MOBILE TECHNOLOGIES AND CHANGING LEARNER CHARACTERISTICS AND PREFERENCES: TEACHERS' PERCEPTIONS

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Introduction

In the last fifteen years, one of the myths in the field of ICT research is the notion that the current generation are "digital natives" whereas older generations are "digital immigrants". The terms "digital natives" and "digital immigrants" were coined by Prensky (2001a; 2001b) around the start of the millennium and consequently, different terms with similar meanings (e.g., Y generation, i-generation, Net-generation) have been used (for example, by Oblinger & Oblinger, 2005; Rosen, 2010; Tapscott, 2009) to characterise the younger generation of technology users. The idea of a whole generation are "digital natives" has been disputed by researchers on conceptual and empirical grounds (e.g., Bennet & Maton, 2010; Jones, 2012). For example, Bullen and colleagues (2011) developed an instrument to measure the learning characteristics of tertiary students. They found that there were little differences in terms of technology use by younger and older students in a Canadian higher education institution. Using the same instrument, similar results were found by Lai and Hong (2014) in New Zealand. While tertiary students in general had certain learning characteristics and preferences related to the use of digital technologies in the study, no significant generational differences were found between students of different ages. Most empirical studies to date that focus on learner characteristics have documented the learners' own self-perceptions. It is therefore necessary to investigate whether university teachers' perceptions of their students' learning characteristics and preferences are similar. This is because teachers' perceptions and understandings of learner characteristics have significant implications on their course design.

The study

In 2014, a study was conducted by the above authors at a research-intensive university in New Zealand aimed at investigating how university teachers utilised digital and mobile technologies in their teaching. One of the research questions guiding the study was:

> *What are the perceptions of university teachers on the learning characteristics and preferences of their students, as compared to 10 years ago, due to their use of mobile technologies and applications?*

An online survey was emailed to all teaching staff (1,272) of this university. A total of 308 completed the questionnaire, with a response rate of 24%. Thirty of the questionnaire respondents took part in a follow-up interview lasting approximately thirty minutes. Demographic information on the questionnaire and interview participants is included in Table 1.

Table 1: Demographic information of the participants

	Male	Female	Professorial staff	Senior lecturer/lecturer	Professional Practice Fellow/Teaching Fellow
Questionnaire respondents	57%	43%	34%	48%	18%
Interviewees	53%	47%	23%	40%	37%

In the questionnaire survey, 108 respondents provided relevant responses to an open-ended question on whether, as well as how students had developed specific learning preferences through using mobile technologies. In the follow-up interviews the same question was asked to elicit examples and elaborations. All interviews were transcribed and coded, and themes were synthesised. Bullen et al.'s summary (2011) of the learning characteristics of "digital natives" (which are based on "digital natives" advocates' claims), were used to develop the coding scheme. Bullen et al. (2011) summarise the following characteristics of "digital natives": digitally literate, constant connection to the Internet and using it to access information; multitasking; a need for immediacy; prefer experiential learning, social and group work and are community minded; prefer structure in learning/goal oriented; and favour images over text.

Findings

The majority of university teachers perceived a change in the learning characteristics and/or preferences of their students over the last ten years, due to the students' usage of mobile devices. Of the 108 responses to the above open-ended question on the questionnaire, approximately three-quarters (76%) indicated they had observed changes in their students' learning characteristics and/or preferences, while 80% of the interviewees felt their students' learning characteristics and/or preferences have changed over the last ten years. These perceived changes are discussed in the following sub-sections.

The ubiquity of mobile technologies

Many participants commented on how the ubiquity of mobile technologies in contemporary society has affected the learning preferences of their students. For example:

> *Almost every student has a laptop, and they would open them up and do their work in class…so I think that's certainly a change because I think students, because of their use of social media and their familiarity with search tools and so on, and because they've got the devices with them all the time, they're able to contribute resources to the discussion. (I14).*

> *Now I see that pretty much every second person has their laptop with them and the same I s'pose with phones starting to become sort of mini computers now. (I24).*

Preference for online resources

With the ubiquity of mobile devices and the instant access to online resources they provide, participants saw their students as highly computer literate. Many discussed how students now have a preference for accessing online resources using their laptop or mobile devices rather than using the library or traditional resources, such as books, for research. For example, three interviewees mentioned how students could immediately access specific applications and/or websites on their mobile devices, which were vital to their course and future careers. These comments are typified by the following:

> *I think they use these mobile, portable handheld devices on an everyday basis if not every hour…they often record lectures, they often use applications to find music that I play in a lecture, they may use something like Sound Hound, which gives you the name of the song, the album or similar songs, they type things if they've got a slightly bigger device, they might, like an iPad or another similar device like that, they may type up notes during lectures, they can access my slides and just click on a link and it takes them to another resource. (I5)*

> *I definitely know things are very different than they were you know back in 2002 when I first started as a teaching assistant, nowadays students ask us for you know podcasts, they ask us for you know lectures online, I mean a lot of other content that ten years ago they wouldn't ask us about it, I mean ten years ago they would ask us maybe about a handout, and now they want things online, and the making some of those resources available on mobile apps will probably you know mean that more students will access them. (I28)*

Sixteen questionnaire respondents commented how their students preferred online information "they can access with their mobile devices" (S12) and students' "preferences for easily accessible, well structured online resources" (S52).

A number of participants stated that with the increasing accessibility of information that digital and mobile technologies allow, the way students' access information has changed. For instance:

> *That people tend to vary the way they learn, or the way they access information for instance, and the way they connect with different kinds of knowledge hubs if you like, so classroom becomes only one single or data point where learning occurs, there are other data points all over the place and of course mobile and ubiquitous technologies help people connect to their alternative knowledge repositories [and less] depending on the classroom and*

the teacher, so that is a change…that there's a trend happening particularly the undergraduate students I would say. (I6)

Not attending lectures

Due to the convenience and ease of accessing information through mobile technologies, participants said that students "prefer to learn via electronic delivery rather than attending lectures and tutorials in person" (S32). Two lecturers commented:

They already have specific learning preferences as shown by wide student use of texting Facebook etc on laptops and phones during lecture delivery, rather than attending to the lecture material. There is some disconnect here – why should students bother to attend formal classes? (S18)

Being able to access learning material online or via a mobile app encourages students to not attend lectures, to the detriment of their learning. Such resources should be an adjunct to, not a replacement for formal learning. (S72)

In order to motivate students to attend lecturers, interview participant I19 only put half the information his students needed for lectures online.

I've taken over a class from a younger colleague and she would put all the Powerpoints up, sort of even the day before the class is taught, whereas…now I am putting them up but I'm trying to do them in a strategic way, where it's not just giving them everything that they need it's actually giving them maybe half what they need and then they've got to come to class to get the other half…

Demand for immediacy

Numerous participants commented that students wanted information immediately since their mobile digital technologies could connect them with the Internet wherever and whenever they wanted. The word immediacy reoccurred across the survey and interview participants' responses. According to the participants, students demanded "immediacy of information transfer" (S34), "instant clarification of ideas and concepts" (S44), and that "content is available to them 24/7, and that you as the lecturer should be available to them 24/7" (S53). Two interview participants also commented that:

There's just more demand for things to be available online…out it on Moodle that's what they say…[they are] showing frustration with non-digital ways of doing things when there's a digital alternative, which is more engaging or more flexible or easier for them. (I18)

They want everything yesterday you know…[students] expecting that everything's there and it's available to them online all the time…and it gives them the false sense of security that they've got this you know, I've

> *downloaded it I've got it, but they haven't got it (laughs) all they've got is a file on their computer, they don't understand it, they haven't necessarily gone through it carefully and thought about it and they haven't you know been challenged on hard points. (I19)*

Self-directed learning

Several participants commented that tertiary students have become more independent and self-directed learners with the use of digital and mobile technologies. For example students have developed, "personalized learning" (S11), and more "autonomy" in their learning (S3). Other survey participants made similar comments that with the advent of mobile digital technologies students have developed a desire for "more informal" (S84) and independent learning, "a preference for learning outside the classroom, on their own time" (S24) and "taking greater opportunities for independent and independently and diversely directed learning pathways" (S81). Two interview participants also stated that mobile digital technologies have allowed students to learn "on their own to try and find an answer for themselves" (I28). Interview participant I30 explained that:

> *I think the students have got more accomplished with self-directed learning, and they certainly know how to use media, they're certainly working a lot more now using resources that are picked up from the Internet than they did when I first started in 2000.*

Surface and uncritical learners

A dominant theme that emerged from the interview and survey (33 out of 108) responses were that students have become surface learners and uncritical thinkers due to their use of mobile technologies, when compared to students ten years ago. Participants' comments indicate that students like to access online information on their mobile devices as it was "easily accessible" (S52), which in turn may discourage them "from using academic, peer reviewed, written information sources" (S50). Many questionnaire respondents discussed how information on the Internet was often "factual superficial" (S66) and not "authoritative or reliable" (S65). It also leads to "indiscriminate accessing of facts without filtering the information for validity or relative importance" (S138). According to some participants, students have thus become knowledge consumers and uncritical thinkers, as commented by I15,

> *Students seem to be less able to engage in a deep level of learning, somebody from the Law department recently was talking about how they've essentially dumbed down their questions over the years you know…but how much is due to engaging in a digital level, having everything accessible online and [I] don't know.*

Many participants also said students are often unable to filter creditable and factual information on the Internet from inaccurate information. These comments are typified by the following:

> *From observation, some (many?) students seem to compile a lot of information electronically, mostly through uncriticial copying and pasting, without actually working through the material and gaining an in-depth understanding. In these cases, computers etc. seem to be a counter-productive medium. (S108)*

> *Obtain immediate answers and perhaps not seek further information to see if there are different opinions. (S35)*

> *They are less likely to remember "facts" and other things that can be looked up easily (S37)*

Preferring smaller pieces of information

According to some participants, students preferred to access small chunks of information on their mobile devices. For instance:

> *There's some anecdotal evidence floating around that there's sort of like multi-screening, all the multi-screening sort of activity that's going on is doing is just dividing attention up into smaller and smaller quanta of attention and small quanta of attention can really only support surface learning it doesn't really support deep learning umm, so I think it the there's definitely some behavioural changes there they've they have a preference for using those sorts of mobile devices to communicate and socialise (I9).*

> *Rather than "preference" perhaps a "disposition" to consuming bite-sized portions of information uncritically, and an attendant lack of willingness/capacity to persevere with material that initially seems difficult/uninteresting/irrelevant (S4).*

One participant commented that accessing small chunks of information on mobile devices fosters:

> *Short attention spans and inability to read text in their entirety, from beginning to end. This in turn makes leaning about acquiring information rather than gaining insight, knowledge or developing a style and perspective. (S120)*

Multitasking

Several participants commented that students in contemporary society have developed a preference for multi-tasking, and as a direct result they cannot concentrate to the same degree as students ten years ago.

> *I've noticed a huge difference in that…most of them have laptops that they bring into class, I am concerned that they can also be barriers to discussion, so I've noticed that yes there's greater use of those but also there also seems to be less umm willingness to put down the lids and engage in a good discussion. (I1)*

> *They're much more focused on being wirelessly connected or connected to a global world through mobile devices, whether that's their phones or their laptop and you can see that in classes where you wander around and they're all on Facebook or something you know, or text messaging when you're lecturing and things, which I can never figure out whether it's a compliment or annoying that they do it … mobile devices are so a part of their lives that they wouldn't know how to function without them up to a point. (I6)*

> *They've got probably more than one device around them anyway and they're checking on those various devices…there's more opportunity for distraction…the kind of ability to stay focused… (I12)*

Experiential learning

"Digital natives" advocates contend that students immersed in digital and mobile technologies prefer to learn by partaking in active activities, rather than by passively listening to lectures and reading course materials (Thompson, 2013). In this study, no evidence was found to support this claim. A marine science lecturer commented on how her students learned from using mobile technologies:

> *[In] our lab sessions and we'll find the students looking up the answers on their phone, they won't actually be looking at the specimen in front of them, they'll go well here's the question, oh yeah Google…they'd much rather look up the answer rather than experience it themselves, we're becoming a step removed from the actually process of doing the learning…I think our students are becoming much more Google smart than they are hands on active learners…and there's the whole reading writing thing and going to libraries, it's just not happening anymore. (I16)*

Contrary to claims made by "digital natives" advocates, some teachers considered that using digital and mobile devices may remove learning from concrete reality. For example, a clinical lecturer commented:

> *In my course we are teach clinical skills as it is a professional course. Already, some students would prefer to hide behind simulations than engage in the real situation. (S114)*

Collaborative and visual learning

There was some evidence to suggest that due to their use of mobile technologies, students now preferred "group learning and discussion as opposed to learning in isolation" (S110). Students also now use Web 2.0 technologies to organise group activities and study groups, as pointed out by interviewee I15.

> *The other day I was putting my students in my 200-level-class into groups, and they were all saying right we'll make a Facebook group you know and they all organize everything via Facebook…that's how they organize their group activities, that's how they engage with their world digitally.*

As for visual learning, there was little evidence to support the claim that students prefer images to text. Only one participant (S89) commented on this "I think they may become more critical about time-relevance, prefer interactivity, prefer graphic material and Multimedia".

Changing pedagogy

The changes in learner characteristics and preferences, led some teaching staff to change their pedagogies. For instance, survey participant 86 stated that his department has changed the way teaching is delivered because of their students' high usage of mobile and digital technology.

> *We have studied the use of mobile technologies for learning in our programme, and 50% use it regularly. It promotes accessibility, flexibility and applying learning to work situations. Learning this has required us to change how we teach – smaller packets of information, presentation etc*

Discussion and conclusion

Teachers' responses in this study highlight how tertiary students do possess some learner characteristics associated with the concept of "digital natives". For example, the majority of teaching staff considered their students highly computer literate however, only in regard to their ability to access online information. Teachers also stated that students also want access to fast information and demand immediate feedback. There was some evidence to suggest that students engaged in multitasking, but little to indicate that students preferred images to text. There was some, although not strong evidence that students preferred collaborative group learning and little evidence to support the notion that students prefer active learning. It is clear however, that teachers considered the current generation of students as preferring to access small chunks of information on their mobile devices, which the participants considered a factor in making students surface and uncritical learners.

While this study contributes evidence on the changing learning characteristics of university students as a result of their use of mobile technologies, as perceived by their teachers, there are some limitations in this study. Firstly, while the questionnaire sample was relatively large, participants came from one university. Secondly, data gathered in this study were self-reports, which were inevitably affected by the participants' backgrounds, their differing experiences and own usage of mobile technologies, which have not been analysed in this paper. More research is needed on how teachers' own thoughts on mobile technologies impact on their own teaching practice and thoughts on their students' usage of mobile digital technologies.

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Acknowledgements