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Sains Humanika

Technology Use and Digital Learning Characteristics Among Malaysian Undergraduates

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Abstract

Digital natives, the net generation or millennial generation are among the labels used to describe the characteristics of learners who are now in universities. They are assumed to be proficient in and use a wide range of digital technologies. In addition, they were posited to have different learning preferences. A number of studies have been carried out to determine and describe their knowledge, skills, understanding and purposes of using technologies. However, some researchers have begun to question some of the claims made about this group regarding their ability to use technology especially for learning purposes. Research and information on this group of learners in the Malaysian and Asian context regarding their use of technology and learning needs are limited. This paper reports a study that investigated the technology use and digital learning characteristics of undergraduates at a Malaysian public university. The cross sectional survey involved a random sample of 1059 undergraduates at the university. The results of the study showed that the students made use of digital technologies for their social activities and academic work. They regularly made use of a number of digital tools such as the mobile phone, laptop computer, Internet websites, Google, and Facebook/ MySpace both for their social activities and learning purposes. They perceive the digital tools used in their daily life to be useful for formal learning. They also appeared to have learning preferences similar to those posited for digital natives. These findings suggest a need for universities to further explore ways to harness common and applicable digital technologies to enhance students' learning. In general, these findings further point to a need for higher education environments in Malaysia to evaluate their capacity to facilitate the learning needs of the technology-driven and multi-sensory new generation of students. It is suggested that further studies be undertaken to validate the findings of the present study and explicate reasons for students' preferred use of digital technologies for formal and informal learning

Keywords: Digital learning characteristics; technology use; net generation

Abstrak

Pribumi digital, generasi net atau generasi milenia adalah antara label yang digunakan untuk menjelaskan ciri-ciri pembelajaran pelajar-pelajar di universiti sekarang.Mereka dikatakan mempunyai kemahiran dan tahu menggunakan pelbagai jenis teknologi digital. Mereka juga dianggap mempunyai pemilihan pembelajaran yang berbeza. Beberapa kajian telah dijalankan untuk menentu dan memperihalkan pengetahuan, kemahiran, kefahaman dan tujuan mereka menggunakan teknologi tersebut. Namun begitu, sesetengah penyelidik telah mula mempersoalkan tanggapan dan perihalan tentang kumpulan pelajar ini terutamanya berkaitan kebolehan mereka menggunakan teknologi untuk tujuan pembelajaran. Kajian dan maklumat tentang penggunaan teknologi dan pemilihan pembelajaran kumpulan pelajar ini dalam konteks Malaysia dan Asia juga masih terhad. Kertas ini melaporkan satu kajian yang bertujuan untuk menyelidik penggunaan teknologi dan ciri-ciri pembelajaran digital dikalangan pelajar pra-siswazah di sebuah universiti awam di Malaysia. Survei keratan rentas digunakan dalam kajian ini dan melibatkan sampel rawak seramai 1059 pra-siswazah. Dapatan kajian menunjukkan bahawa pelajar-pelajar ini menggunakan teknologi digital untuk aktiviti-aktiviti sosial dan akademik. Antara alat teknologi digital yang mereka kerap gunakan untuk tujuan sosial dan pembelajaran adalah telefon mudah alih, komputer riba, laman sesawang, *Google*, dan *Facebook/ MySpace*. Mereka juga berpandangan bahawa alat-alat teknologi digital yang digunakan dalam kehidupan seharian turut berguna untuk tujuan pembelajaran secara formal. Selain itu, mereka juga dilihat sebagai mempunyai pemilihan pembelajaran yang sama seperti pribumi digital. Dapatan-dapatan kajian ini telah menunjukkan satu keperluan untuk universiti mengenalpasti langkah-langkah untuk memastikan penggunakan teknologi digital yang pelajar telah sedia gunakan turut diguna pakai untuk tujuan pengukuhan pembelajaran mereka. Secara amnya, dapatan-dapatan kajian ini juga menunjukkan kepentingan bagi pihak pengurusan pengajian tinggi di Malaysia untuk menyediakan persekitaran pembelajaran yang selari dengan keperluan dan pemilihan pembelajaran pelajar generasi baru ini. Turut dicadangkan agar kajian lanjut dilakukan bagi mengesahkan dapatan kajian ini serta mengenal pasti sebab mengapa pelajar-pelajar gemar menggunakan teknologi digital untuk tujuan pembelajaran secara formal dan tidak formal.

Kata kunci: Ciri-ciri pembelajaran digital; penggunaan teknologi; generasi *net*

1.0 INTRODUCTION

The popular press and educational literature has debated the purported generational differences between the young students of today and students of yesteryears. Labels such as the digital natives (Prensky, 2001a, b), net generation (Tapscott, 1998; Oblinger & Oblinger, 2005; Perillo, 2007), generation Y (Perillo, 2007), millennials (Howe & Strauss, 2000, 2003) and generation C (Duncan-Howell & Lee, 2007; Duncan-Howell, 2008) have been used to describe a generation of young students entering the universities. In the North American context, age has been used as a determining feature of the generational concept, with Prensky's (2001a) describing digital natives as students born

after 1980 while Tapscott (1998, 2009) refers to net generation as those born after 1983. Notwithstanding the different terms used, they describe this generation of learners as being familiar with a range of technologies, having grown up exposed to digital technologies in their everyday existence; digital technologies which did not previously exist (Prensky 2001a,b; Tapscott, 2009). In the Malaysian scenario, several studies (e.g., Narasuman, Md. Yunus, & Kamal, 2011) also used age as the defining characteristics for these generations of learners.

As these students grew up immersed in digital technologies, it is argued that they are exposed to a wide range of digital devices and are proficient in using them. Some studies have indicated that undergraduates in Australia, Hong Kong, South Africa, North America and the United Kingdom frequently use digital technologies for learning purposes such as Brown and Czerniewicz (2008), Bullen, Morgan, and Qayyum (2011), Caruso and Kvavik (2005), Corrin, Bennett, and Lockyer (2010), Jones and Ramanau (2009), Kennedy and Fox (2013), Oliver and Goerke (2007), and Smith and Caruso (2010). Corrin *et al*. (2010) and Jones and Ramanau (2009) also reported undergraduates as being active users of technologies for learning and have good skills in basic communication and Web2.0 tools. Kennedy and Fox (2013) found that University of Hong Kong's undergraduates are net generation learners and use a range of technologies for entertainment but seldom to support learning. They are consumer rather than creators of content. Nagler and Ebner (2009) and Ebner, Nagler, and Schön (2012) pointed out that the higher education is witnessing the arrival of the net generation, yet noting that they are still in the process of learning to using digital technologies for formal learning.

It is further argued, that due to the young people widespread use of digital technologies, they possess different learning preferences (Prensky, 2001a; Oblinger & Oblinger, 2005; Pedró, 2009). For instance, Prensky states that they are inclined towards "parallel processing" and "multitasking"; while Tapscott (1998) believes that they prefer "interactive" over "broadcast". Dosaj and Jukes (2006) remark that younger students learn to use new digital gadgets "intuitively" and through "trial and error". Brown (2000) concludes they prefer "multiprocessing" and "multimedia- and discovery-based learning". Consequently, the current higher education environments are said to be unable to satisfy the needs and abilities of the technology-driven, multi-sensory and spur-of-the-moment students (McCrindle, 2006). The current practices in higher education is said to be anchored in pedagogy of the past which tend to be didactic and not technology intensive. Some researchers remark that this line of thinking has been adopted by higher education institutions internationally with little critical reflection (Bennett & Maton, 2010; Bennett, Maton, & Kervin, 2008; Bullen, Morgan, Belfer, & Qayyum, 2009).

However, the used of the terms such as digital natives and net generation and its accompanying claims have been challenged in recent times. Researchers such as Bennett and Maton (2010), Bennett *et al*. (2008), Bullen *et al*. (2009, 2011), Corrin *et al*. (2010), Kennedy *et al*. (2008, 2009) and Margayan, Littlejohn, and Vojt (2011) argue against it citing insufficient empirical evidences to support the concept. They further argue that while there could be differences in the use of technologies between younger and older generation, there might also exist variation in technological skills within this generation of learners. Conole, de Laat, Dillo, and Darby (2006), Kennedy *et al*. (2009), Margayan *et al*. (2011), and Thinyane (2010) reported that although the digital natives widely use digital technologies such as email, instant messaging, Youtube, Wikipedia and social media in their everyday life, they only moderately use the advanced features of Web 2.0 technologies for recreational, social use and formal learning. Thompson (2013) remarked that the digital native students are using a more limited range of digital technology tools than expected and are also not exploiting the potentials of the digital tools for learning purposes. These findings concur with those of recent international studies refuting the homogeneity of technology use and radical learning preferences of a generation of young students in countries such as Canada (Bullen *et al*. 2009, 2011), the United Kingdom (Margaryan & Littlejohn, 2008; Margaryan *et al*., 2011), New Zealand, Australia (Kennedy *et al*. 2009, 2010) and South Africa (Brown & Czerniewicz, 2010; Thinyane, 2010). Margaryan *et al*.'s (2011) findings also disputed the claims that students had learning approaches and learning patterns drastically different from past generation of learners.

2.0 RESEARCH PURPOSES

The higher education environment in Malaysia among others faces issues of massification, commodification and diversity in education (Hong & Songan, 2011). To address these issues, Malaysian universities are investing in ICT infrastructure, either with their own resources, government assistance or private organizations with the aims of increasing access to quality higher education (Hong & Songan, 2011). In the light of such investment, information on actual use which focusses on educational use rather than administrative, is vital, in light of the debate on the learning needs and preferences of this group of young students entering higher education in Malaysia. However, little research looking into the current digital technology use and learning practices with technology is evident in Malaysia. Likewise only a few studies studied this phenomenon in the Asian context such as Kennedy and Fox (2013) among undergraduates at the University of Hong Kong and Li and Ranieri (2010) in China's ninth grade schools. Kennedy and Fox reported that Hong Kong's undergraduates are digital natives, who used a range of digital technologies for personal and entertainment activities but seldom for learning. Nonetheless, they viewed the use of technology for learning positively and displayed some learning characteristics associated with digital natives. The students are also reported to function as content consumers rather than content creators. Hence, further research on students' use of technology in learning against the backdrop of the Asian context in general and Malaysian universities specifically, is warranted as technologies play an increasingly important role in the complex digital technology-integrated learning environments in higher education (Czerniewicz & Brown, 2013; Thompson, 2013)

Thus, the research objectives of this study were to determine the:

- University students' use of digital technologies for university and social activities,
- digital technology tools used by them for university and social activities,
- frequencies of digital technology tools they used in everyday life,
- usefulness of digital technologies used in social and personal life for learning, and
- digital learning preferences of these students.

3.0 METHODOLOGY

3.1 Location of Study and Participants

The study was carried out at a public university in Malaysia, namely Universiti Malaysia Sarawak (Unimas, http://www.unimas.my). Malaysia is a developing country located in Southeast Asia. Malay Language is the official language in Malaysia but English is widely used in the higher education system and between 2003-2012 English was used for the teaching and learning of Mathematics and Science. Malaysia encourages the use of ICT for teaching and learning (see http://www.unescobkk.org/education/ict/countries/country-information/malaysia/) and has 60.7% internet penetration among its population (see http://www.internetworldstats.com/stats3.htm).

The Malaysian public university has around 13,500 students (http://www.unimas.my/index.php/en/about-unimas-11267/background). The majority of the students are from Malaysia, with international students increasingly becoming an important consideration. The university offers degrees and postgraduate qualifications in eight major areas of Medicine and Health Sciences, Engineering, Computer Sciences and Information Technology, Resource Sciences, Economics and Business, Social Sciences, Applied and Creative Arts, and Cognitive Sciences and Human Development.

A paper-based survey was carried out to a random sample of 1059 undergraduate students in September 2012. Table 1, shows some of the demographic information of the 1027 participants who were classified as net generation and generation next. For the purpose of this study, net generation refers to participants born after 1982 to 1991 (aged 21-30), while generation next refer to those born after 1991 (less than 20 years old) (Oblinger & Oblinger, 2005). Based on Table 1, majority of the participants were classified as generation-next and net generation. In addition, there were more female than male participants.

Table 1 Demographic variables of the participants

	Universiti Malaysia Sarawak (N=1059)	
	N	**%**
Gender		
Male	301	29.3
Female	726	70.7
Age		
*Less than 20 years old (**generation next**)*	285	27.6
*21-30 years old (**net generation**)*	742	71.8

Note: The total for the gender and age do not add to 1059 due to missing data

3.2 Research Instrument

A 21 items questionnaire was used to measure the participants' digital learning preferences, use of digital technologies for university and social/personal activities, digital tools used for university and informal learning activities and their perceptions on the usefulness of digital technologies for learning. These items were based on Bullen *et al.*'s (2011) study, representing ten learning dimensions of digital literacy, connectedness, multitasking, preference for experiential learning, preference for group work, preference for images over text, need for structure in learning/ goal-oriented, social, need for immediacy and community-mindedness. Table 2 provides the details of the learning dimensions and for each item, the participants choose either "Strongly Disagree", "Disagree", "Agree" or "Strongly Agree" as their responses.

Table 2 Dimensions of digital technologies use characteristics and their elaboration

Dimensions	**Elaboration**
Digitally literate	• Able to intuitively use a variety of IT devices and navigate the Internet. • Comfortable using technology but may have a shallow understanding • Visually literate • More likely to use the Internet for research than a library
Connected	• The particular device may change but they are always connected
Multitaskers	• The move quickly from one activity to another, sometimes performing several tasks simultaneously
Need for immediacy	• They demand fast responses – more value on speed than accuracy
Need for experiential learning	• Prefer to learn by doing rather than being told what to do • Discovery learners
Social	• Gravitate towards activities that involve social interaction • Open to diversity • Social nature aligns with preference for team work
Preference for group work	• Prefer to learn and work in teams • Depend heavily on peers
Preference for structure in learning / goal oriented	• Prefer structure over ambiguity • Goal-oriented
Preference for images over text	• Prefer images over text • Don't like reading large amounts of text
Community minded	• Prefer to work on "things that matter" • Believe that science and technology can be used to resolve difficult problems

Note: Adapted from Bullen *et al.* (2011)

Items for assessing the use of digital technologies for university and social/personal activities, digital learners' characteristics and the digital tools used for university and informal learning activities and views on the usefulness of digital technologies for learning were based on the research instruments used by Trinder, Guiller, Margaryan, Littlejohn, and Nicol (2008) and Kennedy *et al*. (2008). For each item the participants select either "Never", "Daily, Weekly", and "Monthly"; "Strongly Disagree", "Disagree", "Agree" and "Strongly Agree"; or "0 hours", "1-10 hours", "11-20 hours", 21-30 hours", 31-40 hours", and "More than 40 hours" as their response choice.

3.3 Data Analyses

Descriptive statistics of means and standard deviations and/or medians were used for analyzing the data to answer the research objectives.

■4.0 FINDINGS

4.1 Use of Digital Technology for University Work and Social/Personal Activities

The students were required to respond to the item "Approximately how many hours each week did you use digital technologies last year for university work?" which had response options of 0 hours, 1-10 hours, 11-20 hours, 21-30 hours, and more than 40 hours The results indicated that based on the median value, the students used 21-30 hours of digital technologies for university work. Similar to the findings on use of digital technologies for university work, based on median value, the students used 21-30 hours of digital technologies for social/ personal activities.

4.2 Digital Tools Used for University Work and Daily Life

Table 3 shows the types of digital technology tools the students used for their university work. The students used the following types of digital technology tools daily for university work: mobile phone (for communicating with friends), laptop computer, Internet websites, Google, Facebook/ MySpace. Other digital technology tools used less frequently, on weekly basis were Morpheus (the official Learning Management System of the university), course website, online discussion groups, real-time chat, email (for communication with friends), Google Scholar, wikis, message board, Youtube, and file/photo upload-sharing. The other digital technology tools listed in the survey were used infrequently, either monthly or never.

Table 3 Frequencies of digital technologies tools used for university work

		Median
•	Mobile phone for communicating with friends	Daily
•	Laptop computer	Daily
•	Internet websites	Daily
•	Google	Daily
•	Facebook/ MySpace	Daily
•	Morpheus	Weekly
•	Course website (other than Morpheus)	Weekly
•	Online discussion groups	Weekly
•	Real time chat	Weekly
•	Email for communicating with friends	Weekly
•	Google Scholar	Weekly
•	Wikis (e.g. Wikipedia)	Weekly
•	Simulations/games	Weekly
•	MP3 player/ IPod	Weekly
•	Message Boards	Weekly
•	YouTube	Weekly
•	File/photo upload-sharing	Weekly
•	Video conferencing	Monthly
•	Email for communicating with lecturers	Monthly
•	Mobile phone for communicating with lecturers	Monthly
•	Virtual worlds (e.g. Second Life)	Monthly
•	Digital camera	Monthly
•	Skype	Monthly
•	Podcasts	Never
•	Tablet computer (e.g. iPad)	Never
•	Blogging	Never
•	Twitter	Never

Table 4 shows the types of digital technology tools the students used for non-university work. Mirroring the results for university work, the students used the following types of digital technology tools daily for university work: mobile phone (for communicating with friends), laptop computer, Internet websites, Google, Facebook/ MySpace. Other less frequently used digital technology tools, on weekly basis were online discussion groups, real-time chat, email (for communication with friends), Google Scholar, wikis, simulation/ games,

MP3/ Ipod, digital camera, and Youtube. The other digital technology tools listed in the survey were used infrequently, either monthly or never.

Table 4 Frequencies of digital technologies tools used for social/personal activities

		Median
•	Mobile phone for communicating with friends	Daily
•	Laptop computer	Daily
•	Internet websites	Daily
•	Google	Daily
•	Facebook/ MySpace	Daily
•	Online discussion groups	Weekly
•	Real time chat	Weekly
•	Email for communicating with friends	Weekly
•	Google Scholar	Weekly
•	Wikis (e.g. Wikipedia)	Weekly
•	Simulations/games	Weekly
•	MP3 player/ IPod	Weekly
•	Digital camera	Weekly
•	YouTube	Weekly
•	File/photo upload-sharing	Weekly
•	Virtual worlds (e.g. Second Life)	Monthly
•	Message Boards	Monthly
•	Skype	Monthly
•	Video conferencing	Never
•	Podcasts	Never
•	Tablet computer (e.g. iPad)	Never
•	Blogging	Never
•	Twitter	Never

Table 5 shows the frequencies of digital technology tools in the participants' daily life activities. The students indicated daily use of digital technology tools for university work, learning about new things, searching for information of personal interest, connecting with friends and family, and entertainment. They also used digital technology tools weekly for participating in group discussions/ chats, making new friends, creating things (videos, photos, blogs etc.) to share on the web, life organizer, and as a distraction.

Table 5 Frequencies of digital technologies used in everyday life

		Median
•	for university (or school) work	Daily
•	learning about new things	Daily
•	searching for information of personal interest	Daily
•	connecting with friends	Daily
•	connecting with family	Daily
•	entertainment	Daily
•	participating in discussion groups/chats	Weekly
•	making new friends	Weekly
•	creating things (videos, photos, blogs etc.) to share on the web	Weekly
•	organizing my life	Weekly
•	as a distraction	Weekly

The participants also responded to the item "The digital technologies I use in my social and personal life are useful for my learning", with response options of 1=Strongly disagree and 5=Strongly agree. In general, the participants felt that the digital technology tools they used in daily life were useful for learning (Mean=3.379 [exceeding midpoint of 2.5], SD=0.6704, Median=3).

4.3 Learning Preferences

The Cronbach Alpha value for the 17 items related to learning preferences was 0.791 indicating a sufficient level of reliability (Nunnally & Bernstein, 1994). The results as shown in Table 6 indicated that in general, the students showed tendencies of being digitally literate, digitally connected, multitasking, experiential learners, structure and goal-oriented, group work for academic tasks, more visual than text, and community-minded (Means exceeding 2.5, 1=Strongly disagree and 5=Strongly agree; Median=3). Although they were also social-oriented - like meeting new people (M=3.156, SD=0.628; Median=3), they showed lower preference for talking about themselves to peers (M=2.525, SD=0.736; Median=3).

Table 6 Descriptive statistics for learning preferences

	M	SD	Median
Digitally Literate			
Q1. I am comfortable using information and communication technologies such as the computers and the Internet for a variety of reasons.	3.450	0.566	3
Connectedness			
Q2. I feel like I am always connected to friends because of technologies such as cell phones and the Internet.	3.383	0.609	3
Multitasking			
Q3. I am used to doing several tasks at the same time.	3.132	0.609	3
Experiential Learning			
Experiential Learning (Average of Q5 & Q6)	3.125	0.510	
Q4. I prefer to learn by exploring and trying things out myself.	3.174	0.591	3
Q5. I prefer to learn by doing rather than being told what to do.	3.076	0.616	3
Structure and Goal Oriented			
Structure and Goal Oriented (Average of Q7 & Q8)	3.189	0.489	
Q6. I prefer to get clear instructions and information before I try something new.	3.271	0.633	3
Q7. I have clear goals in life	3.105	0.648	3
Working in Groups			
Working in group (Average of Q9 & Q10)	3.038	0.576	
Q8. I prefer to work in groups when doing my university/ school work	2.805	0.767	3
Q9. I enjoy discussing ideas with peers	3.148	0.594	3
Social			
Social (Average of Q11 & Q12)	2.839	0.554	
Q10. I enjoy meeting new people	3.156	0.630	3
Q11. I enjoy talking about myself to people I meet	2.525	0.756	3
Visual			
Visual (Average of Q13-recoded & Q14)	2.737	0.420	
Q12. I don't like reading a large amount of text – not recoded	2.931	0.839	3
Q13. I prefer images, videos, and other multimedia elements over text.	3.399	0.641	3
Community-Minded			
Community-minded (Average of Q15 & Q16)	3.039	0.516	
Q14. I get involved in projects and activities that make a difference to society	3.018	0.616	3
Q15. I believe that science and technology can resolve problems in society	3.057	0.659	3
Immediacy			
Immediacy (Average of Q17 & Q18)	2.891	0.478	
Q16. I expect to be able to get information to answer my query quickly	3.154	0.571	3
Q17. I rely on classmates and lecturers to respond to my questions within a few hours	2.628	0.698	3

■5.0 DISCUSSIONS

In this study, on average, the students used 21-30 hours of digital technologies for their university work. Similar number of hours was spent for social/ personal activities. Thus, these findings indicate that young students in Malaysian institutions of higher learning have access to and make use of digital technologies for social activities and academic purposes showing the existence of net generation and generation next learners (Duncan-Howell & Lee, 2007; Duncan-Howell, 2008; Howe & Strauss, 2003; Oblinger & Oblinger, 2005; Perillo, 2007; Prensky, 2001a, b; Tapscott, 1998). These findings also appear to concur with the findings reported by Bullen *et al.* (2011), Caruso and Kvavik (2005), Oliver and Goerke's (2007), and Smith and Caruso (2010) which indicated that undergraduates in their studies in Australia and North America use digital technologies frequently for learning purposes. Similar findings were also reported by Brown and Czerniewicz (2008) and Kennedy and Fox (2013) in the non-western higher education settings of South Africa and Hong Kong.

The common digital technology tools students used daily for their university work include mobile phone (for communicating with friends), laptop computer, Internet websites, Google, Facebook/ MySpace. Digital technology tools used less frequently, on weekly basis were Morpheus (the official Learning Management System of the university), course website, online discussion groups, real-time chat, email (for communication with friends), Google Scholar, wikis, message board, Youtube, and file/photo upload-sharing. The other digital technology tools listed in the survey were however only used infrequently, either monthly or never. The types of digital technology tools students used for non-university activities were also similar to those reportedly used for university work.

These findings in general support the description of a generation of learners who are familiar with a range of technologies, and most likely have grown with digital technologies in their everyday existence (Prensky 2001a,b; Tapscott, 2009). Similarly, Corrin *et al.* (2010), Jones and Ramanau (2009) and Kennedy and Fox (2013) found undergraduates to be active users of technologies for learning. Kennedy and Fox (2013) also reported that undergraduates use a wide range of technologies for entertainment but do not make use of technologies to support learning. Nagler and Ebner (2009), Ebner *et al.* (2012) and Kennedy and Fox (2013) state that the net generation with good skills in basic communication and Web2.0 tools has arrived in higher education, although they are still adjusting to using digital technologies for formal learning. Furthermore, the findings of the present study indicated that the digital technology tools used were almost similar to those reported in studies conducted by Kennedy *et al.* (2008, 2009), Margayan *et al.* (2011) and Thinyane (2010). The results of this study further concurs with findings by Bennett *et al.* (2008), Bennett and Maton (2011), Bullen *et al.* (2009, 2011), Corrin *et al.* (2010), Kennedy *et al.* (2009, 2010) and Margayan *et al.* (2011) that suggest there are variations in technological skills and digital technology tools used within the digital natives. This group of Malaysian university students use of digital technology tools mirrors those reported by Conole *et al.* (2006), Kennedy *et al.* (2009), and Margayan *et al.* (2011) with the young students using new digital technologies such as email, Youtube, wikipedia and social media but only moderately use the advanced features of Web 2.0 technologies for social use

and formal learning. This also supports the findings of research in recent years suggesting a heterogeneity of technology use in a generation of young students in developing countries such as Canada (Bullen *et al*. 2008), the United Kingdom (Margaryan & Littlejohn 2008), New Zealand and Australia (Kennedy *et al*. 2006) and the developing country such as South Africa (Brown & Czerniewicz, 2010; Thinyane, 2010).

The students indicated daily use of digital technology tools for university work, learning about new things, searching for information of personal interest, connecting with friends and family, and entertainment. They also used digital technology tools weekly for participating in group discussions/ chats, making new friends, creating things (videos, photos, blogs etc.) to share on the web, life organizer, and as a distraction. The participants felt that the digital technology tools they used in daily life were useful for learning. These findings although not definitive, appear to contradict apprehension in the literature that informal experiences with digital technologies may not have an impact on students' competency with and understanding of technologies in the context of learning (Grant, Malloy, & Murphy, 2009; Karsten & Roth, 1998; Reed & Giessler, 2002; Rikhye, Cook, & Berge, 2009). Although this group of participants appear to have adequate technology skills and uses digital technology tools for formal university work and informal learning, universities and instructors should still evaluate students' prior technology skills as there may be exist a minority group of students that enters universities with inadequate educational technology skills and require guidance to master common technology tools to succeed academically (Buchanan & Chapman, 2009, 2010). Instructors should also bear in mind the complex nature of engaging with digital technologies in the context of formal learning (Rikhye *et al*., 2009).

In terms of learning patterns, the findings of this study showed that the Malaysian university undergraduates displayed some of the learning characteristics posited for the net generation and this is consistent with the position put forth by Prensky (2201a, b) and further supported by Oblinger and Oblinger (2005) and Pedró (2009). However, this study did not compare the learning characteristics of the net generation and generation next undergraduates with those of digital immigrants due to the small number of digital immigrants among the undergraduates at the public university which served as the location of the study. However, the findings contradicted the results reported by researchers such as Bennett *et al*. (2008), Bullen *et al*. (2011), Jones and Cross (2009), Kennedy *et al*. (2008, 2009), Pedró (2009), Reeves and Oh (2007), Selwyn (2009) and Lai and Hong (2014) which disputed the claims for preferences such as digital literacy, immediacy, connectedness and experiential learning among digital natives students.

■6.0 CONCLUSIONS

This article presented the results of an empirical study which investigated students' use of digital technologies and learning preferences in a Malaysian higher education setting. The students made use of digital technologies for their social activities and likewise utilize digital tools for academic work. They also regularly made use of a number of digital tools for their social activities and learning purposes. Thus, these findings appear to support the suggestions of a group of 'digital natives' or 'net generation' learners. The students also find the digital tools used in their daily life to be useful for the formal learning. The usefulness of digital tools used in daily life for academic purposes indicate a need for universities to further explore ways to harness these common and applicable digital technologies to enhance the quality of formal learning among university students.

Nonetheless, as the study was only carried out at a public university in Sarawak, the findings may not be generalizable to all universities in Malaysia. The findings of this study should be replicated in other universities in the country to further validate the conclusions discussed in this article. Further studies could be undertaken to elucidate the possible reasons for using a particular type of digital technology tools for formal/ informal learning and also the students' learning preferences can be obtained using qualitative data collection techniques such as interviews and observations.

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