously. On the other hand, if they possessed inadequate skills and knowledge, their technology use would be considerably lower. Technology competency is considered as a lifelong learning skill that should be acquired by MTUN students. This aspect is crucial, because the students are expected to be involved in technical skills while in the workforce, where they would be required to utilise a wide array of technologies and machines [21]. On top of that, the students who are competent in using various technology normally have a positive perception and attitude towards it. It highlights the fact that it is imperative to ensure that students in MTUN have sufficient competency in using technology as this would lead to the effective use of technology, especially in trying out the new and the latest technology.

Facilitating conditions is the conditions where the organisational and technical infrastructure in MTUN exists to support the use of new technology among students.

In this study, facilitating conditions was found to be the important factor influencing the use of technology among MTUN students. This result shows that the students highly

agreed that the necessary facilities such as Internet accessibility and computer laboratories should be provided by their university administration in order for them to utilise technology effectively. Universities should also provide specific personnel at the helpdesk to assist students while using technology for learning. The students also agreed that workshops, training and rewards given by the university administration would positively influence their utilisation of new technology. The administration which advocated the use of technology not only in words, but also in action would be able to influence students' use of technology.

The special skills personnel are also important in assisting MTUN students to fix hardware, software and troubleshoot simple network problems. The productive support and the availability of a helpdesk would significantly increase the use of new technology. When the students receive adequate support and help, they would be more likely to use new technology to a greater extent. However, when they received poor support from the administrators, they would probably less enthusiastic in using that particular technology [30]. It is evident therefore, that facilitating conditions in terms of administration and technical support are vital to students in MTUN.

The next factor that was identified as important in influencing the use of technology among MTUN students was behavioural intention. This suggests that when students have an intention to use technology consistently, it increases their perceptions on how they see technology as requiring minimal or no effort.

Social status is the degree to which MTUN students perceive the importance of others believing they should make use technology. In the context of this study, the social status factor was identified as having the least influence in the use of technology.

Effort expectancy refers to users perception that using technology is easy and effortless due to perhaps the characteristics of the technology [33], such as of its technical specification [39], special elements [45] and functionality [44].

A noteworthy result of this study was that, out of the five factors which had been postulated to influence use of technology, effort expectancy was the only factor that was found to be insignificant. From the finding of this study, effort expectancy was found not significant in influencing the use of technology among MTUN students. From the data, it can be seen that the beta value was negative which indicated that albeit the students perceived technology as easy and effortless to use as well as being lightweight, this criteria was actually unable to influence their technology usage directly. In terms of technology technical specification, special elements and functionality were also not enough of attracting the students to use these technologies continuously. This finding could suggest that most students in MTUN perceived technology as important and useful tools and it was confirmed in the earlier analysis.

Hence, it is not advisable to accept students' 'appeared' contentment with the level of technology use by their educators as indication of their desires and needs. It is more accurate to measure their needs based on what they said about the value of technology which is 'all types of technology should be introduced to enhance the learning of English'. However, this needs to be confirmed by a bigger research study involving a bigger sample population and more universities. Incorporation of more research tools such as interviews will enable a triangulation of data.

VII. CONCLUSION AND RECOMMENDATION

Based on the discussion above, it is reasonable at this juncture to conclude that the findings of this study suggest that the use of technology among MTUN students has vast possibilities and potential. The students have viewed the use of technology as positive, essential and beneficial. Even though they do not regularly utilise it for their academic pursuit, they do prefer their classroom to be more technologically-enriched. The fact that technology has not been exploited seriously by the educators may have led to its limited use but this does not reflect the actual needs of the students. Their tendency to respect educators which have been found in earlier research studies undertaken in Malaysia may have led to their passive acceptance of the limited amount of technology used by their educators in their classes [68]. Thus, it is necessary for the students to move away from this teacher-dependent attitude towards greater independence.

This study used a questionnaire survey to collect data from students only from one MTUN. It is acknowledged that the reliability and validity of the results will be increased if the sample population comprises of students to the other three MTUNs. In addition, triangulating the data by adding in a qualitative component will enhance the credibility of the findings. This is recommended for future research. Despite the limitations, the findings have provided deeper insights to this field of knowledge. The findings clearly demonstrate that MTUN students have the potential to become 'digital natives' in the true sense of the word if the appropriate learning environment is provided which includes educators who are ready to embrace the use of technology and the necessary infrastructure support. In addition, it is also necessary for the students to discard their previous overdependence on their educators and to initiate change by independently striving to utilise new technology especially for learning.

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