

Pedagogy, continuance theory and mobile devices: Findings from a New Zealand case study

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ABSTRACT

In 2010, a short-term case study project undertaken in an urban secondary school investigated various mLearning options in a range of classrooms. Mobile devices included students' own cellphones and/or digital cameras, as well as some proprietary software and hardware. Four different classrooms, teachers, subjects and classes participated in the research evaluation, which reported on effects these digital technologies had on pedagogical practices and school infrastructure. The case study used interviews, observation and the collection of artefacts (video, still shots) to provide qualitative data for thematic analysis. The teachers and IT support were all mature professionals whose pedagogical knowledge and practices were already secure. This paper focuses primarily on discussing the pedagogical practices of the teachers and some implications of viewing their experiences through the lens of continuance theory and socio-cultural perspectives.

Author Keywords

Mobile devices, mLearning, pedagogy, secondary schools, case study, continuance theory, socio-cultural ecology theory.

INTRODUCTION

This study grew from one teacher's trials with using mobile devices (such as cellphones, mp3 players, iPod Touches) as data storage and playback facilities. This was at the teacher's former school, where students, mainly from a low socio-economic urban area did not have computers at home, but had cellphones. The trials were initiated by students wanting to know if they could use their phones, instead of having to use computers, to store and retrieve digital files. This led the geography teacher with support from an information communication technologies professional development (ICTPD) facilitator and his students, to finding out. When the teacher moved schools, he built on the national and international awards gained for this work in 2008 (Wilson, 2011). Together they discovered a way to create digital content files that could be stored and read on cellphones, harnessing them for learning purposes. Through the process they developed, students could create their own files, share them, and review them on their devices whenever and wherever they chose. These files consisted of narrated slides containing text and images, exported as movies and saved with specific file extensions compatible with a range of cellphones or other mobile devices, such as mp3 players. Students' frequent use and reuse of these files as part of their learning corresponds both with Bhattacharjee's (2001) exploration of why people continue to use certain digital technologies (continuance theory), and the comment Sørensen, Halvari, Gulli, and Kristiansen made that such technology "enables teachers and students with "possibilities", not with a "ready to use" resource" (2009, p. 1177). Students saw a possibility for learning through using their cellphones instead of computers which they didn't have. Through working with curious teachers as significant others, together they found a way to extend the affordances of these mobile devices.

The technology acceptance model/continuance theory that Bhattacharjee (2001) reported on, centred on customers of a bank's online banking system. This was, essentially, a one-way system where the bank designed an online banking system that customers remotely used. The bank wanted to know how likely it was that customers would continue using it. This was about ease of use, need and customer relations. In educational contexts, systems and technologies and/or affordances can also be readily adapted, but with student input. Also, a wide variety of technologies or affordances can be applied, according to elements such as context, topic, concept, student group, level and access. This differs from the singular approach or system a bank is most likely to create for customers, and links to Pachler et al's (2010) socio-cultural analysis vis a vis young people's continued use of digital technologies. Educationally, teachers are most likely to develop regular digital technology use in classrooms if students learning response is positive.

Many schools or even sometimes, subjects within schools, opt to ban mobile devices in classrooms. However, it is increasingly hard to sustain this position, especially when tablet devices and smartphones are showing their value in learning contexts internationally (Peachey, 2010; Valk, Rashid, & Elder, 2010). This closely links to the experiences of students as outlined above in the New Zealand secondary school, who were never without their cellphones. A socio-cultural ecology theory is developing, explaining how learners use mobile devices to frame their cultural and identity practices to make their way in the world. These aspects are defined as agency, cultural practices and structures and also link to ideas of appropriation – learners use these tools in ways they define for themselves (Pachler, 2010; Pachler, Cook & Bachmair, 2010). The New Zealand innovation summarised earlier is a case in point, particularly when students saw a need and worked to address it with the help of teachers. From that experience, the teachers observed striking learning behaviours – students, for example, were concentrating so hard on arguing about geographical concepts itemized on their

files on their phones, that they bumped into school lockers, or, in another case, coming to blows over differences of opinion about geographic concepts.

Bhattacharjee (2001) and Sørenbø et al. (2009) argue that the continued or prolonged use of any technology is conditional on its perceived value to those using it: if it works to help a person in their job, its use is repeated; if it works really well, its use is expanded and developed over time and it becomes part of their work identity. This suggests that users begin to think about how they can improve its use as part of their work. Teachers tend to be pragmatic - if something helps students learn, they will continue to use it and refine its use for learning over time, thus linking it to a teacher's professional identity. In other words, both the teacher and students will come to see the technology in relation to the teacher and the subject/topic. The aforementioned experimentation in one school is a case in point.

This paper suggests that both socio-cultural ecology theory and continuance theory can be applied to understanding mobile technology adoption in secondary school classrooms in a New Zealand school. Evidence points to students' agency and repeated use when it helps them learn and when they can create digital learning products. Also, teachers engaged in the study remarked on observing positive changes in students' learning behaviours when using digital tools (such as greater focus and concentration, task completion and, therefore, engagement), and this led to teachers as well as students, becoming keen to continue using these technologies/tools and expanding their use.

STUDY CONTEXT

The co-educational school involved in this project is situated in a large, urban, relatively well-off area. However, there are also pockets of socio-economic need and students from such families attend this school. A wide spectrum of cultures and background are represented, including a sizable number of new migrants and speakers of languages other than English or Maori. These were contingent factors the trial staff grappled with as it embarked on its mobile project. The Ministry of Education supported it by funding part of two staff members' time as leaders of the project, as well as money for the research and some capital expenditure. As the researcher, I was sub-contracted to the school for the research evaluation (Wright, 2010a, 2011). Four teachers and the IT Director were the core trial participants. Subjects included an English class, an English for Speakers of Other Language class, soft materials technology (cooking) classes, a senior Japanese class, and a geography class.

For the research evaluation, qualitative case study approach was used for a number of reasons. First, the evaluation had to be a snapshot within one calendar month of the four-month project. During that month, I spent two consecutive days each week in the school, conducting digitally recorded interviews with staff and students, attending relevant meetings, informal discussions with staff in the staffroom at break times, and observing classes. Note-making during observations, meetings and informal contexts during research visit days consisted of taking still photographs, short video clips and using the notes function on a mobile device. Pen and paper were also used occasionally to record information. Data were downloaded to my laptop. Seidel's (1998) process for qualitative data analysis was used each day, since during student interviews in particular, patterns emerged quickly. Seidel argues that noticing and thinking about what the data were saying as they were being collected are credible means for analysis-in-action meant that I was able to adjust questions asked of subsequent pairs of students, based on what previous pairs had commented on. This meant that data from student interviews began to focus on aspects of affordance, appropriation and their desire to use these mobile tools more often for learning, rather than just what was happening in the project classes. Second, because of the snapshot time period, quantitative measures of impact fell outside of the brief, although I was able to follow up with simple comparative assessment results collected by one teacher over a set of classes (two used the mobile devices and two didn't) for the full year. This was because the juniors (years 9-10; ages 13-14) had a one-term 'taster' option for the subject.

THE TEACHERS

Four teachers and the IT Director participated in the study. Brief profiles follow. The geography teacher was the prime initiator and co-director of the project with the IT Director. These two staff members were the ones involved in the initial experiment at the previous school. As the researcher, I spent more time with these two staff members than others, in order to probe their thinking, experiences, and how they handled the arising issues. This sometimes meant we had ad hoc 'brain dumping' interview sessions. This quickly became necessary because although the geography teacher was allocated time out of class to develop and manage this project, he was regularly called upon to help out with other teachers' queries about using mobile technologies. At the same time, he was still responsible for setting classwork while he was involved in this project, and sorting out discipline and pastoral care issues that arose. The IT Director was in a more difficult situation- he was unable to be replaced, so this project work practically occurred on top of managing the IT system, developing solutions to mLearning issues, providing information in assemblies to students about cyber safety and school protocols, and working with all staff to address IT issues as they arose. He also liaised with the telecommunications company to sort out mLearning bandwidth and capacity issues, as well as the Ministry of Education, and the Board of Trustees. At the same time, he supported teachers involved in the project in a number of ways. For example, he prepared the devices students brought to school to video food technology lessons, and created a model video for students, demonstrating what they might create for their assessment. His role straddled the school's leadership, IT infrastructure, external IT providers, and teachers' curriculum/learning needs. His focus was to navigate the IT provision

to best meet teaching and learning needs, while being mindful of effective protocols to ensure the school modelled ethical practices for students. His own secondary teaching background was a fundamentally important factor in how he undertook his role.

The Food Technology teacher regularly experimented with learning design, aiming for students to achieve the best they could from learning experiences in her classroom. She, like the English/ESOL teacher, had been teaching for over 10 years, and, like her, was comfortable adding untried interventions to her practices in order to test their value for learners. Both of these teachers were lifelong learners, had improved their qualifications or were still in the process of doing so. The Japanese teacher had, the year before, experimented with creating content files for loading onto mobile devices, for example, to help students learn about the weather in that language. During the mLearning trial, senior students created their own files about giving directions in Japanese using the same model and process the teacher had used for the weather. This format was the same as used in the geography class. Student control and use of the technology featured strongly in this project, and were part of the learning design. It was not one where teachers pushed content to students; instead, teachers made it easy for students to create and share the digital/mobile learning products themselves.

In terms of continuance theory, which, while arising from business contexts and assumes that those adopting and using technology will do so repeatedly if they see it works to help their job, aspects appear relevant for educational contexts. In such contexts, the added dimension is student learning. Both students and teachers are most likely to continue using digital technologies if they make learning more interesting and engaging, easier, and effective. The correlation between tool/technology and individual use in school contexts is thus filtered by its learning value, rather than simply ease of use for task completion. Another filter is appropriation and its link with identity, understood as agency, cultural practices and structures as learners and teachers use these tools in ways they define for themselves and for the learning purposes (Pachler, 2010; Pachler, Cook & Bachmair, 2010).

FINDINGS

A literature review centred on e-learning and implications for teachers (Wright, 2010b) identified the potential of digital technologies to alter both teachers' pedagogies and their professional relationships with students. Students in the mLearning project found that using digital technologies and creating and sharing their own products enhanced their learning experiences, and precipitated frequent out-of-class use. As one student said, 'it stamps the learning in my mind' because the learning files are always accessible: she always has her mobile device handy. Out-of-class use of work in exercise books, for example, was non-existent by comparison. Students said they seldom reviewed anything in their exercise books while on the bus, nor did they show their parents what was in them. In contrast, they were keen to show their schoolwork stored on their mobile devices, and often reviewed these files in idle moments.

In the English for speakers of other languages class, and where the teacher trialled proprietary software and hardware that allowed students to use text-enabled hand-held devices to post answers to tiles on-screen that could be revealed alongside peers' answers, students reported the following. Overall, they:

- Liked seeing their answers to compare with their peers'
- Found the devices fast to use (they were like texting from their cellphones)
- Remained engaged and concentrated in the learning for long periods of time
- Liked the way the teacher examined and talked about the revealed student answers, seeking more information in a non-judgemental, but respectful way.
- Liked the democracy of all answers being seen (unlike a hands-up scenario, when only one or two students' answers were heard)
- Wanted to use the tool regularly, but not all lesson or all the time.

To summarise the mood and illustrate the level of concentration, one student (usually unable to settle except for very short periods of time) called out during a spelling quiz using the proprietary tools that, 'this is so much fun it doesn't feel like learning'. This student was also fully engaged with the content throughout the lesson. The key difference in the lesson was the intervention: the use of the technological tools.

In other classes where students used their own mobile devices, they reported that they:

- Wanted to use the devices more regularly across subjects – for example, to video their teachers creating equations on the board, so they could refer to the clip later as a revision/recall tool; to use notes functions to record ideas; to link to the internet without having to go to a computer lab
- Constantly referred to files already on their device, and wherever they were - on the bus, at break times, at home
- Shared their work more often with parents (compared to not sharing work in exercise books)
- Shared content files among themselves to supplement and complement their own work. This sharing linked to positive self-esteem and co-operation
- Thought their learning was 'faster' and,
- Were keen to continue to develop digitally-oriented work outside class times.

The above list illustrates Pachler (2010) and Pachler et al's, (2010) socio-cultural framing where students exhibit agency and appropriation within the cultural milieu of school. They demonstrated being in charge of their learning through using

digital tools. Pachler et al's (2010) socio-cultural frame is a way of understanding what happens when digital technologies are inserted into educational contexts. It helps explain levels of co-operation and engagement. And when set beside continuance theory, demonstrates how the uptake of these technologies was likely to continue because the learners could see ways of using them regularly and across learning contexts: they could appropriate the technologies for their own learning purposes.

The teachers consistently noticed changes in students' concentration and willingness to continue learning outside timetabled lesson times, and noted a shift in how they, as teachers, worked with their students when they too were using technological tools as part of the learning. While all teachers in this project were experienced professionals and secure in their practices, they were acutely aware of the 'pain of failure' potential when using unknown and untried tools in their lessons. All took the view that experimenting with students to develop effective learning designs with new technological tools was not only healthy, but enhanced their teacher-student relationship. This can be attributed to not only seeking students' views about how these tools were helping their learning, but demonstrating that taking risks with learning new things was something that teachers did too. In essence, these experiments demonstrated the iceberg principle: that what is visible is only a small portion of the whole, for what has been prepared in advance links closely to the value of deliberate pedagogical design and collaboration. While Bhattacharjee (2001) argues that the technology acceptance model posits that "eventual success depend[s] on its continued use rather than first-time use" (p. 352), in educational contexts such as the mLearning ones described here, continued use rests with its perceived value for learning and ensuing enhanced pedagogical relationships.

In the observed classes, the IT Director was on hand to provide the necessary technical support for lessons to run smoothly. This was especially important when all parties were using an untried tool, or when students were bringing their own devices to use. Students were unconcerned about being part of this learning process; instead, they liked to help sort problems where they could. This collaboration in learning highlights staff-student relationships, and linked closely to co-constructive pedagogical frameworks that were nonetheless within contexts where the teachers had, and exercised, authority. Thus, the collaborative and collective inquiry did not undermine the teacher-student dynamic, but reinforced it because the boundaries about the rules of engagement remained clear. This dynamic is important – these teachers were deliberate in their choice of classes to work with, and deliberate in their pedagogical dealings with their students. The mobile devices and affordances were an opportunity to insert something else into the learning, involving students in understanding what went on. At the same time, these teachers exercised their pedagogical authority and helped students remain secure and safe as learners. When students know what the acceptable boundaries are, makes it easier for teachers to not only initiate and undertake experiments in learning, but also invite students to provide feedback on it.

CONCLUSIONS

An oft-asserted view is that 'old' teachers are stuck and resistant to change. While there are always going to be resisters and the soon-to-be-retired in teaching, this generalisation hides what this project revealed as a key driver of success in this experiment with various mobile technologies and affordances. All teachers in this project probably belong in the 'old' demographic (as in having taught for more than 10 years each, or defined as middle-aged or older), yet all exhibited the opposite of resistance-to-change behaviour. They were open to experimentation and were very aware that the lessons could fail, since they had little prior knowledge or experience of using these technologies in their lessons. However, because they were experienced and keen to continually improve learning experiences, they were prepared to accept that 'failure' was an entirely possible result. This is a crucial finding. It suggested that these teachers were most likely to undertake experiments with digital technologies because they had already accepted what risking the unknown might bring. In other words, since they are pedagogically secure they can accept the potential for failure, because they can retrieve a situation and move on. This links closely to their ability to design learning with the fear of failure in mind: they have the necessary pedagogical nous to do so. This secure professional practice may be important if a technology acceptance model is to be applied to educational contexts, and highlights how important pedagogical content knowledge is to effective experimental practices with learning. Thus the continuance of mLearning practices is most likely to be coupled with teachers' decisions about students' reactions to using these tools. These are contextual and pedagogical purpose factors, as well as identity ones: teachers' professional identity is often linked to their relationships with their students. So, in educational contexts, continuance theory can be closely linked to teachers' existing confidence and competence, *and* their judgement of the extent to which any digital technologies enhance their students' learning experiences. It is also linked to the socio-cultural ecology aspects of agency and appropriation within the culture of both the learning organisation, and students' learning practices.

Finally, this mLearning project demonstrated that teachers were trialling *with* students, not *on* students (a probable point of difference from a bank, which necessarily trialled *on* customers). This difference in application of the theory of continuance is significant. The expectation-confirmation and continuance relationship in education is thus less about customer satisfaction and more about the perceived educational value to both teachers and learners. Continuance theory has potential to help us understand some of teachers' motivations in experimenting with digital/mobile technologies. However, context (education compared with business) and motivation heavily influence what matters, and how the tools are used, and this contextual/motivation factor, allied to the notion of agency, implies Pachler et al's (2010) socio-cultural framework. This framework proposes that individuals or groups will appropriate a technology or affordance for their own

uses, and makes technological uptake more than about a system being used by customers or staff. Instead, it illustrates the importance of accounting for the influence of educational contexts, purposes and users' motivations where digital technologies are concerned.

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