

# BYOD Perceptions and Reality

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## ABSTRACT

In 2014 a New Zealand nationwide, Ako Aotearoa funded project was launched. This project was aimed at exploring and developing a range of practical strategies to utilise the affordances of mobile devices for pedagogical transformation and empowering learners within different contexts of tertiary education. Small community of practices (COPs) were set up in each participating tertiary institution to explore, design, and integrate mobile technologies to support their specific learners' needs. This research reports on the results of a survey launched at one of the institutions involved in the project. The survey examined the perceptions of the students' that would be involved in the project. The results highlight there are a variety of reasons student do or do not use or bring their mobile devices to class and the major issues that need to be overcome before BYOD and mobile learning can be effectively implemented.

**Keywords:** BYOD, Bring your own device, mobile learning, #NPF14LMD, smartphone, tablet, iPad, innovation, inclusion, transformation

## 1. INTRODUCTION

At the beginning of 2014 six tertiary institutions became involved in a NZ nationwide project, 'Learners and mobile devices (#NPF14LMD): A framework for enhanced learning and institutional change'. This project aimed to deliver a "range of practical strategies for students, teachers and leaders to utilise the affordances of mobile devices for pedagogical transformation and empowering learners" (Ako Aotearoa, 2014). The key project questions were derived from Traxler (2010), "Will learners' mobile devices deliver innovation, inclusion and transformation—the main potential benefits for learners? If so, how? What is the 'framework for enhanced learning and institutional change' that will deliver these benefits?" Staff at participating institutions have been developing case studies showcasing how mobile technologies can be exploited to support their learners' needs and how these technologies can be integrated in a variety of learning contexts.

One of the institutions involved in this nationwide research project (collectively referenced under the hashtag #NPF14LMD) is the Eastern Institute of Technology (EIT). At EIT, a community of practice (COP) was established to explore how mobile learning could be more effectively implemented at the institute. Five School of Computing lecturers participated in this project and investigated and explored ways that they could incorporate mobile technology within their teaching. The uses included, setting up online communities, supporting screen sharing inside the classroom, recording lectures and hosting online lectures. These experiences form a series of case studies that showcase how mobile technologies can be incorporated into the tertiary environment (see Mac Callum, Day, Skelton, Lengyel, & Verhaart (2015) for a description of some of these initiative).

At the beginning of 2015, after the lecturers had started their initial explorations and had begun to integrate some form of mobile technology into the classroom, a small survey was launched. The survey examined how learners were using their

mobile devices (smartphones, tablet and laptops) and their

perceptions of using them in the class (Bring Your own Device (BYOD)). Three key questions were examined; firstly, 'do students own mobile technology able to support their learning' and secondly, 'would they be willing to bring these devices to class?', and lastly, 'how are students using these devices to support their learning?'

## 2. LITERATURE REVIEW

The use of mobile devices is growing and its significance in education is diverse and multi-faceted. Mobile devices and technologies provide ubiquitous access to information and provide opportunity for informal and formal learning in a variety of contexts and situations. Traxler (2007) discusses the case of mobile device use for learning, "mobile learning will support a wide variety of conceptions of teaching, and ... is uniquely placed to support learning that is personalized, authentic, and situated" (p.17). Traxler (2007) further states that the pervasiveness of mobile technologies provides opportunities to recognise and support individuality and diversity and context specific learning opportunities. From a pedagogical perspective, these technologies potentially support multiple learning theories; behaviourist, constructivist, experiential and collaborative and allow students control over the time and place of learning (Thomas & O'Bannon, 2013). Although there is widespread interest in the affordances and potential benefits of using mobile devices for learning, there are limitations. Significant among these, and identified in the literature, is student perception and attitudes towards bringing and using their own mobile devices (BYOD) for learning (Mac Callum, 2011).

The BYOD concept recognises that mobile devices are privately owned, portable and pervasive (Hopkins, Sylvester & Tate, 2013) and include, but not limited to, laptop computers, tablets and smartphones. Various issues surrounding the use of these devices by students within an educational context have been identified. Benham Carvalho and Cassens (2014) researched student ownership and use of mobile devices for learning, and although the study found that most students owned devices, there were several reasons why they would not bring these to class. The reasons cited included; perception that the devices were not allowed, not needed, no Internet connection and the possibility of theft. This research also found that the students had an understanding of the benefits of bringing and using mobile for learning and wanted to use the technology more in the future.

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This quality assured paper appeared at the 6<sup>th</sup> annual conference of Computing and Information Technology Research and Education New Zealand (CITREnz2015) and the 28<sup>th</sup> Annual Conference of the National Advisory Committee on Computing Qualifications, Queenstown, New Zealand, October 6-9, 2015. Michael Verhaart, Amit Sarkar, Rosemarie Tomlinson and Emre Erturk (Eds).

According to Benham et al. (2014), “The main obstacle that students see in the path toward using mobile technology in the classroom is their perceptions of their Instructors. In the eyes of the students the inability and/or unwillingness of Instructors to actively engage them in the classroom with the effective use of mobile technology poses a significant challenge” (p. 149).

This unwillingness by instructors/teachers to integrate mobile technology into teaching and learning, and the impact this has on student perceptions and understandings has been highlighted elsewhere in the literature. O’Bannon and Thomas (2014) reported in their findings that some teachers believed that the use of mobile technology does not support learning. They also felt that they lacked training, support and the necessary skills to successfully integrate mobile technology into their teaching. To mitigate these concerns and to support mobile use in the classroom, it has been identified that teachers need to have a clear understanding of technology, pedagogy and integration (Thomas & O’Bannon, 2013). Other challenges presented from a teaching perspective, reside in the perception of the device itself; not all mobile devices are seen as equal. Sad and Goktas (2013) identified the perception that laptops were seen to have more potential as a learning and teaching tool than a smartphone, and this is reflected in the acceptance of student device use in the classroom.

### 3. METHODOLOGY

The aim of this study was to determine students’ adoption of and perception of using mobile technology for learning. The population of interest in this study were tertiary students enrolled in at least one course offered by the five computing lectures that were participants in the COP at EIT.

#### 3.1 Survey design

A survey, based on the survey design of Benham et al. (2014), was administered to School of Computing students at EIT. These students attended at least one of the five classes taught by the lecturers involved in the #NPF14LMD project. These classes comprised of approximately 20 students in each class, with some students enrolled in the more than one class. The survey consisted of 20 questions designed to capture device ownership, device use, engagement in and the limitations of use within the educational context. The survey questions consisted of a mix of yes/no, multi-choice, Likert scale and free answer options and was available online in Survey Monkey (an online survey tool) for a period 8 weeks.

The survey focussed on mobile device usage for learning only. The questions with the survey related to students use and perceptions of these devices for learning. The mobile devices of interest were split into two groups, laptop/tablet and smartphone ownership. Laptops and tablets were grouped together since the distinctions between these two devices have continued to blur as technology advances. Smartphones were classified as a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded apps. Examples include the iPhone, Samsung Android, and Windows Phone).

Due to the small size of the classes only 50 usable surveys were selected (response rate of approximately 62.5%). The demographic of the sample was reasonably representative of the student population within the computing school and comprised of the majority of males (67%, n=30) between the ages of 18 to 24 (47%, n=20).

A copy of the questionnaire may be obtained from the authors upon request.

### 3.2 Ethics

This research was approved by EIT’s Research and Ethics Approvals Committee (2014) under the umbrella of approval granted to the ‘Learners and mobile devices (#NPF14LMD): A framework for enhanced learning and institutional change’ research project. Survey participation was voluntary, and respondents were able to choose which questions to respond to. All results are reported anonymously.

### 3.3 Limitations

The sample size and response rate in this research is identified as a significant limitation and any statistical outcomes cannot be applied in a wider context or used for generalization. The students in this research were diploma and degree level computing students and it would therefore be expected that they have an advanced level of computing skills. It would also be expected that this level of competency would reflect on their ability to use and adopt mobile technologies and mitigate possible technology issues. Therefore, the results may not be representative of all users. Not all students would have attended all classes and participated in all activities aligned to the project. This will be reflected in the results and has been noted where applicable.

## 4. RESULTS AND DISCUSSION

### 4.1 Mobile device ownership to support learning

Students were asked what mobile devices they have and use to support their learning (Table 1). Of the 50 students that responded to the survey, 88% (n=44) of students owned a mobile device (laptop/tablet/smartphone or a combination of these devices). The results showed that most (76%, n=38) but not all students used their mobile devices for their learning. Of those that owned a tablet/laptop there were three students that did not use their devices for learning. The same number of students (76%, n=38) also owned and used their smartphone for learning. Furthermore, there were a further seven students that owned a smartphone but did not use it for learning. The majority of students owned both a laptop/tablet and smartphone (64%, n=32), with an even spread between those that owned just a smartphone or tablet/laptop.

The type of smartphones owned by students were split fairly between those with an iOS operating system (36%, n=18) and those with an android (32%, n=16), with the rest either not specifying (n=5) or having another platform such as Windows (n=4). The laptop/tablet ownership was more diverse, with a wide range of types and operating systems installed on the device.

Having such a variety of devices in class will have implications on how the mobile technology will be used within the classroom. It will also add to the complexity of introducing mobile learning at the institute. It will impact the use of specific applications and may mean a higher focus on cloud based tools. These reliance of Internet services will also have implications on infrastructure and policy.

**Table 1: Built-in Students that use mobile devices to support their learning**

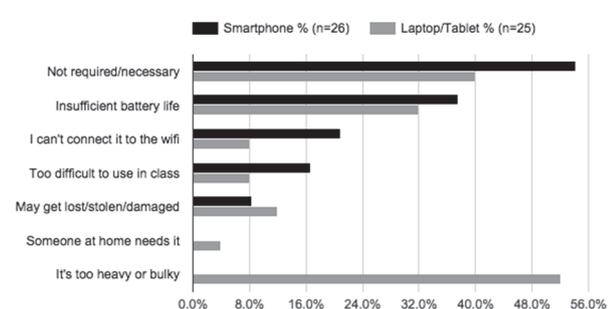
Device	Yes	No
Mobile device	88% (n=44)	12% (n=6)
Smartphone	76% (n=38)	24% (n=12)
Laptop/Tablet	76% (n=38)	24% (n=12)

The findings also showed that there were nine students who did not own or have access to a tablet/laptop and five students (10%) who did not own a smartphone. This finding was a

little surprising. Since the participants of this survey were computing student it was generally considered that these students would most likely be high adopters of technology. Despite this number being relatively low it does highlight an important issue of equity. It reinforces the fact that it still cannot be assumed that all students will own a suitable mobile device. This issue places a limiting factor on the use and adoption of mobile learning by institutes. If it cannot be guaranteed that all students own a suitable device initiating a BYOD approach will not be possible since a consistent approach cannot be undertaken within the classroom. The study did not ask about desktop ownership and usage.

## 4.2 Reasons for not bringing a device to class

Further to the ownership and use for learning the survey asked students whether they bring these devices to class and what limits or prevents them from being these devices to class (Figure 1). From those students that used their devices to support their learning only 68.6% (n=24) of students regularly brought their tablet/laptops to class to support their classwork while only 72% (n=26) regularly brought their smartphones to class for classwork.



**Figure 1: Reasons that limits/ prevents students from using their mobile devices in class**

When asked why they did not bring their mobile devices to class, the majority felt did not feel that it was necessary (Mobile: 54.2%, n=13, Laptop/Tablet: 40%, n=10). A smaller percentage felt that there was an issue with the battery life of their devices being too short (Mobile: 37.5%, n=9, Laptop/Tablet: 43.2%, n=8). For laptops 52% (n=13) of students felt that they were too heavy and bulky to bring to class.

The free answer question shed more but conflicting insight into student attitude towards bringing their devices and using their devices to learn. A number of students were concerned that these devices were distracting. One student in particular stated that *“many other students spend their class time looking into their device, likely distracted or checking their facebook page. They do not seem to be using their device to record the class or take notes. I often wonder if they know what's going on in class at all. The younger the student, the worse the problem.”*. Other students commented on the issues with device itself, with one student noting that *“Laptops too large and heavy to carry Ipad are ideal”*. Other issues with bring their laptops included that they found that there was not much space in some rooms to use their laptops on the table and *“sometimes it take time to setup the technologies”*. Others mentioned the small screen size or not all services or resources being supported on smartphones as a deterrent, *“Lots of sites don't conform nicely to small screens”*, *“screen size too small for some applications”* and on a tablet *“small*

*interface - Ipad not as easy to use when looking to function with Windows technology”*. Consistently, students mentioned Wi-Fi connection speed and authentication as problematic, *“EIT WiFi is too slow and cumbersome to get through their authentication”*, *“hate having to login everytime”* and *“Wifi is slow... So slow. Like seriously slow”*. The increasing demand on institutional Wi-Fi networks is an area of concern, particularly if BYOD initiatives become more widely adopted. Slow connectivity and complicated authentication processes may hinder development in this area.

These results have highlighted that the motivation to bring these devices to class can be strongly impacted by how the devices are used in the class (or lack of use) and the technical issues of the device and infrastructure. Students need to feel that if they are to bring the devices to class it will to be used. By embedding more activities into the classroom, which requires students to use their devices, would make it more likely that students will see these devices as useful and necessary. However as mentioned above, implementing a consistent approach will require students to have and own suitable devices. The technical issues however are harder issue to overcome. The institutional issues with Wi-Fi access and use will require an institute wide resolution and possible policy change.

## 4.3 Learning related activities undertaken with a mobile device

A Likert scale rating (always, very often, sometimes rarely and never) was used to ask students how often they used their smartphones or tablets/laptops for various learning activities. The results indicated a wide spread of activity were being undertaken on their mobile devices (Figure 2 and 3). For the tablet/laptop users (Figure 2) the top activity was browsing the Internet, using the LMS and course resources, sourcing and viewing videos, interacting with social media, using productivity (Email & Calendar) and using Cloud storage. All these tasks have very few students that had never undertaken them on their devices (all less than 13.2%, n=5). The tasks that most students undertake on their smartphones were productivity (email and calendar), browsing the Internet, interacting with social media, sourcing and viewing videos, and recording multimedia, with less than 16%,(n=8) having very undertaken these tasks on their mobile device.

On the other hand, the activities that students had never undertaken on their mobile devices were very similar when compared. In general most students (<44.7%) had not interacting with the course GPlus Community, attending online classes (such as through Adobe Connect), writing a blog, and creating eBooks on their mobile devices. This was however was not surprising since not all classes incorporated these tasks into their teaching. These specific tasks were activities that a few lecturers had started to adopt into their teaching as part of this project. Not all the students had taken all classes so numbers were low on use in these areas. However, when comparing the devices students used to participate in these activities, there is an indication of preference. In general but probably unsurprising, students preferred to use their laptops/tablets to create the e-books, attend online classes and write blog. However, there was no preference to device and those that interact with the GPlus communities. See Appendix 1 for all activities and ratings.

When comparing the results we see that generally there was not a major difference between the number of students that have never undertaken these activities on their mobile devices.

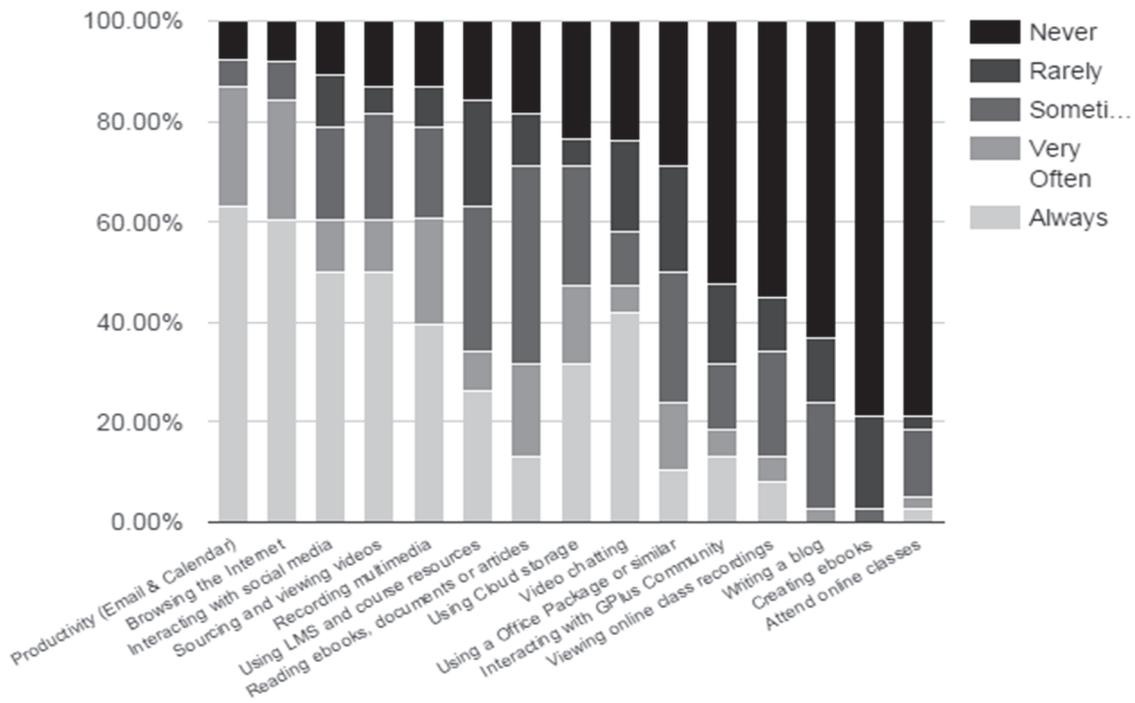


Figure 2: Learning activities undertaken on students' laptop/tablet

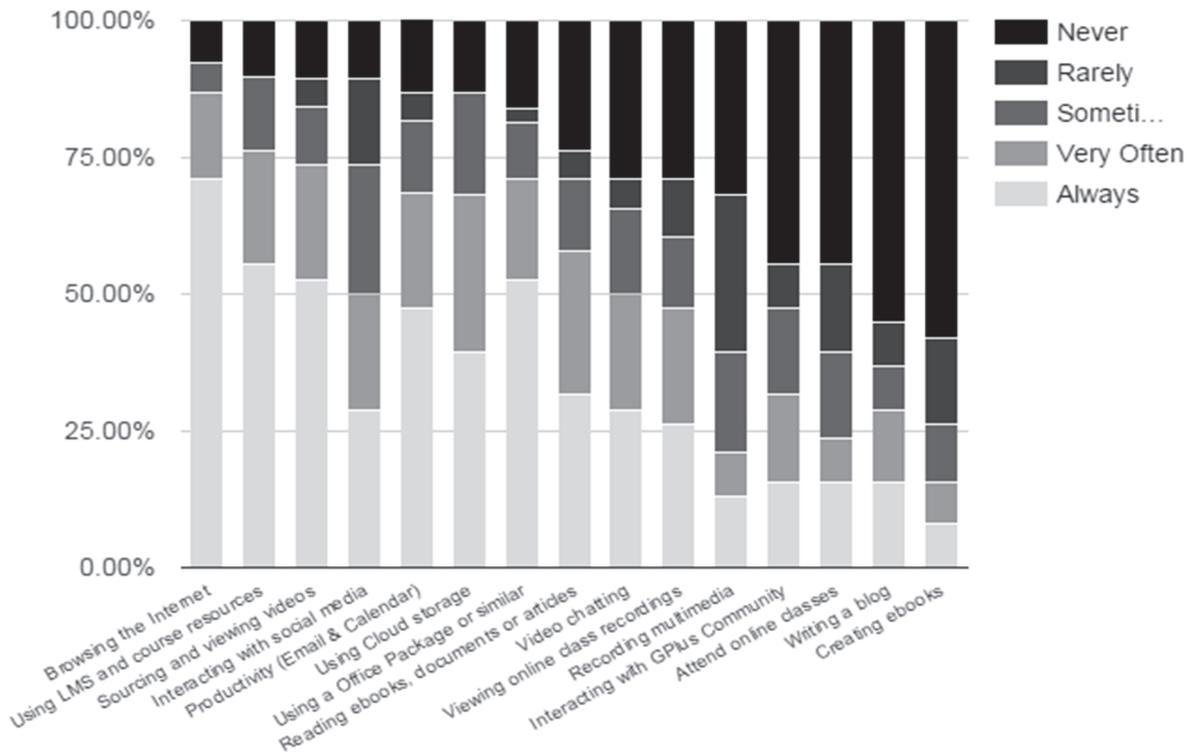


Figure 3: Learning activities undertaken on students' smartphone

However when comparing the students responses on how often they use their devices to undertake each activity we can see that there is significant difference on some activities when undertaking them very often. In particular students were more likely to use their laptops when using productivity software, such as Office (z-value = 3.949;  $p < .00$ ), using LMS and course resources (z-value = 2.572;  $p < .05$ ), recording multimedia (z-value = 2.602;  $p < .05$ ), and interacting with social media (z-value = 1.882;  $p < .05$ ). The full results of student activity and device selection are compared in Table 2.

**Table 2: Student activity and device selection**

Learning activities always undertaken on students' device	Laptop (n=38)	Smart-phone (n=38)	P-value (Paired z-test)
Viewing online class recordings	26.3%	7.90%	0.091
Sourcing and viewing videos	52.6%	50.0%	0.227
Interacting with GPlus Community	15.8%	13.2%	0.322
Using Cloud storage	39.5%	31.6%	0.719
Browsing the Internet	71.1%	60.5%	0.974
Video chatting	28.9%	42.1%	1.202
Productivity (Email & Calendar)	47.4%	63.2%	1.385
Creating ebooks	7.9%	13.2%	1.78*
Interacting with social media	28.9%	50.0%	1.882*
Reading ebooks, documents or articles	31.6%	13.2%	1.924*
Attend online classes	15.80%	2.6%	1.991**
Writing a blog	15.80%	0.0%	2.553**
Using LMS and course resources	55.3%	26.3%	2.572**
Recording multimedia	13.2%	39.5%	2.602**
Using a Office Package or similar	52.6%	10.5%	3.949**

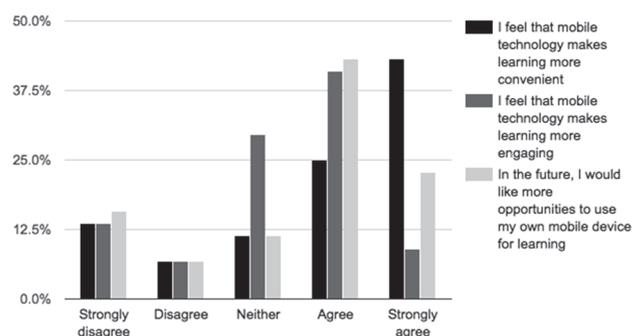
When asked what other learning activities mobile devices were used for, the students gave a variety of comments when responding. The comments fell into two broad themes centred on communication; “Keeping in contact with classmates”, “Facebook communication and texting to other students/friends regarding course content and group discussion” and revision; “taking photos of the tutors board work and loading into one notes” and “If I have to learn by heart, I always write everything in a word document and learn it on my tablet”.

#### 4.4 Positive effects of mobile learning

Students were asked to rate (5 level Likert scale) their agreement to three statements that reflected a positive attitude toward mobile technologies and their use for learning (Figure 4). Most student (68.2 %, n=30) agreed or strongly agreed with the statement that mobile technology made learning more convenient and would adopt mobile learning in the future (65.9 %, n=29). A smaller percentage felt that mobile technology makes learning more engaging (50%, n=22).

To elaborate on these perceptions at the end of the survey students were asked to describe the benefits they perceive that

mobile technology provides to their learning. The benefits centred mainly around four factors; it being convenient and accessible (n=15), easy to use (n=4), portable (n=3) and flexible (n=15).



**Figure 4: Students' perception of mobile learning**

**Convenient and Accessible:** There were a number of comments relating to mobile technology allowed for quick, convenient access to learning resources. Mobile technology enabled student to conveniently access and keep up to date on their learning resources (such as emails, lecture notes and resources) that was accessible from anywhere. One student commented that, “Students can learn anywhere, anytime and they can process the information inside as well as outside the classroom”. Access of to these was also seen as quick since mobile devices were always on and logged in. “[My mobile device is] always logged on, whereas desktops have to login each time and slow. If desktops faster and had dual screens I would use mobile less!”

**Ease of use:** Students also found that mobile technology was easy to use to access and undertake task in their learning. One student commented that “[Mobile technology enabled me easily access my notes, in particular I use it to] take notes in class, capture tutors notes [from the whiteboard by camera], and bring up tutors slides.” Another student commented that, “I personally find using a laptop so easy to take notes. I can't take written notes as I struggle to write and listen at the same time, then retain it. I also struggle to keep up. Whereas with powerpoint, the notes are in front of me and I am able to write down any extra elaborate detail mentioned, and extra useful information.”

**Portability:** The portable nature of the mobile devices was also seen as a major benefit to supporting learning inside and outside the classroom.

**Flexibility:** Mobile technology was also seen as very flexible providing a variety of usage both in a formal and informal manner. In particular one student commented that it was “easy to take notes, easy access to resources on the fly, can record lectures and take notes all on one system”. Other comments included

“I prefer to learn by seeing pictures and doing examples. So having a laptop to try programming code is helpful.” also “bringing my own device [to class] allowed me to keeping all code on one device.”

A number of students also describe the multiple ways that they have used the technology in and outside of class. The lecture/topic recording was in particular highlighted as valuable in supporting learning so too were the ability for some classes to be attended online. These were found to be very useful if they missed classes or for revision purposes (n=8). One student also described that he/she would watch the

lecture that was steaming synchronously on his/her device while still in the class due to poor eyesight.

Class activities that used the devices to research, or complete activities were also found very useful. For example, “*doing small bits of research with a smartphone is helpful to understand concepts*”, “*Being able to google words I did not know or understand to clarify content.*” and “*Great doing the activities in [my class] straight away ... as [my lecturer] talked and going away confident that they were completed [correctly].*”

## 5. CONCLUSION AND FUTURE RESEARCH

As part of a nationwide project, staff from the School of Computing at EIT integrated the use of mobile technologies into their teaching. As part of this project, a small survey was launched to answer the following questions, “do students own mobile technology and would they be willing to bring these devices to class?”, and secondly, ‘how are students using these devices to support their learning?’ The willingness of students to bring their device and use it for learning will ultimately affect the implementation of any BYOD initiatives within the institute.

The results from this research have shown that although most students own a mobile device, they do not bring them regularly. Notwithstanding the mobile project staff participants’ efforts at integrating mobile activities into their class, the majority of students saw no reason to bring their device as it was seen as not required or not necessary. This indicated that for students to accept and use their own devices, integration of mobile activity within a class needs to be purposeful, consistent and ongoing, rather than one off or haphazard. This research also raises the question of equity, not all students own devices, and not all students own the same type of device with the same capability and features. These issues pose dilemmas for educators particularly when designing activities for student participation. Future longitudinal research over a time of sustained integration of mobile activity would give a clearer indication of the effects on student ownership and BYOD habits.

Device use differed between tasks, indicating students had an appreciation of the ease and difficulty in which some devices operated depending on the situation. Students reported that they are more likely to access their calendar and email, engage in social media, record multimedia and video chat on their smartphones, and browse the internet, read eBooks, documents and articles, and view the LMS on a tablet. Laptops were preferred when using office productivity software. This data, along with student comment seems to suggest that screen size and the mobile friendliness of the web pays a particularly important part in activity choice and which device to use. The other noticeable limiting factor was the perception of slow Wi-Fi and poor connectivity. This is an ongoing dilemma as institutes struggle with the demand to Wi-Fi infrastructure while also maintaining network security. Students also chose to use their devices for peer

communication purposes and as a study and revision aid. This is an area that could be developed for future focus, particularly around the use of social media, online groups and communities for peer interaction and support.

## 6. ACKNOWLEDGMENTS

This research was supported and funded by Ako Aotearoa National Fund 2014.

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## APPENDIX 1: COMPARISON OF ACTIVITIES UNDERTAKEN BETWEEN STUDENT OWNED DEVICES

Activity	Device	Always	Very Often	Sometimes	Rarely	Never
<b>Productivity (Email &amp; Calendar)</b>	Smartphone	63.20%	23.70%	5.30%	0.00%	7.90%
	Laptop/Tablet	47.40%	21.10%	13.20%	5.30%	13.20%
<b>Using a Office Package or similar</b>	Smartphone	10.50%	13.20%	26.30%	21.10%	28.90%
	Laptop/Tablet	52.60%	18.40%	10.50%	2.60%	15.80%
<b>Reading ebooks, documents or articles</b>	Smartphone	13.20%	18.40%	39.50%	10.50%	18.40%
	Laptop/Tablet	31.60%	26.30%	13.20%	5.30%	23.70%
<b>Creating ebooks</b>	Smartphone	0.00%	0.00%	2.60%	18.40%	78.90%
	Laptop/Tablet	7.90%	7.90%	10.50%	15.80%	57.90%
<b>Using Cloud storage (such as Google Drive, Dropbox, OneNote etc)</b>	Smartphone	31.60%	15.80%	23.70%	5.30%	23.70%
	Laptop/Tablet	39.50%	28.90%	18.40%	0.00%	13.20%
<b>Browsing the Internet</b>	Smartphone	60.50%	23.70%	7.90%	0.00%	7.90%
	Laptop/Tablet	71.10%	15.80%	5.30%	0.00%	7.90%
<b>Sourcing and viewing videos</b>	Smartphone	50.00%	10.50%	21.10%	5.30%	13.20%
	Laptop/Tablet	52.60%	21.10%	10.50%	5.30%	10.50%
<b>Video chatting (such as Skype or Google Hangouts)</b>	Smartphone	42.10%	5.30%	10.50%	18.40%	23.70%
	Laptop/Tablet	28.90%	21.10%	15.80%	5.30%	28.90%
<b>Interacting with social media such as Twitter</b>	Smartphone	50.00%	10.50%	18.40%	10.50%	10.50%
	Laptop/Tablet	28.90%	21.10%	23.70%	15.80%	10.50%
<b>Interacting with the course GPlus Community</b>	Smartphone	13.20%	5.30%	13.20%	15.80%	52.60%
	Laptop/Tablet	15.80%	15.80%	15.80%	7.90%	44.70%
<b>Using EITOnline and course resources</b>	Smartphone	26.30%	7.90%	28.90%	21.10%	15.80%
	Laptop/Tablet	55.30%	21.10%	13.20%	0.00%	10.50%
<b>Viewing online class recordings</b>	Smartphone	7.90%	5.30%	21.10%	10.50%	55.30%
	Laptop/Tablet	26.30%	21.10%	13.20%	10.50%	28.90%
<b>Recording audio, videos or taking photos</b>	Smartphone	39.50%	21.10%	18.40%	7.90%	13.20%
	Laptop/Tablet	13.20%	7.90%	18.40%	28.90%	31.60%
<b>Writing a blog</b>	Smartphone	0.00%	2.60%	21.10%	13.20%	63.20%
	Laptop/Tablet	15.80%	13.20%	7.90%	7.90%	55.30%
<b>Attend online classes (such as through Adobe Connect)</b>	Smartphone	2.60%	2.60%	13.20%	2.60%	78.90%
	Laptop/Tablet	15.80%	7.90%	15.80%	15.80%	44.70%