

Access and use of digital video based learning: Singapore engineering undergraduates

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ABSTRACT

iPod and iTunes are gaining popularity amongst educators as a tool and platform to access and deliver complementary educational learning materials. The research question focuses on whether students access and use iTunes resources to enhance their content knowledge without teacher's assistance. The participants of the research consist of forty-nine engineering students at a Singapore university who agreed to participate in the research. They required completing a one-off survey at the beginning of the term. The findings of the research indicate that while these students were familiar with YouTube, they were less familiar with iTunes. It can be concluded that while students use online video streaming services for personal viewing, very few take the initiative to use these services to enhance their content knowledge.

Keywords: iPod iTunes-based learning, English as second language, video-based learning, mobile-assisted language learning.

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INTRODUCTION

Singapore has heavily invested in its workforce through education and technology (Kozma, 2010). In February of 2014 there were "8,388,400" smartphone subscribers in Singapore, that is a "155%" mobile penetration rate (Infocomm Development Authority, 2014). Such acceptance of technology has encouraged educational institutions to invest in online education. Weber et al. (2005) explained that Singapore invested "more than \$2 billion" on Information Technology Communication (ICT) for educational purposes. Thus, Singapore is shaping more technology focus goals to set itself at the forefront of digital media integration and innovation (Chea, 2010). While organisations provide data concerning infrastructure investment, very little is known about the subscriber. Research regarding Singapore students' opinion about technology may provide a general overview. For example, Cho (2011) asserted that, according to evidence collected from 214 telephone survey interviews of participants aged 15 and above, "an individual's decision to accept new technologies is determined by his or her cognitively mindful assessment of the target behaviour and its outcomes" (p. 297). The

purpose of this paper is to explore Engineering undergraduate university students' opinion of and familiarity with video casting (vodcasting) and its effect on their target learning behaviour.

iPad/iPod-based research

Whereas in the past learners were connected to the Internet via their desktop or laptops, more recently they have become connected through their smartphones or tablets. Since Duke University's first investigation of iPod devices, research on mobile technology is growing. For example, a few articles have explored the reason for using iPad technology as a learning tool in New Zealand schools or in general in the United States (Banister, 2010; Henderson and Yeow, 2012), the educational merits of integrating iPads in K-12 and university environments in the United Kingdom and Japan (Evans, 2008; Gromik, 2008), and the learning implications that emerges from using such a device (Walls et al., 2010).

As a powerful portable pocket computer, mobile

technologies enable students to access social networking sites, take photos, videos or audio recordings, share and exchange data or information, view videos or listen to podcasts, send SMS or access their email account to respond or send emails anytime at their convenience. It is the mobility of carrying technology, which is gaining research attention, as students can learn anywhere and from anything in their surrounding. In contrast, Gadreau et al. (2014) question whether or not knowing the content that students' access on their devices actually matters. Given the affordances of such technologies, it could be argued that knowing the types of material students access on their mobile devices and how they use that information for learning is of importance since the content may or may not relate directly to their studies. For example, Rosell-Aguilar (2013) reports that survey respondents indicate a positive impact of learning with iTunes U resources. Also, Fried (2008) reported that some of the 137 undergraduate participants observed, used their computers for other purposes than study. Knowing the type of audio-visual resources subscribers access, may enable educators to guide their students towards more beneficial learning resources or to develop more appropriate independent learning strategies. While learners invest in mobile technology for anytime anywhere access and use, very little is known about the content they access and their belief about using technology.

Mobile assisted learning

Mobile Assisted Learning refers to learning that occurs through the use of a smartphone or tablet. Lehner and No'sekabel (2002), state that mobile learning refers to "any facility that supplies a learner with general electronic information and educational content that aids in the acquisition of knowledge regardless of location and time" (p. 100, cited in Hung and Zhang, 2012, p. 3). This learning anytime anywhere definition is accepted amongst the wide range of literature reviewed (Yang et al., 2013). However, Viberg and Gronlund (2013) note that although one can carry laptops, they do not facilitate immediate interaction with the environment or events taking place in real time. As Pegrum et al. (2013) explain, mobile learning is increasingly about the affordances that smartphones and tablets provide students.

Technology affordances may not necessarily be recognised and/or valued by learners and educators. For example, Vasniadou (2001) and Shudong and Higgins (2006) suggest that mobile phone subscribers found the size of the technology a deterrent from wanting to use these devices anytime anywhere, and that it may impact on their learning experiences. Similarly, Phan (2011) suggests that viewing audio-visual material would necessitate more powerful portable devices or that the independent learning aspect of mobile-based learning

may prevent subscribers from "engaging in deep and meaningful learning" (p. 211), since presumably some portable device feature may distract subscribers from learning, and stir them more towards entertainment or gaming. Maniar et al. (2008) would agree with the impact of screen size on viewing behaviour, however, these authors note that students did find viewing content on their mobile device beneficial.

Video casting use to enhance language and content knowledge

Increasingly, learners have access to smartphones and more recently tablet devices. However, despite mobile phones having a 155% penetration rate in Singapore (Infocomm Development Authority, 2014), Kennedy et al. (2008) suggest that these mobile learners may not possess a "high level of competence across a wide range of applications" (p. 117). van Oostveen et al. (2011) advance that there does not seem to be any correlation between "familiarity with the technology" and "no evidence of change attitudes with respect to meaningful learning" (p. 91). Similarly, Parkes et al. (2015) also found that their sample group of Australian university students were "considered to be unprepared for a range of e-learning competencies" (p. 8). Because mobile technology was designed for content consumption and personal interaction, pod and vodcasting may be familiar to educators and learners, using them for personal use. Yet, this familiarity with personal entertainment or social networking experiences may not reflect an awareness of the educational benefits, strategies for accessing and the content streamed-videos offer.

iTunes University was launched in 2007 as a service to store and deliver audio, visual and text content designed by higher education institutions for the benefit of their clientele, and the educational sector at large (Mains and Wilder, 2007). iTunes U and other online video casting learning services, such as YouTube, offer great potentials as supplementary materials for learners to access; most are free. Celik et al. (2012) reported that over 800 universities offered access to "350,000 audio and video files" over the iTunes University service (p. 413). Given these numbers, it would be of great benefits for educators and learners to investigate the potentials that these learning resources may offer. As Hallett and Faria (2006) report, the use of multimedia did increase participants' recall of information compared to traditional lectures. McKinney and Page (2009) also report that 89% of their 125 nursing cohorts agreed that vodcasts and podcasts enhanced "their understanding of pathophysiology" (p. 374). Mayer (2001) and Gromik (2008) agree that video-enhanced learning enables learners to connect words or audio content with visual cues. In addition, Gromik (2008) and Manuguerra and Petocz (2011) assert that using a mobile device to view a video provides the learner with

more viewing control, such as the ability to pause and rewind. Based on findings from the literature, iTunes does provide teachers with the opportunities to use audio-visual resources to complement or deepen content exposure. However, little research has reported on students' initiatives to use audio-visual resources to complement their learning.

Pod and vodcasting have received positive review from the academic community (Rosell-Aguilar, 2013; Walls et al., 2010). In research investigating students' perceptions of the benefits of podcasts, Evans (2008) reported that participants found these to be an "effective revision tool" (p. 491). Podcasting has been used to support learning, has demonstrated positive effect to enhance students' study habits (Abdous et al., 2009). Also, podcasting can enhance learning whether it is on or off campus, as well as reducing learning anxiety (Ragusa et al., 2009). In relation to exam preparation, McKinney et al. (2009) found that students who used podcast lecture recordings to study "scored significantly higher than the lecture condition" (p. 617). Lawlor and Donnely (2010) found that engineering students had a preference for video type podcasts that were designed as a PowerPoint with a lecturer voiceover explanation. More recently, iPods and podcasting were reported to offer a personalised experience with technology and learning resources and improved peer-to-peer collaboration (Walta and Nicholas, 2013).

Pod and vodcasting were primarily used as supplementary materials to reinforce repetitive learning (Walls et al., 2010; Winslett, 2014). Using video casting to supplement and enhance Japanese undergraduate students' language listening skills, Gromik (2008) reports that some English as a Foreign Language (EFL) students may not have the knowledge for selecting appropriate video podcasts to enhance their listening and viewing comprehension skills. Ho and Chou (2009) concur that some of their language learning participants did not "understand whether applying podasting in learning language is a good idea or not" (p. 413). Such evidence led Walls et al. (2010) to point out that the technology and podcasting are efficient only if learners understand the process for using such tools and the educational benefits they can gain from using these regularly. Walls et al.'s (2010) investigation of business and education students indicates that some of these students may not be familiar, motivated and ready to use pod or vodcasting as learning resources, and if not properly trained in the effective use of vodcasting, these may lead to "cognitive overload" (p. 372). Similarly, O'Bannon et al. (2011) concur that students may not be familiar with iPod technology and iTunes services and this may affect their decision to use such services.

This paper seeks to understand 49 Singapore students' familiarity and use of online digital video resources to learn more about the content of their major in English. Thus, the purpose of this paper is to investigate whether

or not Engineering students at a Singapore University are familiar with iTunes U and Youtube, and if they use this service to independently access course specific content.

METHODOLOGY

Sample and procedure

Ethical clearance was obtained from the University Institution Review Board, with approval for the research information sheet and consent form. In addition, the paper-based survey included a consent box for participants to confirm their participation in this research.

Singaporean participants in this survey would have completed the national education structure of 6 years of primary education, 4 years of secondary schooling followed by 2 years of pre-university education (Cheah, 2010). International students would have completed the educational requirements set by their respective countries. Data for this study were collected from 49-second year engineering students (male = 27, female = 22) from an English for Academic Writing course at a Singapore university.

While all participants were from the Engineering department, 22 studied Mechanical Engineering, 11 studied Electrical Engineering, and 5 specialised in Civil Engineering. Three participants studied Industrial Systems Engineering, 2 were Material Science Engineering, another 2 were Bio-engineering students and 2 were Chemical Engineering students. Only one respondent studied environmental engineering and another studied Engineering Science.

Participants were from various ethnic groups ranging from Singaporeans (n=23), Chinese (n = 16), and Malaysian (n = 3), Indian (n = 2), Indonesian (n = 2), and Sri Lankan (n = 1), Philippino (n = 1) and American (n = 1). The mean age was 20 years old.

Instrument

Data were collected through a two-part survey. The first part collected data regarding participants' educational and technological background. The second part was a Likert-scale section (1 = Strongly Disagree, 5 = Strongly agree), which aimed to collect evidence regarding students' perception of their anxiety to study English with a smartphone, iPad/iPod, and with Apps, and their opinion about using mobile technology for various purposes and in various locations. Participants needed 20 min to complete the survey.

Data analysis

Data was recorded on an Excel sheet all private information was de-identified. The information was then transferred to SPSS 22, for descriptive data analysis. An independent-samples t-test was conducted to analyse students' anxiety perception.

RESULTS

Access to technology

Twenty-nine students received their first smartphone between the ages of 11 and 15. Fifteen students received their first smartphones when they were between 16 and 20 years of age and the remaining five students received

their first smartphone when they were between 6 and 10 years of age. While all students had access to a laptop or desktop computer, 29 participants had access to a tablet.

The participants' background experiences with technology revealed that these particular Engineering students did not use their smartphones (no = 36, yes = 13), their tablet PC (no = 38, yes = 11), or Apps (no = 36, yes = 13) to study English. However, if given the opportunity to, the majority of students were in agreement to study English with their smartphone (no = 9, yes = 40) or their tablet PC (no = 8, yes = 41). In terms of which device was better for studying with, respondents reported that studying with a computer is better than studying with an iPod (strongly agree = 17, agree = 14, neutral = 9, disagree = 6, strongly disagree = 3), or a smartphone (strongly agree = 20, agree = 13, neutral = 8, disagree = 7, strongly disagree = 1). Respondents also agreed that both the smartphone and the computer were better options than studying with movies. However all participants were to some extent in agreement that neither a computer or a smartphone were suitable devices to study with compared to books, taking notes or going to lectures. Respondents were also of the opinion that studying with a book was the most appropriate to learn about academic writing (strongly agree = 9, agree = 27, neutral = 10, disagree = 2, strongly disagree = 1), compared to other devices (smartphone strongly agree = 4, agree = 27, neutral = 20; iPod strongly agree = 3, agree = 29, neutral = 11).

In terms of smartphone use etiquette, the evidence collected describes students' perceptions of suitable activities and places to use mobile technologies. With regards to activities, twenty-eight respondents strongly agreed and 11 agreed that it was appropriate to use a smartphone on public transportation (neutral = 9, disagree = 1). Surprisingly, 5 respondents strongly agreed and 15 agreed that it was appropriate to use a smartphone while driving a car. With regards to location, 5 students strongly disagreed and 14 disagreed about using smartphones in movie theatres, 13 students were neutral, 14 agreed and the remaining 3 strongly agreed. Participants were a little more lenient if watching a movie at home. Six respondents strongly disagreed, 10 disagreed, while 22 students were neutral, 8 agreed and 3 strongly agreed that it was appropriate to use a smartphone when viewing a movie with their family and friends. Similarly 27 participants strongly agreed and 12 agreed that it was appropriate to use a smartphone in a supermarket (neutral = 10). In contrast, twenty-three participants strongly disagreed and twelve participants disagreed that using a smartphone in a place of worship was acceptable (neutral = 11, agree = 2, strongly agree = 1). Students offered mixed responses regarding the use of smartphones in class. While 12 strongly disagreed and another 11 students disagreed, 20 students were neutral. Five participants agreed and one participant strongly agreed with using smartphones in class.

Perceptions of video casting-based learning

All the respondents were familiar with YouTube to view videos, and listen to music. Respondents were also familiar with iTunes, to find apps, games, music and videos. However, only 10 out of 49 students knew about iTunes University. Amongst these 10 students, two had actually looked at course related content. The other eight students had glanced but not subscribed to the content. Students were also more experienced with searching YouTube for content about their major (neutral = 10, agree = 21, strongly agree = 6), compared to iTunes (strongly disagree = 11, disagree = 23, neutral = 12, agree = 3).

When comparing whether or not iTunes was better than YouTube to study English with, students were more in favour of YouTube. One student strongly agreed and 26 students agreed that using YouTube was easy to use to study English. Respondents also indicated using this video storing website to study about Engineering (no = 18, yes = 31). All students agreed that they used YouTube for personal viewing on a regular basis. Twelve students were neutral on this matter compared to 6 students who disagreed and 4 who strongly disagreed. Similarly, students thought that YouTube was better to study with than iTunes (agreed = 17; strongly agreed = 12). Respondents also indicated that based on their experiences YouTube was more beneficial for their studies than iTunes (strongly agree = 24, agree = 12, neutral = 5, disagree = 1, strongly disagree = 7). They responded that compared to iTunes, watching YouTube videos could help them learn vocabulary (strongly agree = 7, agree = 23, neutral = 7, disagree = 7, strongly disagree = 2). Students were also of the opinion that they could trust YouTube audio/video resources more than iTunes resources (strongly agree = 18, agree = 15, neutral = 9, disagree = 6, strongly disagree = 1).

The descriptive data regarding the amount of times students spent using either iTunes or YouTube to study English confirm the results above (Table 1). These particular students reported spending less than one minute using iTunes to study English (zero minutes = 42), and less than one minute using YouTube to study English (zero minutes = 37). Similarly, a large number of students used iTunes for less than one minute to study about Engineering (zero minutes = 42). However more students used YouTube to study about Engineering; zero minutes (n = 12), 1 to 4 min (n = 11), 5 to 9 min (n = 10), 10 to 14 min (n = 5), 15 to 19 min (n = 5), 20 to 30 min (n = 3), 31 to 40 min (n = 2) and 41 to 60 min (n = 1). Compared to iTunes, YouTube also seems to be more popular with these students to study more personal topics. Seven students spent zero minutes using YouTube, 1 to 4 min (n = 4), 5 to 9 min (n = 6), 10 to 14 min (n = 12), 15 to 19 min (n = 10), 20 to 30 min (n = 7), 31 to 40 min (n = 1), and two students spent between 41 to 60 min using YouTube for personal viewing. Twenty students spent

Table 1. Frequency analysis personal topic viewing comparison between YouTube and iTunes.

Minutes per day	Frequency					
	iTunes to study English	YouTube to study English	iTunes to study Engineering	YouTube to study Engineering	iTunes to study personal topics	YouTube to study personal topics
0	40	37	42	12	20	7
1 - 4	3	5	4	11	7	4
5 - 9	3	4	2	10	11	6
10 - 14	3	3	1	5	9	12
15 - 19				5	2	10
20 - 30				3		7
31 - 40				2		1
41 - 60				1		2
Total	49	49	49	49	49	49

less than one minute using iTunes to study more personal topics. The remaining number of students spent 1 to 4 min ($n = 7$), 5 to 9 min ($n = 11$), 10 to 14 min ($n = 9$), and 2 students used iTunes between 15 to 19 min to view personal topics.

Nonetheless, in terms of improving learning skills through viewing videos, students responded positively. Eleven students strongly agreed, 28 agreed and 6 were neutral, reporting that videos could help them learn more about the course content (disagree = 2, strongly disagree = 2). Similarly, 11 students strongly agreed, 21 agreed and 14 were neutral in response to the positive impact of viewing videos to accomplish classroom activities more quickly (disagree = 3, strongly disagree = 0). Also, students were positive that viewing videos would give them confidence about their learning abilities (strongly agree = 14, agree = 15, neutral = 11, disagree = 3, strongly disagree = 6).

Based on their prior knowledge and experiences with iTunes and YouTube, 4 students strongly disagreed, 14 students disagreed and 22 were neutral regarding their recommendation that all students study with iTunes (agree = 9, strongly agree = 0). Additionally, 7 students strongly disagreed, 5 disagreed and 27 were neutral regarding students recommending iTunes as a learning resources service (agree = 10, strongly agree = 0). Nonetheless, students would recommend that their peers learn with a mobile device (strongly agree = 15, agreed = 13, neutral = 12, disagree = 2, strongly disagreed, 7).

Gender difference regarding technology use anxiety

An independent-samples t-test was conducted to compare male and female degree of anxiety with using mobile technology or iTunes to study English. There were no significant differences in scores for males ($M = 2.46$, $SD = 1.07$) and females ($M = 2.26$, $SD = .75$) regarding

feeling stressed studying English with a mobile device ($t(47) = .752$, $p = .456$, two-tailed). The magnitude of the difference in the means (mean difference = .2, 95% CI -.337 to .738) was very small (eta squared = .01). Similarly, there were no significant differences in scores for males ($M = 3.00$, $SD = 1.13$) and females ($M = 2.43$, $SD = .843$) regarding feeling stressed studying English with iTunes ($t(47) = 1.96$, $p = .056$, two-tailed) The magnitude of the difference in the means (mean difference = .565, 95% CI -.015 to 1.14) was very small (eta squared = .07) (Table 2).

These two survey items did not reveal significant differences between gender, probably due to the fact that these particular students are well acquainted with the use of learning with technology.

There were significant differences in scores for males ($M = 2.3$, $SD = 1.7$) and females ($M = 2.9$, $SD = 1.4$) regarding their belief that based on their experiences with technology, using YouTube to study is beneficial ($t(47) = -1.25$, $p = .217$, two-tailed). The magnitude of the difference in the means (mean difference = $-.56$, 95% CI -1.475 to .35) was very small (eta squared = .01). However, there were no significant differences in scores for males ($M = 3.15$, $SD = 1$) and females ($M = 3.35$, $SD = .83$) regarding their belief that iTunes would be beneficial for their learning ($t(47) = -.73$, $p = .47$, two-tailed) The magnitude of the difference in the means (mean difference = $-.194$, 95% CI $-.73$ to $.34$) was very small (eta squared = .02) (Table 3).

The evidence from Table 3 would seem to indicate that while students may be familiar with using YouTube, male and female participants seem to have a different experience and perception of the educational benefits of using this service. Nonetheless, since students do not report an extensive familiarity with iTunes as an educational learning resource, they seem to report no significant differences in their experience and perception of this Apple product.

Table 2. Gender difference regarding anxiety to use technology to study English.

I think it is stressful to study English writing with...		Levene's test for equality of variances		T-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									Lower	Upper
Mobile Technology	Equal variances assumed	4.169	.047	.752	47	.456	.201	.267	-.337	.738
	Equal variances not assumed			.767	44.874	.447	.201	.261	-.326	.727
iTunes	Equal variances assumed	1.963	.168	1.961	47	.056	.565	.288	-.015	1.145
	Equal variances not assumed			1.996	45.758	.052	.565	.283	-.005	1.135

Table 3. Gender difference regarding perceived educational benefits of using YouTube or iTunes.

Based on my experiences I know using...		Levene's test for equality of variances		T-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									Lower	Upper
YouTube to study is beneficial	Equal variances assumed	5.538	.023	-1.238	47	.222	-.562	.454	-1.475	.351
	Equal variances not assumed			-1.252	46.829	.217	-.562	.449	-1.465	.341
iTunes to study is beneficial	Equal variances assumed	.171	.681	-.729	47	.470	-.194	.266	-.729	.341
	Equal variances not assumed			-.738	46.795	.464	-.194	.263	-.723	.335

DISCUSSION

This research presented evidence from Singapore regarding engineering students' access to mobile technology and their use of iTunes and YouTube to extend their learning about the target language and engineering content knowledge. The evidence is compelling in the sense that while students have access to smartphones and tablets, they seldom use them to extend their learning. Findings from O'Bannon et al. (2011) concur with the above evidence, stating that their participants

did not conceptualise the educational merits of utilising such resources. Their findings highlighted that half of the respondents were not familiar with podcastings, but that some were aware of YouTube as a video-storing site for entertainment purposes. Similarly, Walls et al. (2010) reported that 78 per cent of their respondents used their portable devices to listen to music. In contrast 26 per cent of the respondents viewed audio-visual content of their mobile device (p. 374). Such evidence would suggest that although students are identified as digitally connected, their digital

resourcefulness requires further educational guidance.

The literature has endorsed mobile-based learning as the opportunity to learn anytime, anywhere at any pace. However the impact of mobile learning within the social environment has seldom been researched. Lipscomb et al. (2007) reported on mobile phone etiquette of 383 college participants. These authors highlight that mobile technology ubiquitousness has led to mobile use impact on socially accepted behavioural practices. Lipscomb et al. reveal that mobile phones are

increasingly used in restaurants, cars and schools, to name just a few locations. These authors conclude that their participants agree on the inappropriate use of mobile technology in certain social settings. Evidence from this research seems to indicate that the line between acceptable and inappropriate use of mobile technology is becoming blurry. For example, these Singapore respondents were of the opinion that it was not acceptable to use mobile technology in a movie theatre, but it was acceptable to some extent when viewing a movie at home. Similarly, these Singapore undergraduates thought that it was inappropriate to use mobile technology in places of worship or in class. These responses concur with Lipscomb et al.'s findings. However, while Lipscomb et al.'s respondents strongly disagreed that it was appropriate to use a cell phone in the supermarket, These Singapore students agreed that it was acceptable. Also, since Singapore students are more likely to use public transportation, they deem it acceptable to use mobile technology on trains or buses. While Keengwe et al. (2014) and Thomas et al. (2014) have identified other etiquette areas, they concur that mobile technology is slowly but surely engaging subscribers in mobile behaviour that will increasingly blur currently accepted social mores.

The evidence also suggests that students are not familiar with iTunes for either entertainment or study purposes. The viewing time indicates that a greater majority of the respondents did not use iTunes. This evidence concurs with Walls et al.'s (2010) participants' responses, which indicated that "55% of students" never accessed podcasts, and 21% not accessing it very often (p.374). Nonetheless, Walls et al.'s findings also indicate that after using podcasting for learning purposes, their respondents indicated an increase in more regular use of this service. This evidence seems to highlight that experience with using a particular platform does engage students to use a service more regularly. With respect to the Singapore participants, their responses reveal that they were more familiar with the benefits of accessing YouTube content for both educational and entertainment purposes. Kemp (2015) corroborates this evidence by providing a report indicating that 34% of Singaporeans watch videos on their mobiles. Due to the general population's inclination to view audio-visual content on their mobile devices, this preference would explain that these participants perceived YouTube as trustworthy and therefore they viewed personal and study related content on this platform in a more consistent manner. Their expertise with YouTube enabled them to report their estimated content viewing time. Based on their prior YouTube familiarity, these students felt confident that video-based learning would benefit their learning experience. Therefore, students were willing to recommend YouTube for learning purposes over iTunes.

The students reported a lack of familiar with iTunes University as a source for content knowledge learning

materials. They also reported being uncomfortable with using their smartphone or tablet in the classroom for learning. This evidence seems to be contradictory to findings from other research. Unlike Kinash et al. (2011) who reported that 96 per cent of their students used mobile technology in the classroom, these Singapore students did not. This occurrence may be a reflection of the institutional policy rather than students' lack of innovative learning approach.

Researchers have acknowledged that there seems to be a gap between male and females students regarding the access and use of technology (Anderson et al., 2008; Sieverding and Koch, 2009). However, Joyce (2009) reports that due to increased infrastructure development, this gap is narrowing or is non-existent in areas with high Internet presence. For this reason, an analysis to evaluate any gender differences in the use of YouTube and iTunes was conducted. The evidence seems to suggest that there is no significant difference between male and female students with regards to anxiety during their use of mobile technology or iTunes to study English. Also, there was no difference between genders with regards to their perception of the educational benefits of learning with iTunes. However, a significant difference was noticed between gender and their belief of the educational merits of using YouTube to study. The data collected could not identify the cause of this difference. The literature on this issue is inconclusive. However, Haridakis and Hanson's (2009) research led them to conclude that male participants "who were socially active and used YouTube for purposes of entertainment...Used YouTube more often than did their counterparts" (p. 329). This finding is corroborated by Yang et al. (2010) who explain that socially active male are more likely to be encouraged to use and share YouTube videos compared to their female peers.

Implications

The descriptive findings from this research conducted in Singapore, revealed that students were familiar with YouTube for entertainment purposes, but were not as familiar with using this online video streaming website to explore audio-visual resources relevant to their studies. Students were even less familiar with iTunes resources. In addition, the evidence reveals that students may not be aware of the possibilities such sites offer to improve their listening comprehension skills. Pegrum et al. (2013) concur that engaging students to capitalise on the educational opportunities such devices and online services afford, warrants further research.

To date, research reporting on students' independent viewing time is not readily reported. Research by Kay (2012) suggests that some students are aware of the educational merits of video-enhanced learning, but the impact of viewing time on learning outcome or classroom

participation or performance, is yet to be reported.

Another area for further research is the connection between mobile technology use and exam scores. Gaudreau et al. (2014) suggested that there is a correlation between laptop use and grade point average. Similarly, further research could investigate the relationship between iTunes or YouTube use to study content specific audio-visual resources and grade point average or exam performance.

The research presents students' current practices with technology and does not contrast their experience with teachers. Parkes et al. (2015) suggests that there is a difference between university lecturers' expectations of students' preparedness with online learning and the actual students' experiences. Further research, similar to Parkes et al. would provide more compelling evidence regarding students and lecturers competencies with mobile and YouTube or iTunes-based learning.

The podcasting literature reports that mobile learners have access to all the tools and features to participate in seamless learning. While some research have explored students' audio-visual preferences (Ragusa et al., 2009) others are yet to investigate the mobile learning benefits (Walta and Nicholas, 2013). Yet, Walls et al. (2010) explain the importance of understanding and capitalising on the affordances of mobile and podcasting or vodcasting-based learning (Popova and Edirisingha, 2010). They contend that audio-visual resources provide visual cues that can enable students to enhance their content comprehension (Lonn and Teasley, 2009; See-To et al., 2012). The integration of audio-visual resources with mobile learning provides a rich area for further research.

Limitations

It could be argued that presenting descriptive data may not provide rigorous statistical evidence. However findings such as the descriptive statistics presented in this paper, or available in Rosell-Aguilar (2013) and in Roberts and Ress (2014), does inform educators about students' mobile technology practices, which could lead to better teaching and digital content use practices. Gromik (2009) and Rosell-Aguilar (2013) have argued that there is still a need to conduct student-centred research that provides evidence regarding their background, prior knowledge and experiences, technology preferences and practices.

While the data seems to report positive evidence concerning students' use of YouTube over iTunes, it does not report on the types of content students are viewing. Rosell-Aguilar (2013) was able to provide an overview of the types of content participants viewed on iTunesU. Collecting such information would assist educators to understand their students' opinions regarding their selection process and viewing style. At the time of the data collection process, this item was deemed

complicated to collect since each student would express individual video genre preferences.

Conclusion

While it may be argued that knowing students' use of technology and access to digital content may not be as informative, this paper has revealed that educators need to understand students' technology use, since this evidence can provide invaluable information to develop future lessons or to access complementary digital resources for educational purposes. The evidence presented in this paper indicates that while Singapore is emerging as a digital society, its citizens may not be familiar with the educational benefits that iTunes University and YouTube may afford them. Even though, this research sample size is small, the evidence from these undergraduate university students indicates that further research in technology and digital content access is warranted.

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