Schools face a major challenge in creating a seamless interface between Information Technology and best practice in teaching and learning. What does the future hold? The existing structure of schools is under the microscope. Leading researchers have questioned our present organisation of schooling, which was established in response to prevailing economic conditions and is now outmoded in a technological age (Drucker, 1995; Spender, 1998). Drucker (1995) advocates a re-engineering of the knowledge based education system.

Paradoxically, this may not necessarily mean that the school as we know it will become more important. For, in the knowledge society, clearly more and more knowledge, and especially advanced knowledge, will be acquired well past the age of formal schooling, and increasingly, perhaps, in and through educational processes that do not centre on the traditional school. (pp. 204 - 205)

This article explores the past, present and future of Victorian schools' developmental journey into the Knowledge Age. The author's perspective of the developmental pathway describes the nature of systems and resource support impacting on student learning. Reflections are shared on the progress and planning for future development, encouraging discussion between school leaders and state administrators. Key questions include: How far have we travelled? What assisted our progress? Where are we going? Hargreaves and Fullan (1998) suggest that to expand and survive we need to use new technology to deepen learning - "going wider and going deeper" (p.28).

**Context**

On 17 April 1999, at an International forum, the state Education Minister, Phil Gude, surprised many by pleading that every Victorian school student would be given an email address starting Term 2, 1999. The plan for Victoria is to lead the world in providing a unique online facility for each student. Previously email addresses have been given to every staff member and School Council President in the state. Student email access opens a whole new world with endless possibilities in navigating and learning on the Internet. The ability to send and receive messages enhances interactive growth and communication skills.

The provision of email for all students is a giant step towards adapting to the rigours of the Knowledge Age. The Knowledge Age requires students to access, conceptualise, manipulate and analyse information in order to become more knowledgeable. The fast rate of development in technology supporting learning and teaching has shifted the definition of learning from 'retaining information' to 'processing information'. In this age, knowledge is more about understanding and creating solutions to problems, rather than fact retention.

The shift towards this interpretation of knowledge, with the aid of technology, requires robust management and leadership at state and school levels of operation. Historically the leaders have experienced problems in the rapid expansion of Information Technology. Concerns amongst the government ranks emerged from a Department of Employment, Education and Training Report in 1994, stating that "the introduction of technology has developed without planning" (Tinkler, Smith, Ellyard, Cohen, p. 38). The lack of planning indicated a bleak and uncoordinated future for the development of technology assisted learning and teaching in Victoria.

In direct response, the Smith Report into Technologies for Enhanced Learning (1994), gave some hope and purpose. The report suggested that technology promised to frame the way
students interacted with teachers and to give new meaning to knowledge and the way it is "generated and manipulated" (p.1). Smith (1994) predicted that the use of computers in schools would become more meaningful as different learning styles are accepted and interactions between students and teachers focus more on the learning process instead of the gathering of knowledge. He argued that a school is an effective learning community when the teachers and students demonstrate flexibility by adapting to the changes with a dynamic style of development. Clear strategic directions are required.

How could a management system develop a dynamic approach creating cohesion in the face of radical technological change? Sheingold’s model for strategic development (1990) suggested a reengineering of schooling incorporating a consensus about learning and teaching coupled with sound integrated uses of technology. Victorian education leaders adopted Sheingold’s model with its inherent emphasis on learning and teaching. Peter Allen, the Director of Education in Victoria, stated that "the department must work alongside schools to support, reengineer and shift the infrastructure in education delivery" (1998, p.27).

Emanating in Victoria were two facets of support needed to assist change in schools. The process is outlined in Figure 1. The first facet involved systems support including government expectations, strengthening leadership capabilities, professional development and people networking between schools and key organisations. The other facet constituted resource support ensuring schools’ access to hardware and software and curriculum back up via Wide Area Networking (WAN). Effective systems and resource support determined the school’s progress in establishing best practice.

**Systems support**

At one level systems support is provided through the extensive documentation issued to each school. The DoE Learning Technologies Planning Guide for Schools and Learning Technologies Implementation Guide for Schools (1998a, 1997) provide comprehensive materials to help direct and lead staff through the process of establishing a viable computer network. The aim is for an expanded IT knowledge base enabling school personnel to make informed decisions.

The Department of Education mandated a set of requirements for Information Technology development with rigid timelines to ensure statewide consistency. The requirements set high expectations in relation to the pace schools moved to adopt Information Technology. The requirements included:

- Every school is to have an Information Technology Implementation Plan;
- Charters should address the school’s progress in Information Technology adoption;
- Job descriptions for senior school personnel include a criterion pertaining to the use of Information Technology; and
- From the beginning of 1999 all performance management systems were to contain use of Information Technology (1998 b).

The intent was to ensure statewide consistency through centralised decision making.

In 1998 evaluation data from 81% (171) schools in the Northern Metropolitan region of Melbourne were collected and collated by Melbourne University using a Learning Technologies survey. More than 60% of schools held a belief that the introduction of Learning Technologies required systematic planning and widespread consultation. Further evidence pointing to a coordinated response was evident, for over 60% of schools confirmed that Learning Technologies had not been introduced in an ad hoc manner. Nearly 70% indicated evidence of a commitment from the whole school. The data provided early indications of a moderate degree of satisfaction amongst Victorian schools towards the initiation and implementation of statewide changes in technology-assisted learning.

However, the Victorian education Information Technology infrastructure is still in a formative stage of development in preparing students for the Knowledge Age. While a positive start has been made, further careful planning is essential to ensure a positive developmental pathway is mapped out for both the students and teachers. Minister Gude’s promise to give each student an email address indicates his confidence that the infrastructure is established sufficiently to sustain such innovative curriculum change.

---

**Figure 1: Information Technology Development Pathway in Victorian Schools**

<table>
<thead>
<tr>
<th>Resource Support</th>
<th>Schools</th>
<th>Systems Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>Leading Schools</td>
<td>Government Expectations</td>
</tr>
<tr>
<td>Software</td>
<td>Navigator Schools</td>
<td>Leadership support</td>
</tr>
<tr>
<td>Wide Area Network</td>
<td>Global Classrooms</td>
<td>Professional Development</td>
</tr>
<tr>
<td>Internet Curriculum Sites</td>
<td>Navigator Schools</td>
<td>Curriculum Networks</td>
</tr>
</tbody>
</table>

**Best practice in learning and teaching**

Knowledge Age
Systems support for leadership

Systems support for leadership, staff professional development and networking, impacts significantly on the positive adoption of Information Technology in Victorian schools (See Figure 1). Learning and teaching remains a central focus. Leadership in a time of rapid technological change requires wise decisions. There is a salient reminder in the words of Alfred Tennyson, ‘Knowledge comes but wisdom lingers. Wisdom somehow got lost in knowledge and knowledge in information.’

Multiple demands on school leaders, including management of people, physical resources, planning and implementation of numerous programs, challenges them to make insightful judgements about optimising the learning environment for students to thrive in the Knowledge Age.

Wise leaders use their courage and vision to refine and develop strategic frameworks and guide participants in the school and community to accept change. The notion of wise leadership requires knowledge of systems that integrate various cycles of development. For instance, the cycle of professional development in schools should be informed by staff appraisal, performance review and research findings into the effectiveness of technology to improve student learning. Wise principals accept innovative change based on identified needs and make decisions throughout the developmental cycle based on valid and reliable data.

In Victoria the central administration appointed key personnel to lead the initiatives. The movement began on many different fronts. In 1994 Geoff Spring, former Victorian Director of Education, articulated his vision to transform schools through the ‘Schools of the Future’ program. Caldwell and Sawatzki professionally developed principals with a comprehensive (five day) program incorporating units on ‘Creating an Information Age School of the Future’ (1994-95). The intent was to nurture strategic and visionary leaders capable of reengineering schools. This large-scale initiative provided principals with a framework and basis to begin their journey into a new era of technology assisted learning.

The conception of the ‘Schools of the Future’ program provided an opportunity to nurture growth and development. Networks between principals encouraged peer learning. There was an expected variation in take-up of the process and some leaders were slow to implement change within the schools. Other leaders utilized the possibilities as the system expanded and indicated frustration they couldn’t move quicker because of perceived systemic and financial constraints.

What, indeed, has been learnt by the centrally driven initiation of technology into schools? The decision to centrally mandate expectations is an enduring characteristic of the Victoria education system that continues to affect change in schools. The daily use of computers by principals has become a prerequisite of leadership. From Term 2 1999, principals received all the memos and documentation from the DoE via their computer and ISDN connection. The clear alternative to engagement in the initiative is to miss out on information. The system needs to show clarity in planning in order to be responsive to needs of all stakeholders, both enthusiastic and cautious. The decision-makers must retain hope, purpose, passion and a belief in the ability of its school leaders to create the change required. Professional development and networking will, it is hoped, seek to stimulate vision in school leaders.

Systems support in professional development

Visionary leaders hold a belief that learning and teaching capabilities can be enhanced with computers, unlocking a future world for students. Such a vision requires staff support. Tapscott (1996) suggested that there tends to be a real delay between teachers’ use of the outmoded broadcast learning mode and interactive, constructionist learning. The need for change in pedagogical practices is reinforced by Atkin (1998), who discussed the developing role of the teacher to a ‘learning technologist’ the ‘guide by the side’ rather than the ‘sage on the stage’ (p.3). She asserted that the relationship between teacher and student is paramount in learning acquisition and success. The author authenticates the nexus between meaningful employment of Information Technology and high quality learning and teaching strategies is central to visionary leadership in Victorian schools.

In 1995, seven Navigator Schools were selected with the intent to create ‘testbed sites to help define the operational parameters for schools as learning institutions in a technologically rich world’ ( 1998d, p.21). These seven schools became resource rich with each classroom receiving a bank of networked computers. Every teacher was equipped with a notebook computer and all staff received extensive amounts of professional development with the additional allocation of a leading teacher, a project officer. The project officer’s brief was to forge the way with Information Technology, creating a type of beacon on the horizon for mainstream schools.

Research by the Department of Education into the adoption of Information Technology in seven Navigator Schools, found that a major influence to adoption is the teachers’ accessibility to the new tools (1998d). The findings are consistent with overseas experience that report teacher access to personal notebook computers is pivotal to effective change. A Victorian innovation, in 1998, was the ‘Notebooks for Teachers’ initiative. Over three years staff members will be able to lease a notebook for $450.00. Across the next five years a notebook computer will be available for each teacher. Initially the notebooks were allocated to, and rewarded staff in state schools who were prepared to spend additional time learning about computers in professional development programs. Elliot (1998) maintained that it is imperative to increase the teachers’ levels of confidence in Information Technology, which shapes their skills and attitudes towards enhancing learning. Ready access to computers is one way to help increase understanding and skills.

There are varying professional
development activities available for staff. Many teachers and principals have attended professional development at Navigator Schools. Bruce Rigby, Manager of Information Technology with the Department of Education, believes 1 in 3 teachers have accessed this professional development over four years. Similarly Leading Classroom Practice Schools provide working models of excellent teaching strategies using IT. Teachers are presented with an overview of possibilities and tangible ways of implementing new learning in their contexts. This initiative encourages dialogue and exchange of ideas. The Teacher Capabilities Questionnaire (1998c) was another way to direct and chart professional development needs and requirements. The Navigator School model and the Leading Classroom Practice Schools indicate that learning and teaching can be transformed. Their credibility for ‘leading the way’ in the first stage has been authenticated.

**Systems support in networking**

Systems support and recognition of best practice contributes towards a climate of collaboration. A spirit of learning emanates from mainstream schools. As the number of ‘on the ground’ experts expands, the nature of classroom behaviour will hopefully change to incorporate Information Technology into each curriculum area. Local experts are acknowledged and networks continue to grow. Leading Classroom Practice schools and Global Classroom mentors engaging in best practice are given financial rewards by the DoE, encouraged to share expertise with others. Peer mentoring and school visits are advocated.

The Professional Interaction Networks facilitate communication. One of the most significant school influences of tangible and working supports is Mag-net, a group originating from Monash University. The ‘hands-on’ team gives inspiration and curriculum assistance to staff members. Motivation is a key precondition for change to learning and teaching. Formal and informal interactions amongst teachers are shaping a new form of curriculum delivery. In a collaborative culture, behaviour changes in individual teachers can affect the behaviour of others to enrich the school climate.

Despite a range of initiatives, research commissioned by the Professional and Leadership Development Centre of DoE (1998e), indicated that there are still significant numbers of teachers not using information technology routinely in classrooms. The report suggests a number of reasons why some teachers resist change: lack of access to technology support, lack of personal expertise, lack of access to computers and available time. The first three barriers to change are being addressed by the professional allocation equips schools with tools in Information Technology to strengthen teaching and learning. The DoE (1998e) provided a ‘2 for 1’ resource initiative and then ‘3 for 1’ grants where the school gained proportional funding for strategic Information Technology purchases. These resulted in assistance for purchasing over 32 000 computers for schools, making the computer pupil ratio at 1:6 (Gude, 1999). Each school has been allocated administration computers, including a 64K ISDN connection to the backbone of the schools’ computer network through VicOne, a government wide area network. The WAN links every school in the state. Enhanced networking facilities change the interconnectedness of schools. There has been improved system support though Computerised Administration System Environment in Schools (CASES), Human Resource Management System (HRMS) and CASES 21 in administration. Additional resources are continually made available for use. For instance, old computers from industry have been recycled into schools. Further, the DoE continues to provide some valuable advice about developing school capabilities in generating technology resources. Nevertheless, Information Technology is a significant consideration in a school budget for set-up, maintenance and depreciation costs. EkinSmyth in ‘Rethinking Learning and Teaching – the Navigator Schools Experience’ (1998d) suggested 4% -7% of a school’s annual budget is required to implement technology-assisted learning and teaching.

One overriding necessity at this stage of implementation is the provision of adequate technical resource support. Effective resource maintenance remains an ongoing dilemma for schools. Recently a news release from the Education Minister Gude (1999) addressed some of the issues in maintenance of school computer systems by allocating an additional $17.2

---

“A spirit of learning emanates from mainstream schools.”

---

**Resource support**

Resource support is the other major variable in the Information Technology development pathway in Victorian Schools, shown in Figure 1. Massive directional change in resource
million during 1999-2000 for specialist technical assistance. Minister Gude said, "principals have long said to me that technical support of their computers was a key issue in schools". The rationale is to provide a cluster of schools with highly skilled and well paid technical support personnel. These technicians will assist the school personnel plan, implement and evaluate technology-assisted learning and teaching at the school level. The Victorian central administration is responding to the needs of schools. This latest initiative is expected to further strengthen the development of computer-assisted learning and teaching and will be monitored carefully.

Once computers are in the schools, the expense issues of software and licensing emerge. In this instance, creative and favourable contractual licensing arrangements with Microsoft were brokered centrally by Paul Doherty, the General Manager Information Technology Division. Schools are allowed unlimited use of nearly all the Microsoft products on any school computers. A software-rolling fund has been established to reduce the price of other major curriculum software. All Office 97 products are available for home use by staff. This innovation alleviates a potential minefield of expense at the school level.

### Resource support in the curriculum

Future directions need to build on the strengths of leading schools, passionate teachers and administrators to influence all schools. The central focus on curriculum development with resource expansion supporting learning and teaching must be retained. Consideration of the Curriculum Standards Frameworks (CSF) needs to dominate in the development of technology. Otherwise there is a danger of interest groups taking over computer usage. For instance, software firms can potentially produce glossy programs that are time fillers rather than providing quality learning opportunities for children.

It is envisaged that with the CSF at the core, teachers and students will have access to meaningful learning experiences and strategies sufficient to deliver specific applications and skills. The Leading Practice Idea Bank is an existing resource with an extensive potential for referencing and exchanging excellent practice. [http://www.sofweb.vic.edu.au/lpool](http://www.sofweb.vic.edu.au/lpool). The central idea is not just to make this phenomenon Victorian, but a national resource for Australian teachers.

The lines of communication are open to locate available resources within the system and apportion them efficiently. The information available to staff, principals, students and parents on the DoE SooWeb [http://www.sofweb.vic.edu.au/index.htm](http://www.sofweb.vic.edu.au/index.htm) page is comprehensive. Creative people have been able to produce a user-friendly site that is full of curriculum and administration data. A raft of information about the system, some interactive, is found in the EduLibrary, through EduNet, Edumail and the Digital Resource Centre. These promise to extend the high quality services available to schools. Help lines are available. Regular briefings to key personnel about resource changes are conducted. Each of the innovations discussed must operate effectively and serve the purpose intended.

This discussion focused on two key issues of resource and systems support with an underlying belief that effective learning and teaching is central to all innovative change in schooling. Victoria’s pathway to significant systemic change in technology-assisted learning and teaching is still in an embryonic stage. The author has isolated key elements in the early stages of the journey that frame multiple layers of development required in the future.

### The future

How does our education structure need to change in response to the times? New arrangements of technological ‘pods’, with Internet access, may be more relevant to the needs of our students. Spender (1998) proposed, that the child of today, when compared to one born a century ago, requires a different set of skills to negotiate learning. Will online learning replace schools? The relevance of the contemporary model of schools, based on past needs of the industrial era, is open to examination. New parameters and skills will dictate the type of curriculum required in tomorrow’s world. In order to survive, the school curriculum needs to be adaptive and bear relevance to the technologically based knowledge world of the future.

The new school complex at Caroline Springs on the outskirts of Melbourne, heralds the type of environment education may encounter in the new millennium. The connection and links between home and school are in the form of fibre optic cables – a backbone running from the school into the community. This configuration affirms the school’s crucial role interwoven with the community in learning and teaching.

In a number of strategic intentions proposed by Caldwell and Spinks (1998) they state:

- Schools will play an important role in the knowledge society and advances in technology will be central to this effort;
- Virtual schooling is a reality in every setting, but there will always be a place called school (p. 17).

The evolution and form of schooling is under considerable scrutiny.

Last year all state education ministers assembled and produced the ‘National Goals for Schooling in the 21st Century’ (1998). A basic expectation of students leaving school was:

‘To have skills in analysis and problem solving and the ability to become confident and technologically competent members of the 21st century society’.

The ability to capture leading edge progress nationwide makes logical sense, if we are seeking the best for Australian students.

Movements such as reengineering, restructuring and reculturing (Davies, 1997, Fullan, 1997), challenge our traditional thought and belief structure and articulate the possibility of systematic and relevant change within the education system. Our focus should remain firmly fixed on the needs of the prime stakeholders, the students, and secure for them their right for the best possible education in a Knowledge World. They must have access
to valuable and worthwhile learning. The huge task ahead is creating a technologically rich environment whilst encouraging high quality and purposeful change. A powerful metaphor of Andy Hargreaves (1997), is found in the ‘Parrot of Purpose’ sitting on our shoulders questioning our actions. This position must permeate if we are to proudly take our place as educators, confident that we have given students the best possible education to equip them with skills and flexibility in facing the many challenges of the 21st Century.

Time is precious and the way ahead uncharted. Educators must keep hold of the agenda and work rigorously to create meaningful teaching and learning experiences integrating Information Technology into the world of each student. Given the parameters of the system, Information Technology development in Victoria has proceeded steadily. The pathway ahead should be smooth, if the commitment and beliefs are sustained. The journey is challenging and we have a long way to travel before we can take our place with our heads held high.

REFERENCES


http://www.ncrel.org/ncrel/.

