

Students' engagement with learning technologies

Derek Larkin & Kim C. Huett

This paper seeks to add to the discussion surrounding young adults' relationship and engagement with learning technologies, exploring whether they naturally engage with these technologies when the use of them is either compulsory or optional.

We discuss our findings in relation to whether young people are truly engaging with technologies or whether they are simply passive consumers of some technology, and unenthusiastic innovators in others. Participants in the UK (N=6, Mean Age 20.66, undergraduate psychology students) provided their responses to a short series of face-to-face interviews using open-ended questions designed to elicit a critical exploration of their learning experience with particular emphasis on learning technologies. Participants in the US (N=26, Mean Age=22.38, pre-service teachers) responded to a series of short open-ended questions submitted online using asynchronous video journals uploaded to a private classroom space on YouTube.

We found that young people are generally unenthusiastic users of learning technologies, which has significant implications for the educational sector in the UK and the US, as many of our participants are pre-service teachers. At a time when great emphasis is being placed on increasing student access to technologies in the classroom to enrich the learning experience, and to offer greater opportunity for understanding and discovery of information, trainee educators seem reluctant to engage with many types of educational technologies.

Keywords: Learning technologies; student engagement/disengagement.

'People think that because I'm 23 and was born into the technological generation, that it should be easy for me to use the technology, that it should be a breeze. But it's not.' US 5

STUDENTS entering higher education in the early part of the 21st century have a world full of technology at their fingertips. Those born around 1980, whom Prensky (2001b) and Tapscott (1999) call *digital natives* or the *Net-generation*, respectively, have spent much of their lives surrounded by and using technology such as the internet, mobile communications, and satellite television.

In response to rapid technological change, educational futurists such as Prensky (2001a, 2001b) and Tapscott (1998, 2009) have developed narratives to explain shifting social dynamics and the parallel need for changes in educational practice. Prensky (2001a, 2001b) claims the younger generation of *digital natives* (DNs) think differently from the older digital immigrants (DIs, those born before 1980), and he has

suggested the *natives'* brains may be changing as a result of their growing up in technology-saturated environments. Tapscott, a self-defined DI (2012), describes the *N-Generation* as 'outpacing and overtaking adults on the technology track' (1999, p.36). Both Prensky and Tapscott call for reforming the way in which the younger generation is educated, changes that would impact curriculum, instruction, and the professional development of educators.

As policymakers, advocacy groups, think tanks, business leaders, and the media pick up the message, such claims have the potential to initiate significant educational change, from early childhood education through higher education, whether such change is warranted or not. Often, reforms to educational practice are put into place without sufficient evidence or justification

(David & Cuban, 2010), costing much in monetary expense and effort. Researchers (Bennett, Maton & Kervin, 2008; Sánchez et al., 2011) have begun to question the existence of a fundamentally changed group of learners, calling for further exploration of such claims.

Through this qualitative study, we seek to add to the research that explores the notion of the existence of a new generation of learners among contemporary undergraduate psychology and education students in the contexts of universities in the UK and the US.

Relevant literature

The 'new generation of learners' thesis

For the purposes of this paper, we see a sufficient overlap between the concepts of the DN and the N-generation to treat them together: both groups are defined by a similar chronological timespan, and their proponents call for changes in the level of embrace of technology in the education system.

Prensky (2001a, 2001b) advocates for the design of learning environments that support multi-tasking, random access to information, frequent feedback and rewards, and social networking. Prensky (2005) warns that DNs are often restless and frustrated in the face of conservative policies and practices, created by DIs in school. Both Prensky and Tapscott (1999) claim that DIs struggle to a large extent with technologies because they retain an 'accent' (Prensky, 2001a) from their non-digital past, turning to books for reference rather than the internet, for example.

According to Tissington and Senior (2011), young people have little patience for delays, and they desire to be part of the digital community 24 hours a day, seven days a week. Tissington and Senior (2011) reference evolutionary biology and the human desire to socialise as mechanisms for survival. The DNs have adopted social networks in order to stay in contact with peers but on a much grander scale than our evolutionary

cousins could have dreamt. Tissington and Senior (2011) suggest that DNs view knowledge as a utilitarian concept that is accessible everywhere and at any time, and access to the sum of human knowledge is a way of life.

Current debate surrounding digital natives

The support against a dichotomous digital society is growing. For example, Bennett et al. (2008) and Sánchez et al. (2011) dismiss the very notion of DNs or DIs. Both studies report that although there is evidence that recent generations are increasingly more comfortable with technology than their predecessors, most use the technology to supplement social activities and far less for educational purposes. Sánchez et al. (2011) report that young people still value face-to-face contact and that social networks supplement pre-existing friendships: the paradox being that most individuals who socialise a great deal online still only do so with a handful of people, in spite of having dozens or even hundreds of 'online friends' (Dunbar, 1992; O'Malley & Marsden, 2008).

In their deconstruction of Prensky's (2001a, 2001b) premise of the digital knowledge divide, Kennedy et al. (2008) concluded that there is no compelling evidence that this technological division actually exists. They state that while some students embrace and clearly engage with new technologies, others of a similar age and background do not. They also criticised Prensky's notion that DI brains have changed to accommodate digital technologies. Instead, Kennedy and colleagues postulated that if a division exists, it is between *living technologies* [social and/or entertainment] and *learning technologies* [technologies whose primary purpose is the facilitation or enhancement of learning (Kennedy et al., 2008)]. Thus, by extending Prensky's argument, this would imply one brain wired for social technologies and another for LT.

A debate, which is yet to be explored, is the potential impact DI (Prensky, 2001a, 2001b) teachers at school and tutors at university have on their digitally native

students. According to Bennett et al. (2008), there is a moral panic among educators, in relation to the provision of technologies in the classroom and lecture theatre. Some even state that the classroom is woefully ill equipped to meet the emotional, intellectual and motivational needs of the DN (Prensky, 2001b; Tapscott, 1999). Jones et al. (2010) have made compelling arguments that changes in teaching practice in terms of pedagogy and assessment are absolutely fundamental if students are to reach their full potential in an academic arena.

Consumers, not innovators

Bennett et al. (2008) report that students tend to use technology in a different way to how Prensky and Tapscott suggest. Bennett et al. propose that although young people are familiar with technology, their use of it and skills are by no means uniform among their peers. Kennedy et al. (2008) found that students were reluctant to engage with some learning technology (LT). For example, they were happy to send text messages, but reticent to write blogs or to read RSS feeds. This would therefore suggest that although students have access to an increasingly wide range of technologies, their use of some technologies is far less common than some have argued.

Expanding use of technology in higher education

The push to use technology in higher education reaches beyond the computer labs and into the use of smart phones and tablets in lectures and seminars, but as Surry (2002) points out there can be a number of barriers to the introduction of educational technology in higher education. These barriers can include cost, the existing structure and having adequate support. One crucial barrier that Surry (2002) points out is 'learning', and he describes this as the need for technology to enhance the educational goals of the college or university. Surry (2002) breaks down the 'need' element still further by suggesting that technology is not an end point but a means for accomplishing

goals. These goals are pedagogic benefits, student tutor interaction, and serving the existing and new students in a cost effective way. It is possible that sometimes a gap is created between the drive to introduce learning technologies, and their ultimate effectiveness in the classroom or lecture hall.

Purpose of the study

In this study, we employed a qualitative methodology. The aims were to explore why and how two distinct groups of undergraduate students, in the UK and US contexts, elected to engage or disengage with LT, and to explore whether previous educational experience influenced engagement/disengagement with technology.

The UK university was chosen because it had a number of learning technologies available to all students, but the use of these technologies was not a compulsory element to the degree programme. Whereas in the US students were undertaking a specific module designed to be delivered entirely online, and students were obliged to use learning technologies that may have been unfamiliar to them. We acknowledge the potential confound of UK (optional) vs. US (compulsory) use of technology, and we were also mindful of cultural and geographical differences in the two populations, but these differences did not detract from the fact that both populations were digital natives, born after 1980, and share access to the depth of technological knowledge, and same degree of understanding or anxiety of technology. Further, we wanted to extend the discussion on whether young people are increasingly becoming consumers of technology rather than innovators and the potential impact that technology-reticent individuals have on future generations.

Method

This qualitative study is an exploration of undergraduate student use and perception of LTs, which can be defined as technologies whose primary purpose is the facilitation or enhancement of learning (as opposed to

supporting social or entertainment functions).

Participants and contexts

Data were collected from two groups of students (see Table 1). The first group consisted of students in the UK who were encouraged (not required) to engage with a number of LTs whilst in their first year at university. The second group of students consisted of university students in the US who were required, as part of an online course, to interact and engage with a number of LTs. The researchers felt that the differences between the two groups of undergraduate students, with the first being allowed to choose to use or not use the available LTs and the second being required to use LTs, would provide a unique contrast and further insights into young adults' perceptions and employment of technologies.

Six first-year undergraduate psychology (BSc Honours) students at a Post-92 university in the UK volunteered (recruited via an email appeal, among first-year psychology students) to take part in this study (five females and one male; mean age of 20.66; range from 18 to 28). Volunteers were born after 1980 and were registered to the full-time psychology BSc (Honours) programme.

During their first year at university, students were given the opportunity to engage with a number of LTs, as part of their undergraduate course. Alongside the BlackBoard virtual learning environment students had a dedicated website, smartphone applications (providing assessment details, staff contact information, and teaching material), a dedicated social network, and Facebook applications. These LTs were an adjunct to the normal technological provision within the degree programme, and although encouraged to use these tools, students were not penalised if they chose not to engage with them.

In addition, 26 undergraduate pre-service teachers enrolled in a required educational technology course at a university

in the US (16 females and 10 males; mean age of 22.38 years; range from 20 to 30 years). Students enrolled in the course in partial fulfilment of the bachelor's degree. All elements of the course, including course material and assessments, were communicated and submitted online. Volunteers were recruited via an email of appeal.

At first glance we appear to have chosen two very diverse populations to explore, as they differ in geographical location, culture, course of study, and some might argue language. However, Prensky and Tapscott stated that the only criteria to attaining an innate relationship with technology would be being born after 1980, and having access to technology, both our populations share these crucial, and overriding criteria. Studying young people who share the same geographical location, precisely the same cultural references and studying the same university course and mode of study would have compromised generalisability to a greater or lesser extent, and any findings would have suffered this understandable limitation.

Data collection

The six UK students provided their responses to a series of open-ended questions designed to elicit a critical exploration of their learning experience with particular emphasis on technologies. The 30-minute semi-structured interviews were conducted individually over the space of two days, under the same conditions. Interviews were digitally recorded, transcribed, and anonymised (UK 1–6).

The 26 US online students provided their responses to the same series of open-ended questions as their UK counterparts, with additional prompts to elicit responses in the online environment (structured interview). Student responses were submitted two-thirds of the way through the semester as asynchronous video journals uploaded to a private space on YouTube. Videos were approximately 10 minutes in length, and they were transcribed, and anonymised (US 1–26).

Table 1: Details of the student sample according to country and ID degree, gender and age.

	Country and ID	Degree topic	Gender	Age
Group 1: Learning Technology Use Optional	UK 1 *	Psychology	F	22
	UK 2 *	Psychology	F	18
	UK 3 *	Psychology	M	19
	UK 4 *	Psychology	F	19
	UK 5 *	Psychology	F	18
	UK 6 *	Psychology	F	28
Group 2: Learning Technology Use Required	US 1 *	Early Childhood	F	20
	US 2 *	Early Childhood	F	20
	US 3 *	Early Childhood	F	20
	US 4 *	History	M	20
	US 5 **	Special Education	F	21
	US 6 **	Early Childhood	F	21
	US 7 *	Speech Language Pathology	F	21
	US 8 *	Early Childhood	F	21
	US 9 **	Middle Grades – LASS	M	21
	US 10 *	Special Education	F	21
	US 11 *	Math	M	21
	US 12 §	Early Childhood	F	22
	US 13 *	Biology	F	22
	US14 **	Early Childhood	F	22
	US 15 *	Math	F	22
	US 16 *	History	M	22
	US 17 *	Speech Language Pathology	F	22
	US 18 *	Middle Grades – MATH-SCI	M	22
	US 19 *	Early Childhood	F	22
	US 20 *	Early Childhood	F	23
	US 21 *	Special Education	M	23
	US 22 *	Special Education	M	23
	US 23 *	Early Childhood	F	24
	US 14 ±	Math	M	27
	US 25 ±	PoliSci	M	29
	US 26 *	Middle Grades – MATH-SS	M	28

Race – Ethnicity: * White – not of Hispanic, Latino, or Spanish origin, ** Black/African-American, § Asian, ± American Indian or Alaskan Native.

Use of different methods UK–US

We exploited a number of different but related methodologies, namely face-to-face semi-structured interviews (UK participants), and structured recorded interviews (US participants). Within a semi-structured interview, which emphasises validity, the researcher tries to build a rapport with the respondent and the interview is like a conversation, the objective is to understand the respondent's point. This approach is generally the preferred method, depending on the research question. A structured interview emphasises reliability, and often uses larger samples sizes than semi-structured interviews because respondents answers can be directly compared, hence our decision to have a greater number of participants from the US. An important advantage over many other types of research methodologies is that interviews are extremely adaptive. We needed to adopt an adaptive approach for pragmatic reasons. The US students were geographically isolated from the researchers, due to the nature of their degree programme, and were unable to attend face-to-face interviews. As we applied the criteria set out by Lincoln and Guba (1985) used to judge qualitative research (see below), we would argue that data from both populations has credibility, transferability, and dependability.

Data analysis

Data were analysed using thematic analysis, a method for identifying, analysing and reporting patterns or themes (Braun & Clarke, 2006). In thematic analysis, the task of the researcher is to identify a number of themes, which adequately reflect their textual data (Howitt & Cramer, 2007). In the current paper, we used inductive analysis, so that the themes were not fixed to a pre-existing framework, but were data-driven (see Braun & Clarke, 2006). Lincoln and Guba (1985) outline a set of criteria that are typically employed to judge qualitative research – credibility, transferability, dependability. Credibility comes through the use of

rich data and methodological and investigator triangulation. In the current research we used multiple qualitative analysts (both experimenters), and a third independent additional analytic auditor used to review data for discrepancies, overstatements and reporting errors. Transferability is generally described as the ability to extrapolate the findings to other situations. We used two seemingly diverse populations, who differ in a number of ways, for example, geography, culture and method of study, but share the same overriding relationship that all were born post-1980 and all have access to the very latest learning technologies; together these emphasise generalisability and transferability. Kirk and Miller (1986) state that dependability is equal to the term reliability used in quantitated research. The dependability of the research findings in this study was established by a transparent coding procedure and inter-coder verification. To ensure coding consistency, every coder used the same version of the scheme to code the raw interview data.

Findings and interpretation

Through thematic analysis several higher-order dimensions were found. These included technical problems, functionality, prior experiences, and perceptions of use, each of which is discussed in more detail below.

Technical problems

According to Prensky (2001a, 2001b) and Tapscott (1999), those born after 1980 would have an innate understanding of technology simply because they were surrounded by it their entire lives, and even their brains would be wired in such a way as to enhance their understanding of technology. Contrary to these expectations, we found that many of our participants experienced a number of technical problems. For example, in relation to the dedicated social network, UK 1 stated, 'While I did sign up to blabberBOX, it took ages to sign up and then took ages to learn how to send messages. I thought this is just

too much,' and added '...it just got overwhelming for me, personally. It was just too much and I'm not a technophobe or anything. It was just too much to keep up with...'. UK 5 said, 'Technology is just not my thing. I just get so confused, I can click on a link, but apart from that, I'm lost', and UK 6 stated, '...I had real problems just accessing some of the apps. I just couldn't get it to upload or download or whatever it is.'

Many of the US participants also reported experiencing technical problems; US 9 stated that although he found the use of technology 'pretty easy,' he still had problems making an assignment video. He explained that it was 'time-consuming due to audio synchronisation issues.' This theme permeated many statements. Participant US 10 had tried 10 times to use the equipment to make the feedback video and reported she was 'tripping over technology' and that she had '...toyed with a number of audio settings and microphones...' before finally figuring out how to use the equipment. Participant US 1 states that although she knew how to browse the internet, 'the new technologies... were more difficult.'

It is clear from these statements that these young people struggled with the many practical aspects of technologies. Although many participants stated that they had no technical issues, the vast majority stated some sort of technical problem, particularly when setting up equipment. This evidence would cast doubt on the notion of a generation of individuals who find technology innate and intuitive.

Ease of use or functionality

Alongside the notion that DNs have an innate understanding of how technologies works is the idea that they would have an explicit appreciation of how to operate the technology. Prensky (2005) states that young people are adopting new systems for communication including blogging, using wikis, and using search engines such as Google. He further postulates that DNs have no need to read instruction manuals to understand

technology applications, and that in-service training is essentially useless.

We, however, found that in most cases, our participants struggled with the operation of technology. In spite of seeing the utility of Moviemaker and Audacity, US 1 remarked, 'using Moviemaker was pretty difficult, and Audacity I would not use again, because it was so difficult to use.' US 2 made a number of comments concerning how frustrating using the movie-making technology was and states that 'it took me over 10 hours to work it out... it was frustrating at first, but once I did figure it out, it was kind of good.' US 7 echoed these sentiments, saying 'it took over two hours to upload my digital movie to YouTube, which was frustrating when I had other things to do', conveying a reticence to engage in the multi-tasking Prensky would have predicted among a student of this generation.

US 7 states that she would probably not have used this technology if she had not been asked to do so in this course. She further stated, 'I am not a fan of online things. I would prefer to do things face-to-face.' US 9 was not really engaging with the technology '...I'm struggling... bit fed up, really.' He also states that if it were not 'for this course, I would not use [technology].'

The UK participants mirrored many of these issues with functionality. For example, UK 3 said, '...I did try to download your iPhone app, but I couldn't find how to do it, so I gave up in the end.' UK 6 states that 'I do struggle with technology, [and] I much prefer face-to-face contact with my tutors.'

Overall, these data do not show young adults as being technologically savvy or in possession of innate abilities to use technology. In many instances, they show these individuals as being distinctly frustrated and wary of technology and reluctant to use it in their everyday life and in their future professional contexts.

Previous experience with technology

Previous publications have suggested young adults will have an instant rapport with tech-

nology, that there will be no need to read operating instructions, and there will be a tendency for them to look to technology to answer everyday questions. Contrary to these claims, many of our participants stated that they had trouble setting up and operating these technologies, and they stated a reticence to use the technologies in the future. A number of participants tried to use existing knowledge of technologies to map onto the new technologies that they were trying to use. UK 1 stated that she did not like the blabberBOX, because 'it was unlike Facebook' and if it had Facebook-type functionality they 'may have used it more often.' Another participant echoed this sentiment.

An interesting point is that many participants stated that they do not use technology in their everyday lives, but made reference to using mobile phones, iPods and computers on a daily basis. This could be evidence that some technologies are so ubiquitous and ingrained in everyday life that they are literally second nature. In this regard, Prensky and Tapscott are in a limited fashion vindicated, limited by the fact that participants make reference to social technologies and rarely mention LT. But this only goes to emphasise that individuals are increasingly becoming consumers of technology and increasingly less likely to be innovators.

Previous perceptions of technology in higher education

A number of UK participants stated that their A-level tutors indicated LT would not be available in universities. UK 2 stated 'my A-level tutor said that I would need to hand-write all my assignments and that I would need to make extensive notes during lectures... [The tutors] made it sound like we would be given no help at all... the fact is this is not true: we have BlackBoard with all our lecture slides and notes, and we use computers with [Microsoft] Word to type our assignments.' UK 5 received a similar message from her A-level tutors: 'We were given every indication that we would not be given notes, or hand-outs, and that tutors

were to be seen but not ever spoken to... in fact this is so not the case.' UK 2 states that because they were unprepared for the use of LT it was '...a bit off-putting. We suddenly had to learn all the new stuff, login to this and login to that. I've still not got my head around it.' UK 5 states that 'I really didn't expect that we would be using computers to analyse data; my A-level tutor said that everything would be done by hand.' UK 4 states the 'we all got the wrong message [from her A-level tutors]: they told us that A-level would be harder than university, and that the jump to university would be nothing... but it's been a huge jump.'

When asked about the technologies used in A-level teaching, all six participants stated that none were used, other than having access to the internet and handheld calculators.

Even though the US participants reiterated a similar message, the surprising message that many of the future teachers stated is that they are unlikely to use LT in their own classroom. Many question the usefulness or the ease of use of LT, while some question the place for LT in the classroom.

US 13 sums up many of the statements. 'LT are cool and everything, but I don't find them useful... if not required I would not use them... I don't have time to sit here and use this stuff... I'm unlikely to use it when teaching.'

Conclusion

Prensky (2001a, 2001b) and Tapscott (1999, 2009) suggested that the new generation would innately possess unprecedented abilities with technology. The teachers of this new generation, said Prensky, were in danger of not being able to appropriately teach these students, due to issues of having an accent from the pre-digital age.

Calls for further research to explore the strength of the digital native/N-generation constructs have resulted in studies such as this that seek to deny or confirm the presence of a special generation of learners vis-à-vis technology.

What we found appears to cast doubt on the very notion that digital natives exist, not in the way the Prensky (2001a, 2001b) and Tapscott (1999, 2009) thought of them anyway, as an innately technologically knowledgeable generation. In contrast, however, we found that the digital natives appear to have an increased affinity with some technologies (e.g. Facebook, and smartphones, etc.), but their true skillset is limited, and they rarely turn to learning technologies. In essence we found that our participants were consumers of technology rather than innovators.

Our study would refute the notion of the existence of a generation of learners with uniform pro-technology qualities. Rather, our students in both the UK and US undergraduate context are experiencing a number of challenges and frustrations with the use of technology, often to the point of acknowledging that they will not likely continue using them beyond the course or programme. Technical problems are not viewed as fun challenges, but rather as obstacles and distractors from the course or programme. Students often feel they are 'tripping over technology.'

Several among the group of pre-service educators were reticent to embrace technology, and they indicated clearly that they would not be using it in their future K-12 classrooms. What does Prensky say to this? In the case of our study, these 'digital natives' demonstrate a low tolerance for technical challenge, and little in the way of technological fluency beyond the use of programmes such as Facebook.

In a recent TED Talk, Tapscott observed that the Net Generation has 'no fear of technology, because it's not there. It's like the air' (Tapscott, 2012). In light of our results, we may understand this to mean that easy-to-use, hyper-intuitive programmes such as many mobile apps, Pinterest and Facebook are 'like the air': requiring little challenge for the user, they are easily taken in. But not

all technology (and certainly not all important technology) is easy to take in like the air. Robotics programmes, multimedia presentation software, publishing software, and research software are just a few examples of technologies that will require greater commitment on the part of the user. To assume that because a person is younger they can easily use such programmes is folly on the part of organisations. People will continue to need time and resources such as professional development to improve their knowledge and skills.

Even young people who were born after 1980 have not been truly immersed in technology particularly in the classroom right from their very first day, as a consequence of cost, because their teachers, as we have reported, were sceptical of technology and its usefulness in an educational setting, and because educational technology was in its infancy in the 1980s. It would be of great interest to revisit this research once again after a cohort of students (young potential educators) has passed through the educational system who have seen the use of educational technology right from their very first days in reception classes aged 3 or 4. It is possible that these true 'digital citizens' will have a much different approach to using educational technologies in the classroom.*

Much of the language and logic of both Prensky and Tapscott's message (e.g. digital native, digital immigrant, Net-generation, digital divide, etc.) has entered the vernacular of education. While the premise of the digital natives, for example, may hold a kind of common sense appeal, it is important that we examine the claims given for educational reforms. The more confidence we have in the merit of a given reform idea, based on evidence, the more likely we are to make realistic, positive change.

*Thanks must go to an anonymous reviewer for raising these points.

About the Authors

Derek Larkin is a Senior Lecturer in Psychology at Edge Hill University (UK).

Kim C. Huett is an instructor in the Department of Educational Innovation at the University of West Georgia (US).

References

- Bennett, S., Maton, K. & Kervin, L. (2008). The digital natives, debate: A critical review of the evidence. *British Journal of Educational Technology*, 39(5), 775–786.
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- David, J.L. & Cuban, L. (2010). *Cutting through the hype: The essential guide to school reform*. Cambridge, MA: Harvard Education Press.
- Dunbar, R. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution*, 22(6), 469–493.
- Howitt, D. & Cramer, D. (2007). *Research methods in psychology*. Essex: Prentice Hall.
- Internet World Users by Language (2011, 31 July). *Internet World Stats*. Retrieved 2 November 2011, from: <http://www.internetworldstats.com/stats7.htm>
- Jones, C., Ramanau, R., Cross, S. & Healing, G. (2010). Net generation or digital natives: Is there a distinct new generation entering university? *Computers & Education*, 54(3), 722–732.
- Kennedy, G., Judd, T., Churchward, A., Gray, K. & Krause, K. (2008). First-year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology*, 24(1), 108–122.
- Kirk, J. & Miller, M.L. (1986). *Reliability and validity in qualitative research*. Beverly Hills, CA: Sage.
- Lincoln, Y.S. & Guba, E.G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- O'Malley, A. & Marsden, P. (2008). The analysis of social networks. *Health Services and Outcomes Research Methodology*, 8(4), 222–269.
- Prensky, M. (2001a). Digital natives digital immigrants. *On the Horizon*, 9(5), 1–6.
- Prensky, M. (2001b). Do they really think differently? *On the Horizon*, 9(6).
- Rainie, M. (2006). *Digital 'natives' invade the workplace. Pew Internet & American Life Project*. Retrieved 2 November 2011, from: <http://pewresearch.org/pubs/70/digital-natives-invades-the-workplace>
- Rideout, V.J., Foehr, U.G. & Roberts, D.F. (2005). *Generation M: Media in the lives of 8- to 18-year-olds. A Kaiser Family Foundation Report*. Retrieved 2 November 2011, from: <http://www.kff.org/entmedia/index.cfm>
- Sanchez, J., Salinas, A., Contreras, D. & Meyer, E. (2011). Does the new digital generation of learners exist? A qualitative study. *British Journal of Educational Technology*, 42(4), 543–556.
- Surry, D.W. (2002). *A model for integrating instructional technology into higher education*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans.
- Tapscott, D. (1999). *Growing up digital: The rise of the Net Generation*. New York: McGraw-Hill Companies.
- Tapscott, D. (2009). *Grown up digital*. New York: John Wiley & Sons.
- Tapscott, D. (2012, June). *Four principles for the open world* [Video file]. Retrieved from: http://www.ted.com/talks/don_tapscott_four_principles_for_the_open_world_1.html
- Tissington, P. & Senior, C. (2011). Social networks: A learning tool for teams? *British Journal of Educational Technology*, 42(5), E89–E90.

Correspondence

Derek Larkin PhD

Department of Psychology,
Edge Hill University,
St Helens Road,
Ormskirk L39 4QP.
Email: derek.larkin@edgehill.ac.uk