CONTESTING IDEAS OF INNOVATIVE TEACHING PRACTICE WITH TABLET PCs

Dr Greg Neal and Kristy Davidson
School of Education
Victoria University, Melbourne, Australia
Greg.Neal@vu.edu.au
Kristy.Davidson@vu.edu.au

Pen-based computing is a relatively new technology in education, and its impact on teacher practice is an emerging area of research. The focus of this paper is centred on the ways in which teachers integrate Tablet PCs into their particular subject domain within secondary schools. The data provides evidence about the impact of Tablet PCs on teachers’ classroom practice and its subsequent influence on students’ thinking and learning processes. In a case-study involving two large secondary schools in Melbourne, Australia, a mixed methods approach was conducted to capture and describe the ways in which teachers integrated Tablet PCs into classroom practice. It was evident from the qualitative findings of the study that teachers working within different subject domains utilised the technology resources with varying degrees of success. In some cases, it was apparent that traditional styles of teaching and learning continued to impede the potential of the resource. This was also confirmed through the use of student voice which further informed the findings of the study. The conclusion to this paper reveals the relationship between the Tablet PC technology and individual teaching and learning circumstances. It also describes the major issues facing teacher practitioners who are required to integrate the use of pen-based computing into secondary school settings.

Introduction

The invention of new forms of information and communication technology (ICT) has led to increased expectations that such technology will significantly enhance teaching and learning across all domains, including K-12 schooling. The Tablet PC, a type of stylus or pen-based computer, is one such technology whose use has recently emerged in schools. There are several types of Tablet PC currently available for purchase in Australia. The first consists of a display screen in a slate format which allows for handwritten input via a pen. This type of Tablet PC does not have a keyboard integrated into the unit, but has the capacity for the attachment of peripherals. The second variety of Tablet PC is similar in appearance to a laptop, and can be used in either slate mode or laptop mode via a rotatable screen. The present study focuses on the use of this form of Tablet PC and its effect on pedagogical practice. This report adds to the limited knowledge about the use of Tablet PC technology in school settings with school-based classroom practitioners.

Available literature has mainly reported on Tablet PC usage in higher education courses, primarily computer science, mathematics, and multimedia/design classes and lectures. There has only been a limited amount of research reported on its use in primary and/or secondary schools (e.g. Mancabelli, 2007; Moore and Dicken, 2006; Petty and Gunawardena, 2007; Sommerich and Collura, 2007).

The most obvious advantage of Tablet PCs over traditional laptops is their ability to accept and digitise handwritten input, such as text, drawings, or other types of notation (Backon, J. 2006). Accordingly, university lecturers and instructors value the pen-based capability of the Tablet PC in preference to a notebook or ‘traditional’ computer as it allowed them to:
• Alter, modify, and annotate displayed material in real time (e.g. as projected on a screen)
• Collaborate with ease by drawing diagrams and writing notes, e.g. in small group brainstorming sessions, or notes between the instructor and the student
• Integrate activities into lectures in real time, using the pen to provide concrete examples
• Give instant handwritten feedback for work submitted electronically, and
• Add a personal touch to a digital document, e.g. assignment feedback.

(e.g. Anderson, et. al., 2006; Anderson, et. al., 2007; Backon, 2006; Koile and Singer, 2006; Loch and Donvan, 2006; Thede, 2006 etc.)

In addition, French (2007) observes that “the Tablet PC can significantly assist in grading with the ability to mark documents” (p. 86). It has the capability to allow a teacher to send to the student an electronic copy of feedback which contains handwritten insertions. Such insertions can highlight areas that the teacher would like the student to give further thought and editorial attention. In contrast, the traditional method of editing work by using ‘tracked changes’, a feature of Microsoft Word, allows the student to incorporate the teacher’s comments into the text without additional thought. Using the Tablet PC pen as an assessment tool adds another approach to a teacher’s repertoire that can be used to improve student learning.

Researchers have also found several other positive benefits to student learning that they attribute to the pedagogical use of Tablet PCs by instructors. Cicchino et al (2004) made note of the fact that sharing material digitally via a Tablet allows students to concentrate on the lecture instead of simply copying chunks of information. In a study of over 250 university students, Wolf (2007) found that when using the Classroom Presenter software in conjunction with pen-based technology to annotate lecture material in real time “…students perceive (with statistical significance) lectures (1) to be more exciting and (2) to be more adequately paced [than traditional technology using PowerPoint presentations]” (p 79). Wolf also found that students’ final grades were better when the pen-based technology was used in lectures in preference to ‘non-inked’ PowerPoint presentations. Weaver (2006) also found similar results for another cohort of university students. She found that the majority of students stated that they learn best when an instructor used the pen to annotate electronically displayed lecture material in real time and that they are more engaged with the material when this occurs.

Loch and Donovan (2006) sum up the advantages of the Tablet PC succinctly by stating that “[by using the pen]…diagrams, concept maps and solutions are developed spontaneously in real time thus promoting student directed learning and creating an interactive and dynamic learning process which fully engages students. As the material is developed spontaneously it ensures a flexible process, building on student’s abilities” (p 6).

The Tablet PC is also well regarded in domain specific education, namely mathematics and science in particular. As Backon (2006) states, “Since most teachers require students to show their work as well as the problem solution, the pen is again an ideal tool. It permits students to work through a solution, trying multiple approaches and making intermediate notes and calculations in a manner that is meaningful to them” (p 6).

Given the stated advantages of the Tablet it is pertinent to be conscious of and to attend to potential disadvantages when introducing such technologies into schools. To ensure that potential disadvantages are limited or at least lessened to assist the classroom practitioner, two prominent disadvantages as identified from the literature (e.g. see Loch and Donovan, 2006) must be noted; namely the necessity for adequate training to enable the use of pen-based tools across different applications, and downtime due to problems with the technology (e.g. with freezing or crashing). Loch and Donovan (2006) saw computer downtime as the most significant disadvantage for this sort of technology and warn that “the
seriousness of technical problems and reliability of the equipment are major factors impacting on the successful use of Tablet technology” (p. 5).

Overall, it is recognised that the value of Tablet PCs is attributable to its ‘naturalistic’ mode of use as a pen-based learning tool. As Backon (2006) states, “The pedagogy of pen and digital ink is closely tied to individual learning, providing an abstract palette for organizing thoughts, ideas, research, and problem solutions” (p. 9). Petty and Gunawardena (2007) further agree, stating “Pen input may be particularly useful for younger students because of the similarities it bears to the normal workflow enhanced by the benefits of a digital environment” (p. 89).

However, Bakon (2006) further qualifies his comments by acknowledging the differing capacities of pen-based and keyboard-based modes. He goes on to state that, “The pedagogy of the keyboard is to create large amounts of text quickly and accurately, and organize it hierarchically in a manner that may be read by a universal audience. Since both pedagogies are important, they complement each other in the PC computing world” (p. 9).

Moore and Dicken (2006) also agree on the dual necessity and importance of stylus and keyboard capabilities of Tablet PCs, with 85 percent of high school students in their study indicating that the combination of these elements made note-taking easier. Further to this, they also found that for the high school in which they taught, younger students gained more enjoyment from using the stylus and were more interested in the available inking software, whereas the survey responses of older students indicated that they preferred using the keyboard. While research suggests that there are recognisable strengths to both Tablet PC modes, Bakon (2006) concludes that “The pen approach suggests more flexibility in teaching and learning” (p. 9).

Given the wealth of research stating the benefits of the use of Tablet PCs, it may appear obvious that Tablet PCs can be extremely valuable in enhancing teaching practice. However, Loch and Donovan (2006) cautioned that successful teaching with Tablet PCs is still dependent on the skill and ability of the lecturer (or teacher). Teaching staff need to be able to respond dynamically to take advantage of the ability of the technology to provide real time responses and clarifications to student questions. Thus, best use of the technology requires changes to pedagogy in order to most effectively use the functionality that it offers.

**School Classroom Teaching Styles**

While the available research has many enthusiastic affirmations as to the worth of Tablet PCs, it is worth examining the pedagogical styles employed by users of Tablet PCs. In terms of teaching pedagogy, two contrasting styles appear to dominate in schools today: that of transmissive or didactic pedagogy, and that of constructivist pedagogy. In the didactic form, the teacher acts as a direct transmitter of knowledge with students positioned as receptacles for that knowledge. This style of teaching, which is often seen during lectures is critiqued for its lack of sensitivity to the differing needs of individual learners (National Research Council, 2000). This style is contrasted with that of constructivist pedagogy which promotes the teacher as taking on a more facilitatory teaching role. In this mode, the teacher employs techniques of inquiry-based teaching and student self-assessment to facilitate the learning process, which is more likely to be appropriately targeted to individual learners.

Both traditional and innovative methods of teaching and classroom learning environments can be effective for different students in different ways. One of the challenges facing lecturers or teachers is determining the appropriate balance of teaching methods in order to provide the most supportive context for each individual within a particular group of learners. For example, research into student learning notes that certain transmissive forms of teaching are beneficial for some learners (e.g. lecture modes because they ‘give’ new information and hone students’ skills), however the importance of downplaying the use of such transmissive modes was also stressed (National Research Council, 2000)
Technology advocates such as Saye and Brush (1999), claim that technology will encourage teachers to move their practice away from teacher-centred environments (traditional didactic or transmissive approaches) toward student inquiry and problem-solving. Brown (1994) points out, however, that even potentially powerful applications, such as various forms of ICT e.g. Tablet PCs, do not lead to spontaneous development of problem-solving or other thinking skills in students. A supportive teaching-learning environment is important, but the teacher’s role and style remains integral to the learner. In fact, advances in technology will not make current teaching methodologies redundant. Rather, ICT should be grasped and applied in imaginative and creative ways to enhance cognitive learning for students (Gilliver, Randall, & Pok, 1999). In other words, the learning process is enhanced by the teacher’s awareness of the range of different learning experiences which benefit students.

Society expects more of teachers than to simply function as information providers. The teacher’s role in an ICT environment is complex and multidimensional. It involves a number of aspects to ensure effective learning including: designing the learning environment, managing people and resources, mediating student learning, and improving practice (Hartnell-Young, 2003). Effective education has to be cognisant of the factors that mediate the effects of good teacher practice and whole-school effects (Lingard et al., 2000). Therefore, it is clear that the inclusion of ICT, such as Tablet PCs, in school curriculum must be matched by appropriate pedagogical practices in order to best use that technology to enhance the learning process.

Methodology
Research to improve teaching and learning should be derived from a paradigm that embraces change. Cochran-Smith and Lytle (2001) suggest an approach whereby teachers learn while generating local knowledge of practice, within the context of inquiry communities, which are connected to larger social, cultural and political issues. In this investigation a group of teachers and students from two large independent secondary schools, both of which are situated in metropolitan Melbourne, Australia, participated in a school-based initiative to introduce Tablet PCs into their teaching and learning practices. Participating teachers at either school were directly involved in teaching a Year 7 or 8 class who had some form of access to Tablet PC technology. One of the classes had access to a bank of 15 Tablets stored within the common teaching space (the dominant teaching area designated for most of the Year 7 classes at that school), while the second school established a class where all the students purchased their own Tablet PC. Teachers from both schools, who taught these cohorts, each owned a Tablet PC.

Previous research (Hattie, 2003; Wenglinsky, 2002; Rowe, 2002) affirms that it is the quality of what teachers know and do that matters most to students and their learning. Hattie (2003) concludes emphatically that “we should focus on the greatest source of variance that can make the difference – the teacher” (p. 12). The research involved working with the teacher practitioners to identify effective teaching strategies that incorporated Tablet PC technology that responded to the learning needs of the students. The intent of the research was to observe and record details of existing practices, as they emerged or unfolded, as a basis for understanding the use of the Tablets as a teaching/learning tool.

Results presented in this paper are from year-long classroom observations conducted within the two selected schools. In addition, staff and student interviews and surveys were also undertaken with the emphasis on capturing evidence with a particular focus on developing a case study picture, using both qualitative and quantitative data, to illustrate, explore and analyse how the Tablets PCs were being used in pedagogical practice.
Findings and discussion

The study found that the impact of the technology was at its peak when the type of teaching and the subject matter intersect to best effect. Most teachers in this study endeavoured to trial the use of their Tablet PC as a presentation tool linked with a data projector. According to the literature, the real strength of this style of teaching relates to the utilisation of the pen to alter and modify work in real time while collaborating with the students. This practice was evident amongst teachers from both schools and highly valued by both staff and students, as expressed by two teachers:

_I love the fact that I can write on the screen, mark things and underline things—that’s been tremendous._

_I had it up on the screen and I was adding annotations as we were talking, using Word. I had a couple of prior exams and we projected them up onto the screen and we highlighted the answers._

The interactivity, the sharing of relevant student work and the use of the pen in particular to highlight something in real time engaged students in their learning, identified by their willingness to persevere and complete set tasks. Loch & Donovan (2006) also found that developing materials spontaneously in real time was considered as a way to increase student performance. This finding was borne out in the current study. However, the use of this particular teaching approach was dependent on the ease of access to, and availability of, data projection machines.

While the practice of using a Tablet PC and data projector was commonly identified, student comments raised concerns relating to this teaching approach. For example, when teachers stood in front of the class and simply relayed information from the Tablet PC to the students via a data projector in a traditionally instructional manner, students found this style disengaging. One student commented:

_Our maths teacher is not very technical with laptops and gives us [the whole class] step by step instructions._

The students were much more receptive, as indicated by classroom observations, when teachers worked in an interactive manner with students. Instances where teachers used the Tablet PC and data projector as a reference point and played a supporting role in the classroom were far more engaging for the students. [Teacher’s name] explains it much better, encourages us to ask questions, roves around room. These aspects are characteristic of a ‘student-centred’ learning approach.

The value of the Tablet PC as a teaching tool was often reliant on the availability of, and/or access to a data projector. In the two schools in this investigation, one had wireless data projectors installed in the Year 7 classrooms, while the other school relied on portable data projectors. For many of these teachers the constant need to set up a portable data projector became an ongoing cause for concern. In fact, it prevented many of the teachers from even considering the use of the Tablet PC as a presentation tool because of the associated inconveniences:

_I didn’t use the Tablets as an interactive whiteboard mainly because of the restrictions to overhead projectors. Have to find and set up a data projector…if I am going to go in and use them and to get them working it’s time consuming._

For those teachers who needed to use portable data projectors, the Tablet PCs used in this investigation were not user-friendly due to the incompatible positioning of projector cords on the unit which then restricted the use of the Tablet PC as a presentation tool. For this reason, in addition to having to source and set up a data projector, many teachers became disenchanted and ceased using the Tablet as a presentation resource. On the other hand, those
staff who had access to a wireless data projector already installed in the classrooms observed that, the wireless projector is great – I can do my board writing on my Tablet and I can project kids’ work through the projector. The installed data projectors present material visually at a sharper resolution than the portable projectors and are obviously more readily accessible and therefore time efficient for the teacher to set up and willingly use.

The main difference between the Tablet PC and more traditional notebooks lie with the pen-based capabilities. At some point or other, all teachers experimented with the use of Tablet pens either as a teaching or learning tool. Many of the teachers described moments that demonstrated the value of the pen. For example, one teacher thought the pen is more convenient for annotating work and being able to do that when presenting work to the class. Three experiences are outlined below:

- The Tablet has been very useful for the kids. The work I’ve given them, they can write directly into it with their pens and it’s worked very well with the curriculum I deliver. I can see a lot of advantages with the pen particularly with writing notes. It’s a lot faster to correct.

- I have mainly used it to get students to take notes in Onenote and getting them to do their (maths) exercises in Journal. I provide information and students take notes and copy down examples. Onenote is good for that because you can divide the notes into subpages. The children are more motivated – they love using it. In the initial phase, they are completing about the same (maths exercises) but enjoy doing it. It’s not such a grind, and the tool [the pen] contributes to their learning. They love the colors, erasers, fixing errors.

- My kids are doing some great stuff with mind mapping in Journal. It’s quite innovative compared to non-tablet [users]. Given the opportunity to use different programs, some of them used Inspiration and some Journal with drawing pictures and it has given them a lot more freedom and structure.

The statements from the teachers provide good examples of some positive experiences that have emerged in their classroom practice since the Tablets became available. One further example highlights how the pen as a learning tool adds value and extends the students learning opportunities:

I do a lot of brainstorming [in class] and the children can scribble and write [with the Tablet pen] and it frees up their thinking, makes brainstorming freer. When they can just scribble it down you do get a better discussion. The other classes [non-Tablet classes] spend more time concentrating on jotting things down like typing them in so they’re not missing what’s going on.

While the listed examples of pen use clearly highlight the effectiveness of its inclusion into learning situations, it must be acknowledged that a ‘novelty effect’ for Tablet usage was found to exist for teachers and students alike. As the novelty of the pen started to wane, there was a noticeable trend for the students to use the Tablet in keyboard mode:

We don’t use them as Tablets because even with writing we tend to type it because it’s much more convenient and it’s clearer. I’m a neat writer but I still don’t use it for writing.

From the many classroom observations that were conducted during the year, it became more noticeable as time went by that teachers were using the pen less often to accentuate their teaching. The pen use that was observed to occur was most commonly seen in the Arts, Mathematics and LOTE strands. It would appear that the type of teacher rather than any particular subject domain was the main indicator of the inclusion of the pen as a resource. For example, one English teacher did not see the pen-based technology as a
valuable teaching resource as she could not directly see its potential for integration into her style of teaching.

In the Arts, classroom observations highlighted the value of the Tablet pen to support the teaching-learning process in these subject domains. In the first example, LOTE teachers encouraged students to use the pen to attempt to write Chinese characters which were then modified by the technology. The teacher valued this methodology as the *Journal* software converted the Chinese characters accurately for the students and became a self correcting tool for them. As one teacher commented, *[it] adds another dimension, [and] reinforces what you are doing.*

A second Arts example occurred in music classes where both schools incorporated composition software into their teaching programs. In one case, the teacher used the data projector to demonstrate how to make a musical arrangement, then led and guided the students-users to encourage them to create their own musical arrangements.

Students participating in the Arts classes saw the Tablet pen as being of value, and used it as their preferred learning mode. The students explained the pen as being more user-friendly to:

- move things around the screen e.g. musical notation,
- annotate notes, e.g. on art pictures,
- incorporate their own personal styles e.g. bubble writing,
- modify and alter images e.g. Internet pictures,
- convert handwriting to text, e.g. Chinese characters
- draw pictures to add to documents.

Backon (2006) also highly regards the use of the Tablet pen as an ideal tool for students to demonstrate calculations in maths and science-based subjects. It was also evident in the current investigation that the Tablet pen was consistently used by students in one of the maths classes. However, the students indicated that the teacher’s use of the Tablet PC and pen did not support effective learning. The teacher was observed to consistently use the Tablet and a data projector to present the set learning tasks in a defined sequence to the collective group. While the pen allowed and encouraged the students to work out solutions, the restrictive teaching sequence did not support nor encourage individual learners to progress at their own pace. Nor did the series of maths related problems allow the students to engage in ‘authentic learning’. It should be noted however, that the teacher was endeavouring to integrate the technology in his pedagogy but was inhibited by his lack of Tablet PC expertise; a fact of which the students were very aware. The teacher used the pen minimally, but during the occasions in which he did use it he attempted to make real time learning happen.

While the pen is regarded as the most obvious advantage of Tablet PCs, keyboard computing is still perceived by users as important (Backon, 2006; Mancabelli 2007). The current investigation confirms similar findings to Moore and Dicken (2006) who found that a large proportion of high school students preferred the use of the keyboard in preference to pen-based computing. In the classroom observations and discussions from this study, this was also evident. Students from both schools were permitted by teachers to choose either the pen or the keyboard to complete their work. More often than not, the students used the keyboard to complete set tasks as this was viewed by them as being more time efficient and more user-friendly in comparison to the pen.

With regard to the teachers participating in the study, they too generally found the keyboard more time efficient. Only a couple of individual teachers used the pen regularly as a teaching tool. The most notable examples occurred in Chinese (LOTE) classes where the pen played a key approach in teaching Chinese characters.

There was little evidence to suggest that teachers used the Tablet PC to provide electronic communication to the students, or that they regularly used the pen as a correction tool. The
Tablet PC was only occasionally mentioned for this purpose and when it was used in this way it was predominantly done so by teachers who worked with senior school students. Those teachers saw the value of Tablet PCs in enhancing their assessment methodology, but conversely these same teachers saw the lack of available time as the major reason they did not use this approach with their middle-years students.

A similar minimal number of teachers trialled the use of the pen as an administrative tool. While it is beyond the scope of this investigation to discuss this aspect of pen use, it is worth suggesting that regular use of the technology assists in the skilling up users. Overall, it was apparent that teachers used the keyboard as their preferred option because of its familiarity and ease of use.

The biggest obstacles to successful teaching with the Tablet PCs were identified as its ease-of-use and its reliability. A main concern raised in the early stages of Tablet use concerned the Tablet’s ability to successfully convert handwriting into text. Based on this knowledge, staff and students tended to choose the pen or keyboard as deemed-appropriate to completing a given task at the time, and/or the intended audience.

However, the biggest concern about the use Tablet PCs raised by the teachers and students was its unreliability. It is a concern which others have also considered to be a significant disadvantage to the successful use of Tablet technology (Loch & Donovan, 2006). Many staff and students in the current investigation found the constant freezing and/or ‘lagging’ of the Tablet a major disruption and frustration. For many users, the problems with their Tablet PCs continued to exist throughout the year and were unable to be adequately resolved by their school-based technical support team.

School support is critical whenever new initiatives are introduced into schools. Technical support, a supportive infrastructure and effective professional development are integral to the success of ICT initiatives. Both schools in this study endeavoured to support the teachers through the implementation stages of the new technology. External professional development worked well for most of the teachers in this project as it enabled many of them to learn something new and trial it in their classroom. However, the most effective implementation strategy occurred when individual teachers received internal collegial support. For example, when mentors within the school worked together, individual teachers shared knowledge and collaborated to assist in building the development and confidence of those less proficient. An excellent example occurred when one school arranged to have some of the teachers share their successful pedagogical strategies that were based on direct classroom experience of working with Tablet technology. Overall, professional engagement that considered facilitatory teaching roles, scaffolded learning experiences, and the promotion of thinking strategies were particularly well regarded by teachers who endeavoured to integrate Tablet PC technology into their practice to support the development of individual learners.

Conclusion

The Tablet PCs discussed in this study were used in the curriculum of two very different school environments. In one case the students have access to their own Tablet PC, while in the second case the students only have access to a bank of Tablet PCs. In both situations teachers have their own Tablet PC and are provided with school professional development support. These two different scenarios create their own teaching and learning culture that establishes and perpetuates the pedagogical practices around the use of technology within the school. That is, the emphasis remains with the teacher and the way they incorporate Tablet PC technology into their pedagogy for effective learning.

The teachers identified in this Tablet PCs project have endeavoured to incorporate the Tablets into their pedagogy. The research data confirms much of what is already known in the literature concerning the modes of Tablet PC usage as a teaching resource, and as a pen-
based learning tool for their students, and highlights the importance of the teacher’s role in a technology-rich classroom environment. It demonstrates that teachers generally value technology as a teaching resource and that they consider it as having a positive effect on their teaching. Despite the reservations of some individuals, teachers see the value of technology as a learning tool and talk openly about the possibilities for innovations in their pedagogy once they become more proficient in Tablet PC use.

A supportive classroom context is integral to promoting and harnessing learning, hence the use of ICT in classrooms as a teaching tool must be justified as making a significant contribution to encourage learning. Real time teaching when teachers and students collaborate together with (or without) the pen is potentially powerful and can be used across different subject domains. When teachers instruct with the pen the student participants found the richness of the content more engaging. The encouragement of pen use for drawing was particularly engaging for some learners, e.g. visual learners. Despite these findings, pen use diminished over time both as a teaching and learning tool. While the practicalities of the keyboard are seen as more user-friendly for many, pen use potentially facilitates the evolution of innovation and creative thinking, e.g. LOTE and Music classes.

In some subject domains where the instructional teaching approach remains the dominant teaching style, opportunities for innovative and creative thinking were limited. This teaching approach is often used because teachers in a student-centred environment need more time to plan and prepare. In addition, classroom management is made all the more difficult when all students each have a computer, therefore in the hectic process of teaching, it is easy to understand how some teachers may feel disempowered and simply resort to convenient teaching approaches in which student behaviour is more manageable.

The need for an effective and ongoing professional development program remains critical to the development of a ‘Tablet’ culture. When teachers learn in a collegial manner, as was evident in this investigation, shared electronic artefacts, such as lesson plans, and samples of student work, encouraged an enhanced pedagogical approach to Tablet usage. Schools need to have a systematic approach to planning for the inclusion of such new technological resources in pedagogy, both in terms of long range strategic planning and day-to-day project management, to ensure successful teaching and therefore learning.

Certainly the evidence from all the data suggests that as a resource, some individual teachers are incorporating the Tablet PC into their pedagogy in an innovative manner. There remains some variance in the use of pen-based technologies to support new teaching and learning. The individual teacher remains central to the successful integration of new technologies in curriculum.
References


