CHAPTER FIVE

THE 'DIGITAL NATIVE' DEBATE: AN APPRAISAL OF PEDAGOGICAL AND GENERATIONAL CLAIMS

JAMES CÔTÉ

Introduction

In the early years of the 21st century – and the third millennium – mass educational systems around the world are facing numerous challenges, ranging from declining governmental support to how to adapt the new information and communication technologies (ICTs) to educational settings. Advocates of these technologies argue that they can revolutionise both classroom teaching and enhance learning. At the same time, cash-strapped schools and governments are open to suggestions about ways to solve their financial problems, including adopting ICTs.

The more ardent advocates claim that these new technologies can revolutionise or even replace traditional pedagogies (Gomez 2007; Palfrey and Gasser 2008; Prensky 2001, 2006; Tapscott 2009), and some colleges are looking for ways to do just this. For example, Carnegie Mellon University in the USA claims to have online programmes under development that are capable eliminating classrooms and professors (Kolowich 2009a).

The enthusiasm for the new technologies is further fuelled by claims that a generational change has taken place with the arrival of 'digital natives' – those born after the early 1980s who have grown up using computers, the Internet and related ICTs. It is claimed that digital natives learn far better with these new technologies than with the older, 'low-tech' or 'no-tech' pedagogies. Those who promote the digital native concept sharply contrast contemporary students with previous generations. This sharp generational contrast at this point in history – a

new millennium – adds a sense of urgency that has apparently lent a greater sense of importance to the adoption of these technologies. However, in order for the argument about the urgency in their adoption to be true, the digital native must be valid. This chapter examines that claim in terms of its underlying generational and pedagogical assertions by asking the questions: are there sharp generational differences in the use of these new technologies; and do these new technologies allow for superior educational experiences that benefit students over traditional pedagogies?

The generational divide claim

The more ardent technology advocates, like Prensky and Tapscott, claim that the putative digital native generation are tech-savvy multitaskers, who are capable of learning on their own, especially from the Internet, when they are given the chance. For example, Prensky is noted for the claim "teachers are no longer the fountain of knowledge; the Internet is" (Tapscott 2009, 139). And Tapscott asserts "schools should be places to learn, not teach … now that students can obviously find the facts they're looking for in an instant [on the Internet]" (Tapscott 2009, 134). These claims challenge traditional pedagogies, undermine the authority of teachers and educators, and open the door for the wholesale adoption of certain high-tech software and hardware, some of which have become common accoutrements of popular culture (such as computer tablets and smart phones). While it is understandable that those students who are bored with school would endorse anything that might add some excitement to classes, like using computers, for a variety of reasons, educators should approach these claims like any other proposed change: by critically analysing the arguments and evidence. In this case, the claim that an entire generation is tech-savvy needs to be examined (that is, the claim of generational homogeneity), as does the claim of sharp differences between generations in their usage pattern of ICTs (that is, the claim of generational differences in usage patterns).

Generational homogeneity

With respect to the claim of generational homogeneity, the evidence is clearly showing that not all people born after the early 1980s are tech-savvy. Although the younger demographic may currently be more likely to be early adopters of some technologies – by merit of their

greater leisure time allowing them to spend more time using them – even in affluent countries some young people do not even own a computer, and others do not know how to navigate through even basic programmes. In these societies, there is still an economic 'digital divide' that is largely socio-economic, but there is also a 'second digital divide' within each age group comprising those who are not comfortable with computers and related technologies even if they could afford them, and many of these young people grew up with technologies and are studying in today's schools (see here Vaidhyanathan 2008).

When we look outside the affluent societies in which these technology advocates live, the 'global digital divide' is obvious. As of June 2010, less than one third of the world's population had access to and was using the Internet. Access and usage ranged from a low of 10.9% in Africa to 77.4% in North America, with Europe coming in at 58.4% (Internet World Statistics 2010). Indeed, a 2010 study from South Africa found that age was not the relevant factor in ICT sophistication; rather, experience was key, as made possible by access and opportunity. Of the 14% of a large sample of South African university students that corresponded to the digital native stereotype, most were from middle or upper socio-economic groups, spoke English or Afrikaans, and had easy home access to the technologies. The authors of that study refer to this as 'digital apartheid' (Brown and Czerniewicz 2010).

An Australian study by Kennedy et al. (2010) developed a similar typology based on the usage patterns of over 2000 university student ICT users born after 1980. The most savvy group, which they termed "power users", constituted only 14% of the sample (this group used a wide range of technologies and did so very frequently, including web 2.0 usage like web publishing and file sharing). The second most savvy group they called "ordinary users", and they made up 27% of the sample (characterised by web and mobile use, but the infrequent use of games and web 2.0). Both of these groups had more males than females. Some 60% of the sample was either "irregular users" (the 14% with moderate use of web and mobile technologies) or "basic users" (45% of the sample who used mainly mobile phones but infrequently used web technologies). These latter two groups had more females than males.

The authors of this study concluded that pedagogical transformations based on assumptions about the digital skill levels of current students would not be justified. Because only a minority of

students are 'tech-savvy' in ways that give them some independence from instruction, technologies that are useful in educational settings would have to be carefully introduced, with appropriate instruction on their use. The authors insist that "it is the use of technology based on misguided assumptions about the technological experiences and educational expectations of students that should be discouraged" (ibid., 339-40).

Others have made note of similar deficiencies in the claims ofgenerational homogeneity. In their review of the evidence Bennett, Maton and Kervin (2008) were unable to find convincing evidence about either the existence of a generation of digital natives among Australian university students or that current students have a preference for technologies as part of their education. They found that at best 20-25% of the university students they studied could be considered tech-savvy in terms of their usage of technologies. Nor were they able to find evidence for distinctive 'learning styles' among current students (see Pashler et al. 2008). Indeed, certain claims, such as a preference for multitasking, are not only unsupported, but research on multitasking suggests that it can be counterproductive to learning (for example, Kirschner and Karpinski 2010). On the basis of these and other findings, Bennett and colleagues (op. cit., 782) conclude: "Our analysis of the digital native literature demonstrates a clear mismatch between the confidence with which claims are made and the evidence for such claims." They continue by noting that educators "have every right to demand evidence and to expect that calls for change be based on well founded and supported arguments", but "many of the arguments made to date about digital natives currently lack that support".

In sum, in the developed countries studied, there is little evidence for the existence of a distinctive generation defined principally by their relationship with technologies. Technology advocates seem to have been engaging in 'generational myth-making', misappropriating a sociological concept without exercising due caution. The advocates of the digital native claim have been committing a common error made by those who adopt a generational approach in attempting to explain and predict social trends. This is the error of homogenisation, whereby all members of a given birth cohort are assumed to have the same psychological and behavioural traits. Unfortunately, this conceptual error can lead to further errors: over-generalisation, exaggeration, and the selective use of evidence (see Bennett et al. 2008), as in the case of the claim of sharp differences in the usage patterns between generations.

Generational usage patterns

Like the above generational claim, the empirical evidence does not confirming the claim of sharp generational differences in usage, especially the claim hinging on the concepts of 'digital natives' versus 'digital immigrants', as Prensky (2001, 2006) frames it (the latter would have been born before the 1980s).

For example, in Canada, a 2007 population survey found that the generational differences in Internet use were small when those 45 to 54 years of age were compared to those 15 to 24; the difference was 85% and 94%, respectively, between so-called 'immigrants' and 'natives' to the digital world (Veenhof and Timusk 2009). Moreover, when the actually usage of the Internet was examined, it was the older 'immigrant' using it in a more sophisticated manner.

Another Canadian study of 2313 Internet users polled in 2008 by a large survey research firm found that the youngest age group used the Internet almost entirely for leisure and entertainment, while older people used it more to manage their finances and for self-education and information gathering – generally using the Internet in a more sophisticated manner than younger users (Ipsos-Reid 2008). This study also found that the younger users sensed this, with only 28% of teens considering themselves 'very skilled' in Internet use. In fact, the teens in this random population sample spent only 13 hours per week on the Internet compared to 19 hours for adults, and only 37% of teens rated Internet use as an important part of their day, compared to 51% of adults in the sample.

These findings are supported by a 2010 American survey of 1000 banking customers, which found that those over 30 had more sophisticated ICT use patterns than those under 30, suggesting that 'growing up' with these technologies is not responsible for savviness (Wells Fargo 2010). And they are further supported by a UK study of 2350 respondents, which found gender, education, and experience with and breadth of use of ICTs, explain more variance in ICT usage than age (Helsper and Eynon 2010). The authors of this study concluded that it

> is very clear … that it is not helpful to define digital natives and immigrants as two distinct, dichotomous generations. While there were differences in how generations engaged with the Internet, there were similarities across generations as well, mainly based on how much experience people have with using technologies. (ibid., 515)

Thus, contrary to the digital native claim, the accumulating evidence from population surveys comparing generations is clearly showing that the most sophisticated ICT age-demographic groups who were *not* reared on these technologies.

What is more, when the computer skill levels and usage patterns of the most educated among the younger cohorts are examined, the digital native claims of tech-savviness become further suspect. For example, a study of American university students found that most overestimated their skill level for basic applications like Microsoft Word, PowerPoint, and Excel (Grant, Malloy, and Murphy 2009). Students' perceptions were worst for the spreadsheet programme Excel, where most (69%) rated themselves as average, but could not even perform basic operations. For the word-processing programme Word, their performances were better on basic tasks like bolding text, but most could only perform one half of the moderately difficult tasks (like justifying paragraphs), and none of the advanced tasks, like using a clipboard.

A second study of the digital savviness of university students involves the ethnographic analysis[1] of American university students' researching skills (Kolowitch 2011). This multi-institution project found that the majority of students relied on Google searches as opposed to using libraries' more extensive and appropriate databases. However, even Google searches tended to be done poorly, because most students did not understand the basic logic of searches. Only a small proportion – 7 of 30 students in one study, or 23% in another – could conduct competent literature searches. The researchers concluded:

> Today's college students might have grown up with the language of the information age, but they do not necessarily know the grammar. … [para 17]. Years of conditioning on Google had not endowed [these] students with any searching savvy to speak of, but rather had instilled them with a stunted understanding of how to finely tune a search in order to hone in on usable sources. (ibid, para 20)

As a consequence of the conditioning to Google, all but 10% of the students failed to narrow their searches when they could, and instead

---

[1] The Ethnographic Research in Illinois Academic Libraries (ERIAL) project involves a series of studies conducted at four American universities: Illinois Wesleyan, DePaul University, Northeastern Illinois University, and the University of Illinois. Rather than collecting survey data, two anthropologists were the lead researchers conducting open-ended interviews and making direct observation.

perseverated with Google's 'any word anywhere' technique, which of course overwhelms the searcher with irrelevant sources (not to mention that Google does not link to all academic journals, and even if they do link to journals will not necessarily give the students free access to articles as many library databases do). Frustrated by their lack of progress in finding relevant sources, students would often change their topic to something that could be researched in the rudimentary Google way.

These ethnographic investigations lead to the conclusion that today's students are far too confident about their digital abilities, and in fact most need remediation in digital technologies applied to academic settings, yet they do not ask for help because of their over-confidence. Quite simply, they 'don't know what they don't know.' To make matters worse, because of the digital native stereotype, their teachers have been assuming that they have these abilities, so current students are not being taught 'what they don't know' about these technologies. What is needed is instruction to increase competencies in the serious use of these technologies, showing students how to break the bad habits they developed through playing with them in non-educational settings.

A third study of the savviness of university students found that the overuse of Facebook adversely affects academic performance (Kirschner and Karpinski 2010). This study found that Facebook users reported earning lower grades (a 3.06 GPA versus a 3.82 for non-users – a 20% difference) and spending fewer hours per week studying than non-users (averaging in the range of 1 to 5 hours per week, versus 11 to 15 hours per week for non-users).

It thus appears that many current university students are over-confident in their use of the new technologies with educational applications and do not realise how their misuse or overuse adversely affects their academic performance. The word savvy actually means 'shrewd and adept with practical knowledge'. Given the consistent finding that at best one-quarter of young people in developed countries seem to be well versed in computer hardware/software, only this minority would qualify for consideration as savvy, depending on how much they use these technologies in positive ways that enhance their lives and their education. As the studies of usage patterns discussed above suggest, many young people are using ICTs in pre-programmed ways that take up enormous amounts of leisure time. Indeed, large numbers of young people actually seem more 'slavish' to the technologies, feeling insecure when they do not have them within arm's reach. Given the six to eight hours per day now taken up by them

(mainly for entertainment and social networking), is this really a shrewd way to spend one's time, especially if healthful, intellectually stimulating, and pro-social activities are displaced (see here Bauerlein 2008)?

Indeed, on the whole, these studies suggest that, rather than being led into the digital age by their students, educators should doing more to teach current students how to use these technologies in a more sophisticated manner so they can benefit from them in broader and deeper ways. In this respect, the digital native stereotype seems to be doing young people a disservice because it is obscuring serious skills deficits that might be interfering with full functioning in higher educational systems and the workplace, where computer literacy is often taken for granted by the very teachers and employers who are dismissed by technology advocates as Luddites (see here Kolikant 2010).

Pedagogical claims

The claim that various new technologies are necessary properly to educate current students is often appended to the charge that teachers are Luddites who are too wedded to old teaching techniques, like the lecture format (Tapscott 2009, 128). Tapscott further argues that old university "broadcast pedagogies" like the lecture should be abandoned in favour of collaborative techniques that have been made possible by the Internet. Recent research, however, casts doubt on this characterisation of professors. For example, a 2010 study of 939 American professors concluded that they

> are no Luddites when it comes to Web 2.0 tools … 80 percent of professors, with little variance by age, have at least one account with either Facebook, Twitter, YouTube, Skype, LinkedIn, MySpace, Flickr, Slideshare, or Google Wave. Nearly 60 percent kept accounts with more than one, and a quarter used at least four. A majority, 52 percent, said they used at least one of them as a teaching tool (Kolowich 2010).

But, even if all professors were Luddites, technologies are tools, not outcomes; they are means, not ends. Indeed, the above study finds a consensus among professors that these technologies will not become the primary medium of teaching, but supplements to it. The confusion between means and ends seems to be responsible for some fuzzy thinking about so-called new collaborative pedagogies ostensibly made possible by Web 2.0 (interactive) software. While the concept of

collaborative learning may indeed sound novel, this pedagogy is far
from new. Indeed, proposals to increase collaborative learning date
back to Rousseau (the 1700s), through Dewey (the early 1900s), to
Freire (the 1960s), and fed the progressive education movement that
transformed schools around the world in the 20th century.

Claims of an imminent paradigm shift in pedagogies sparked by
new technologies are thus suspect, and smack of 'old wine in new
bottles'. What is new is the technology to expedite this type of learning,
not the pedagogy. Thus, evidence for the pedagogical utility of these
technologies should be evaluated to look for ways to improve
pedagogical delivery, as we will now do.

Laptops

When they first became affordable, there were great hopes for
laptop's pedagogical applications. However, since those honeymoon
days, schools at all three educational levels that once embraced laptops
– even supplied them to students – have been dropping them (Hu 2007).
At the university level, professors have been banning them from their
classrooms because they are distracting to other students, to teachers,
and to the students using them, many of whom use the various
entertainment and communication features during classes, especially
when Wi-Fi (wireless connectivity) is available (Tibbetts 2007).

As systematic evaluations of laptop use in universities are being
published in peer-reviewed journals, these concerns are being validated.
For example, one study found that compared with non-users, laptop
users

> spent considerable time multitasking and that the laptop use posed a
> significant distraction to both users and fellow students. Most
> importantly, the level of laptop use was negatively related to several
> measures of student learning, including self-reported understanding of
> course material and overall course performance. (908)

This multitasking involved spending almost one-quarter of the
lecture time checking e-mail, instant messaging, surfing the Internet,
and playing games. As a result, their grades in these courses were 5%
lower than were those who did not use a laptop. Another study found
that students using laptops were less satisfied with their course than
students who did not use them (Wurst, Smarkola and Gaffney 2008).

Still, an evaluation of the potential benefits of laptops must also take
into account the type of learning being undertaken. In general, laptops

are often no better for taking notes because most students continue the bad habit of trying to write everything down without mentally processing it first (Jairam and Kiewra 2010). There have been some attempts to use laptops as part of group problem-solving collaborations (Nicol and MacLeod 2005), but not all course curricula lend themselves to this form of learning. Many university courses are content-oriented, especially lower-level ones. These lower courses also tend to be large, and this content sometimes provides a foundation for later learning abstract principles in advanced courses. Only after a certain amount of content is understood, and a number of principles are learned, can students usefully collaborate in solving hypothetical, abstract problems (see here Willingham 2009). In this case, students need to be patient while they work their way up learning curves. The claims of technology advocates about the universal utility of laptops simply interfere with this pedagogical necessity and do students a disservice by giving them unrealistic expectations.

So, do students benefit from in-class laptop use? Based on the current literature, laptops may have certain applications in classroom settings, but generally not in large lecture classes when they are not an integral part of a lesson plan requiring all students to focus on educational material, except on an individual basis for those students who need them to compensate for special problems in writing notes.

And, do students like in-class laptop use? Those who find lectures boring and prefer to entertain themselves might say yes, but many ex-users who have become serious about their education report that they are happy to be free of the habit. For other students, it appears that they are an inconvenience, and as one report noted, "many students who own laptops do not carry them to class because they are bulky, heavy, and 'uncool'" (The New Media Consortium 2006).

Clickers

Clickers, also known as audience response systems, have become very popular in some large lecture courses. These devices allow students to select answers in a true/false or multiple-choice format in response to questions usually presented on PowerPoint slides.

Do students prefer these devices to conventional classroom techniques of delivering and deliberating information? Studies are finding that about half of students indicate they enjoy clickers, but a sizable percentage is either ambivalent or downright hostile to them (Graham et al. 2007). A substantial minority of students, about 15-20%,

report that they are not comfortable with clickers (Hoekstra 2008), and some 10% of students will not buy them even when they are part of a course requirement (Caldwell 2007). Some students experience difficulties with simple matters like registering their user-numbers properly. The advent of smart phones and computer tablets may address some of these problems, but latest technologies are also expensive to buy and use.

The key factor affecting the acceptance of clickers by students seems to be whether they are used primarily for the benefit of the instructor (for example, for taking attendance or easy grading) or for the students (Graham et al. 2007). And, they must match the pedagogy. Clickers appear to be more suited to training students in certain vocational-type skills for which there are clearly correct answers, whether they are content-retention or problem-solving abilities (Caldwell 2007). Thus, clickers are more often found in the STEM disciplines – science, technology, engineering, and mathematics. On the other hand, good teachers using active-learning approaches, such as class discussions that involve students in reasoning through problems, have been able to enhance learning outcomes long before clickers came along. One study investigated this by comparing the same course taught with clickers versus active class discussions of material, finding no difference in learning outcomes (Martyn 2007).

Do today's students benefit from this technology? The published peer-reviewed research is mixed concerning the effectiveness of clickers in terms of both learning engagement and learning outcomes (Morling et al. 2008). Student reactions are more positive when clickers are used in ways that they perceive to be in their interest; these involve formative evaluations and active learning of the principles of a discipline (Carnaghan and Webb 2007). One study summed up the issues, noting that a certain amount of student engagement must precede the use of clickers, and that clickers cannot produce engagement on their own:

> The clicker itself does not ensure engaged, active students in the classroom, but rather is a tool that may facilitate that process, depending in part upon the expectations that students bring to the large lecture class … If students want to be involved and engaged, they are more likely to perceive clickers positively in terms of both learning and involvement processes. (Trees and Jackson 2007, 35)

Podcasts

Podcast technologies present more clear-cut issues than do clickers because they are basically an extra service provided to those students who are willing to view them, either as part of an online (or distance) course(Fernandez, Simo and Sallan 2009), or in a regular classroom course. Because of this, there is not the implicit coerciveness as in some clicker use. But, do current students prefer them to regular lectures? The answer appears to be a definite "no", except in the cases where there is no choice, as in certain distance courses, and then it is not really a question of preference. Do students benefit from them in conjunction with attending classes? The answer to this is maybe, depending on how serious the student is and the type of programme in which it is used.

When podcasts are made available, it appears to be mainly keen students who listen to, or view, them. Unmotivated students who do not bother to attend class or pay attention if they do attend are unlikely to take the time to listen to podcasts. At the same time, the research suggests that attendance is not seriously affected (Copley 2007; White 2009). Thus, the promise of this technology seems to be to help serious, engaged students to review material, a supposition supported by the fact that mainly professional schools are using them. However, good quality video podcasts are expensive to produce, and may require two camera people to film each lecture being 'captured', or a well set-up classroom with expensive start-up and overhead costs (Bowness 2008).

From what has been published, students appear to be generally happy with podcasts – apparently much more so than with clickers. One source reports that clickers received an evaluation of 3.5 out of 5 in response to a survey question asking students how much the technology helped them learn, while podcasts were given a score of 4.5 out of 5 (Harpp 2008). However, the satisfaction is far from unanimous, with about one-quarter voicing various forms of dissatisfaction (Evans 2008).

Do student benefit from podcasts? The available literature is mixed. Some studies find no increased benefits (for example, Copley 2007). Several studies have found that podcasts must be regularly used in conjunction with the lecture for enhanced learning ('hybrid learning'; for example, see Carle, Jaffee and Miller 2009), while one study found that they can substitute for the lecture, so long as students are highly motivated and take notes (McKinney, Dyck and Luber 2009).

Could podcasts replace lectures? It is doubtful, any more than did courses in previous decades when they became available on videotapes

or on certain public television stations. Podcasts are simply a new generation of technology that can make certain types of learning easier by reinforcing information delivered by live lectures. Most students apparently like the structure of live lectures, and the option of interacting with instructors. If students could do without this structure, the lecture system would have broken down long ago: students would simply have gone to university libraries, where most accumulated knowledge has been stored, and read voraciously to educate themselves (see here Kolowich 2009b).

Online Courses

Of all of the new technologies, the strongest claims have been made about online courses, perhaps because of the stakes: this delivery medium constitutes the heart of potentially lucrative enterprises that have drawn the attention of large corporations. Some ardent technology advocates would like to see all university-level instruction go online, so that students can learn at their own pace and with their own 'style,' presumably drawing much of their ancillary knowledge from the Internet. Indeed, in the United States online university programmes have been growing at a far faster pace than conventional classroom-based ones. Online courses increased by between 9.7% and 36.5% annually between 2003 and 2007, as opposed to an annual growth of only about 1.5% per annum for classroom-based courses (Allen and Seaman 2008). About 20% of American students took at least one online course in 2007 – some four million students (DeBolt 2008). In spite of this, not all online start-ups have been successful (Terris 2009).

But do today's students really prefer online courses over conventional courses or even over low-tech distance courses of the past? Studies do show that most students are generally satisfied with online courses. One recent study found that students rated factors like convenience and flexibility highly; but they were less enthusiastic about discussion boards and e-mails among students, even though they missed the socialising aspect of regular classes (Walker and Kelly 2007). Points of dissatisfaction cited by students included feeling isolated because of a lack of face-to-face contact with their classmates and professors, feeling that there was too much reading and too many assignments, as well as insufficient constructive feedback. Encountering problems with the technology can also be an issue with many students, in terms of both software and hardware. In one study, only one-third of the students

surveyed had no complaints (Walker and Kelly 2007; see also Bolliger and Wasilik 2009).

Still, do students benefit from online courses over conventional courses? In assessing this question, it must first be acknowledged that online courses, by their very nature, should be smaller than most conventional lecture-type courses. Although they should optimally have fewer than 20 students, online courses typically have between 20 and 40 students, because beyond 40 students, the workload for the instructor becomes unmanageable (although some schools push numbers into the 80s). This is because, in the absence of the efficiency of the lecture hall, instructors must monitor each student and require participation of each student through a series of assignments and postings in discussion groups. Thus, it should not be surprising if research shows that online courses 'engage' students more. Without this engagement, students would be learning entirely on their own and simply taking tests. If that were the case, it is doubtful that online courses would be very popular.

A recent exhaustive review of the literature by the U.S. Department of Education emphasised the need to make exact comparisons between online and classroom-based courses:

> Despite what appears to be strong support for online learning applications, the studies in this meta-analysis do not demonstrate that online learning is superior as a *medium.* In many of the studies showing an advantage for online learning, the online and classroom conditions differed in terms of time spent, curriculum and pedagogy. (U.S. Department of Education 2009, xvii)

In other words, a true comparison of online and classroom-based courses would require comparing courses of the same size and, to be totally fair, with the same number of assignments and other requirements. Yet this is rarely the case in the evaluation research reported in the literature, making these comparisons a matter of 'apples and oranges'.

Two recent peer-reviewed 'reviews of reviews' similarly argue that interpretations of studies evaluating the two forms of education are problematic (Abrami et al. 2006; Kanuka and Kelland 2008). In general, they found inconsistent results, ranging from no differences between online and classroom-based courses, some differences in specific instances, and small positive effects overall in favour of distance education, but with wide variation among the studies (that is, mixed findings, with at best a trivial effect – 4% – for distance learning overall, but with many studies revealing negative effects).

Hence, it appears that online courses can be just as good, or bad, as classroom-based courses. Good courses in either medium have committed teachers who design the curriculum to engage students and move them up a learning curve, while giving realistic feedback about their achievements in the subject matter and their potential to further pursue it. Good courses also have committed students who are prepared to engage themselves in the subject matter and move up a learning curve, while listening to feedback about their performance and potential to further pursue that subject matter. In these respects it is telling that, while online courses enjoy some popularity among today's students, there is no evidence of a mass exodus of from conventional courses.

The politics of online courses

Before leaving the topic of online courses, several additional issues need to be considered to put the digital native debate in context because there are several important political issues involved in any decision to adopt them in a wholesale fashion. These issues arise because politicians and university administrators are currently taking notice of the digital native claims that promises online courses as a quick remedy to financial problems. Given that online courses are in fact no better or cheaper than conventional courses when exact comparisons are made, the popularity of the digital native rhetoric appears to be related in some ways to other political agendas, one of which involves the exploitation of faculty labour.

The faculty who do, or could, teach these courses need to be considered in any implementation. Their satisfaction is obviously very important, because unhappy teachers are likely to breed unhappy students. Indeed, the research suggests that faculty satisfaction with online courses is highly correlated with student satisfaction, especially when students perform at higher levels (Bolliger and Wasilik 2009). Faculty are more satisfied when they feel that their students are actively involved, participate at appropriate levels, and maintain effective communication with them.

Teacher satisfaction is also affected by institutional factors, such as recognition and adequate remuneration for their work, opportunity for promotion and tenure within a reward system, adequate technical support, and recognition that online teaching is more time-consuming than regular classroom-based courses – including release time for course development (Bolliger and Wasilik 2009). Yet these forms of support are often lacking, in cause or consequence of the fact that most

faculty teaching these courses are in precarious contractual positions, involving low pay, benefits, and security (Eubanks 2009).

In many institutions, the growing number of online course offerings and the expanding coterie of part-time and contract instructors is seen as the first warning shot across the bow in the impending war against tenure. In these institutions, online course are mainly taught mainly by part-time instructors shut out of full-time positions. These itinerate academics have to cobble together packages of part-time work to earn a living wage. In addition to the low pay, online courses can be more time-consuming for instructors than regular courses, both in terms of set-up and monitoring student communication (answering e-mails can be a burdensome task that may have to be completed in evenings and on weekends, or may displace other work to those times). Thus, it should be no surprise that there are widespread suspicions that moves toward online courses are part of a money grab, especially when universities partner with the corporations that deliver them (Stripling 2009).

Conclusions

On both counts, the claims of technology advocates fall short: there is no evidence of a radical generational shift or difference in tech-savviness or ICT usage patterns in favour of those born after 1980, and the pedagogical value of the various new technologies is less than what has been declared. At most, about one quarter of those born in the last 30 years have the level of acuity with the new technologies that correspond with the 'digital native' stereotype, and all of the technologies have limitations: laptops do not universally engage students or increase students achievement (they can actually have the opposite effect); the effectiveness of clickers depends on why they are used and on the motivations of the teachers and students using them; podcasts can reinforce lectures, but they can be expensive to produce and do not interest all students; and online courses do not offer a financial savings or pedagogical advantage over classroom-based course of the same size and academic standard – they can offer improvements over the old forms of distance learning, but they also have the potential to proletarianise the professoriate.

The evidence examined above suggests that while the new technologies can facilitate learning, they cannot replace teachers, as some would have it. Ardent technologies advocates like Prensky and Tapscott have it wrong: *the Internet is a library, not a teacher*. In fact, there is strong evidence that the majority of current students actually

need to be taught how to use these technologies more effectively in educational settings. In this respect, the 'digital native' stereotype has done harm to many current students who are expected to function above their computer competency levels. Jones and Healing (2010) offer the following commentary on the harm that is being done to current students:

> The … Digital Native arguments rest on a simplistic form of causality suggesting that technological change in the world leads to changes in attitudes, and even brain function as well as behaviour. This kind of argument is not new and generational metaphors have been used repeatedly to capture a sense of shifts in culture, from baby boomers to millennials … In popular use, such overgeneralizations are largely benign, but when they become an accepted and an even received wisdom, they hold dangers. Policy-makers make use of generational metaphors to describe future intakes of students and to frame plans for the development of educational infrastructures. Teachers begin to design their courses for a presumed audience of [digitally savvy] students. (ibid. 354)

Why then, does the stereotype persist? Several explanations for this persistence have been offered by other social scientists having reviewed the evidence and found it lacking.

Borrowing from Stanley Cohen's (1972) concept of the moral panic, Bennett et al. (2008) argue that ardent technology advocates have created this form of panic by evoking a media-driven sense of urgency claiming the need for immediate changes in education systems (moral panics are characterised by a hiatus between evidence and reality that favours zealotry over reason). More recently, Bennett and Maton (2010) have offered two additional explanations for why the current discussion has been resistant to "the intellectual rigour it requires and deserves: 'historical amnesia' and the 'certainly–complacency spiral'" (ibid., 328).

Historical amnesia involves the 'forgetting' of past claims about how technologies would revolutionise education (for example, the impact of television in the 1950s and 1960s), while the certainly-complacency spiral involves the repetition of an idea so often that it is taken to be self-evident. With respect to the digital native concept, they describe this as follows:

> Belief replaces considered debate, and echoing commonsense perceptions of fundamental change and citations of similar claims made by other authors' substitutes for research evidence. Each proclamation

of the existence and needs of 'digital natives' thereby iteratively amplifies and reinforces the sense of certainty and encourages intellectual complacency. Rather than representing bold conjectures to be tested, claims become unquestioningly repeated as if established facts, restricting the possibility of open, rational debate. Intellectual complacency over the veracity of claims (whether digital natives exist, whether they take the form ascribed and whether education needs changing in the ways called for) is masked by the urgency and stridency with which calls for change are made. (ibid., 328)

Finally, although the above literature review may have simply exposed some misconceptions that have created unfortunate biases, the worst case scenario is that certain interest groups have agendas that have nothing to do with the desire to deliver high-quality education to otherwise alienated students, and everything to do with the marketisation of education defined by the hegemonic discourses of neo-liberalism (see here Levidow 2002). Countries that currently face huge cuts to educational budgets may be particularly vulnerable to these promises of simple solutions, especially if politicians and policy-makers are naïve enough to accept the myths about digital natives and their supposed preference for online course delivery.

As revealed above, there are numerous problems with a wholesale adoption of the digital native rhetoric, so it is particularly galling if what is being promoted are cost-cutting measures that seek to deliver low-budget mass educations at the expense of students and their teachers. Indeed, if the rhetoric is uncritically accepted at the national policy level, we risk handing over control of our educational systems to the corporations that control these technologies and their delivery.

If countries do this, they will not only allow these corporations to define pedagogies, but they will allow these corporations to de-legitimise university autonomy in defining academic standards and learning outcomes, especially for liberal education. The liberal arts and sciences will not likely survive if the university system is defined as a virtual marketplace. Moreover, if universities are left to survive in an unregulated marketplace, countries may find themselves in a situation that characterizes the current 'Wild West' situation in the USA with respect to online schools like Kaplan University and the University of Phoenix where economically disadvantaged students have been driven into debt pursuing degrees of dubious value (see here, for example, Blumenstyk 2010).

Players in this for-profit marketplace have made it clear that they intend to de-legitimise traditional education and replace it with their

own delivery formats and curricula. If politicians are naïve enough to go for these quick-fix solutions, we may witness something like a 'hostile takeover' where a corporation buys its competition and then shuts it down, closing up shop and firing now-redundant employees, as has been happening in the USA in the for-profit sector (Frontline 2010). If this spreads to other countries, university systems around the world might become dependent on multinational corporations, which in turn will control curriculum based on profitability. These corporations will then be free to produce a 'hidden curriculum' for the manufacture of consent to their (neo-liberal) interests.

In addition to a loss of the university as a place for free enquiry unfettered by means-ends logic, this would be disastrous for many students, especially those from disadvantaged backgrounds whose labour market vulnerability will be further exploited, and it is bad news for teachers, whose role will be de-legitimised. Individually, teachers forced to teach online courses will face further wage exploitation, and reduced career security and benefits. Professors forced to turn their lectures into podcasts and courses into online packages might lose their intellectual property rights. Collectively, the teaching profession could experience a further proletarianisation characterised by technological labour-displacement and a loss of collective bargaining.

Before we get to this point, we must all ask politicians who might be tempted by quick technological fixes: "Do we really want to hand over control of our education systems to corporations?" In this worst-case scenario, the digital native rhetoric is merely a Trojan horse that gets corporations into our universities and allows them to take them over, sacking them first.

References

Abrami, Philip C., Robert M. Bernard, Anne Wade, Richard F. Schmid, Eugene Borokhovski, Rana Tamim, Michael Surkes, Gretchen Lowerison, Dai Zhang, Iolie Nicolaidou, Sherry Newman, Lori Wozney, and Anna Peretiatkowicz. 2006. "A Review of E-Learning in Canada: A Rough Sketch of the Evidence, Gaps and Promising Directions". *Canadian Journal of Learning and Technology* 32(3): 1-70.

Allen, Elaine, and Jeff Seaman. 2008. *Staying the Course: Online Education in the United States*. Needham, MA: The Sloan Consortium.

Bauerlein, Mark. 2008. *The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes Our Future.* New York: Penguin.

Bennett, Sue, Karl Maton, and Lisa Kervin. 2008. "The 'Digital Natives' Debate: A Critical Review of the Evidence". *British Journal of Educational Technology* 39(5): 775-86.

Bennett, Sue, and Karl Maton. 2010. "Beyond the 'digital natives' debate: Towards a more nuanced understanding of students' technology experiences". *Journal of Computer Assisted Learning* 26(5): 321-31.

Blumenstyk, Goldie. 2010. "Kaplan Suspends Enrollment at Campuses Where Federal Investigators Found Recruiting Abuses". *Chronicle of Higher Education,* August 6. [http://chronicle.com/article/Kaplan-Suspends-Enrollment-at/123835; accessed 27.04.2014].

Bolliger, Doris U., and Oksana Wasilik. 2009. "Factors Influencing Faculty Satisfaction with Online Teaching and Learning in Higher Education". *Distance Education* 30(1): 103-16.

Bowness, Suzanne. 2008. "How Technology Is Transforming the Lecture". *University Affairs* December: 14-17.

Brown Cheryl, and Laura Czerniewicz. 2010. "Debunking the 'digital native': beyond digital apartheid, towards digital democracy". *Journal of Computer Assisted Learning* 26(5): 357-69.

Caldwell, Jane. 2007. "Clickers in the Large Classroom: Current Research and Best-Practice Tips." *CBE – Life Sciences Education* 6: 9-20.

Carle, Adam C., David Jaffee, and Deborah Miller. 2009. "Engaging College Science Students and Changing Academic Achievement with Technology: A Quasi-Experimental Preliminary Investigation". *Computers & Education* 52(2): 376-80.

Carnaghan, Carla, and Alan Webb. 2007. "Investigating the Effects of Group Response Systems on Student Satisfaction, Learning, and Engagement in Accounting Education". *Issues in Accounting Education* 22(3): 391-409.

Cohen, Stanley. 1972. *Folk Devils and Moral Panics.* London: MacGibbon & Kee.

Copley, Jonathan. 2007. "Audio and Video Podcasts of Lectures for Campus-Based Students: Production and Evaluation of Student Use". *Innovations in Education and Teaching International* 44(4): 387-99.

DeBolt, David. 2008. "Universities See Double-Digit Increase in Online Enrollment, Study Finds". *Chronicle of Higher Education,*

November 12. [http://chronicle.com/wiredcampus/article/3457/univ ersities-see-double-digit-increase-in-online-enrollment-study-finds?utm_source=at&utm_medium=en; accessed 27.04.2014].

Eubanks, Michelle Rupe. 2009. "Online Study Ups Workload for Instructors". *TimesDaily.com*, April 18.

Evans, Chris. 2008. "The Effectiveness of M-Learning in the Form of Podcast Revision Lectures in Higher Education". *Computers & Education* 50(2): 491-98.

Fernandez, Vicence, Pep Simo, and Jose M. Sallan. 2009. "Podcasting: A New Technological Tool to Facilitate Good Practice In Higher Education". *Computers & Education* 53(2): 385-92.

Frontline (PBS Documentary). 2010. *College Inc.* [http://www.pbs.org/ wgbh/pages/frontline/collegeinc/; accessed 02.12.2010].

Gomez, Jeff. 2007. *Print Is Dead: Books in Our Digital Age.* New York: Macmillan.

Graham, Charles R., Tonya R. Tripp, Larry Seawright, and George L. Joeckel III. 2007. "Empowering or Compelling Reluctant Participators Using Audience Response Systems". *Active Learning in Higher Education* 8(3): 233-58.

Grant, Donna M., Alisha D. Malloy, and Marianne C. Murphy. 2009. "A Comparison of Student Perceptions of their Computer Skills to their Actual Abilities". *Journal of Information Technology Education* 8: 141-60.

Harpp, David. 2008. "Let's Enhance the Classroom Experience: We Should Provide Whatever Assistance we can To Empower Students, Including Recorded Lectures". *University Affairs* March: 40.

Helsper, Ellen Johanna, and Rebecca Eynon. 2010. "Digital Natives: Where Is The Evidence?" *British Educational Research Journal* 36(3): 503-20.

Hoekstra, Angel. 2008. "Vibrant Student Voices: Exploring Effects of the Use of Clickers in Large College Courses". *Learning, Media and Technology* 33(4): 329-41.

Hu, Winnie. 2007. "Seeing No Progress, Some Schools Drop Laptops". *New York Times* 4 May [http://www.nytimes.com/2007/05/04/education/04laptop.html?_r=2 ; accessed 25.02.2014].

Internet World Stats. 2010. *Usage and Population Statistics*. [http:// www.internetworldstats.com/stats.htm; accessed 25.02.2014].

Ipsos-Reid Survey. 2008. *Canadian Teenagers Are Leading the Online Revolution? Maybe Not…* 27 February. [http://www.ipsos-na.com/ news-polls/pressrelease.aspx?id=3829; accessed 25.02.2014].

Jairam, Dharmananda, and Kenneth Kiewra. 2010. "Helping Students Soar to Success on Computers: An Investigation of the SOAR Study Method for Computer-Based Learning". *Journal of Educational Psychology* 102(3): 601-14.

Jones, Chris, and Graham Healing. 2010. "Net Generation Students: Agency and Choice and the New Technologies". *Journal of Computer Assisted Learning* 26(5): 344-56.

Kanuka, Heather, and Jennifer Kelland. 2008. "Has E-Learning Delivered on Its Promises? Expert Opinion in the Impact of E-Learning in Higher Education". *Canadian Journal of Higher Education* 38(1): 45-65.

Kennedy, Gregor, Terry Judd, Barney Dalgarno, and Jenny Waycott. 2010. "Beyond natives and immigrants: exploring types of net generation students". *Journal of Computer Assisted Learning* 26(5): 332-43.

Kirschner, Paul A., and Aryn C. Karpinski. 2010. "Facebook and academic performance". *Computers in Human Behavior* 26(6): 1237-45.

Kolikant, Yifat Ben-David. 2010. "Digital natives, better learners? Students' beliefs about how the Internet influenced their ability to learn". *Computers in Human Behavior* 26(6): 1384-91.

Kolowich, Steve. 2009a. "Hybrid Education 2.0". *Inside Higher Ed* 28, December.
[http://www.insidehighered.com/news/2009/12/28/Carnegie; accessed 25.02.2014].

—. 2009b. "Fans and Fears of 'Lecture Capture'". *Inside Higher Ed* 9, November.[http://www.insidehighered.com/news/2009/11/09/capture; accessed 25.02.2014].

—. 2010. "Professors and Social Media". *Inside Higher Ed* 4, May. [http://www.insidehighered.com/news/2010/05/04/socialmedia#ixzz1bQnththHq; accessed 25.02.2014].

—. 2011. "What students don't know". *Inside Higher Ed* 22, August. [http://www.insidehighered.com/news/2011/08/22/erial_study_of_student_research_habits_at_illinois_university_libraries_reveals_alarmingly_poor_information_literacy_and_skills; accessed 28.02.2014].

Levidow, Les. 2002. "Marketizing Higher Education: Neoliberal Strategies and Counter-strategies". In *The Virtual University? Knowledge, Markets and Management,* edited by Kevin Robins, and Frank Webster, 227-48. Oxford: Oxford University Press.

Martyn, Margie. 2007. "Clickers in the Classroom: An Active Learning Approach". *Educause Quarterly* 30(2): 71-5.

McKinney, Dani, Jennifer L. Dyck, and Elise S. Luber. 2009. "iTunes University and the Classroom: Can Podcasts Replace Professors?". *Computers & Education* 52(3): 617-23.

Morling, Beth, Meghan McAuliffe, Lawrence Cohen, and Thomas M. DiLorenzo. 2008. "Efficacy of Personal Response Systems ('Clickers') in Large, Introductory Psychology Classes". *Teaching of Psychology* 35(1): 45-50.

Nicol David, and Iain MacLeod. 2005. "Using a Shared Workspace and Wireless Laptops to Improve Collaborative Project Learning in an Engineering Design Class". *Computers & Education* 44(4): 459-75.

Palfrey, John, and Urs Gasser. 2008. *Born Digital: Understanding the First Generation of Digital Natives*. New York: Basic Books.

Pashler, Harold, Mark McDaniel, Doug Rohrer, and Robert Bjork. 2008. "Learning Styles: Concepts and Evidence". *Psychological Science in the Public Interest* 9(3): 105-119.

Prensky, Marc. 2001. "Digital Natives, Digital Immigrants". *On the Horizon* 9(5): 1-6.

—. 2006. *Don't Bother Me, Mom − I'm Learning: How Computer and Video Games Are Preparing Your Kids For Twenty-first Century Success – and How You Can Help!* Saint Paul, MN: Paragon House Publishers.

Stripling, Jack. 2009. "So Many Students, So Little Time". *Inside Higher Ed,* 24 March. [http://www.insidehighered.com/news/2009/03/24/heh; accessed 25.02.2014].

Tapscott, Don. 2009. *Grown Up Digital: How the Net Generation Is Changing Your World*. New York: McGraw-Hill.

Terris, Ben. 2009. "Online University, Struggling to Attract Students, Loses Investors as Well". *Chronicle of Higher Education: Wired Campus*, 9 December.
[http://chronicle.com/blogPost/Online-University-Struggling/9148/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+chronicle%2; accessed 25.02.2014].

The Ethnographic Research in Illinois Academic Libraries (ERIAL). 2011. [http://www.insidehighered.com/news/2011/08/22/erial_study_of_student_research_habits_at_illinois_university_libraries_reveals_alarmingly_poor_information_literacy_and_skills; accessed 25.02.2014].

The New Media Consortium, 2006. *The Horizon Report: 2006 Edition*. Stanford, CA: New Media Consortium.

Tibbetts, Janice. 2007. **"**Professors Declaring Classrooms Laptop-Free Zones". *National Post* 18 November. [http://www.nationalpost.com/news/story.html?id=18a506fe-13c1-40dd-87c9-49d46100bdcb&k=21800: accessed 25.02.2014].

Trees, April R., and Michele H. Jackson. 2007. "The Learning Environment in Clicker Classrooms: Student Processes of Learning and Involvement in Large University-Level Courses Using Student Response Systems". *Learning, Media and Technology* 32(1): 21-40.

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development. 2009. *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*. Washington, DC: U.S. Department of Education.

Vaidhyanathan, Siva. 2008. "Generational Myth: Not All Young People Are Tech-Savvy". *Chronicle of Higher Education,* 19 September. [http://chronicle.com/free/v55/i04/04b00701.htm; accessed 25.02.2014].

Veenhof, Ben, and Peter Timusk. 2009.**"**Online activities of Canadian boomers and seniors". *Canadian Social Trends*, 6 August: 25-32, Ottawa: Statistics Canada. [http://www.statcan.gc.ca/pub/11-008-x/2009002/article/10910-eng.pdf; accessed 25.02.2014].

Walker, C. Eugene, and Erika Kelly. 2007. "Online Instruction: Student Satisfaction, Kudos, and Pet Peeves". *Quarterly Review of Distance Education* 8(4): 309-319.

Wells, Fargo. 2010. *Youth and Tech Savvy Not Always Related, Wells Fargo Survey Shows*. 21 January. [https://www.wellsfargo.com/press/2010/20100121_Tech_Survey; accessed 25.02.2014].

White, Brian T. 2009. "Analysis of Students" Downloading of Online Audio Lecture Recordings in a Large Biology Lecture Course". *Journal of College Science Teaching* January/February: 23-7.

Willingham, Daniel. 2009. *Why Don't Students Like School?* San Francisco: Jossey-Bass.

Wurst, Christian, Claudia Smarkola, and Mary Anne Gaffney. 2008. "Ubiquitous Laptop Usage in Higher Education: Effects on Student Achievement, Student Satisfaction, and Constructivist Measures in Honors and Traditional Classrooms". *Computers & Education* 51(4): 1766-83.