

Engaging with the transforming possibilities of ICT: a discussion paper

ABSTRACT

This article contributes to conceptualising pedagogy that has been transformed by information and communications technologies (ICT). The push for pedagogical change is evident in Australian education policy documentation as well as literature about the characteristics of our existing student population and future educational trends. This article is situated within a current state education reformation process in Queensland Australia, which is requiring all teachers to engage with the transforming possibilities of ICT. The Department of Education, Training and the Arts (DETA) Smart Classroom Professional Development Framework (2007b) requires teachers to move from 'integrating' ICT in learning to making ICT 'integral' to learning. An examination of this ICT professional development framework and the implications this has for pedagogy and models of ICT professional development are presented.



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INTRODUCTION

The demand for the transformation of pedagogy has precipitated a worldwide concern for teacher professional development in ICT. The International Society of Technology in Education (ISTE, 2000-2002) devised performance indicators for teachers based on a national consensus in the USA on what teachers should know and be able to do with technology. The National Educational Technology Standards project (NETS) was designed to guide educational leaders in recognising and addressing the essential conditions for effective use of technology. Train the Trainer workshops (ISTE, 2006) are currently supporting the implementation of these standards. One of the major initiatives under the UK government's *ICT in Schools* project, was to provide training for teachers to enable them to use ICT effectively in their work (OFSTED, 2002). Major findings of this project indicate that the training failed to build on teachers' ICT skills or enabled them to tackle pedagogical issues adequately. More recently, the push to 'embed' ICT in British schools has seen, at best, some teachers providing a balance between discrete uses of ICT and the use of ICT across subjects. In no British schools, ICT could be said to be "embedded to the extent that it was an everyday aspect of pupils' learning" (OFSTED, 2005, p.1).

In Australia, as elsewhere, rhetoric about the use of ICT in schools has circulated since the 1970's. For example, a 1974 Australian document entitled *Computers and Teaching in Australia* included a recommendation for "The training of both teachers and support personnel" (Australian Advisory Committee on Research and Development in Education, 1974, p.85). Since then both Commonwealth and State educational bodies have been repeating similar messages. For example in 1984 the Commonwealth Schools Commission recommended that professional development activities should enable teachers "in a broad range of curriculum areas to develop skills and understandings in the use of computers ... and their appli-

cations across the curriculum" (p.5). In 1986 the Department of Education, Queensland recommended "professional development to ensure that all teachers are computer literate and develop competencies in the instructional use of computers" (p.1), in 1995 they again noted that "teachers will require ongoing professional development to assess the potential of computer hardware and software when planning, implementing and evaluating classroom programs" and in 1997 under their corporate identity as Education Queensland, they specified ICT skills that teachers must obtain in the areas of curriculum applications, school planning and student-centered learning.

More recently, documents such as *Learning for the Knowledge Society* (Australian National Training Authority, 2000), *Quality matters, Revitalising Teaching* (Ramsey, 2000) and *Real Time: Computers, Change and Schooling* (Meredyth, Russell, Blackwood, Thomas, & Wise, 1999) prioritise the need for ICT professional development that impact pedagogy, while others such as *Raising the Standards* (Department of Education Science and Training, 2002) propose an ICT competency framework that can be used for ICT professional development purposes. The latest national ICT policy the '*Pedagogy Strategy*' (MCEETYA, 2005) for both Australia and New Zealand provides a set of strategic principles for pedagogy that embraces the opportunities for learning in an online world. The strategy links pedagogy with ICT as an innovative approach by stating:

Pedagogies that integrate information and communication technologies can engage students in ways

not previously possible, enhance achievement, create new learning possibilities and extend interaction with local and global communities (p.2).

The *Pedagogy Strategy* directs teachers to conceptualize the use of ICT in learning through their own pedagogical frameworks rather than through attainment of ICT competency and skill. This movement from skill based analysis to pedagogical framing is evident in DETA's Smart Classroom Professional Development Framework (2007b) as it states clearly that:

The framework promotes using effective pedagogies with ICT to transform the design and delivery of curriculum and to improve learning outcomes for students. This represents a significant shift away from ICT skills for teachers and students.

The Smart Classroom Professional Development Framework (2007a, p.1) promotes pedagogical development through "effective pedagogies" that "transform" teaching and learning. What are considered effective pedagogies are not clearly defined, however there are outlined expectations for the types of ways students need to be engaged using ICT. This article firstly attempts to define effective pedagogies associated with ICT so that all teachers have a clear indication of what is required in the reformation of their practice. The move from a 're-tooling' orientation to ICT professional development is then discussed followed by clear guidelines for what models of professional development enable teachers to engage with the 'transforming' possibilities of ICT.

ICT pedagogies

The Smart Classroom Professional Development Framework presents three levels of engagement with ICT pedagogies. These levels make a clear distinction in the progressive adoption of ICT by teachers and have been termed by DETA (2005, p.2) as "the evolution of ICT and learning". These levels are reminiscent of Dwyer's, Ringstaff's and Sandholtz's (1991) 'Model of instructional change' that they established in the early 90's. A comparison between this model and the three levels of the Framework is provided in Figure 1.

The model of instructional change on the left of Figure 1 represents five stages in the evolution of teachers' integration of ICT in their classroom practice, from Entry to Invention. The alignment of the three levels in the Smart Classroom Professional Development Framework indicates correlation between stages and levels. The Adoption stage correlates well with the ICT Certificate, acknowledging an Entry stage that teachers have attained and have moved to an 'adoption' of ICT. At the Adoption stage teachers are developing and working with some core

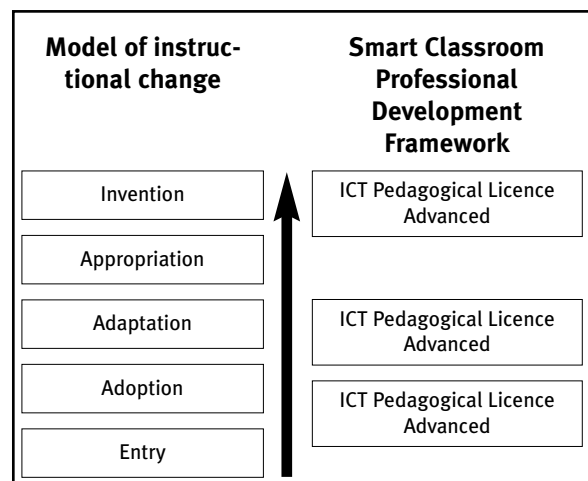


Figure 1 Comparison of model and levels of Framework

skills and knowledge about teaching and learning with ICT. The third stage, Adaptation identifies teachers who are adapting their existing curriculum practices to integrate ICT. This is acknowledged in the Framework at the level of an ICT Pedagogical Licence.

The ICT Pedagogical Licence reflects modes of integration that augment the existing curriculum. For example, a guideline in the Licence that represents professional practice states that as a teacher:

'I plan learning experiences within units of work that use ICT to achieve curriculum goals and are based on student development needs, interests, prior knowledge and experiences.'

Lankshear and Bigum (1998, p.12) have described pedagogical approaches that assimilate ICT as traditional teaching that has been "technologised". They state that little has changed in teaching and learning since the 1970s and 1980s where the traditional 'project' dominated and is now being digitalised. In classrooms this may look like the history or geography project with topics such as 'The overland Australian explorers' or 'Countries of the world' where information is copied from the internet and made into a powerpoint presentation. The learning process where facts are written under given topics remains the same, the use of technology provides a change in the publishing medium. This approach to integrating ICT has been labeled as "adding-on" (Prestridge, 2005, p.10) where ICT are assimilated into existing pedagogy. Spender (1995) believes that this traditional process is based on educational theory that is founded on a 'body of knowledge' principle in which teachers master information for the purpose of passing it on to their students. She believes that this teaching/learning model is out of 'sync' with the real world, irrelevant for students and fast becoming unworkable. Fabry and Higgs (1997) have claimed more directly that teachers characterised by this pedagogical approach have to radically change their teaching to use ICT effectively.

Downes et al. (2001) in their report on models of ICT professional development, that was funded by Commonwealth Department of Education, Science and Training (DEST), developed a framework that identified goals for the integration of ICT into classroom practice. This framework is summarized in Table 1.

Goal A- ICT skills	Acquisition of ICT skills as an end in themselves. Skills needed for employment. Skills continuum. Could be considered a subject.
Goal B- ICT as a tool for learning	To enhance student's ability with existing curriculum. A pedagogical tool- a tool that can improve learning or change how learning occurs, but leaves curriculum unchanged. Different modes of integration varying in complexity.
Goal C- New content/new pedagogy	An integral component of curricular reform. Change in structure of learning and materials, classroom techniques and fundamental beliefs about the learning process. An example is making strong links with important community issues and mapping backwards to underlying theory. Transformative aspects of ICT as change in content and pedagogy.

Table 1 Goals of integrating ICT into the classroom (adapted from Downes et al., 2001, pp.23-28)

What is significant here is the alignment with the Smart Classroom Professional Development Framework and Dwyer's model (Figure 1). At the Licence level where integration of ICT into existing classroom practices is required, teachers are adapting their pedagogies to enable ICT as a tool for learning. Bigum (2002, p.133) describes this as "domesticating" the computer, where ICT are made to conform to requirements of the classroom rather than transform teachers' practice.

A transformative approach, described as goal C New context/new pedagogy (Downes et al. 2001), aligns with Dwyer's (1991) Appropriation and Invention stages (see Figure 1), requires a change in traditional pedagogical practices to "thoughtful, responsive and futures oriented teaching" (O'Rourke, 2001, p.13). A teacher engaging with ICT at the ICT Pedagogical Licence 'Advanced' level transforms his or her pedagogical practices to redesign the learning-teaching nexus. Rhetoric about ICT and pedagogy presents snapshots that indicate fluency and invisible blends of learning with technology. Gibson (2001, p.57) proposes a "pedagogy of learning" as the most favourable style for the effective use of ICT. Pedagogy is focused on the learner and learning outcomes. A teacher would draw on both learning theories associated with knowledge instruction (objectivist) and knowledge construction (constructivist) to choose the best strategy to accomplish a

learning outcome. Gibson states that the most effective learning environment is "that in which the teacher, the facilitator, the guide, the instructor is capable of selecting the most appropriate strategy" and that ICT must be "transparent to the learner and allow for ubiquitous learning opportunities" (p.56). At the Advanced level, ICT are fused with learning as engagers and facilitators of thinking and construction, where the student is viewed as an active creator and user of information rather than a passive consumer of knowledge (Davis et al., 1997; Jonassen, Carr, & Yueh, 1998). Meaningful learning is the outcome of ICT engaging students in "knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; reflection, not prescription" (Jonassen, Howland, Moore, & Marra, 2003, p.15). Teaching is directed towards the process of learning rather than its products (Scrimshaw, 1997). Pedagogy that is transformed considers ICT as an integral part of the learning dynamic supporting collaborative investigation of real life happenings within multidisciplinary global contexts.

Transformed pedagogy could be considered as a new paradigm for pedagogy infused with ICT. What is important to teachers striving for effective pedagogical practices with ICT is enabling the transition from the stage of Adaptation to the stage of Appropriation. This is represented in Figure 1 by the upward arrow and gap between the Licence and Advanced Licence levels. Dwyer et al. state that progression "hing[es] on each teacher's personal mastery - or appropriation - of the technology" (p.48). Movement by a teacher into an Appropriation stage is significant, as they have greater inclination to reflect on their teaching, challenge old practices and seek reasons for changes to working relationships in the classrooms. It is acknowledged as the stage of experimentation where teachers' pedagogical beliefs and practices are 're' formed. It is not until a teacher has examined their own practice and embeds a reflective action process for pedagogical renewal that engagement with the transforming possibilities of ICT can occur.

What is important for ICT professional development is the circumstances required to enable teachers to move from an Adaptation stage to an Appropriation stage where they are enabled to transform their practices, as indicated in Dwyer's et al. research. This implication is explored in the next section on ICT professional development.

Re-tooling to transforming ICT professional development

One of the perennial barriers to the integration of ICT into teaching and learning is considered to be that of teacher professional development (AAUW, 2000; Schofield, 1995; Sherwood, 1993; Zammit, 1992). The literature provides numerous examples of what are claimed as successful models of ICT professional development (see for example, Bottino, Forcheri, & Molino, 1998; Holzberg, 1997; Taylor, 1997; Williams & Dundas, 1996). However, most of this professional development is driven by what Watson et al. (1999) described as 're-tooling' intentions. That is, they intend to augment the existing curriculum by providing specific skills and competencies focused on specific types of ICT applications. Skill audits such as that discussed above (Meredith et al., 1999) and a similar UK study reported by Denning & Selinger (1999) are predicated on this re-tooling intention. Most

of the current Australian teacher professional development documents with respect to ICT have this 're-tooling' intention. For example, Education Queensland's (1997) *Schooling 2001* mentioned previously, is directed towards improving teachers' ICT competency levels. NSW's *Technology in Learning and Teaching*, Tasmania's *Learning Technologies Plan*, ACT's *Plan for IT in Learning and Teaching* and South Australia's *Plan for IT 1996-2001* all identify teacher professional development in their goals with a commitment to integrating ICT into the existing curriculum. This, in itself, is valuable in an introductory sense and as a confidence building exercise for teachers, and in fact Queensland teachers have applauded the specificity and clear guidelines for ICT professional development detailed in *Schooling 2001*, but it does little for transformation of pedagogy.

Currently, in Australia there are many school based initiatives that provide teachers with the opportunity to partake in ICT professional development. School based approaches manage the scope, form and extent of ICT professional development to meet the needs of local teachers. Many of these initiatives are funding dependent as government schools must provide documentation of teacher professional programs as well as future plans for ICT infrastructure (DETA, 2007c) to be eligible for subsidy. Such focused ICT professional development coupled with an increase in accessibility to better hardware and software that has occurred in schools in general over the past ten years, has still not yielded substantial evidence of transformation of pedagogy (Downes et al., 2001).

Presently, schools are engaging teachers at the Adoption and Adaptation stage of ICT integration through ICT professional development programs. If we have any hope of a transformative outcome as required by the transforming intention of the Smart Classroom Professional Development Framework and for connection with digital clients (Prensky, 2004), ICT professional development intentions need to move from re-tooling with infrequent curriculum integration to a model that will enable teachers to see the 'transforming' possibilities of ICT. The final section of this article provides clear guidelines for transformative ICT professional development.

Transformative model of ICT professional development

ICT professional development is perceived as an avenue for pedagogical change based on the notion that the implementation of ICT will signify subtle shifts in expectations of schooling in the 21st Century and that alternate modes of using ICT in classrooms can be modeled in deliberate approaches within professional development programs (Russell, 1999).

O'Rourke (2001, p.13) supports this premise, but signifies that it is more effective to "focus on issues of pedagogy than on the technology itself" while Loveless (2003, p.324) emphasises teachers' "confidence in change...rather than evidence of competence" in continuing teacher ICT professional development for greater transforming outcomes. Simplistically, for ICT to be used effectively in contemporary classrooms to its greatest potential, ICT professional development must focus on transformation of pedagogical practices. The Smart Classroom Professional Development Framework orientates professional development activity to do just that. Consequently, schools need to adopt a model of ICT professional development that fundamentally changes a teacher's pedagogical beliefs and practices to acknowledge and understand a digital culture, challenge pedagogy grounded in print culture and provide opportunities to explore alternative approaches to working with students that will lead to the integral use of ICT in learning.

Emerging out of my PhD research was a model of ICT professional development that empowered teachers to engage with multiliterate (future oriented literate practices that identify ICT as a premise) classroom practices. In my research I worked with eight schools (known as the Suncoast Cyberschools) over a two year period designing, implementing and evaluating ICT professional development. Figure 2 presents a transformative ICT professional development model that evolved from this research.

Figuratively in Figure 2, teachers enter this model from the left hand side and move as the arrows indicate in a circular motion. They enter with existing pedagogical beliefs and practices. These existing pedagogical beliefs and practices are shaped through engagement within the core reflective process to produce a state where their beliefs and practices are continually evolving. An evolving state implies that professional development is considered by a teacher as continual and an intrinsic part of their professionalism. It also implies that different pathways and flexibility are required within professional development for teachers to direct their own professional journey. As a teacher's pedagogical beliefs and practices are reformed they re-engage in the core reflective process.

In Figure 2, actual professional development processes are indicated in the formation of and relationship between the central three sections. These include the core reflective process indicated by the central configuration of investigation, reflection and constructive dialogue; the internal school context and the external school context. As the teacher moves from left to right, he or she engages simultaneously with the three professional learning activities of investigation, reflection and constructive dialogue. These three professional learning activities must be viewed as dynamically interdependent. Each professional learning activity is required in ICT professional development to initiate teacher engagement that pre-empts reflection to enable further informed strategic action. The innermost shaded intersection of these three activities is considered

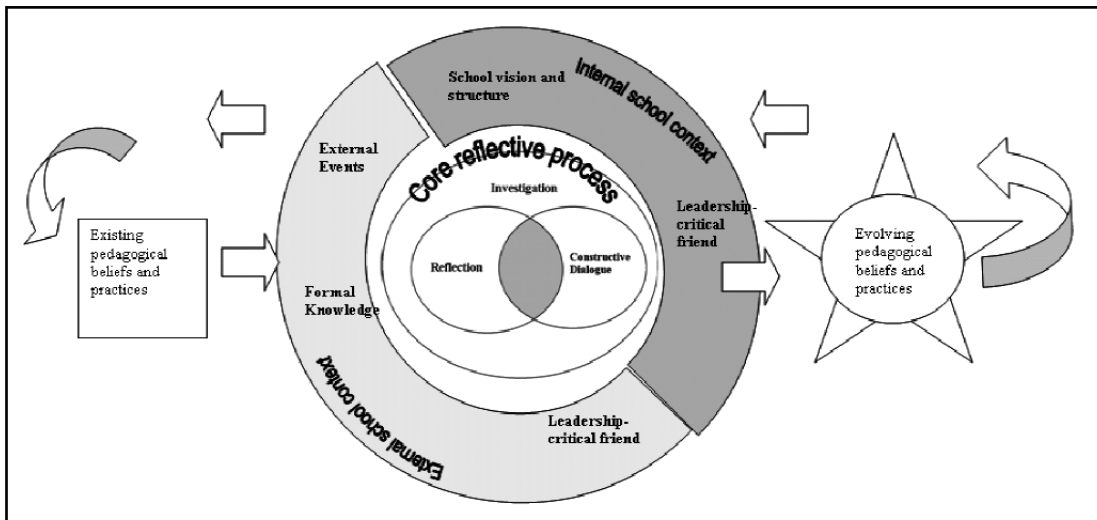


Figure 2: Transformative ICT professional development model

the space where teachers are able to transform their beliefs and practices.

Teachers' transformation occurs within ICT professional development when teachers' verbal reflection, supported by written reflection is actioned with critical discourse that is based in collegial formations. Teacher action is best embedded within an investigative context such as a classroom based inquiry. Teachers engaged in this dynamic interplay of the three professional learning activities make links with elements in the internal and external school contexts when they are required, such that internal and external leaders are drawn on to direct or challenge their pedagogical beliefs; formal knowledge and external events are used to inform their pedagogical practices; and school vision and structures provide opportunities to collaborate with other teachers within and across schools.

Conclusion

My research into ICT professional development has informed me of the kinds of activities that teachers are required to engage in if they want to change their teaching practices. I firmly believe that teachers need to begin ICT professional development by becoming aware of and acknowledging the pedagogical beliefs that are informing their existing classroom practices. They need to contextualize ICT professional development by making their classroom a site for pedagogical investigation. Teachers need to make the walls of their classrooms transparent, inviting opportunities to engage with other teachers about what is occurring in their classroom, forming relationships that give rise to both collegial and critical discussion around pedagogy. Teachers also need to support these discussions with personal reflection so that changes in their beliefs are informed, strategic and a response to actions. It is important also to ensure that teachers are able to follow their own pathways in ICT professional development, and to gain a better understanding of their digital students, and to do so, teachers need to live and learn within technologically supported environments.

ICT professional development is about enabling teachers to engage with a transformed pedagogy infused with ICT. It is

about developing teachers who are sufficiently critical of themselves to acknowledge and utilise the differences they have with their students; and developing the capacity for continual transformation and being responsive to the changes brought by new technologies; and lastly, it is about providing the pathways for self renewal of one's own beliefs and practices.

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BIOGRAPHY

SARAH PRESTRIDGE recently completed her PhD. She examined models of ICT professional development that enable transformative outcomes. Sarah has always been interested in ICT. As a primary school teacher she tinkered with early simulations and communications technology. She ran an ICT Lighthouse project that examined ICT and mathematics, studied her Masters in ICT education and worked as an ICT Curriculum Adviser. Her passion for leading others along the pathway of technology integration has been fuelled by the excitement both teachers and students generate while engaging in ICT. Sarah currently lectures in ICT education at Griffith University.

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