TPACK IPAD PROJECT IN SCHOOLS (TIPS): PHASE 1

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Abstract

This is a paper about ‘what has been going on’ in Phase 1 of TIPS. It commences with a brief overview of TIPS and presents the rationale for its genesis. Then it moves to an account of research activity during the first phase: starting with a brief description of how data were gathered to establish teachers’ needs for professional learning and support to introduce mobile touch tablet technologies, such as iPads, in their teaching; then detailing the intervention, using a blended learning model, plus the monitoring of teachers’ learning progress; finally, there is news about the project blog and online professional learning resources, which were developed to support the teachers when using touch technologies and are taking on a life of their own.

Introduction

TIPS is a professional learning model to improve the skills of teachers in schools and support teachers to integrate new technology – iPads in particular – into their teaching. The project was funded by an Edith Cowan University (ECU) Teaching and Learning grant, and was designed to be implemented in schools over the course of one school year. For this project, 20 iPads were purchased by the researcher, two schools purchased their own iPads and one set of 20 iPads were loaned by a commercial partner for the research project. In this paper I report on phase 1 of TIPS.

TIPS is important because it is addressing a vital need for Australian teachers, as will be described in detail in the next section. Significant policy and curriculum developments are demanding that teachers become information and communication technology (ICT) savvy, and new applications and devices are making ICT more suitable for educational applications. New standards and frameworks for monitoring teacher performance also require that teachers demonstrate level of competence at integrating technology in their teaching (AITSL, 2011).

Rationale for TIPS

There has been much discussion over the past decade about 21st century competencies for students – the set of skills needed for young people to cope in a ‘knowledge society’. In recent times this discussion has culminated in various sets of standards for students and teachers (e.g. UNESCO’s ‘ICT Competency Standards for Teachers’, 2008). In this section I concentrate on three Australian developments crucial to the origin of TIPS.

The Teaching Teachers for the Future project

To implement technology-rich curriculum, teachers need to acquire different skills (UNESCO, 2008,p1). To support this edict, the Australian Government Department of Education, Employment and Workplace Relations (DEEWR) through the Information Communication Technology Innovation Fund provided funding to bolster pre-service teacher education. Hence The Teaching Teachers for the Future Project (TTF), which was led by the Australian Learning and Teaching Council (ALTC) in 2011 and 2012. One of the TTF Project aims was for all pre-service teachers in Australia to become proficient users of ICT. Thirty-nine Australian Universities participated in the TTF project and it impacted on 55,000 student teachers. The project was aimed at pre-service teachers achieving competence in using ICT to improve student learning, and ICT pedagogy officers (ICTPOs), were appointed in all 39 institutions to support teacher educators to teach ICT education. I was fortunate to be selected as an ICTPO at ECU in 2011.
National standards for Australian teachers

An important sub-task of the TTF (outlined above) was to contribute to the development of new National Teacher Standards, which had been entrusted to the Australian Institute for Teaching and School Leadership (AITSL) – resulting in seven standards, which will guide the professional performance of teachers at all levels of the profession (AITSL, 2011). There is an increased emphasis on the use of ICT in these standards; and, as part of the TTF project, the ICTE skills for graduate level teachers were developed.

The Australian National Curriculum

In 2011, Australia introduced the first National Curriculum for all schools. This Curriculum has been developed by the Australian Curriculum Assessment and Reporting Authority (ACARA, 2011) over several years and it is now being implemented in stages across all states.

The Australian National curriculum brings new expectations for both curriculum delivery and content, including a significant increase in the role of ICTE, which is embedded in each curriculum area and is one of the general capabilities (see below). This, of course, challenges the methods of teaching and learning used in many Australian classrooms and has implications for preparing and re-educating teachers to deliver this technology-enriched curriculum (Christensen & Horn, 2008; DEEWR, 2008; Lane, 2009; Lloyd, 2008; MCEETYA, 2008).

In the Australian National Curriculum there are seven general capabilities: literacy, numeracy, information and communication technology (ICT), critical and creative thinking, personal and social competence, ethical behavior and intercultural understanding (ACARA, 2011; ACCE,2011). In the curriculum documentation frequent reference is made the use of ICT in the classroom, such as the following:

Rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology, and young people need to be highly skilled in ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade (ACARA, 2011).

The Australian Curriculum documentation also states that students need to develop a wide range of ICT skills, including higher order thinking and creative uses of ICT to investigate, create, communicate, manage and operate ICT while applying social and ethical standards. Thus students need to have the skills to become creators, not merely consumers, of digital products (ACCE,2011; AITSL,2012; DEEWR,2011; Larkin & Finger, 2011; OECD,2009).

New developments in technology

Technology is evolving rapidly (BECTA,2004). The technology supporting the development of touch tablet technologies has become cheaper and more widely used in the past five years. A new mobile touch tablet device, the iPad, was released to the Australian market two years ago. This device is rapidly gaining popularity in educational contexts. As this market develops cheaper and more efficient devices will be released to the market, as seen with the release of the Rasberry Pi small computing device the size of a credit card that can perform most of the functions of a small computer yet costs only $25. The research conducted in the TIPS project will be applicable to the introduction of any new technology, device or platform that requires teachers to learn new skills and transform the way they teacher.

The TPACK Framework

The project introduces the TPACK Framework to teachers as a means of assisting them to design learning activities that effectively integrate ICTE. The TPACK Framework, was developed by Koehler and Mishra (2008) to conceptualise the skills needed by teachers in 21st century classrooms. TPACK
represents the integration of three bodies of understanding: Technological Knowledge (TK) an understanding of how to use technology for learning; Pedagogical Knowledge (PK) the knowledge and skills of which instructional strategies to use in the classroom; and Content Knowledge (CK) the knowledge of the content and curriculum area (Vaughan, 2010). Previously these were treated as three separate entities, yet this research is indicating they need to be integrated for successful classroom implementation (Koehler & Mishra, 2008). The TPACK Framework was used in the TTF project and is now used in most teacher education courses in Australia and has been used internationally in Education (Archambault & Crippen, 2009). Shortcomings of the TPACK framework is that the descriptors are broad and vague which can led to misinterpretation, for example TPACK is referred to by some as a new conceptual domain, where other see it as an intersection of existing areas of understanding (Voogt, Fisser, Pareja Roblin, Van Tondeur & van Braakt, 2012). The TPACK Framework has been used in the professional learning with the teachers this links to the work of the TTF Project with the pre-service teachers.

**Challenge-based learning and the Integrated Challenge Planner**

One of the aims of the professional learning in the TIPS Project was to get teachers to make significant shifts in their pedagogy. We did not want teachers to continue to do the same tasks with a technology application layered over the task. We wanted the complete redesign and reconceptualization of a task using the TPACK Framework. Thus a specific pedagogy “Challenge Based Learning” (CBL) was selected for this project. CBL is a teaching strategy based on the problem-based learning (PBL) and an inquiry- based learning approach (Johnson; Smith; Smythe & Varon, 2009). CBL was influenced by the work of Dewey (1939), who postulated that the education should not focus on the acquisition of content knowledge and skills, but should lead to the development of individual potential and the improvement of society. CBL allowed the teachers to demonstrate the use of the TPACK model, integrating the technology, the pedagogy and the content in the planning of a learning activity. In CBL students to engage in authentic investigations about a topic framed as a challenge. It is a student-centred approach, the students research, investigate, collaborate, critically evaluate resources and solve problems posed as challenges (Johnson, et.al,2009). In CBL students use multi-media tools to express their learning, observations and findings. CBL is traditionally used at a secondary school level. Hence, the Integrated Challenge Planner (ICP) was designed for the TIPS Project as a resource to make CBL appropriate to students from K- 12 (Lane,2012). The ICP planner facilitated the implementation of CBL, in a limited time period of two to four weeks.

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<tr>
<th>focus question/ provocation/ big idea</th>
<th>the challenge</th>
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<tr>
<td>guiding resources</td>
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<td>action/ resolution</td>
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<td>publishing/ performing /creating/engaging</td>
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*Figure 1. The Integrated Challenge*
Planner (ICP)

The hardware
In the TIPS Project iPads were used to support the use of ICTE. iPads were chosen because they are multi-modal ‘convergence’ tools that bring together the possibilities for researching, producing, communicating, teaching and learning. iPads and the Applications (the software used on iPads) are a new technology for many schools. These mobile tablet devices connect to the Internet using wireless technology. There are a number of different types of touch tablets on the market. The iPad is an Apple product and works on the IOS operating system. Many other touch tablets work on the Android operating system. The iPad has many applications that are designed for classroom use. Using multiple iPads in an enterprise level system is complex. The introduction of “Applications” (Apps) and different methods of file management and document transfer protocols have led to many requests from teachers and school leaders for professional development and support materials for the use and integration of this new technology in teaching and learning. These requests led to the TIPS blog and website for online learning resources, an account of which will be given in a subsequent paper.

The research component of TIPS

The research question and method
In what ways does a challenge-based approach to learning, using iPad computers, the TPACK framework and digital video analysis, improve teacher capacity to use ICTE in schools?

The project employs a quasi action research design gathering data from participants using surveys, interviews and video-recorded observations. The data were analysed and interpreted on a case-by-case basis, providing for triangulation and comparison (Freebody, 2003). The goal overall has been for the evaluation component to be responsive, with results feeding in to further improvement via the blog and other social networking.

The sample
The core research was conducted in three primary schools and one secondary school. XX Secondary College is a specialist science and technology school that is part of the XX cluster consisting of five independent Government primary and secondary schools. X Primary School is a Catholic Education School K-6, all teachers in the school participated in the research. Two government primary schools were selected, one was an independent government school XXX Primary School and one was a traditionally funded and managed government school, XXXX Primary School. Seventeen teachers participated in the project from K-10. The schools provided a distributed sample from different socio-economic groups. Teachers and students were asked to volunteer to participate in the project. All participants provided sign consent to participate in the research. Parental permission was obtained for all underage participants. The project blog was used build a learning network, which connected the teachers in the project with pre-service teacher and other educators around the world. Members of the online learning community participated in the research by completing the online survey.

The blended learning model
A blended learning model incorporating social networking, online resources and face-to-face sessions was selected for the professional learning this research because it was a cost effective and sustainable way to deliver the professional learning (PL).

The iPad touch tablets introduced many new skills that teachers needed to master. The teachers working in the project requested ongoing
support during and after school hours. This created a problem for the researcher who had limited time and resources to provide this support to all participants over four school settings. Teachers have very busy workloads and there is a limited amount of time during the school day to attend professional development sessions.

This led to the use of social networking, namely a blog and twitter to support the project. A blog is an online space where you can place resources and comments called “postings”. Blogs can have privacy and security settings. In the TIPS Project the researcher wanted to develop a learning community, blog was left open for all to access. The social networking tools provided a link between the project teachers, the pre-service teachers and other educators.

Each school had a four two-hour group professional learning sessions. The teachers communicated with the researcher using online tools, emails, twitter, SMS and blog postings, as they needed support in the development of their lessons. The teachers requested mentoring sessions where the researcher reviewed their lesson plans and made suggestions for implementation. A number of teachers requested additional “shoulder to shoulder” co-teaching sessions where the research worked alongside teachers in the classroom as they introduced the new devices.

Data Collection Tools

Digital video analysis

Video-capture of teaching and learning combined with computer-based analysis was used to throughout the project investigate in the ways a challenge-based approach to learning, using iPad computers, the TPACK framework and digital video analysis, improve teacher capacity to use ICTE in schools? In the video analysis relationships between teacher behaviour, student engagement in learning and learning outcomes were explored and tagged. Artichoke software was used to split the video into 60 second clips, which were coded (Lane & Fetherston,2008). Text units describing the teaching were linked to the codes. Cluster analysis was used to group the codes and text units (Lane & Fetherston,2008). The software used a hierarchical, dissimilarity matrix, a squared Euclidean distance approach to assessing similarity (Romhberg, 2004). This matrix assisted in the generation of qualitative themes in the data.

As a teacher takes action to improve their teaching, they will collect and consider evidence against the agreed objectives, deliverables and performance measures. Judgements about the effectiveness of teaching, whether they arise from self-reflection, are used as a basis for improvement or result from formal assessment of performance, have greatest validity when based on multiple sources of evidence (AITSL,2012).

The online survey

In phase 1 of the research an initial scoping survey was conducted with the online learning community of teachers and pre-service teachers using the TIPS Project professional learning resources. The survey included 22 questions and used Likert-type scales to gauge teachers’ and students’ perceptions about their current ICT skills and competence levels, the need for professional development on the integration of ICT in classroom teaching (teachers) and experiences of the integration of ICT in classroom teaching (students). The survey gathered data on how to improve teacher capacity to use ICTE in schools.

The survey was developed as a smart online form that could be accessed on computers and mobile devices, tablets, iPads, Android devices and mobile phones. The online form collated the responses and displayed the data in a variety of tables and graphs. The information was exported as a CSV file to SPSS for further analysis (Freebody, 2003).

The findings from the survey

The survey was conducted online through the TIPS Professional learning blog. There were 237 responses in a two-month period. Two pre-intervention and post intervention surveys will be
conducted, one with teachers and one with the students.

There have were 237 responses to the online survey over a period of 2 months. The respondents to the survey on the blog were 26% male and 74% female, 64% were primary and early childhood teachers, with 31% coming from the secondary sector, other respondents were a mix of school leadership, IT integrators and other educators. There was validation for the value of the blog as a professional learning resource 79% found the blog a useful resource, 28% have already applied the information found on the blog and 60% are planning to use information from the blog in their teaching, 10% have no plans to use the information.

In response to the statement “At school I was given a range of strategies to help me use technology (ICT) to learn more effectively” 64% of respondents disagreed with this statement with only 9% in agreement. This indicates that the majority these teachers have not acquired strategies to use technology for learning during their own school experiences. The respondents to the TIPS survey supported for the need for professional learning for teachers around integrating TPACK and iPad technology in teaching, 86% of the respondents agreed with the statement “I would like to learn more about using iPad technology in education”. While 84% of the respondents agreed they wanted to be able to integrate iPad technology in their classes, while 86% wanted strategies based on research to help them and 84% needed more information to help them use this technology in their teaching.

Not all teachers reported positive experiences with ICTE see Teacher response No 6 below

Unfortunately there is a long way to go before iPad technology will be part of classrooms in my school. For starters, they are not supported by our region, secondly, there are no standards for wi-fi for primary schools and the cost is prohibitive. Lack of leadership and understanding are also issues in my school. Also, the management issues such as synching, iTunes etc need to be addressed. Lack of professional development and interest is also a huge issue in my school. (Teacher Response No6 - TIPS online survey)

Yet others showed enthusiastic and transformative use of technology, with the students teaching the teachers.

My goal is to teach how to integrate technology into classrooms. I am finding that not all teachers are ready to integrate technology until they are thoroughly trained and see practical applications. I’m finding that if I teach my students using Web 2.0 tools, they will carry their knowledge into other classes. In some cases, teachers asked students what tool they are using and the students teach the teachers creating less of a divide.

(Teacher Response No 9 - TIPS online survey)

This comment on the survey was indicative of the responses on many teachers who feel overwhelmed and left behind by the advances in technology

Technology changes all the time, at uni I felt contemporary. I stayed at home with the kids for 9 years - come back and everything has changed and it can be daunting, I hate not knowing how to do things! (Teacher Response No 112 - TIPS online survey).

The further phases of the TIPS Project

In further phases of TIPS reflection and simulated recall techniques will be used in post-teaching sessions with the teachers where they will view the videos and reflect on the processes they were using in the classroom, their levels of confidence, their skill development in using technology in their teaching and areas for future growth and development. The data from these sessions will be used to plan future teaching and for the design of professional learning materials.

Conclusion and areas for future research

The integration of Information and Communication Technology in Education (ICTE) is a significant problem in Australia and internationally. A particular challenge for Australia is the introduction of a new Australian National Curriculum that will require the integration of
ICTE into every curriculum area within the next two years and the AITSL National Teacher Standards. In order to deliver the new Australian Curriculum, all teachers will need to have the skills and understanding to use a range of digital technologies and applications in their classrooms. Many of the teachers currently teaching in schools graduated before ICTE was integrated into all curriculum areas and therefore do not have the skills to implement the new national curriculum requirements. They do not have sufficient ICTE skills to mentor our pre-service teachers in this area. Hence, there is an urgent need for research-informed professional learning programs in ICTE for teachers in WA, across Australia and internationally. This project will make a significant contribution to our understanding of how to effectively equip current and pre-service teachers with the requisite skills to effectively integrate ICTE in school classrooms. The professional learning developed for this research project, which uses a blended learning model will provide an effective training model for teachers to help them achieve the ICTE components of the National Standards.

A practical outcome of the TIPS Project will be the development of a research-informed professional learning model for teachers with a series of video exemplars illustrating the TPACK model in WA classrooms. In addition, guidelines for teachers on implementing a transformative way of teaching, integrated challenge-based learning and resources for teachers and school leadership on how to establish a learning program in a school using iPad devices will be produced.
References


Reading, UK: ICEL.


