

# Learning technologies – Making IT happen in schools

## INTRODUCTION

I feel privileged to have been able to contribute to a number of teacher professional associations since the early 1980s at both the local and national levels. My involvement with Australian Council for Computers in Education (ACCE) was for a period in excess of 18 years as the Computer Education Group of the ACT (CEGACT) representative on the Board, as president for six years and then ACCE representative to and chair of the Technology Education Federation of Australia (TEFA) for the period 1992-99. This has enabled me to be involved in a range of projects over a number of years including; *Gateways: Information Technology in the Learning Process* (Commonwealth of Australia 1996), *Making Better Connections – Models of teacher professional development for the integration information and communication technology into classroom practice* (Commonwealth of Australia 2001), *Raising the Standards: an ICT Competencies Framework for Teacher* (Commonwealth of Australia 2001), and the *Learning Technologies Plan for ACT Government Schools and Preschools 2004-2006* (Australian Capital Territory 2004a).

These projects and a range of other professional association related experiences have enabled me to gain some insights into the complex issues around the embedding of ICT into teaching and learning in schools. The following outlines my thoughts (and some from the research literature) about what needs to happen, particularly at the school level, for the full benefits of learning technologies to be realised.

## Levels of Effective Use

Much has been written and even more has been expended in pursuit of exploiting the full potential of ICTs in teaching and learning. The research literature provides lots of pointers about what the potential might look like and how it might be achieved. There is substantial writing about the concept of schools/teachers going through a number of levels of development in the embedding of ICT into teaching and learning. Whilst there may not be consensus on the number and naming of levels there is considerable agreement as to where schools/education systems should be heading. This ultimate level is probably best described as the transforming level. This level is when ICT is not only integral to the teaching and learning process, but it is also a catalyst for the transformation of pedagogy, what and how students learn and the organisation and structure of schooling itself.

For one interpretation of what the stages might look like for a school/school system I would refer the reader to the ACT Learning Technologies Plan 2004-2006 (Australian Capital Territory 2004a). The ACT Plan identifies four levels of effective use as follows:

**Emerging:** Emerging schools are in the first stages of development of ICT support for teaching and learning. At this level, a school's hardware and software resources are limited and their use is typically confined to basic applications. A teacher-centred approach to teaching and learning is predominant. School organisation provides discrete time periods for each subject, and learner use of ICT is confined to laboratory access in limited areas of the curriculum.

**Adopting:** Adopting schools have an understanding of the potential of ICT to support learning, and ICT is used to streamline or enhance existing tasks. The learning environment is still largely teacher dominated. School organisation provides discrete time periods with some flexibility to integrate the curriculum and vary time periods. Learner access is predominantly through laboratories, with some computers in classrooms.

**Infusing:** Infusing schools have a range of computer-based technologies readily accessible by students and teachers. Teachers use ICT to support student-centred learning environments and explore new ways in which ICT can change their personal productivity and professional practice. At this level, a school's use of ICT supports an integrated approach to the curriculum that reflects real-world applications. School organisation provides flexibility to integrate curriculum and time periods. Learners take more control of and responsibility for their learning and students can access a range of ICT tools that enable them to undertake projects that stimulate their learning across a range of curriculum areas.

**Transforming:** Transforming schools use ICT to creatively rethink and renew school organisation. ICT is an integral and routine part of personal productivity and professional practice. The focus of the curriculum is integrated and strongly learner-centred. Learner access to ICT is available to meet their needs across the school and from home. The school has become a centre of learning for the community. (pp 5-6)



**IAN WEBB**  
ACCE Fellow (2001)  
(BA, Dip Ed,  
Grad Dip Ed Stud)o

## BIOGRAPHY

*Ian has been involved in the use of ICT in education for over 25 years. He has spent that time mostly as a teacher of IT in the Australian Capital Territory (ACT) government school system with interludes as a consultant and project manager. He is a founding member of Computer Education Group of the ACT (CEGACT), was president of the Australian Council for Computers in Education (ACCE) for 6 years and voted the inaugural ACCE fellow in 2001. He was also the ACCE rep-representative and chair of Technology Education Federation of Australia (TEFA) for 5 years.*

Within the ACT Plan the four levels are described in detail relative to each outcome. The articulation of the levels for each outcome serves two purposes. Firstly, to assist schools to gauge where they are currently at in terms of goals and outcomes and secondly, to provide pointers to where they should be going – ie towards the transforming level.

### **Essential Conditions**

Whilst schools and school systems have been pursuing the transforming level for some time there has only been limited success in systemic and/or whole school change. This is not to deny the excellent work done by 'lighthouse' teachers who implement innovative and effective applications of ICT. The challenge is to go beyond individuals to whole school and systemic change. To reach the transforming level requires schools/school systems to resolve a complex array of interrelated issues. These issues are widely addressed in the literature. The International Society for Technology in Education (ISTE) articulates them as a set of essential conditions, all of which must be addressed simultaneously, as follows:

#### **Shared Vision**

*School system, preschools, schools, school boards and educational leaders provide proactive leadership in developing a shared vision for learning technologies among school personnel, parents, and the community.*

#### **Equitable Access**

*Students, teachers, staff, and administrators have equitable access to current ICT, software and telecommunications resources.*

#### **Skilled Personnel**

*School leaders, teachers and support personnel are skilled in the use of ICT appropriate to their job responsibilities.*

#### **Professional Learning**

*School leaders, teachers and support personnel have consistent access to ICT-related professional learning. This professional learning supports educational leaders and teachers in making appropriate pedagogical choices to use ICT to enhance learning.*

#### **Infrastructure**

*Teachers and students have access to a robust, secure infrastructure appropriately deployed to meet the learning needs of all students.*

#### **Technical Assistance**

*Personnel have access to technical assistance in maintaining and using ICT.*

#### **Curriculum Frameworks and Curriculum Resources**

*Teachers and school leaders are knowledgeable about curriculum frameworks, related curriculum resources,*

*pedagogy, and the use of ICT to support and enhance learning.*

### **Student-Centred Teaching**

*Teaching in all settings includes the use of ICT to facilitate student-centred approaches to learning.*

### **Evaluation and Accountability**

*Schools have systems for the continual evaluation of effective ICT use for improving student learning.*

### **Community Support**

*Schools maintain partnerships and communications with parents, businesses, and the community to support ICT use within the school.*

### **Support Policies**

*Schools have policies, financial plans, and incentive structures to support the use of ICT in learning and in the operations of the school.*

(Australian Capital Territory 2004a:4)

To address these Essential Conditions requires a mix of strategies including reviewing contemporary research, investigating what has worked (and what has not worked), building networks of people to capitalise on the synergies possible through collaboration, determining the characteristics of the school, its students, teachers and community, creating a shared vision, and incorporating a regular dialogue of teaching and learning and action research approaches into the culture of the school (Australian Capital Territory 2004a).

### **Barriers and Enablers to Teachers' Use of ICT**

Other parts of the literature develop the concept of essential conditions further and identify barriers and enablers that affect the embedding of ICT into the teaching and learning process. In 2003 the British Educational Communications and Technology Agency (Becta) commissioned two literature reviews to identify the factors which hinder or promote the effective use of ICT by teachers; *A review of the research literature on barriers to the uptake of ICT by teachers* (Becta 2004a) and *Enabling teachers to make successful use of ICT* (Becta 2004b).

### **Barriers**

The Becta Review of the research literature on barriers to the uptake of ICT by teachers brings together evidence from a range of sources on the actual and perceived barriers to the uptake of ICT by teachers. It draws on the literature associated with teachers' use of ICT, and also on a survey of teachers conducted by Becta.

Key findings of this report include:

- confidence, time and access to quality resources are major factors in determining teachers' engagement with ICT.
- recurring technical faults, and the expectation of faults occurring during teaching sessions, are likely to reduce teacher confidence and cause teachers to avoid using the technology in future lessons.
- resistance to change is a factor which prevents the full integration of ICT in the classroom. In particular, teachers who do not realise the advantages of using technology in their teaching are less likely to make use of ICT.
- there are close relationships between many of the identified barriers to ICT use; any factors influencing one barrier are likely also to influence several other barriers. For example teacher confidence is directly affected by levels of personal access to ICT, levels of technical support and the quality of training available.

(Becta 2004a:3-4)

## Enablers

The Becta literature identifies the factors which are most effective in enabling and encouraging the uptake of ICT by teachers. Key enablers identified include:

- effective leadership and planning
- sharing of resources
- reliable technical support
- schools working with each other and with the local community
- differentiated training and continuous professional development for teachers
- participation in national ICT initiatives and projects.

(Becta 2004b:5-6)

Jamie McKenzie, in his article *Making the Best of New Tools – Generation 2*, provides lots of practical idea and hints about how best to encourage and support effective use of ICT in schools including: how can we win broader use including guidelines for reaching the reluctant?, how can we win more frequent use through investment in professional development?, how can we identify & learn from best practice?, how can we focus, consolidate and optimise – supporting quality and effective pedagogy?, how can we know what is happening – gathering data on the impact of ICT in your school?, how can we support and encourage building a culture of encouragement?, how can we manage limited resources – providing just in time technology?, how can we shed and prune – focussing on quality, not quantity?, how can we shelter/protect teachers from too much change too fast? (McKenzie 2003a)

Not surprisingly there are recurring themes in relation to essential conditions, barriers and enablers. These include; the need for effective leadership and vision, both at the school and system levels, the need for planning, the provision of time to teachers and professional learning support, a focus on high

quality pedagogy and improving student learning outcomes, the need for robust and reliable infrastructure and, the provision for anywhere, anytime access to the technology for teachers and students.

The literature (and successful practice) provides strong evidence that all of these facets must be addressed simultaneously. It is my view that Australian education is littered with well meaning costly government funded ICT projects which led to no significant improvement in student learning outcomes because they too often focussed only on one facet – usually the hardware.

## Lessons Learnt from Successful Practice

While it is useful to be mindful of what the research literature has to say, it is equally important (and perhaps more relevant and practical) to consider actual current successful practice. Too often we tend to want to reinvent the wheel rather than learn from previous experience and practice. There are schools that have significantly addressed these Essential Conditions and exemplify the transforming stage. One such school is Essendon North Primary School in Victoria. The following is an adaptation of some of the lessons learnt on their journey to embed ICT into teaching and learning across the whole school:

### Teaching and Learning

Start with an emphasis on good teaching and learning strategies. De-emphasise the technology. Learning technologies shouldn't be seen as an add-on but as something that teachers believe will enhance learning. Learning technologies can be a catalyst for changes to teaching and learning in classrooms.

### Professional Learning

The professional learning of teachers is a priority. Teachers are supported by providing time for teachers to reflect, to visit other schools and distance themselves from their classrooms. Teachers are encouraged to start small, set achievable fortnightly goals, share successes and the not so successful aspects. Teachers work in pairs/teams to help each other develop an effective learning model. Risk takers are supported.

### Infrastructure

New hardware, software and peripherals are introduced in the context of ways they can be used in the classroom. People are shown how to use them, given sandpit time to use them and then share how they used them in their classrooms. The technology infrastructure is robust and deployed to enable student anywhere, anytime access.

### Evaluation and Celebration

What is learnt is documented and the mission and goals of the school charter, relate to all school policies and practice. The exciting things happening at the school are shared with parents and parents are assured that basic skills are being taught. (ENPS 2005)

## Focus on Pedagogy

It is pleasing to see that amongst many decision makers and in the literature there is an increasing realisation that effective pedagogy is a significant factor in the successful embedding of ICT into teaching and learning on a whole school basis, as is vision and leadership. As can be seen from the following extracts, there is a general consensus about the pedagogical models and learning environments which best support the effective embedding of ICT into teaching and learning.

McKenzie makes a powerful case in his article *Pedagogy Does Matter* –

*It is because we failed to fund professional development and pretty much ignored pedagogy that many schools have suffered from the screensaver's disease and found little return on their technology investments... for much of the past two decades we have mistakenly focused our energies on the learning of new software and the functions of new tools with too little attention to pedagogy - how to use those new tools effectively to maximize student learning while orchestrating all of the other aspects of daily classroom practice.*

(McKenzie 2003b)

Becta also puts a strong emphasis on the importance of effective pedagogy. The report *ICT and Pedagogy* – a review of the research literature states that ...the evidence from the research literature shows that teachers' pedagogies and pedagogical reasoning influence their uses of ICT and thereby pupils' attainment (Becta 2005:3). It goes on further to identify a range of practices which should be part of teachers' pedagogical frameworks if they are to integrate ICT effectively into teaching, learning and the curriculum. These include the need for teachers to: understand the relationship between a range of ICT resources and the concepts, processes and skills in their subject area; use their subject expertise to select appropriate ICT resources which will help them meet the specific learning objectives; be aware of the potential of ICT resources both in terms of their contribution to pupils' presentation skills, and their role in challenging pupils' thinking and extending their learning; develop confidence in using a range of ICT resources; appreciate that some uses of ICT will change the ways in which knowledge is represented, and the way the subject is presented to and engages pupils; know how to prepare and plan lessons where ICT is used in ways which will challenge pupils' understanding and promote greater thinking and reflection; recognize

which kinds of class organisation will be most effective for particular learning tasks with ICT (Becta 2005).

These conclusions are supported elsewhere in the literature. For example, ISTE (International Society for Technology in Education) identifies the characteristics of learning environments that best support the effective use of ICT as characterised by multisensory, multipath progression, multimedia, collaborative work, information exchange, active/exploratory/inquiry-based learning, critical thinking and informed decision-making, proactive/planned action, authentic, real-world context. (ISTE 2004)

The ACT Learning Technologies Planning and Implementation Guide also provides information on appropriate learning environments and pedagogies that support the effective use of ICT in the classroom. The Guide suggests that particular pedagogical practices lend themselves to effective ICT use to promote improved student learning outcomes. Some suggested pedagogical models include Productive Pedagogies, the Multiliteracies Model – a Design for Learning, the Inquiry Based Learning Model and the Information Literacy model (Australian Capital Territory 2004a)

All these models support learning environments which are characterised by an emphasis on student-centred teaching and learning strategies; information exchange between teacher and learner; teacher as learner, active, exploratory, inquiry-based learning; project based tasks; collaborative work; creativity, critical thinking and informed decision making; involvement in authentic and real-life tasks; transfer of skills and knowledge; multi-sensory stimulation; multipath progression and proactive, planned action.

## Planning

All of the above, in terms of whole school learning technology adoption, will amount to nothing unless there is support through effective leadership, vision and good planning. For some ideas on leadership the reader may want to consider the Becta report on *Strategic Leadership and Management of ICT in Schools* (Becta 2003). In planning for effective embedding of ICT into teaching and learning there is a 3 step process that schools should undertake:

1. Work out where your school is at now. This has several dimensions including infrastructure, teacher pedagogical understandings, teacher ICT skills and current ICT uses. To gather data about infrastructure, current ICT use and teacher skill levels and professional learning needs a survey at the school level can be undertaken. In addition, the ACT Learning Technologies (LT) Plan provides detailed levels of effective use by which schools can assess their current situation against the goals and outcomes (Australian Capital Territory 2004a).
2. Work out where you want to be in 3 to 4 years – this relates to developing a shared vision and realistic goals. A school LT plan should have goals relating to

students, teachers, school leaders, infrastructure, access to resources and partnerships with the community.

3. The third part of the planning process is to work out how to achieve the shared vision and goals – i.e. the plan. School LT Plans should be devised as a result of auditing current practice in ICT and identifying priorities for development. Plans should have clear, agreed aims and objectives that describe the school's vision for ICT. The plan should have a timescale, be costed, show responsibilities and be evaluated. Targets should be specific, measurable, achievable, realistic and timed.  
(Becta 2003)

There is a plethora of resources on the Internet that detail the planning process for the effective use of ICT in schools. Two such resources are *Planning Good Change with Literacy and Technology* (McKenzie 1999) and the *ACT Learning Technologies*

*Planning and Implementation Guide* (Australian Capital Territory 2004b). Links to a range of further planning resources are contained in this Guide.

## CONCLUSION

Putting all of the above into a nutshell, for a school to effectively embed ICT into teaching and learning on a whole school basis they need to develop a learning technologies plan which engenders the support of the whole school community. The Plan must address all the essential conditions simultaneously, promote the enablers and minimise the barriers. Effective leadership and vision are vital and always ensure the focus remains on the improvement of student learning outcomes through quality pedagogy supported by the effective deployment and use of a range of appropriate tools and technologies.

## REFERENCES

- Australian Capital Territory (2004a) *Learning Technologies Plan for ACT Government Schools and Preschools 2004-2006* viewed at <http://activated.decs.act.gov.au/admin/techplan/index.htm> on 13.05.05
- Australian Capital Territory (2004b) *Draft learning technologies planning and implementation guide* viewed at <http://activated.decs.act.gov.au/admin/techplan/contents.htm> on 13.05.05
- Becta (2004a) *A review of the research literature on barriers to the uptake of ICT by teachers* viewed at [http://www.becta.org.uk/page\\_documents/research/barriers.pdf](http://www.becta.org.uk/page_documents/research/barriers.pdf) on 13.05.05
- Becta (2004b) *Enabling teachers to make successful use of ICT* viewed at [http://www.becta.org.uk/page\\_documents/research/enablers.pdf](http://www.becta.org.uk/page_documents/research/enablers.pdf) on 13.05.05
- Becta (2003) *What the research says about strategic leadership and management of ICT in schools* viewed at [http://www.becta.org.uk/page\\_documents/research/wtrs\\_stratleaders.pdf](http://www.becta.org.uk/page_documents/research/wtrs_stratleaders.pdf) on 13.05.05
- Commonwealth of Australia (1996) *Gateways: Information Technology in the Learning Process* viewed at <http://production.edna.edu.au/sibling/learnit/> on 13.05.05
- Commonwealth of Australia (2001) [Commonwealth Department of Education, Science and Training] *Making Better Connections – Models of teacher professional development for the integration information and communication technology into classroom practice* viewed at <http://www.dest.gov.au/NR/rdonlyres/3A88BB29-9798-49A1-90DB-0E46590E96BF/1593/MBC.pdf> on 13.05.05
- Commonwealth of Australia (2002) [Commonwealth Department of Education, Science and Training] *Raising the Standards: an ICT Competencies Framework for Teachers* viewed at <http://www.dest.gov.au/NR/rdonlyres/B35D8670-5447-4DFC-8388-1C81F3329113/1574/RaisingtheStandards.pdf> on 13.05.05
- ENPS (2005) *Essendon North Primary School* viewed at <http://www.enps.vic.edu.au/index.html> on 13.05.05
- ISTE (2004) *Essential conditions to make it happen* viewed at [http://cnets.iste.org/students/s\\_esscond.html](http://cnets.iste.org/students/s_esscond.html) on 13.05.05
- McKenzie (1999) *Planning good change with technology and literacy* FNO Press, Bellingham, WA, 2001.
- McKenzie, J (2003) *Making the Best of New Tools – Generation 2* viewed at <http://www.fno.org/oct03/gen2.html> on 13.05.05
- McKenzie, J (2003b) *Pedagogy does matter* viewed at <http://www.fno.org/sept03/pedagogy.html> on 13.05.05