

OECD/CERI ICT Program
ICT and the Quality of Learning

An Overview of the Australian Case Studies

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Background

In 1995, the Department of Education, Employment and Training in the State of Victoria, Australia launched the Navigator Schools Project. Seven schools became laboratories to develop:

1. Models of best methodologies teachers can use in classrooms in which computers are primarily used as tools for acquiring information, thinking and expression;
2. Increased understanding of how teaching and learning changes in such classrooms;
3. Models of administrative arrangements that facilitate and support improved student learning;
4. Models to increase and improve parent-school interaction;
5. Expanded teacher professional development opportunities to support the adoption of improved teaching practices;
6. Ongoing evaluation of, and advice on, curriculum materials, equipment and software;
7. Support structures for other schools that chose to undergo such transformation.

The project piloted an initiative that has since become statewide. The findings of the seven original navigator schools have been used to inform statewide support for schools. Seven very different schools were originally involved as navigator schools: Apollo Parkways Primary School, Bayswater Primary School, Bendigo Senior Secondary College, Buninyong Primary School, Essendon North Primary School, Glen Waverley Secondary College and Northcote High School. Over the four year duration of the project these seven schools worked as a team and developed similar innovative models of teaching and learning in a technology rich environment.

The overall model is essentially a form of student centred-teacher guided learning. It blends aspects of constructivism, authentic learning, thinking skills, inquiry learning, Gardner s Multiple Intelligences, Bloom s Cognitive Domain and de Bono s Thinking Hats into a pattern of sequenced but integrated knowledge, skills and attitudes. The development of this model,

and how Information and Communication Technologies (ICT) might be used within it, has been the focus of much of the work of the project. The schools and teachers are continuously refining the model through ongoing reflection on classroom practice involving teachers and students.

In the process of developing the model all of the schools have, in a whole school reform sense, re-engineered themselves. In this context, re-engineering means changing curriculum, changing school management procedures, changing teaching and learning practices and changing approaches to staff development. This approach to re-engineering is designed to achieve whole school reform. Whole school reform in this regard means changing the curriculum, changing approaches to learning and teaching, **and** changing **the** administrative and management practices in ways that make the school more effective.

Two of these schools, Bendigo Senior Secondary College and Glen Waverley Secondary College, participated in this OECD study. The Principal Investigator for the OECD study had also been previously commissioned to conduct between 1999 and 2000 for the Victorian Department of Education, Employment and Training the evaluation of the Navigator Schools program. Thus he has had a relatively long association with the schools and was able to draw upon it during the conduct of this investigation.

The Case Study Schools

Glen Waverley Secondary College

Glen Waverley Secondary College (GWSC) is a coeducational school with an enrolment of **1830** students in years 7 to 12. It is located in the eastern suburbs of the Australian State of Victoria's largest city, Melbourne. There are 30 international full fee paying students at the school. The staff numbers 155, 125 teaching staff and 30 non-teaching. It has an annual global budget^[1] of approximately \$9 million.

The college was opened in 1960 and many of its buildings are from that era. However, the college has recently undergone extensive refurbishment to create a modern and vibrant learning environment that reflects the changing nature of teaching and learning that is taking place there. The remodeling commenced with the construction of a new Science and Technology Centre in 1995 that created contemporary, open and transparent learning spaces that would allow teachers and students to interact in their learning in a way that was restricted in traditional classrooms. The extensive use of glass is a noticeable feature allowing all aspects of learning and teaching to be easily observed throughout the college. College resources have been redirected to the remodelling of the remainder of the buildings. The transparency of classes through the use of glass is an ongoing feature of the college architecture.

Some major features of this rebuilding work have been the computer networking of all areas of the college and the creation of withdrawal spaces where students can work independently from their classroom teacher. At GWSC it is a routine occurrence to see a teacher operating with students in two or three separate locations so that learning is not restricted to the single,

teacher-centred classroom.

The students also have access to modern landscaped outdoor spaces at the Glen Waverley site and access to a rural campus, Nayook Outdoor Education Centre located 100 kilometres from Melbourne.

Nayook provides an outdoor program for all students in the junior school. Students in year 7 and year 8 undertake a sequential outdoor program covering experiences such as canoeing, water watch activities, cycling, bushwalking, rock climbing, caving, adventure rope courses and navigational events. Two and a half full time teachers conduct the Nayook residential challenge program.

In general terms, the school community is relatively affluent. GWSC is also considered to be a high performing school. It has a high proportion of students who speak a language other than English at home. There are 20 language groups among the LOTE speakers whose origins largely are Asian countries such as Malaysia, China and Sri Lanka. The school is very highly regarded in the community which is also served by several large high profile and expensive non-government schools.

The school prides itself on its student retention rate. It retains virtually all of its students through the final years of secondary schooling with over 90% of those graduating from Year 12 proceeding to tertiary education.

The college has a very considered policy on student individualisation, relating to the first goal of the school's 2000 Strategic Focus: *Care of the Individual Learner*. The school emphasises the teachers' responsibility to all learners to enable each student to access the support they require to make progress. Initiatives have included the Junior School Curriculum Trial of 1999-2000, which consisted of teams of teachers working with smaller groups of students. The main goals of this trial were to improve student welfare and a sense of belonging, to enhance student learning and enhance teacher professional growth and to improve teacher welfare. Evaluation of this trial has led to a restructure of the curriculum in years 7 to 10 beginning in 2001.

The ongoing improvement of the quality of teaching and learning combined with the innovative use of Information and Communication Technologies (ICT) has been the major focus of school reform for six years. This has seen substantial resources being redirected into professional learning and programs that will assist students and teachers to become effective lifelong learners.

A constant stream of visitors through the school observes teachers and students in action. The visitors come from all around the world as well as locally, some staying only an hour or so, others participating in professional development activities for several days. Over a thousand visitors come each year. Students and teachers at GWSC are the centre of international attention. Visiting educators, politicians, industry people and others investigating innovations in teaching and learning are invited to request staff members to explain and elaborate their everyday practices.

The overwhelming impression one forms after being in the school is that it is a place that values learning. It describes itself as a learning organisation and assiduously works on achieving that as a major goal. In classrooms, students are engaged and enjoy a challenge. In return they challenge teachers to provide a learning environment which leads to higher learning. Teachers participate in a personal program of on-going professional learning. The senior management consistently advocates processes and programs designed to continually improve learning and teaching at the school. ICTs are an integral part of GWSC. They are found in all areas of the school, including most classrooms and all staffrooms, enabling routine access for students and staff. The college is a technology rich learning environment where students and teachers access the technology tools they require not only from all areas within the school but from home as well.

Bendigo Senior Secondary College

Bendigo Senior Secondary College (BSSC) is a single campus senior secondary college with 1787 students enrolled in years 11 and 12, the final two years of secondary school in Victoria, Australia. They are involved in 9 study areas including the Arts, Business Studies, English, Human Development, Mathematics, Science, Technology Studies including Information Technology, Studies of Society and Environment (SOSE) and Languages Other Than English (LOTE). There is also a range of Vocational Education and Training (VET) courses offered to students. There is a staff of 113 effective full time teachers and forty six support staff. The school's annual operating budget exceeds \$8.6 million.

The college is centrally located, adjacent to the City of Bendigo's public gardens, which provide the outlook from the front of its nineteen twenties style red brick building. The school itself was established in 1922.

Approximately four thousand visitors come annually to inspect the school on the grounds of its international reputation in the field of school restructuring and particularly the use of ICT in the restructuring process.

There is an air of collegiality about the school. Teachers plan and work in groups. There are numerous working groups, some developing new practices and others monitoring current practices. Students are considered to be young adults. The expectation is that they will accept responsibility for their own learning. There is a sense of harmony and purpose within the energetic school community.

Bendigo is the Australian State of Victoria's fourth largest city of eighty thousand people. It is the regional centre for Central Victoria. It is a heritage city that has its origins in the gold mining that occurred in the district in the eighteen fifties.

BSSC is in like school Group Five^[2] within the Victorian Department of Education, Employment and Training's categorisations of state secondary schools. Group Five has a relatively high proportion of students on Education Maintenance Allowance/Youth Allowance and a low proportion of Non English Speaking Background (NESB) students. The schools in

this like school group are not considered to be high performance schools.

The school places strong emphasis on lifelong learning skills. It offers the greatest range of units at the senior secondary level in Victoria (VCE)^[3], a range of Vocational and Education Training (VET)^[4] programs, apprenticeships, traineeships and is an accredited provider of CISCO, Microsoft and Aries^[5] courses.

The VCE marks the satisfactory completion of secondary schooling in Victoria. It is comprised of forty-four study designs and ten VET courses that are offered over the final two years of secondary schooling. Typically, students select the equivalent of five subjects each year.

The VCE was in a transition period during the year two thousand. It has been revised to incorporate more school based tests and fewer of the large scale, research based projects that characterised its previous form. According to some staff members at BSSC this has made some students more inordinately focussed on the content and assessment aspects of study designs than was formerly the case. This has had, in their view, the effect of making generic skill development in young people more challenging at present as the new system beds down.

BSSC takes the notion of continuous improvement very seriously. All aspects of the college are subjected to ongoing evaluation processes. Recently, the college moved to be accredited by the European Council of Independent Schools (ECIS). One reason for doing so was the desire to be able to bench-mark itself against strong international criteria.

Since 1994, BSSC has been pursuing an agenda for whole school change which encompasses three main things:

- The development of a consensus within the school community that teaching and learning has to be active, constructivist and experiential and that classrooms have to change to accommodate such an approach
- The belief that well integrated use of ICT enhances teaching and learning
- The belief that schools have to be restructured to support the changed classroom.

The key goal of the whole school reform effort has been to improve the quality of teaching and learning at the college. The incorporation of the widespread, effective use of ICT, a reconsideration of approaches to teaching and learning and an organisational restructure were all, in combination, intended to contribute to that key goal. ICT was the catalyst for the reform effort. Its introduction was to play a major role in the transformation of teaching and learning and the reorganisation of management and administration arrangements.

Over the past seven years the school has:

- Revised its overall organisational and management structure
- Reorganised its decision making processes and procedures
- Expanded and revised its curriculum arrangements
- Developed an extensive in-house professional development program

- Established a formal annual review and appraisal process for all staff
- Radically revised its timetable and the pattern of student access to the school and staff
- Redesigned much of the classroom space so as to accommodate better student centred-teacher guided learning
- Improved the sense of professionalism amongst the staff and increased staff's work ethic
- Integrated the school into the family, business and wider education community aspects of Bendigo
- Firmly located itself as an international leading school in the integration of ICT into a wholly changed school setting.

In short, it has very successfully achieved a program of whole school change. Some of the main effects of the changes have been:

- Improved staff morale
- Increased skill levels in using ICT
- Substantially improved externally assessed student learning outcomes
- Increased parental satisfaction with the school
- Increased sense of professionalism on the part of staff
- Increased work ethic reported by staff.

An Overview of the Findings from the Case Studies

Hypothesis One - Technology is a strong catalyst for educational innovation especially when the WWW is involved, or

Where true school wide improvement is found technology served as only an additional resource and not as a catalyst. The forces that drove the improvements also drove the application of technology to specific educational problems

At Bendigo Senior Secondary College ICT was a strong catalyst for educational innovation and the power of networks and the Internet were an integral part of this innovation because of their role in increasing communication, collaboration and sharing. Whilst the focus of ICT usage at the school was from day one on curriculum and on teaching and learning it was, nevertheless, the vision that ICT would transform schools that spawned the whole school change effort at BSSC. ICT has been the catalyst for changing teaching and learning practices. It has been the instrument for changing management practices.

In the case of Glen Waverley Secondary College the focus of the innovation has always been improved teaching and learning. At GWSC the serious use of information and communication technologies came after the college embarked on its effort to reform conceptions and practices about teaching and learning. Learning technologies ICT has been incorporated into the change process and used to challenge teachers and students about their views of teaching and learning. According to the Principal:

Technology is a catalyst but must be accompanied by changes to approaches to teaching and learning. Whole school restructure is absolutely essential. It is a complex and interrelated

change process. New technologies can help to transform schools but only if they are used to support new models of teaching and learning. If technology is simply used to automate traditional models of teaching and learning then it will have very little impact on school .

Hypothesis Two - Diffusion follows the pattern of stages (know, persuade, decide implement and integrate). There are early adopters through to resisters. There are mass media channels and personal channels for communication, the innovation must have advantages, must be consistent with prevailing values, not too difficult to understand, be able to be experimented with, see the results or

Different diffusion patterns exist for ICT

The former hypothesis is supported by the evidence from the two cases. Both colleges had been investigating the potential of technology and its impact on learning, however staff skill levels and awareness of the role technology could play were minimal. Initial diffusion proceeded through a set of coaches. Staff moved through stages similar to the Rogers model for diffusion. Diffusion was assisted by mentoring processes. As people gained confidence and skill they adapted the learning technologies and made it a tool for enabling a review of teaching and learning and whole school change.

The diffusion of ideas about the use of ICT to improve teaching and learning followed the pattern described by Rogers. People proceeded through stages. Most started by getting to know the details of ICT. Over time they proceeded through the stages of deciding to use ICT through to personalising its uses and integrating it into their repertoire of teaching skills. People moved at different rates through these stages. They were assisted by peers. The process of moving through the stages was helped when people felt they were emotionally supported . By emotional support people meant:

the teaching and learning coaches also provided emotional support. They didn't make you feel you were silly or inferior if you had trouble with the technology. You felt you were part of a team all working on it together.

There were groups of early adopters and resisters. Early adopters are characterised by their colleagues as risk takers and reflectors . There were also groups of laggards who resisted using ICT because they feel it is unnecessary or because it required them to develop new skills which they felt would require too much time. Tying performance with ICT to annual performance plans helped to overcome this frame of mind.

Hypothesis Three - Successful implementation of ICT depends mostly on staff competence on the integration of ICT into instruction and learning. This hypothesis assumes teachers mediate ICT applications when they are successful, and that ICT's academic value relates positively to teacher competence, or Technological infrastructure and student competence rather than teacher competence determine ICT implementation outcomes

A combination of both hypotheses is supported by both case studies.

The technology and infrastructure must be reliable, powerful and efficient.

Successful implementation of learning technologies at GWSC results from having learning technologies supporting good teaching and learning. GWSC is an environment where teachers are expected to implement learning technologies. Their attempts to do so are monitored. They are encouraged to implement learning technologies by having its use tied to the performance appraisal. Student competence is a focus and is developed, although there is still further work to be done in this area.

At BSSC successful implementation results from having ICT supporting good teaching and learning in an environment where teachers are expected to implement it through ICT implementation plans, teaching charters, performance appraisal and the like. Successful implementation requires the staff to gradually acquire competence with ICT, sometimes with the assistance of students and regularly with the help of colleagues.

Hypothesis Four - Gaps in academic performance between high and low poverty students do not increase when equal access to ICT is available to all, or More advantaged students leap ahead in ICT rich environments

According to the Principal of GWSC:

Access is the crucial issue here. Even though all students can have access from home, if they subscribe, the college also opens for extended hours to facilitate access to facilities. Staff at GWSC generally considers that all students are advantaged by ICT. They are able to take greater initiative in using it for autonomous learning .

The BSSC case study demonstrates that academic standards are set by a range of factors but most especially:

- staff expectations,
- the sense of competition with other schools, and
- the culture of student trust.

Hypothesis Five - Successful implementation of ICT leads to higher standards in spite of low quality ICT materials. Academic standards are a function of teacher and school expectations and not of the standards of textbooks or ICT materials, or Academic standards will be lowered because young people are not able to use the technology to their advantage

At GWSC and BSSC teachers have taken the initiative to use and develop their own resources for students. The focus is on teachers and students as developers and creators, on the use of software to create appropriate materials and resources rather than the use of content already developed. There is a range of high quality software available for teachers and students and support structures in place to empower students and teachers as creative users and developers of resources.

Staff members critically evaluate technology resources as they would other resources. There is access to content materials such as encyclopedias and the Internet to aid research. Students are

taught information literacy skills to support their personal evaluation of technology resources as one of the necessary skills for becoming independent learners.

There is a pervasive use of learning technologies in the colleges and academic standards have improved since the beginning of the work on teaching and learning and the integration of technology. Retention rates have also improved. The case studies show that academic standards are a function of a number of inter-related factors such as:

- the pervasive learning culture,
- staff morale,
- a sense of being on show to the world,
- demands of the tasks set for students, and
- a sense of competition with other schools.

[1] Victorian schools receive a formularised annual global budget from which they have to meet all salaries and recurrent costs.

[2] The Victorian Department of Education, Employment and Training clusters schools into groups of like schools to enable comparisons of schools to be made of their relative performances on a state wide testing scheme.

[3] The Victorian Certificate of Education (VCE) is the credential used to mark the satisfactory completion of secondary schooling in Victoria. It is used to calculate tertiary entrance scores of applicants for places in the further and higher education systems in Victoria.

[4] There is a range of specifically vocational education programs incorporated into the VCE system.

[5] The CISCO, Microsoft and Aries courses are all commercial technology related courses.