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The Role of Digital Technologies in Learning: Expectations of First Year University Students

Le rôle des technologies numériques dans l'apprentissage : les attentes des étudiants de première année universitaire

Martha A. Gabriel, *University of Prince Edward Island*

Barbara Campbell, *University of Prince Edward Island*

Sean Wiebe, *University of Prince Edward Island*

Ronald J. MacDonald, *University of Prince Edward Island*

Alexander McAuley*, University of Prince Edward Island*

Abstract

A growing literature suggests that there is a disjuncture between the instructional practices of the education system and the student body it is expected to serve, particularly with respect to the roles of digital technologies. Based on surveys and focus group interviews of first-year students at a primarily undergraduate Canadian university and focus group interviews of professors at the same institution, this study explores the gaps and intersections between students' uses and expectations for digital technologies while learning inside the classroom and socializing outside the classroom, and the instructional uses, expectations and concerns of their professors. It concludes with recommendations for uses of digital technologies that go beyond information transmission, the need for extended pedagogical discussions to harness the learning potentials of digital technologies, and for pedagogies that embrace the social construction of knowledge as well as individual acquisition.

Keywords: digital technologies, first year university students, learning inside and outside classrooms, teaching and learning

Résumé

Des études de plus en plus nombreuses suggèrent qu'il existe un écart entre les pratiques d'enseignement dans le système de l'éducation et la population étudiante desservie, notamment en ce qui concerne le rôle des technologies numériques. La présente étude, fondée sur les résultats de sondages et d'entrevues de groupe auprès des étudiants de première année inscrits à une université canadienne principalement axée sur les études de premier cycle, ainsi que sur des entrevues de groupe auprès de professeurs du même établissement, explore les écarts et les concordances entre, d'une part, l'utilisation et les attentes des étudiants relativement aux technologies numériques dans l'apprentissage en classe et dans les relations sociales en dehors des classes, et, d'autre part, l'utilisation de ces technologies dans les pratiques d'enseignement, les préoccupation et les attentes des professeurs. L'étude se conclut par des recommandations concernant une utilisation des technologies numériques dépassant la transmission de l'information, et la nécessité de discussions pédagogiques poussées permettant d'exploiter le potentiel des technologies numériques dans le cadre de l'apprentissage ainsi que de méthodes pédagogiques adaptées à la construction sociale des connaissances et au mode individuel d'acquisition des connaissances.

Introduction

First year university students arrive in schools with different expectations, skills, and needs than those the traditional education system was designed to teach (Cope & Kalantzis, 2009; Kumar, 2010; Tapscott & Williams, 2010). These differences highlight the requirement for an examination of appropriate pedagogies to meet the literacy and learning needs of these new learners (Kinzer, 2010; Oblinger & Oblinger, 2005). In our research team's investigation of digital literacies and writing, we explored the penetration of digital tools into teaching and learning. We found that first year university students have already integrated communication technology into their personal lives and have a tacit understanding that schools will integrate technology into the classroom in multiple ways, a perspective not always shared by their instructors (Smith & Caruso, 2010). In this paper, we share results from our Social Science and Humanities Research Council (SSHRC) funded study (Wiebe, Gabriel, Campbell, MacDonald, & McAuley, 2010) as well as an earlier study (Gabriel, Wiebe, & MacDonald, 2009) on the beliefs and actions of students and teachers regarding their use of digital literacies both inside and outside tertiary educational institutions.

Review of the Literature

In our review of the literature we explored how first year university students used digital technologies as part of their studies. In particular we were interested in studies that described when and how personal or social uses and educational uses were separate and/or blended.

Our research focused on three basic questions:

- How do first-year university students use digital technologies in their personal lives and for learning?
- What expectations do first-year university students have with respect to the use of digital technologies for teaching and learning at the university?

- How do we understand differing student and professor expectations for the teaching/learning environment?

The crux of these questions is the extent to which universities, institutions of higher education with roots extending back nearly a millennium and increasingly seen as a necessity for social and individual well-being of an ever-larger portion of the population, are prepared to meet the learning needs and expectations of that population.

The latter part of this issue is framed by a rapidly expanding literature that situates this population within a context of escalating access to and use of digital information and communications technologies. Variously dubbed Digital Natives, Net Generation, Information Generation, Millennials, and Neo Millennials (Barnes, Marateo & Ferris, 2007; Gee, 2002; Negroponte, 1995; Negroponte et al., 2006; Oblinger & Oblinger, 2005; Prensky, 2001; Tapscott, 2009, 1998; Tapscott & Williams, 2010), this group of young people was born around 1996 as the Internet began its ascent towards global ubiquity and has grown up with ever-more-capable, numerous, and cheaper digital appliances which increasingly mediate their social and recreational activities, at least as characterized by rising trends in their Internet access in North America, the United Kingdom, and Europe (Lenhart, Arafeh, Smith & Macgill, 2008; Media Awareness Network, 2005).

Both hardware based, through ready access to such devices as smartphones, tablets, and high-speed connectivity, and software based, through social media, Web 2.0 or the "read/write web," and digital audio/video production tools, this digital immersion has contributed to significant numbers of young people who are comfortable creating, distributing, and transforming knowledge within a digital context (Knobel & Lankshear, 2007; Lenhart, Madden, Macgill & Smith, 2007). More than a reflection of the shifting socio-recreational activities of ever-larger groups of young people, however, this phenomenon also reflects the impact of digital technologies on an increasingly interconnected, knowledge-driven global economy within which social well-being and economic prosperity are linked to a population with the digital skills to work in it (Government of Canada, 2010). Conventional notions of literacy—"readin', writin', and 'rithmetic"—while not obsolete, are no longer adequate and must be extended by the capacity to learn, share, and communicate using a broader range of print and electronic technologies, something which requires skills and processes common to print literacy, but also those that are distinct (Coiro & Dobler, 2007; Leu, Kinzer, Coiro & Cammack, 2004).

The specifics of those distinct skills remain somewhat nebulous and debatable, but are often referred to as "new literacies" (Coiro, et al., 2008; Cope & Kalantzis, 2009; Lankshear & Knobel, 2006) or "multiliteracies" (New London Group, 2000) or, currently gaining the most traction in the educational community, "21st Century Skills" (Bellanca & Brandt, 2010; Partnership for 21st Century Learning, 2007; Trilling & Fadel, 2009). Fortunately for the purposes of this study the specifics of these skills are less important than the consensus that they are different from traditional literacy skills, that they integrate high-level critical and creative competencies with digital technologies, and that the K-20 education system must be ready to deal with them. Along with this consensus is a more nuanced critique of monolithic terms such as "Net Generation" which tend to overwrite differences within the digital native generation that are as significant as those between generations (Bennet, Maton & Kervin, 2008; Guo, Dobson & Petrina, 2008; Kennedy, et al., 2008; Sánchez, et al., 2011). Further, at the K-12 level research is

demonstrating that fluency with digital technologies does not necessary equate with proficiency in using them for higher-level knowledge work (Asselin & Lam, 2007; Bennet, Matan & Kervin, 2008; Harouni, 2009; Livingstone & Bober, 2005; Oblinger & Hawkins, 2006; Shenton, 2007).

Although the work of Michael Wesch (2007, 2009) has popularized the transformational potential of digital technologies at the post-secondary level with respect to bridging technological fluency and higher-level thinking, it also draws attention to the fact that, with a few other notable exceptions (Aycock, Garnham & Kaleta, 2002; Garcia-Ros, Perez & Talaya, 2008), little discussion has taken place about the impact of digital technologies on pedagogy and learning at the post-secondary level.

Along the K-20 continuum then, despite assertions by those such as Clark (2010) who notes that "…social networking environments are challenging our notions of the boundaries of the classroom and our pedagogical assumptions about learning" (p. 28) and a call by researchers and educators to adopt and integrate digital technologies (Coryell & Chlup, 2007; Hampel, 2009; Mumtaz, 2000; Segrave & Holt, 2003; Wang, 2008) a tension remains around the presumed fluency of the "Net Generation" with digital technologies and how the educational system might adapt itself to make better use of that fluency to enhance teaching and learning. This is the tension that our study set out to explore. Working with one of the earliest cohorts of the Net Generation to enter the liminal space between K-12 and post-secondary education, it seeks to ascertain the extent to which this group fits the profile described in the literature, determine which digital technologies they use and for what purposes, and compare and contrast their expectations with the perceptions and practices of the professors who will be teaching them at the university.

We conclude our literature review by noting the following tension which informed our research questions: On the one hand, policy-makers, researchers and educators do understand the potential of digital technologies to support teaching and learning in the 21st century, and the affordances these technologies provide. Students today are frequently characterized as people who have grown up immersed in digital environments and who are comfortable utilizing digital technologies in all areas of their lives. Yet on the other hand, research has demonstrated that there are gaps in the how first year university students work with digital technology, and that perhaps students would not choose to be immersed in digital environments constantly. In the current study, the research team asked students enrolled in a first year mandatory course 'Global Issues' how they used digital technologies both in their personal and educational lives. This foundational writing course is unique to this undergraduate university. It was developed to support students in cultivating their capacity for critical reflection, enhancing their ability to read texts with nuanced understanding, and teaching them how express their insights in well-developed forms of writing. Throughout the course, students work in three different instructional groupings to accomplish their writing goals, including traditional lectures, small group seminars, and monthly town hall meetings.

Methods

The study is designed as a mixed methods study, as presentation of data would be incomplete without reference to both quantitative and qualitative data (Creswell, 2009; Mores & Neihaus, 2009). The research team adopted a consecutive (quantitative and qualitative) mixed method

approach to data collection (Johnson & Onwuegbuzie, 2004). The supplementary quantitative survey data was analyzed and informed the core qualitative data from focus group interviews (Johnson & Onwuebuge, 2004; Mores & Neihaus, 2009; Tashakkori & Teddlie, 2003).

The quantitative instrument was comprised of a survey of opinions and practices of first year university students regarding their expectations for digital technologies at the university, their personal use of such technologies, and their understanding of writing. This survey was refined from a survey developed the previous year exploring similar issues. We utilized the results of the survey to then develop interview protocols and conduct interviews with students and professors. This qualitative component of the study is the focus of this paper.

We begin with a description of the pilot study conducted the previous year. At that time, first year students had been invited to participate in an electronic survey exploring issues regarding digital technologies. Due to the low response rate (19%) the research team decided to conduct a paper-based survey to collect data face-to-face in the current study, which we implemented the following year. Initial contact was made with the coordinator of the first year/first term writing course at a primarily undergraduate Atlantic Canada university. With approval of the coordinator, requests for permission to conduct research during class were subsequently emailed to Faculty members teaching the first term/first year writing course. All first year university students (no matter in which discipline they are enrolled) were required to take this course and therefore presented a unique opportunity to capture data. The research team visited the classes of 8 professors, explained the research, and then invited students to take 20 minutes to fill in the survey if they wished to participate. 291 first year students from a group of 547 participated in the survey for a return rate of 53%. Students who participated in this study were relatively homogeneous in terms of their ages, with 63% of the participants 18 years of age, and with 18% of participants 19 years old. There was a split of 45% male and 56% female students, which reflects the demographic reality of the university. The survey was developed to measure a snapshot of students' past, current, and future expectations for technology use and to ascertain their attitudes towards writing.

As explained below, we analyzed the results of the surveys, and then developed the focus group protocol (Patton, 2002). We had invited students who participated in the survey to indicate if they were willing to participate in a focus group planned for the winter term. Although 67 students indicated their interest in participating in the focus groups, due to timing issues, many were not able to attend the actual focus group interviews. We reviewed the questions asked in the pilot study and determined that due to the close match between the interview protocols, that it was appropriate to analyze the pilot and current study data concurrently. The qualitative data shared in the findings are drawn from in-depth semi-structured interviews with eleven students (seven students from the pilot study and four students from the current study).

Concurrently, an invitation was sent via email to all professors at the university to participate in a focus group interview to discuss issues surrounding digital technologies, teaching and writing, and global issues. Further qualitative data were collected in interviews with the three professors who volunteered to participate. Even though this is a small sample of professors, it still provided an important glimpse into how we understand differences in student and professor expectations for the teaching and learning environment.

Data analysis involved both SPSS (quantitative) and NVivo 8 (qualitative) research data analysis software. Descriptive and inferential statistical analyses were conducted. Interviews were transcribed and coded, and subsequently, themes and patterns were determined. We used an analytical framework based on the key issues raised in the research questions. The survey questions specifically addressed the issues delineated in the research questions 1 and 2. Further, the focus group questions allowed participants to give a fuller description of their perspectives about these same issues, with a particular focus on digital technologies and writing. Focus group interview with the professors helped inform research question number 3.

Findings

The next section presents the results of the focus group interviews with both student and faculty participant groups. From our analysis, we grouped findings into two major orientations: (1) how students use digital technologies both within and outside of educational settings, and (2) professors' perceptions of the affordances and challenges of using technology in teaching, learning, and writing.

How students use digital technologies inside and outside educational settings

In the initial interviews in the pilot study, students reported anticipating using their laptops frequently for learning and for socializing. And in fact, the students' expectations were met as they used their laptops to write papers and assignments, to maintain contact with their friends, and to access online information sources. When we analyzed the data for the current study, we found that students articulated how they used a large number of digital technologies for both learning and socializing. Students included laptops in their discussion, but also brought scanners, cell phones, digital cameras, printers, ebooks, iPods, and particular programs such as *Kurzweil* and *Dragon Naturally Speaking* and *RefWorks* into the discussion. Students in this study did tend to use digital technologies in a variety of ways.

The survey results demonstrated that the technologies most frequently used in-school for learning included the Internet, email, word processing, math and science programs, texting on cell phones, and electronic databases. 77.2% of students who participated in the survey reported that they used computers more than two hours a day for both inside class and outside class purposes (compared to 68% who reported this amount of use in the pilot study). There were no significant differences between the percentage of male and female students who used computers to this extent.

> I use the computer, definitely I use my iPod a little bit. You can upload books... I sort of used my cell phone… It would be more for group meetings for getting in contact, for communication, using that technology I guess. I've used the scanners a lot. (Student Interview)

Students from the current study as well as the pilot study relied heavily on information found online. The Internet figured predominantly in the students' approach to digital technologies, with a particular emphasis on online information resources. The Learning Management System (LMS) chosen by this university was Moodle, an open source system that has been adopted by a number of post-secondary institutions in the region. Students seemed to understand how to use an LMS quite quickly— "I picked it [Moodle] up pretty quick, because I've been using

computers for so long" (Student Interview)—and they grew to depend on the course information that was made available any time and any place. Participants in both the survey and the interviews agreed that Moodle works quite well. However, there was a significant difference in students' comfort level when working online in Moodle; males were significantly more comfortable than females.

> Moodle? That's probably the best invention–it's really great. Like you can get the syllabus online, and if there's changes to the syllabus, professors can post it, and it's really really useful. A lot of readings are posted ahead of time... but in the past I have had tests put up on there–multiple choice. And discussion groups as well. (Student Interview)

Students commented on the anytime, anywhere aspect of accessing information on the course LMS noting that the syllabus is posted, podcasts are available, PowerPoint presentations are uploaded, and notices for the class are all excellent ways for someone who is not on campus to feel in touch with the course. "So if you finish the book at two o'clock in the morning, you could write the test shortly after that, and you wouldn't have to wait... everything would be sort of fresh in your mind" (Student Interview). Students commented that using digital technologies is the way that they communicate, helping them in their creative writing. They also mentioned that if people are shy, then they feel free to use technology to communicate their understanding, rather than speaking out in class. Another further in-school use of technology is the ability to upload information and classes to their iPods as well as to upload books. One student stated that "You can upload books... and then they can use them when they're traveling from class on the bus to home" (Student Interview).

We did find major differences in how students chose to use digital technologies outside the classroom and how they used technologies inside the classroom. Survey results demonstrated that students tended to use email, the Internet, social media, texting on cell phones, instant messaging, and talking on cell phones when they were outside the classroom during social engagement activities. They used these tools for communicating, socializing, and also for learning. Students who participated in the interviews confirmed that they used these tools for a range of purposes.

> Cell phone, texting, and just plain old calling people, e-mail, Facebook... I read a lot of blogs rather than write. Sometimes I'll have friends that have blogs... I guess I'd read it and then say "Hey, I read your ..." or you can leave a note on their blog, so that's how I use it for learning and for socializing. I just started using Skype. I find that really interesting. (Student Interview)

> I text–didn't think I ever would but yeah, I text–I now text. (Student Interview)

> Facebook helps. I find I am checking even if I don't think there is anything there…a thought on the wall. And I am still checking my cell phone for the time instead. (Student Interview)

> I used to keep an online journal... Well, you can communicate with so many different people that you don't know and they can give you outside advice that you can't always get from friends... (Student Interview)

As we turned to student expectations for how digital technologies would be used in post-secondary classrooms, students reported that they expected professors to use a variety of digital technologies in their classrooms. Some of these expectations were met, while other students reported being in classrooms with professors who did not choose to integrate digital technology into their teaching. "Well one of my professors uses overheads, so I didn't expect that at all... Just because it is so old school. I expected computers and PowerPoint to present everything. Just from friends talking about Moodle, I expected that" (Student Interview). However, some students found that their professors had adopted digital technologies and were integrating them into the teaching and learning environments of their classrooms.

> A lot of professors are putting [Powerpoint] slides up, which I find helpful too, because you can listen more in the classroom, instead of trying to copy everything down... Some are posted ahead of time and some aren't until after the class, because they want to encourage people to attend class. (Student Interview)
>
> My professor always used Moodle. My teacher always posted assignments, and the solution to the assignment on Moodle.... she always gave us grammar practice and some vocabulary practice, and I searched Moodle to do the practice. My professor posted his PowerPoints on Moodle, and he used the PowerPoint to teach the class. Sometimes he gave us some movies about the class–he used YouTube. (Student Interview)
>
> I'm finding YouTube is becoming something that's been used a lot and it's really interesting. It's a different way of learning I guess, because it's interactive. (Student Interview)

These students were not sure what to expect when they entered first year university. Some had notions that the use of digital technologies in university would be different from their use in high school. When they arrived in classrooms, they found a range of approaches to using technologies as tools for learning.

Affordances and challenges of using technology in teaching

Just as the student participants reported, there is an entire spectrum of approaches to the integration of digital technologies in teaching in post-secondary classrooms. There is no policy regarding the implementation of digital tools into teaching at the university (our research site), and all professors approach their teaching with their own perspectives and preferences. Three professors indicated their willingness to participate in this study, and engage with the researchers in a discussion about teaching and learning and digital technologies. All of these professors used Moodle, our university Learning Management System. Moodle was used to communicate within writing forums and discussion forums, for posting links to websites and music videos, and as a mechanism to facilitate setting up small groups. One professor commented that "I do make use of Moodle, maybe not extensive use, but I do make use of Moodle. I think that certainly for some very basic straightforward kinds of things, it's a wonderful tool" (Faculty Interview). Another instructor commented that:

> I use it [Moodle] all the time to send messages. I just did one the other day; found an interesting news article based on something we were talking about in class. And sent out an e-mail with the article attached through Moodle, and they all read it and it was the topic of discussion in the next class. (Faculty Interview)

Another professor used Moodle for tracking grades and sending out information to students, as well as communicating in between class times. This teacher stated, "Moodle is certainly the primary technology that I use... I keep track of grades and … submit the grades to them... I use it to send out e-mails, and course notices, and stuff like that. They know to look for it now" (Faculty Interview).

In terms of writing, some professors used Moodle as a space where students maintained personal blogs; some teachers experimented with blogging as an effective method of encouraging students to begin writing creatively. A few professors also used Moodle as a collaborative writing tool where students could write different parts of the paper, merge these components, and then submit one paper written by the team.

> We wrote a book online in one of my classes last semester, it was like a group, or class wide book that we wrote together... but it was always there 24 hours so you could always keep up to it. (Student Interview)

These teachers identified a number of barriers that professors must address if they wish to implement online learning and other digital technologies in their teaching. One of the challenges of using an LMS like Moodle is the lack of assurance that the student who is writing the test is actually that student.

> Then to be able to mark the stuff like that becomes really problematic. I don't know if it's them doing it or their best friends that's doing it... there's zero control at that point for marking purposes. (Faculty Interview)

Other issues have also surfaced, including the distractions that laptops may present when students are using them in class, and the interruptions presented by ringing cell phones.

> They [students] frequently came with laptops. And I think that some of them were really using them purposefully. But there were some at the back, I'm sure they were Facebook-addicted, and I did have to go walking around like I was in a high school classroom... and they'd shut them, so you knew then, right? And so that was a problem. (Faculty Interview)

> And then the phones–once in a while you'd see them.... We talked about if it was an emergency...well, then answer it. But then otherwise, it would be more respectful to just wait until the class is over, and call them back.... Now of course, driving cars, you're not supposed to talk–it's dangerous–it's a kind of metaphor. It's dangerous to do that in class too... I think you're going to be missing information if you're facebooking and talking on the phone. (Faculty Interview)

These professors have also noticed that students perform more poorly when trying to multitask, when they are highly engaged with a variety of technologies at one time. This observation goes counter to students' beliefs that they are able to multitask very effectively.

> ...their [students'] activities outside the classroom shaped their expectations in the classroom, and we sort of fast forward now to the age of multitasking. All the research says, you know, the more we try the worse we get. Nonetheless, they come with their laptops, they're doing their Facebook while they're taking the

> odd note while they're checking e-mail, and so their attention span is all over the place. (Faculty Interview)

A further challenge is professors' belief that the students have an expectation, a demand for immediacy, and therefore do not want to come into the office for the traditional office hour discussion but want professors to be accessible 24/7 on e-mail.

> There is an immediacy that is expected there that is extremely unrealistic... they almost have this vision of us hovering over our computers waiting for the next e-mail to come through. I've also noticed this year a phenomenon of students tracking me down on Facebook and sending me messages on Facebook when I haven't responded to their e-mail quickly enough. (Faculty Interview)

> They [students] are online or wired all the time. They can presume that we are... it's simply an assumption they work with. (Faculty Interview)

> I get more work done during office hours than any other hour of my day, because students don't come. I think it's sort of an offshoot of what we've been talking about in terms of immediacy. If you are online all the time, why do we need anything formal? (Faculty Interview)

The professors felt that the push for online learning reduces the face-to-face time that they see as being necessary for effective education. At this particular university, face-to-face teaching is held in high esteem by administration, many professors and a large number of students alike.

> I can see students not coming to classes because they can get everything, just go to Moodle and there's all your work. And I heard that some schools are doing more … with online courses, because they [students] can stop and pause…I've heard a few students say that they prefer them [podcasts] to actual lectures, because if they don't understand anything, they just go back and listen. (Faculty Interview)

The professors believed that digital technologies seemed to be privileging visual learners over students with other learning styles. They also felt that writing using technology was creating an artificial safety net for the students where students slipped into using improper words, incomplete ideas, and incorrect grammar. Current writing practice seems to be resulting in a far less formal way of writing. One instructor lamented, "If we use technology as a blanket statement for all teaching, then we are going to get ourselves into big trouble. It becomes a crutch" (Faculty Interview).

We have shared a range of beliefs and practices regarding digital technologies. By comparing data that emerged within each group and then across groups we were able to understand the perspectives of participants— first year students' use of digital technologies both in-school and out-of-school, and university professors' experiences of the affordances and challenges of integrating technology into teaching and learning environments.

Discussion

Throughout the process of collecting survey data, meeting with students and professors, and our research team discussion, we have found that many of the insights we gleaned connect strongly with what other researchers have reported. We would now like to examine ideas about the Net Generation, and this group's posited orientation towards technology. Then we will discuss the connections between what we found regarding digital literacies in post-secondary education.

One of the findings in both the pilot and the current study was that first year university students were using different digital technologies for their in–school and out-of-school contexts. While the inside/outside designation no longer adequately distinguishes personal uses of technology from school-focused uses (Christensen, 2008), the student respondents still referred to the brick and mortar buildings of the campus as a means of identifying being at school. Students' most frequent use of technology *outside* of school was email, Internet, social media, texting on cell phones, instant messaging, and talking on cell phones. The focus was on communication and socializing with others. The students' most frequent use of digital technologies *in* school were (in descending order) accessing information on the Internet, using email, word processing, math and science programs, texting on cell phones, and accessing electronic databases. In school, the students tended to use digital technologies to collect, select, and work with information. The differences between these two lists are significant. Some students felt that there was a place for all technologies in an educational form, while others wanted to maintain a separate digital footprint for inside the classroom as well as outside the classroom digital technologies. This finding is similar to what Clark, Logan, Luckin, Mee, and Oliver (2009) found in an investigation of the technology landscapes of students. These researchers introduce the term "digital dissonance" to describe the "tension with respect to learners' appropriation of Web 2.0 technologies in formal contexts" (p. 56).

The study does raise the issue of managing expectations at the university—both the expectations of students and those of the professors related to the effective use of technology within the university. When conceptual understandings are more fixed, the 'management' challenge is one of degree or balance: such as providing and utilizing well the Learning Management System and other elearning tools, yet not to the extent that the acknowledged ideal (at this particular institution) of face-to-face teaching is undermined. But the additional challenge is the shifting conceptual understanding of the classroom space. When students do not necessarily need to attend that space for some kinds of learning experiences, then this shifts the management question to what kinds of learning experiences are best conducted in the classroom space.

This study revealed a high comfort level among students with the research site's online learning environment and a reasonably similar student comfort level with a number of the university's professors' uses of technology. Clearly this is a strength in the university's learning milieu and needs to be built upon and enhanced. However, it is apparent from this study that in a blended online and face-to-face environment, male students are more comfortable participating in the online learning component than female students. This finding points to the need and the opportunity to support and encourage female students preferentially in the digital learning environment. It is also apparent that not all professors are proactively using the university's elearning platform (Moodle). Again, this reality represents an opportunity to provide additional support service to professors to facilitate their effective use of elearning opportunities.

At previous times the university has supported the provision of faculty online learning support workshops. There have also been summer institutes dedicated to highlighting online teaching and current effective practice in online environments. Similarly, a handbook has been developed, drawing on the insights from such workshops and institutes to afford faculty effective approaches for adopting elearning tools in their teaching. Our study suggests ways these supports could be improved. For example, with the expectation by students (not all, but evident in a cross section) that they would have electronic access to their professors on a 24/7 basis, it would be pragmatic to be as specific as possible regarding reasonable expectations for student-professor communication (such as online office hours) when it comes time to update the student handbook and revise the new student orientation activities. Additional support could also come from the addition of a Technology Use Protocol that proposes guidelines and principles for best practices for use of digital technologies in the classroom.

At this university there is a long-standing tradition of emphasizing the importance of high quality face-to-face teaching. This principle is an integral component of approaches to teaching and learning at this site. Even so, the university has committed time, energy and resources to providing new digital technologies, and to ensuring that professors have the opportunity to become adept in their use. However, the variance in their adoption and the variance in the beliefs about the benefits of their adoption suggests there is still a need to enhance professional development (which is not simple implementation), as, according to Clark (2010), digital technologies are "challenging our notions of the boundaries of the classroom and our pedagogical assumptions about learning" (p. 28). Our findings give some scope for understanding next steps.

With respect to technology use in learning, the variety of student and professor comfort, use, and understanding underscores the notion that enhancing professional development means critical conversation regarding the changing classroom space, moving past the traditional 'how to's and 'handbooks' for effective teaching. The discrepancies between the expectations of students and professors regarding the use of digital technologies within the classroom setting provides evidence for the need of an enhanced kind of professional development. Hardy's (2009) research on professional development underscores the need for mentoring and critical conversation so that instructors are not positioned as mere implementers of the latest protocols and practices. As our study found variances in *beliefs* about what is optimal in the classroom space, such as students' beliefs regarding their ability to multitask and the beliefs of the professors that students' "attention span can be all over the place," our findings suggest that fostering a critical and constructive conversation would be a timely and needed response that addresses the growing reality of increased use of digital technologies for learning and teaching.

Conclusion

Given that our findings support the need for increased critical conversation via enhanced professional development, our team concludes this paper by identifying three important discussion points regarding technology use and the shifting classroom space. First, it is important to understand that the most creative and productive uses of technology have yet to find prominence in the typical classroom. This is clearly reflected in the data when implementing technology into teaching is described as using PowerPoint, using a learning management system, and spicing up lectures with YouTube. All of these are still transmission-oriented approaches to

technology use with strong ties to traditional teaching tools: (a) PowerPoint being used as an upgrade on the overhead projector; (b) Moodle being used as a course syllabus; and (c) YouTube being used to transmit lecture points. Critical conversation means addressing the ways in which the classroom meeting space is still (or is no longer) ideally suited for transmission learning.

Second, we recommend that critical conversation that articulates even the simplest technological implementation become part of professional development systems. For example, the basic advantages of a learning management system (communication between course meetings, more efficient means to create teachable moments, more transparency around grades and evaluation processes, and so forth) might be part of the language of best practices. Instructor efforts such as posting links, making connections between resources, and joining online discussions might be understood as part of the student research process. Even potential barriers to implementation, such as plagiarism, distraction, or addiction, might be part of professional development discussions on what professors have done to counteract these possibilities.

Third, we recommend that critical conversation address the deeper, conceptual changes to teaching practices as they relate to the historicity and social construction of knowledge. Instructor concerns regarding formal language and individual authorship are two examples of where technological implementation is stalled not because of knowledge or lack of training, but because of deliberate resistances to what digital technology might be changing. Even among the adopters, what is typically missing in digital technology professional development is the social construction of knowledge, and how the ways knowledge is shared shifts expectations for how knowledge should be utilized and valued. Greater uptake in digital technology should mean greater understanding of how the social dynamics of digital technology are already part of the scholarly mobilization, translation, and production of knowledge. Perhaps an emphasis on how to implement has overlooked important conversations of why and what is at stake.

Taking points one, two, and three together, we believe that the next steps to technological implementation should focus on enhanced professional development via a more efficacious critical conversation at the university. In conclusion, we note that our study confirms (and sheds additional light on) what the literature has been saying about students' use of, and expectations about, digital technologies in the learning environment of the university. There is a strong indication that a reasonable comfort level exists among students both in accessing online information and conducting some of their work in an online environment. It also confirms what the literature has shown, that some, though not all, professors are incorporating elearning strategies and environments into their teaching. Ultimately, the findings support the development of a more efficacious critical conversation via enhanced professional development. Timely would be fostering a dialogue within the university community regarding how digital technologies are part of the social construction of knowledge, and how professors can optimize teaching and learning for the changed classroom space, whether that be elearning, face-to-face, or some kind of blend.

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References

Asselin, M. & Lam V. (2007). Learning to learn: An examination of instructional support during a grade 9 research project. *Studies in Media and Information Literacy Education, 47*(2), 1-47.

Aycock, H., Garnham, C. & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology, 8*(6). Retrieved from http://www.uwsa.edu/ttt/articles/garnham2.htm

Barnes, K., Marateo, R. C., & Ferris, S. P. (2007). Teaching and learning with the net generation. *Innovate: Journal of Online Education, 3*(4). Retrieved from http://innovateonline.info/pdf/vol3_issue4/Teaching_and_Learning_with_the_Net_Generation.pdf

Bellanca, J. & Brandt, R., (Eds.). (2010). *21st century skills: Rethinking how students learn.* Bloomington, IN: Solution Tree Press.

Bennet, 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.

Christensen, C.M. (2008). *Disrupting Class: How Disruptive Innovation will Change the Way the World Learns*. McGraw-Hill, New York, NY.

Clark, J. E. (2010). The digital imperative: Making the case for a 21st-century pedagogy. *Computers and Composition*, *27*(1), 27-35.

Clark, W., Logan, K., Luckin, R., Mee, A., & Oliver, M. (2009). Beyond web 2.0: Mapping the technology landscapes of young learners. *Journal of Computer Assisted Learning, 25*(1), 56-69.

Coiro, J., & Dobler, E. (2007). Exploring the online reading comprehension strategies used by sixth-grade skilled readers to search for and locate information on the Internet. *Reading Research Quarterly, 42*(2), 214-257.

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (Eds.). (2008). *Handbook of research in new literacies*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Cope, B. & Kalantzis, M. (2009). "Multiliteracies": New literacies, new learning. *Pedagogies: An International Journal, 4*, 163-195.

Coryell, J.E., & Chlup, D.T. (2007). Implementing E-Learning components with adult English language learners: Vital factors and lessons learned. *Computer Assisted Language Learning, 20*(3), 263-278.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches (3rd ed.)*. Los Angeles: Sage.

Gabriel, M.A., Wiebe, S., & MacDonald, R. J. (2009, April). Net generation expectations for technology-mediated learning at the university level. In *Research, reflections and*

innovations in integrating ICT in education. Proceedings of the V International Conference on Multimedia and Information & Communication Technologies in Education, Lisbon, Portugal.

Garcia-Ros, R., Perez, F., & Talaya, I. (2008). New university students' instructional preferences and how these relate to learning styles and motivational strategies. *Electronic Journal of Research in Educational Psychology, 6*(3), 547-570.

Gee, J. P. (2002). Millennials and bobos, Blue's clues and Sesame Street: A story for our time. In D. Alverman (Ed.). *Adolescents and literacies in a digital world* (pp. 51-67). NY: Peter Lang Publishing.

Guo, R. X., Dobson, T., & Petrina, S. (2008). Digital natives, digital immigrants: An analysis of age and ICT competency in teacher education. *Journal of Educational Computing Research, 38*(3), 235-254.

Hampel, R. (2009). Training teachers for the multimedia age: Developing teacher expertise to enhance online learner interaction and collaboration. *Innovation in Language Learning and Teaching, 3*(1), 35-50.

Hardy, I. (2009). Teacher professional development: A sociological study of senior educators' PD priorities in Ontario. *Canadian Journal of Education*, *32*(3), 509-532.

Harouni, H. (2009). High school research and critical literacy: Social studies with and despite wikipedia. *Harvard Educational Review, 79*(3), 473-493.

Government of Canada (2010). *Improving Canada's Digital Advantage: Strategies for Sustainable Prosperity*.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Kennedy, G. E., Judd, T. S., Churchward, A., Gray, K., & Krause, K.L. (2008). First year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology, 24*(1), 108-122.

Kinzer, C. (2010). Considering literacy and policy in the context of digital environments. *Language Arts*, *88*(1), 51-61.

Knobel, M., & Lankshear, C. (2007). *A new literacies sampler*. New York: Peter Lang.

Kumar, S. (2010). The net generation's informal and educational use of new technologies. *In Education: Technology & Social Media* (Special Issue, Part 2), *16*(1). Retrieved from http://ineducation.ca/issue-2

Lankshear, C.,& Knobel, M. (2006). *New literacies: Everyday practices and classroom learning* (2nd ed). Maidenhead: Open University Press.

Lenhart, A., Madden, M., Macgill, A. R, & Smith, A. (2007). *Teens and social media.* Pew Internet & American Life Project.

Lenhart,A., Arafeh, S., Smith, A., & Macgill, A. R. (2008). *Writing, technology, and teens.* Pew Internet & American Life Project.

Leu, D. J., Kinzer, C. K., Coiro, J. L., & Cammack, D. W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. In R.B. Ruddell, & N. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1570-1613). Newark, DE: International Reading Association.

Livingston, S., & Bober, M. (2005). UK children go online: Final report of key project findings. Retrieved from http://www.york.ac.uk/res/e-society/projects/1.htm

Media Awareness Network (2005). Young Canadians in a wired world. Retrieved from http://www.media-awareness.ca/english/research/YCWW/index.cfm

Morse, J. & Niehaus, L. (2009). *Mixed method design: Principles and procedures*. Walnut Creek, CA: Left Coast Press Inc.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: A review of the literature. *Technology, Pedagogy and Education, 9*(3), 319-342.

Negroponte, N. (1995). *Being digital*. New York: Vintage Books.

Negroponte, N., Bender, W., Ballro, A., & Cavallo, D. (2006). *One Laptop per Child*. Presentation by OLPC Association, Miami, Florida.

New London Group, The. (2000). A pedagogy of multiliteracies: Designing social futures. In B. Cope & M. Kalantzis (Eds.), *Multiliteracies: Literacy learning and the design of social futures* (pp. 9-38). London: Routledge.

Oblinger, D.G., & Hawkins, B.L. (2006, Mar-April). The myth about student competency: "Our students are technologically competent." *EDUCAUSE Review*, 12-13.

Oblinger, D., & Oblinger, J. (Eds.). (2005). *Educating the net generation.* EDUCAUSE. Retrieved from http://www.educause.edu/educatingthenetgen/5989

Partnership for 21st Century Learning. (2007). Retrieved from http://www.p21.org/

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks: Sage.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Sánchez, 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.

Segrave, S. and Holt, D. (2003). Contemporary learning environments: Designing e-learning for education in the professions. *Distance Education*, *24*(1), 7-24.

Shenton, K. (2007). The paradoxical world of young people's information behaviour. *School Libraries Worldwide, 13*(2). Retrieved from http://www.iasl-online.org/pubs/slw/july07-shenton.htm

Smith, S. D., & Caruso, J. B. (2010). *The ECAR study of undergraduate students and information technology, 2010*. EDUCAUSE Center for Applied Research.

Tapscott, D. (1998). *Growing up digital: The rise of the Net Generation.* New York: McGraw-Hill.

Tapscott, D. (2009). *Grown up digital: How the Net Generation is changing your world.* New York: McGraw Hill.

Tapscott, D., & Williams, A. D. (2010). Innovating the 21st-century university: It's time! *EDUCAUSE Review*, *45*(1), 16-29.

Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social and behavioral research.* Thousand Oaks: Sage.

Trilling, B. & Fadel, C. (2009). 21st century skills: Learning for life in our times. San Francisco, CA: Jossey-Bass.

Wang, Q. (2008). 'A generic model for guiding the integration of ICT into teaching and learning', *Innovations in Education and Teaching International, 45*(4), 411-419.

Wesch, M. (2007). *The machine is us/ing us.* Retrieved from http://hdl.handle.net/2097/4972

Wesch, M. (2009). *From Knowledgable to Knowledge-able: Learning in New Media Environments*. Retrieved from http://www.academiccommons.org/commons/essay/knowledgable-knowledge-able

Wiebe, S., Gabriel, M. A., Campbell, B., MacDonald, R.J., McAuley, A. (2010, December). *Writing the digital economy: A summary of research and perspectives.* Final report to Social Sciences and Humanities Research Council.

Authors

Martha A. Gabriel, Faculty of Education, University of Prince Edward Island. Associate Professor of Education and co-principal investigator of the Research in Early Child Development Initiative at the Centre for Education Research. Gabriel's research and teaching interests centre on the investigation of literacies—digital, multimodal, and new literacies/pedagogies, and on implementing community-based action research processes. Email: mgabriel@upei.ca

Barbara Campbell, School of Nursing, University of Prince Edward Island, is Director of Teaching and Learning and International Relations at UPEI, Associate Professor in Nursing, and Adjunct at University of New Brunswick. Campbell's research includes family literacy, pedagogy with new learners, and knowledge translation. She has co-authored 17 publications, a book, a chapter, and is a Senator on the UPEI Board of Governors.

Sean Wiebe, Faculty of Education, University of Prince Edward Island, is a poet, philosopher, parent, and provocateur. His career has spanned 17 years in education, beginning as secondary English teacher before moving to educational administration and higher education. He has recently published "How Boys Grow Up" with Acorn Press.

Ronald J. MacDonald, Faculty of Education, University of Prince Edward Island, is Undergraduate Coordinator and science methods instructor. Research focus: supporting science teacher communities of practice when they are integrating technologies; gender differences in students' attitude toward science when technologies are used; first year university students' technology use; and the merging of theory and practice in teacher education.

Alexander McAuley, Faculty of Education, University of Prince Edward Island, is Associate Professor of Education at the University of PEI. His teaching and research focus on the intersections of digital technologies, literacies, and knowledge building in diverse cultural contexts.

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