EXPLORING COMPETENCY DEVELOPMENT WITH MOBILE DEVICES

Maurice DiGiuseppe, Elita Partosoedarso, Roland Van Oostveen and Francois Desjardins
University of Ontario Institute of Technology
Toronto, Ontario
Canada

ABSTRACT

Computer-based technologies have been used in the field of education for over thirty years. However, more recently, powerful and more affordable mobile technologies are becoming popular in everyday life and the education system. This paper reports on an online survey of student body in a university in Ontario, Canada focused on the use of a wide variety of digital technologies, including mobile devices such as conventional cellphones, smartphones, tablets, and e-readers. Preliminary results indicate that students are using conventional cellphones with less frequency, favouring use of smartphones and tablets ─ using such devices more for technical, social, and informational interactions including texting and sharing data and less for computational functions and talking.

KEYWORDS

Mobile devices, smartphone, higher education, digital technology

1. INTRODUCTION

Although the past thirty years have been witness to a constant influx of technology in the post-secondary education sector (PSE), attention to understanding how students use technology is far more recent. Technology integration in education has usually meant teacher use of technology; however, in the past few years this technology has become far more portable and affordable. Powerful digital technology is now in the hands of learners and they are purchasing and using it for a broader set of purposes (Dahlstrom, 2012).

Mobile devices are essentially small, handheld computers that can be found in a variety of configurations including smartphones, tablets and, most recently, phablets, or intermediaries between smartphones and tablets (Passary, 2013). Most smartphones come equipped with a 8-9cm (3-3.5") (measured on the diagonal) screen size, while tablets can have screens as large as 25-27cm (9.7-10.6"). Screen resolutions may vary as well from 320x240 to the extreme high end of 2048 x1536 in the 3rd Generation iPad with Retina Display (List of displays by pixel density, 2013). When equipped with powerful but efficient miniature processors that require little electrical power and sufficient memory (16, 32, 64 and 128GB), these devices can be relied upon to clearly display great masses of information.

Most current mobile devices rely on touch input interactivity directly on the screen and through the use of a virtual keyboard that is displayed on the screen. Mobile devices may be equipped with WI-FI or a wireless local area network, Bluetooth, global positioning systems (GPS) and cellular radio capabilities that can allow connections to the Internet and other Bluetooth capable devices such as an automobile or a microphone headset. The feature set is generally rounded out with a camera or two and a media player that is enabled for video, music and static pictures. The operating systems (OS) used in mobile devices provide support and services for the use of small programs known as "apps". Originally apps were created for a wide variety of purposes, such as email, calendaring, and contact management, and over the past 2 years, more than 100,000 apps have been created for each of the 3 major OS platforms; iOS from Apple, Android from Google and BB10 from Blackberry. The availability of apps for virtual video conferencing, blogging, microblogging and other social networking affordances ensures that mobile devices will be used for educational purposes.

Recently, educational and commercial institutions and systems alike have been affected by a novel phenomenon referred to as Bring Your Own Device (BYOD)(Hesseldahl, 2013). Mobile devices are starting to be used in classrooms at all levels, including Higher Education (HE) and at a higher rate by students than by faculty, resulting in an impetus for a transformation in higher education in the areas of 'recruiting, teaching, learning, delivery, communication, social interactions, and campus operations' (Melton & Kendall, 2012).

Today, most PSE institutions have adopted digital technology into their curricular practices, but to varying degrees, from simply using the World Wide Web as a means of distributing materials to students, to institutions with full laptop programs. At the University of Ontario Institute of Technology (UOIT) in Oshawa, Ontario, Canada, where, for the past 10 years, laptops have been supplied to every incoming student and where the environment has been focused on facilitating access and delivery of learning materials through the Internet, mobile technology used by students is changing the educational landscape. Students use their institutional laptops, but they are also seen using many other digital devices, especially mobile devices. These changes are challenging our assumptions about these learners and causing us to investigate their use of mobile technologies for learning. To help understanding the current use of digital technology by students at UOIT, the study reported here examined five research questions: 1. What technologies do students use? 2. For what purposes? 3. How often do they use them? 4. How confident are they in using these technologies? 5. How long have they been using these technologies?

In order to provide the basic, necessary data, an instrument was adapted from a survey designed to collect similar data from teachers and instructors (Desjardins & Bullock, 2012). Both instruments are based on the premise that all digital technologies are fundamentally computers, and, as such, can only process, store, and transmit computer data. From these three functions, user interactions with digital technology may be categorized into four general classes of interactions (Desjardins, 2005), namely, Technical interactions *(interacting with digital devices)*, Social interactions *(interacting with others through digital devices)*, Informational interactions *(interacting with information through digital devices)*, and Computational interactions *(interacting with data processing software through digital devices)*.

2. METHODS

Knowing the technologies that students use and what they use them for does not necessarily indicate whether they are able to use them effectively. To determine university students' ability to use mobile devices, we surveyed UOIT students on their use of mobile technologies using two Likert scale indicators, namely Frequency of Use and Confidence of Use (Table 1).

Table 1. Five-point Likert scale used to measure frequency of use and competency of use

Frequency of use	Confidence of use
1 = never	1 = do not know how to use
2 = few times a year	2 = not confident, require assistance to use
3 = few times a month	3 = confident, can solve some problems
4 = few times a week	4 = quite confident, can use with no assistance
5 = daily	5 = very confident, can teach others how to use

Frequency of use was employed as an indicator of effective use on the assumption that the more a specific device or system is used, the more the likelihood of use in different situations and the higher the probability of reinforcing of procedural knowledge. Confidence of use was employed as an indicator of effective use since this measure can be related to the likelihood of a user exploring new uses and applying this technology to new problems or tasks.

A total of 423 students (n = 423) were invited by email to complete the online survey and 157 students (n = 157) voluntarily completed the survey, for a 37% completion rate. Quantitative data gathered from online surveys completed by UOIT students were analyzed in Microsoft Excel using descriptive statistics for frequency of use and confidence in using mobile technologies.

3. FINDINGS

Preliminary data analyzed in this study (Figure 1) indicate that the first device that most students purchased were cell phones without data plans. However, the number of students purchasing their first cellphones without data plans has decreased since 2010. This decrease coincides with the increase in the number of students purchasing Internet-enabled smartphones and tablets over the same period.
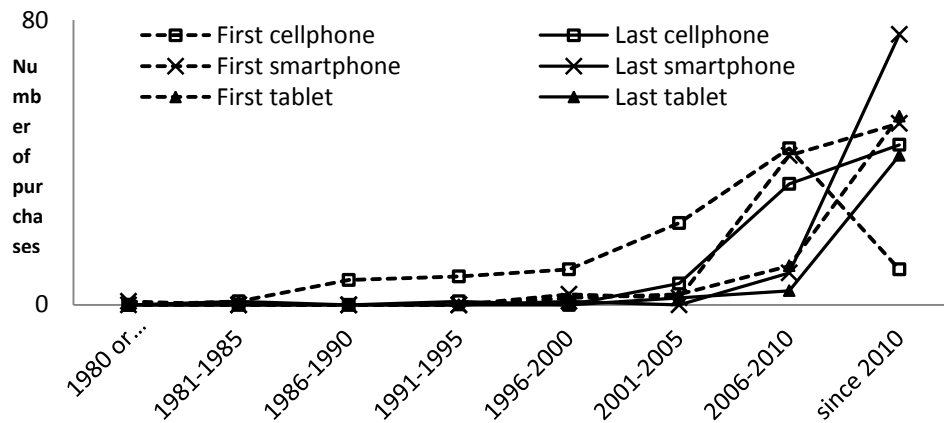
Figure 1. Year of first and last purchase of cellphones (no data), smartphones (with data), and tablets

Of the four general categories of devices (cellphones with data plans, cellphones without data plans, smartphones with data plans, and tablets), students had the most access to Internet-enabled smartphones, with the majority of these students owning at least one smartphone. The number of students with access to a tablet or e-reader was higher than the number with access to cell phones with no data plan.
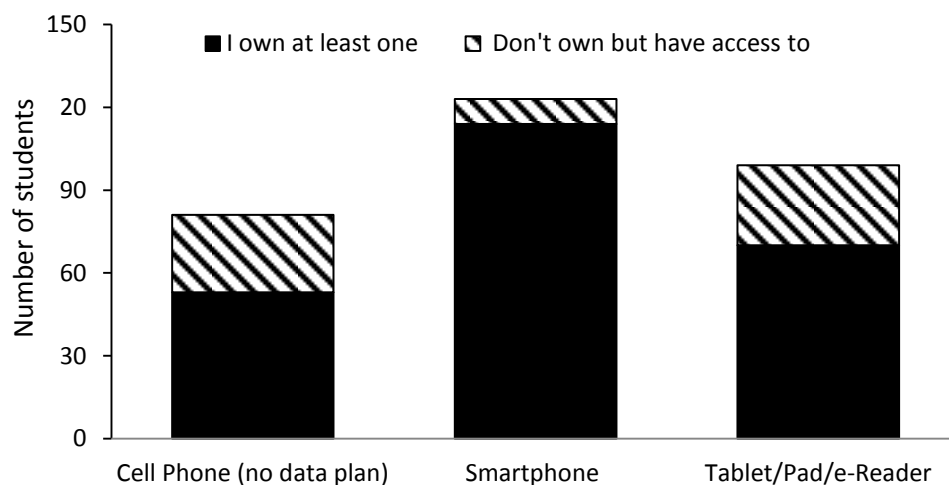
Figure 2. Student access to cellphones (no data), smartphones (with data), and tablets

Data in Table 2 indicate that students used their smartphones most frequently (daily) to communicate via texting, with other modes of communication, namely audio, email, and social media occurring reasonably frequently (a few times a week). These students were quite confident in their abilities to use their smartphones for these purposes. Students also used their smartphones to create and edit documents and multimedia objects reasonably frequently. Students used their smartphones less frequently to search for information, although they were confident in being able to obtain this information with these devices. Most students did not use their smartphones for computational purposes; this was reflected in their lower confidence levels for these tasks. With the exception of sharing documents, students primarily used their smartphones for technical, social, and informational interactions and mainly for personal purposes.

Table 2. Frequency, confidence, and main purpose of smartphone use for the four classes of interactions.

		Frequency of use (5-point scale)	Confidence of use (5-point scale)	Main purpose of use		
				Personal	Studies	Work
Technical	Create/edit documents	3.66	4.33	78.4%	14.8%	6.8%
	Create/edit voice recordings	2.19	4.02	69.2%	23.1%	7.7%
	Create/edit multimedia	3.14	4.33	85.5%	8.1%	6.5%
Social	Email	3.92	4.69	65.1%	12.7%	22.2%
	Video	2.21	4.33	92.5%	0.0%	7.5%
	Texting	4.76	4.74	95.7%	1.1%	3.2%
	Audio	3.86	4.62	93.2%	1.4%	5.4%
	Social media	3.80	4.62	98.5%	0.0%	1.5%
	Share document	1.97	4.02	18.2%	69.7%	12.1%
	Share works and ideas	1.55	3.68	66.7%	20.0%	13.3%
Informational	Search for articles	2.68	4.57	63.9%	27.8%	8.3%
	Search for short videos	2.99	4.73	86.5%	9.6%	3.8%
	Search for movies	1.25	3.60	100.0%	0.0%	0.0%
	Search for music	1.59	3.84	100.0%	0.0%	0.0%
	Search for ebooks	1.34	3.53	85.7%	14.3%	0.0%
Computational	Share calendar	2.95	4.18	59.5%	29.7%	10.8%
	Use concept maps	1.05	2.94	33.3%	66.7%	0.0%
	Use diagrams	1.17	2.74	42.9%	28.6%	28.6%
	Sort data	1.25	3.26	80.0%	10.0%	10.0%
	Produce graphs	1.14	3.00	14.3%	57.1%	28.6%
	Complex calculations	1.71	3.88	55.0%	40.0%	5.0%

4. CONCLUSIONS

Preliminary analyses of the data in this study indicate that the majority of post-secondary students who participated in this study changed the types of mobile devices they have been using since 2010, reducing ownership of cellphones without data plans in favour of smartphones and tablets — primarily employing these devices for technical, social, and informational interactions. Furthermore, initial findings indicate that a majority of these students own at least one smartphone and more have access to a tablet or e-reader than a

cell phone with no Internet accessibility. These analyses also indicate that students are using their mobile devices more for texting and sharing data than for talking only. These results point to a marked transformation in student frequency of use and confidence in using Internet-accessible mobile devices such as smartphones and tablets (Melton & Kendall, 2012), and suggests further studies focused on student and professor use of mobile devices in the learning and teaching process.

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