

WINNING STRATEGIES: TECHNOLOGY + TEACHERS = TRANSFORMATION

Steve Herbert MP
Parliamentary Secretary for Education
Victorian Government
Australia

Abstract

This paper discusses the experiences of Australia's most densely populated state, Victoria, in developing a holistic approach to the implementation of ICTs across the State's Government schools. It considers the national context in which these reforms are being undertaken and the progress made. It shares lessons learned in developing three interrelated areas of ICT provision in the Victorian education system, namely: professional capability; curriculum reform and resources; and infrastructure, access and school design. By implementing such a holistic approach the pedagogy of teaching is rapidly changing in Victorian schools enabling a more targeted and individual approach to learning.

Introduction

Information and communication technologies (ICTs) are revolutionising the world of work and home and are contributing significantly to a transformation in education. This paper addresses the potential and the reality about the use of ICTs to enhance teaching and learning in the Victorian Government school system.

ICT presents both extraordinary opportunities and challenges for education. Digital technologies have the potential to change the way in which schools are organised, teachers teach, students learn and parents relate to their children's schooling.

In Victoria, exciting ICT innovations are occurring across a wide spectrum. Significant progress is being made in effectively using ICTs to support a curriculum that provides students with the knowledge and behaviours needed to prosper in a world that is being transformed by technology. Over the past ten years in particular, Victoria has invested heavily in digital infrastructure, content and leadership to enhance teaching and develop students' digital skills and overall learning potential.

Through this investment, Victoria's aspirations for ICTs in education have been well established. The most effective technologies for the Victorian education system are those that can contribute to successful learning outcomes for students by:

- catering for diverse learning styles and student needs
- helping teachers to make use of the available data and resources to design the best possible programs for individual learners
- animating the instructional process and the learning environment
- bridging the distance for students in remote locations
- re-engaging learners of all ages at all stages of their working life
- improving assessment and evaluation
- building partnerships with parents and the wider community, and
- improving the efficiency of school administration.

Through the State's investment in ICT, significant lessons have also been learned about the impact of ICTs and the ongoing challenges of providing universally accessible and high quality infrastructure, building teacher capability and ensuring the potential of digital technologies is fully realised across the whole education system.

The Australian Context

Australia has a population of 20.34 million in an area of 7.70 million square kilometres. The population density ranges from 0.2 people per square kilometre in the Northern Territory to 138.2 people per km² in the Australian Capital Territory. The majority of the population lives in coastal locations with the minority spread unevenly across the vast landmass. These geographic factors, coupled with the structure of a relatively immature telecommunications sector, have meant that broadband rollout has been significantly behind partner countries such as Singapore due to the high cost of laying infrastructure across vast distances.

Australian Bureau of Statistics data for 2007-08 shows that for households:

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|------------------------|-----------|-----|
| • Access to a computer | Australia | 75% |
| • Internet access | Australia | 67% |
| • Broadband access | Australia | 52% |

These statistics will be significantly enhanced by the recent Federal Government announcement of an Aus\$43B broadband rollout supplying high speed optic fibre to homes across the nation over the next 8 years.

This is a major announcement for education as there is significant disadvantage for many Australian students due to living in geographically remote and/or rural locations. Isolation, the tyranny of distance, is a real issue for both teachers and their students and is being addressed through collaborative technologies and online curriculum provision.

The Australian education system is federated — there are eight states and territories in Australia and each one has its own approach to curriculum, staffing, resourcing and governance of state schools. Victoria is the second most populated state in Australia (see Figure 1).

Victoria's school system performs well on international comparisons and has made significant improvements in the last few years, which positions it well for international success.

The 2008 *Blueprint for Education and Early Childhood Development* (Department of Education and Early Childhood Development [DEECD], 2008) sets out the Victorian Government's five-year agenda for learning and development from birth to adulthood. It is the next generation of reform to improve outcomes for children and young people across Victoria. The Blueprint recognises the changing nature of learning in the 21st century and the need for children to develop the knowledge, skills and learning strategies they need to deal with the vast amounts of information and range of technologies now available to them. Importantly, the Blueprint recognised that Victoria, with its highly diverse cultural population, has many pockets of education disability.

Figure 1: A Snapshot of Victoria

Population: 5.25 million
 Gross State Product: AU\$228 billion
 36% of Gross State Product spent on education & training
 Multicultural: over 230 countries of birth and 200 languages spoken
 State capital: Melbourne. Population: 3.7 million, 71% of Victorian population
School System
 Schools: Government schools: 1587
 Non-government schools: 706
 Students: Enrolled in government schools: 538 116
 Enrolled in non-government schools: 303 936
 Staff in Government Schools: Teaching Staff: 40 447
 Non teaching staff: 11 483

(Source: Department of Education and Early Childhood Development [DEECD], 2008)

Victoria's Approach

In Victoria, the ICT story has progressed from an initial focus on infrastructure, access to computers and network design in the early 1990's to embracing the role that ICTs can play in delivering returns in professional capability and curriculum reform in 2009. These strategies recognise the need to balance the vision for a

technology supported future with the reality of the learning curve for each new technology. Professional learning for teachers is integral to the change process.

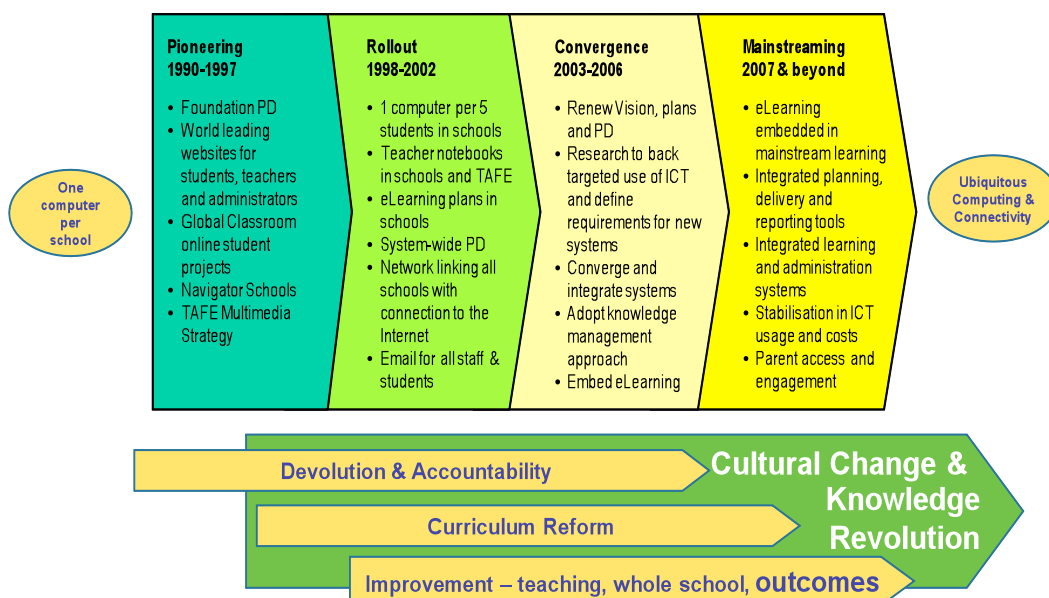
The Victorian story has developed from a simple desire to skill up the teacher workforce in the use of ICT to new individualised approaches to learning. ICT has enabled a shift from the traditional model of teacher led instruction of classes of students, to team teaching of students within ability groups. Individualised learning programs for students with exceptional capacity as well as students who are achieving below expectations are greatly enhanced with ICT. As such, the universal goal of equality of opportunity for all young people is much closer to becoming a reality.

Victoria's journey, from provision of laptops and e-mail accounts to all teachers in 1999, to electronic reporting and individualised lesson plans, through to the vision of parental engagement in the learning process via online learning environments has managed to counteract the cultural, socio-economic factors that have traditionally disadvantaged some young people.

Three strategies are explored in Figure 2 and illustrate recent developments in Australia and Victoria and demonstrate how progress is being made for a holistic response to the demands for 21st century learning. These strategies are:

- Professional capability
- Curriculum reform and resources; and
- Infrastructure, access and school design

Figure 2: Three Strategies



Professional Capability

In the technological revolution, each new generation is vastly superior in using, adapting and manipulating ICT than the previous generation. In education this means that students' mode of learning and capacity to use ICT is superior to teachers' knowledge of the pedagogy of learning with ICT. The Victorian Government's ICT strategy has focused strongly on developing professional development strategies which bridge this gap and enhance the expertise and knowledge of existing teachers (see Figure 3). This has been crucial in changing the way schools operate and the way students learn.

Innovators need to be supported in developing new practices and utilising new technologies, but it is important that professional development is targeted to the capability level of all teachers.

Benchmarking teacher capability. Victoria has developed an online tool that supports teachers to develop their confidence and capability to integrate ICT into their teaching practice (DEECD, 2009). It consists of an online survey, a bank of curriculum resources, an online journal and planning tools.

This is supported by a wide range of professional development programs available to Victorian teachers, through locally produced programs and partnerships with commercial providers. All of these centre around the fact that from 2000 each teacher in the State system has a highly subsidised notebook computer provided by the Government.

Figure 3: Examples of Partnerships for Building Professional Capability

Microsoft Partners in Learning

In 2009 this project will involve 9 Victorian schools working with Microsoft. The Catalyst schools will investigate ways of transforming classroom practice for improved student learning outcomes through the effective use of ICT. This will include developing a range of curriculum resources and tools to support other schools in their implementation of ICT into their teacher classroom practice (DEECD, 2009).

Intel ® Teach Program

Introduced in Victoria in 2003, the Intel Teach suite of programs has proved a popular and effective way to support teachers to integrate Information and Communication Technology (ICT) across the curriculum. Over 6000 Victorian teachers have been trained in Intel professional learning programs (DEECD, 2009).

The Creating eLearning Leaders (CeLL) (DEECD, 2009) initiative found that for effective integration of ICT in learning and teaching in schools:

- Leadership is critical
- Teachers are more likely to use ICT in the classroom when a whole school system is in place
- Sustained use of ICT in the classroom requires that teachers are appropriately skilled and have access to support for their immediate teaching needs
- More teachers will adopt ICT in their teaching approaches when they have access to ideas, activities and materials they can share and use
- eLearning can support schools to develop a more personalised approach to teaching and learning
- Getting *beyond engagement*, to the use of ICT to improve learning is hard work that takes time and effort.

It could be well argued that teachers are, more than ever, critical enablers of student learning with technology. Although students are routine adopters and users of new technologies, national curriculum testing has shown that they do not have depth of understanding of the applications and lack the skills to interpret knowledge they gain through the use of ICTs.

Curriculum Reform and Resources

Over the past two years, ICT has been increasingly recognised in curriculum standards. The Victorian Curriculum and Assessment Authority specifically highlight the ICT domain as an interdisciplinary domain which includes:

- ICT for visualising thinking
- ICT for creating
- ICT for communicating.

Specifying the area in its own right has given ICT unprecedented prominence and a licence for innovators to change what, how, when and where they teach with multimedia technologies in particular. This is supported by a collaborative national effort in the development of quality online learning resources.

Victoria has taken a national leadership role in the use of new digital content formats and Web 2.0 technologies through the \$8 million *Knowledgebank: Next Generation* (KB:NG) project. The project is establishing a content repository and portal for teachers across the country that:

- provides examples of leading practice in ICT including curriculum plans, digital stories, a showcase of student work and practitioner-led action research using Web 2.0 applications;
- provides easy access to online professional learning and access to other teachers through collaborative networks;
- brings together Web 2.0 content into a repository where a search will return 100 high quality, targeted resources for teachers rather than 1,000,000 as would be expected from a Google search; and
- develops policy around cybersafety, content procurement, copyright, intellectual property rights management and technology infrastructure.

The online content developed from world famous cultural institutions including the National Gallery, the Melbourne Zoo, The National Science Museum and international partners will be showcased through KB:NG. This content is improving every year, in line with the development of the local multimedia industry and, importantly, in line with the expectations of students.

Infrastructure, Access and School Design

The evolution of technology infrastructure has moved from an early focus on administration, to providing better classroom tools, to the present design of contemporary learning environments in which teachers and students access up to date ICT infrastructure to support varied styles of learning and teaching in newly designed learning spaces.

National infrastructure policies continue to centre on improving access to computers and ICT equipment and providing scalable, secure and robust infrastructure including broadband. Bandwidth provision for all government services, including schools, has been the single largest issue in a country with sparse population density and huge distances.

Victoria has invested more than \$3 billion in ICT infrastructure since 1999 including: technical support for all schools; computers in schools; heavily subsidised notebooks for every teacher and an optical fibre broadband network linking all schools.

Many initiatives have focused on being strategic about leveraging past investments. Outcomes include:

- driving down the cost of computers and telecommunications infrastructure;
- making all Victorian government schools wireless in 2005 to break down the barrier for end-to-end access to teaching resources;
- better management of the Internet Service Provider industry;
- introducing a “white list” of quality education internet sites to maintain security around the internet resources accessed in schools.

A central focus of current infrastructure development in Victoria is the Ultranet, an online learning and teaching environment that will enable system-wide improvement in curriculum planning, access to learning resources, student assessment, reporting and communication with parents about individual student progress and needs.

Central to the value that Ultranet offers is the capacity for evidence based planning and more targeted delivery of personalised learning programs for each student. ICTs drive a more formative assessment approach for student learning and shift the focus to a changed relationship between teacher and student. Demonstrative of this approach has been the undertaking of the 2009 Netbook trials which encourage out of school learning (see Figure 4).

Figure 4: 2009 Netbook Trials

The Netbook Project has provided 10,000 students in 340 Victorian Government schools with a mini-notebook (“netbook”). The Government is contributing to the purchase of these netbooks and more than 28 educational software programs, so that they are available to families at a fraction of the cost of their commercial retail price. Netbooks are promoting better learning in and out of school by encouraging:

- anywhere, anytime access to learning
- independent, self initiated learning
- more family involvement in education
- collaboration between students in different schools, states & countries.

School Design. The iterative relationship between educational design and architectural design, coupled with new ways of engaging school communities, is enabling the vision for technology rich learning spaces. Over the next two years Victorian Government schools are benefiting from investment of nearly \$AU4 billion from State and Federal Governments for new school buildings that feature ubiquitous technology in learning areas.

In terms of innovative design, the past five years in Victoria has seen 162 secondary schools participate in a \$162 million project to design new learning spaces for students in the traditionally hard to engage middle years of their schooling (12 to 16 year olds). The new models have informed the capital investment program for all schools, producing innovative design templates for new buildings, which take schools from industrial models of classroom design to a more contemporary learning environment (DEECD, 2009).

This contemporary environment sees a concept of personalised learning at the core. Key concepts are innovative, flexible space and furniture, and ubiquitous technology — that is, access for students to whatever technology is required, as and when it is required.

Australia's Approach: A Digital Education Revolution

To respond to the challenge of distance and varied performance across Australia, the Federal Government has nominated education as their top priority with an agenda for a *Digital Education Revolution (DER)* as a lead initiative. The aim of the DER is to stimulate sustainable change to teaching and learning in Australian schools that will prepare students for further education, training and jobs of the future and to live and work in a digital world (Department of Education, Employment and Workplace Relations [DEEWR], 2008).

The Australian Government is committing more than AU\$2 billion over two years to provide:

- new or upgraded ICT for all secondary students in Years 9–12
- high speed fibre broadband connections to all Australian schools
- online curriculum content to support the national curriculum
- teacher access to training in the use of ICT
- web portals which will enable parents to participate in their child's education.

Moving Forward: Challenges and Opportunities

Ongoing challenges remain for the Victorian education system across all three of the areas outlined above. Victoria is currently working on policy program options to address these challenges:

Professional capacity:

- The absence of a readily available, recognisable and tangible picture of successful e-learning for teachers — models, competencies and pedagogies.
- Policy (e.g. copyright and intellectual property) which has lagged behind technology.
- Familiarity with new technologies is difficult in an aging workforce.

Curriculum reform and resources:

- The speed of change and lag between technology development and development of effective teaching and learning practice.
- Issues and perceptions about cyber safety, real and imagined.
- Access to high quality, targeted resources from across the world.
- Ensuring the curriculum is flexible enough to incorporate new ICTs as they develop and are embraced by students and teachers, while ensuring the key focus remains on how the available technologies are best used to improve student learning.

Infrastructure access and school design:

- Ongoing management of the centralised learning management system (*Ultraset*) as it is rolled out across the state.
- Home access to digital learning resources for students and families.
- Increasingly sophisticated technical support requirements.
- Bandwidth management to ensure that key systems are not compromised..

Developing New Metrics

Although international education benchmarks continue to focus on baseline literacy and numeracy measures, Victoria is participating in international research to identify the student capabilities that are developed through the use of new technologies. Some challenges that are being addressed include:

- How do we measure and demonstrate success when the targets keep changing? New metrics are needed to measure the success of initiatives that focus on the use of data as information, access to high quality resources, use of Web 2.0 technologies, etc.
- What are the new cost models, for example, supporting distance education students; 24/7 access to learning spaces; and high quality professional learning?

- What is Web 3.0? How do jurisdictions plan for the next wave of reform through technology? How do we balance cyber safety and innovation to undertake a genuine transformation in classroom practice?

Opportunities for Innovation

Innovative practitioners are leading practice in adoption of technologies with educational value, specifying future directions to the industry, and joining up processes, technologies and communities. Education systems need to encourage experimentation, take risks, but systematically identify “what works” so as to take the best practices to scale across the system.

The value of practitioner-led innovation in developing new practices, tools and resources for the benefit of the whole system cannot be underestimated. The Victorian Department of Education and Early Childhood Development is supporting school-led, disciplined innovation projects that address some of the key issues in ICT integration in teaching and learning. These projects include the establishment of a Virtual Learning Network for rural and isolated students and the development of a Digital Literacy Curriculum and Assessment Support Tool to provide teachers with materials and tools to teach the skills of digital literacy in a variety of curriculum areas as well as assess students’ digital literacy competencies.

Conclusion

In a very short period of time ICTs have become a pervasive part of society, which is naturally reflected in our students. The way we communicate, access and process information about our world has fundamentally changed — as has the skill set required of our students for the workforce of 2010 let alone the more distant future.

In a very real way, technology has changed the way we think about the world - potentially less linear and more complex. We have moved gradually from a supply model of ICT infrastructure provision to a demand model which is focusing more on the individual needs of students and teachers.

There are tantalising views of what we can achieve through technology happening in our most innovative schools today — building whole communities of learners including teachers, students, siblings and parents, who can learn anytime, anywhere, at any stage of their life. The most exciting part about being in education in 2009 is that we know we are still only on the start of the change curve that technology will bring to our lives and our profession. No one has all the

answers but the technology itself is enabling us to collaborate globally to work towards solutions, build preferred futures for technology enabled learning and address the real challenge of moving students beyond the superficial use of communications technologies to higher levels of analysis and evaluation of information about their world.

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