ICT INNOVATION TRANSFORMING THE HEART OF THE CLASSROOM

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Abstract

The Sydney Centre for Innovation in Learning (SCIL) — the research and development unit of Northern Beaches Christian School, has sought to facilitate successful, transformational, ICT-related pedagogical change into the core of classroom practice in a K-12 school in Sydney, Australia. This paper outlines the success of SCIL as a research and development unit, from its inception in 2005 through to 2008, in facilitating a shift in pedagogical practice among its staff, enabled by pervasive access to ICT throughout the school.

SCIL: Transforming Teaching

Surveys have for the last half decade indicated two recurrent themes in relation to the use of ICT in the classroom. In a simplified précis, these two themes would be well represented with the two conclusions summarised as follows:

1. that used as a tool, the innovative use of ICT in every classroom has the ability to transform the educational landscape and raise academic standards. This is well exemplified in *The big pICTure: the Impact of ICT on Attainment, Motivation and Learning* (Pittard, Bannister, & Dunn, 2003), and

2. that the greatest challenge for schools in relation to using technology to improve student achievement, lies with transforming their greatest resource in the process — their teachers. In its second major report on school technology, *Are we there yet?* (NSBF, 2002), the National School Boards Foundation indicated that "many teachers still are unprepared to integrate technology into their instruction."

Thus the vital link in any transformation process is the empowerment of teachers at the classroom level to take best advantage of available ICT in order to improve student achievement. With this challenge in mind, Northern Beaches Christian School (NBCS) grew its vision of a dynamic school-based research structure, the Sydney Centre for Innovation in Learning (SCIL), strongly committed to creating and disseminating knowledge as linked to the use of diverse ICT tools, in order to improve learning. SCIL programs have experienced phenomenal growth in scope

in a very short space of time, providing teachers with opportunities to embrace the challenges inherent with pedagogic shift.

SCIL: Vision-driven research and development

SCIL has grown guided by the notion that pedagogical change:

- led via school leadership in a vision driven process,
- supported by teachers, kept close to the classroom, and
- connected to pervasive and innovative use of ICT

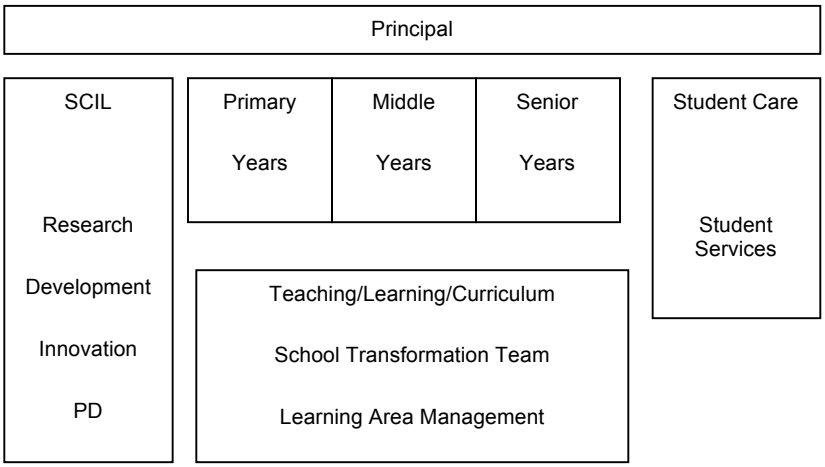
has the potential to enable improved individual learning outcomes and provide a catalyst for whole school improvement. Under this model, SCIL has taken up the challenge to embed pedagogical practice that effectively uses a range of ICTs in every classroom, as well as driving up student academic outcomes across the school. The emphasis of SCIL is to sponsor teacher creativity, supporting staff through targeted professional development and opportunities.

In order to track any specific school trend in student attainment, SCIL is closely monitoring NBCS student attainment over a five year period at key stages in schooling. Specific tracking commenced in 2005 using the mandatory Australian national assessments in literacy and numeracy, taken at Years 3, 5 and 7. From 2008 these tests will also be taken by Year 9 students nationally, in time providing more comparative data. These assessments provide a useful reference point for observing fluctuations in the learning outcomes of a specific grade over a sequence of years. Some preliminary observations are included in the conclusion. At the same time, it is recognised that there are multiple strategies in place to improve learning outcomes at NBCS and that any improvements could not be traced solely to the use of ICT.

SCIL Interface with NBCS Operations

As a unit within the school, SCIL sits alongside the broad management structures of NBCS, with the Principal providing concurrent oversight and direction over the whole school, as well as the research and development activities of SCIL. As illustrated in Figure 1, SCIL is both an integral part of the School's operation, as well as a distinct component of the School's structure. Staff can be allocated work within SCIL projects as part of their annual allocation. In doing this, SCIL has quickly become an embedded and understood activity within the school.

Figure 1: The structural interface between NBCS and SCIL



Supportive Research

SCIL is drawing from the growing body of research over the last decade that is seeking to assess any emerging wider trends linked to the impact of ICT on learning at a school level. As highlighted in the introduction, one report, *The big pICTure: the Impact of ICT on Attainment, Motivation and Learning* (Pittard et al., 2003), reached the following conclusion:

> Overall, the weight of evidence presented. . .suggests clearly that ICT provision and pupil ICT use do in fact impact positively on pupil attainment and on school standards. . .

However, this conclusion was tempered with the comment that "there is no definitive study demonstrating causality." It went on to state that:

> . . . any added value of ICT in educational terms is clearly not just based in the fact of ICT provision, or the amount of use pupils make of it. . .it is dependent on the types of use to which it is put. Therefore the decisions of schools and teachers (and of course pupils) about how ICT is deployed and used to support subject learning are critical.

Likewise, the National School Boards Foundation in *Are we there yet?* went on to state that "the focus needs to expand to how schools are using technology"(2002). The report further indicated that:

> technology will have a marked impact on traditional classroom teaching and learning in the near future [with] almost 30 percent of school leaders

> [believing] that at least one in five students soon will receive a substantial portion of their instruction over the Internet.

Another useful study, this one sponsored by the ministries of education across four Scandinavian countries, *E-learning Nordic 2006: Impact of ICT on education* (Ramboll Management, 2006) provides a further useful reference point. Among a range of conclusions, the Nordic research suggested that:

> Teachers, who experience the greatest positive impact of ICT, use ICT in the most project-oriented, collaborative and most experimental ways. . . those who most often engage their pupils in teaching sequences where the pupils are asked to work exploratively and innovatively supported by ICT.

In order to create its own workable model for facilitating increased staff innovation and sustained uptake of ICT, and as part of a Macquarie University ICT Fellowship (2005), NBCS participated in an experience-based study undertaken in schools or school systems in six countries. The review process was structured around systematic interviews with school leaders, as well as those responsible within an institution for the development of an innovation connected with the use of ICT within curriculum delivery. The ICT Fellowship provided the specific catalyst for the creation of a model that would facilitate increased integration of ICT into every classroom. A separate division within the school was envisaged — the Sydney Centre for Innovation in Learning, dedicated to facilitating teacher professional development in connection with ICT, as well as sponsoring recurrent and sustained innovation. SCIL commenced as a distinct identity from August 2005.

It is interesting to also note some recent related research undertaken in 38 NSW high schools by the University of Wollongong, Australia (Devai, 2007). Devai reached the conclusion that:

> principals of schools where outstanding results were being achieved were relentless in their quest for enhanced student outcomes. . .they constantly remind students, staff and the community that the core purpose of the school is teaching and learning. Principals who brought out the best in their teachers and students were those who were not afraid of change. Rather than attempting to keep change at bay, these principals expose the school to the opportunities and pressures brought by change.

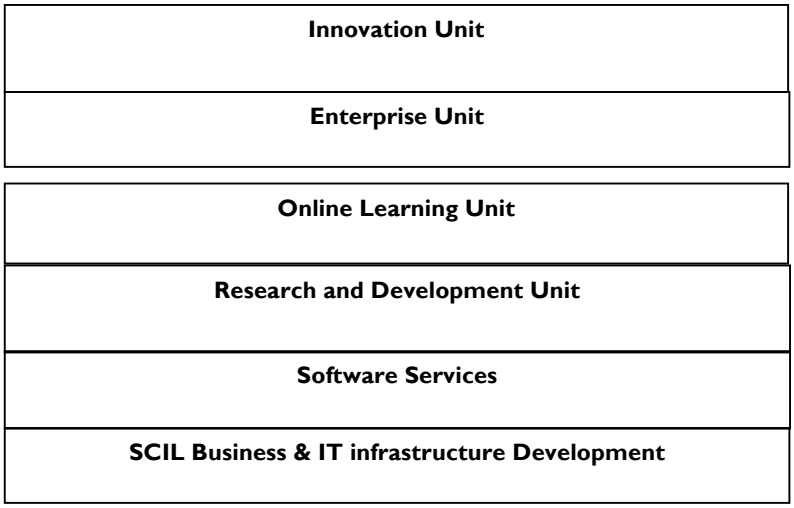
The University's research supports the paradigm chosen by NBCS to position a unit within the school — SCIL — whose main function is to nurture innovation as

a recurrent facet of the school's operation and create well-resourced opportunities for staff to more effectively integrate ICT into their teaching.

SCIL Operation

SCIL is structured around six components. The structure has been created so that teachers can easily identify with the different components of the SCIL endeavour.

Figure 2: SCIL structure 2008



The initial experience has been that teachers have been keen to tackle the professional challenges opened up through SCIL programs, providing them with fresh career opportunities as they embrace the flexibility offered through ICT. SCIL operates to continually extend opportunities and develop new programs:

SCIL Emphasis

SCIL operates from the philosophy that students should be prepared to become problem solvers and team players, opening the possibilities for ideas, design and solutions in preparation for an ever-changing workplace and lifelong learning. A fourth dimension, a virtual dimension, is now part of the paradigm of teaching. As Marc Prensky highlighted in "Digital Natives, Digital Immigrants":

> Our students have changed radically. Today's students are no longer the people our educational system was designed to teach. Today's students have not just changed incrementally from those of the past. . .A really big discontinuity has taken place. One might even call it a "singularity" — an event which changes things so fundamentally that there is absolutely no

> going back. This so-called "singularity" is the arrival and rapid dissemination of digital technology in the last decades of the 20th century. . . .Our students today are all "native speakers" of the digital language of computers, video games and the Internet. (2001)

Our students are immersed in this language from birth. SCIL seeks to empower teachers to lose their tentative digital accent and become native speakers themselves through facilitating systematic exploration of the application of new technologies and e-learning to any classroom situation.

The focus of SCIL has been as much on the construction or re-design of classroom space, organisation and dynamics, as it has been on pedagogic innovation. SCIL recognized that classroom design and the ease of access to technology within a classroom can have a highly significant impact on a teacher's ability to successfully integrate ICT into curriculum design. Since 2005, every classroom at NBCS (Kindergarten to Year 12) has been progressively re-fitted so that at the very least, all learning areas have access to a multimedia capability including:

- a large screen with digital projector, surround sound,
- connection to a flat screen monitor visible to the teacher,
- connection to an internet enabled hard drive, accessible from anywhere,
- and all located on an lectern within a room.

SCIL Websites. SCIL has oversight of multiple websites. Some of these are linked to the main www.scil.nsw.edu.au website or the broader school portal, while some remain as independent entities. Different web domains are attached to different projects and stages within the school, creating an immediate access point for the wider community, as well as providing an avenue for showcasing student endeavour or enterprise. Key websites include:

- www.scil.nsw.edu.au
- www.hsconline.nsw.edu.au
- www.beyondborders.edu.au

Key SCIL Programs

Since 2005 SCIL has developed and implemented a range of key programs. In time, each program becomes an embedded activity of NBCS.

LEARN Portal

NBCS has progressively developed an online school portal as the entry point for a virtual school that mirrors face-to-face classroom activity. That portal commenced

as a HTML based system in 2002, but by 2005, led via the developmental work undertaken through SCIL, that first more basic iteration of a school portal was replaced with a Moodle based tailored learning management system — LEARN (http://learn.nbcs.nsw.edu.au). As teachers became more adept at using LEARN to support their pedagogy, a timeframe was established for SCIL to lead a further significant step forward and start transforming LEARN material into a format suited to the delivery of distance online courses. An additional portal was established to deliver a range of courses for the New South Wales (NSW) Higher School Certificate (HSC) in fully online distance delivery mode.

Distance Online Learning

Perhaps the most significant program currently managed through SCIL is the development and delivery of fully online or blended Stage Six courses. In 2006 SCIL was ready to commence offering fully online interactive courses in Year 11 with its own specific new web domain, established using a Moodle environment — www.hsconline.nsw.edu.au. In doing so, through the work of SCIL, NBCS was the first individual school in NSW to offer fully accredited online courses to its own students, as well as a number of external students. Initially 15 students from 4 schools completed NSW Board of Studies Preliminary HSC courses in either Legal Studies, Software Design and Development or Ancient History. Since then there has been a rapid uptake of online courses and by 2008, over 220 students from 40 NSW schools have enrolled in one of 35 courses. The majority of students undertaking online courses live in rural regions of NSW, choosing subjects that would not otherwise be an option at their local school.

The growth in online course delivery has had the positive side benefit of allowing more highly developed blended learning approaches to be offered to all NBCS students. It would also be a recurrent observation, that the process and preparation of online course programming, has had a significant flow on effect in raising the standards and quality of all senior courses, as well as encouraging more obvious innovation and integration of ICT-enabled learning in a wider range of subjects.

Beyond Borders

Another key SCIL program, *Beyond Borders*, drew its inspiration from a program observed in France, during the ICT Fellowship tour of 2005. That program, the WKTO project from Lycée l'Oiselet, Bourgoin-Jallieu, sought to provide northern hemisphere schools with the opportunity for language development through a shared portal.

With that project in mind, SCIL set about establishing its own collaborative e-learning program, *Beyond Borders.* As with the SCIL distance online learning program, *Beyond Borders* has its own specific web domain, again established using a Moodle environment — www.beyondborders.edu.au. Since 2005, *Beyond*

Borders has been supported through a sequence of Australian Government language grants. *Beyond Borders* provides a safe teacher-mediated environment for students to undertake collaborative short or medium term projects with other students anywhere in the world. During 2007 *Beyond Borders* was further fine tuned and now includes 'Collabor8', a sequenced learning module that provides an immediate framework for teachers anywhere to participate in collaborative projects with other schools. While the majority of projects provide scope for intensive language development, with participants communicating in an agreed language other than their main language, its scope allows for collaboration in any learning area.

Beyond Borders has grown rapidly since its inception in 2005 and now has more than 1800 registered participants from over a dozen countries. A typical project sees sixteen students, from a variety of countries, co-operate and collaborate in order to research an area of interest. Participants communicate using online forums, document exchanges and a real-time chat facility. Students use wiki technology to publish a final web page that remains accessible for future visitors to the website. Language-based programs now exist in French, German, English, Japanese, Spanish, Arabic, Italian or Chinese. Communities of students range in character, from informal and student-driven, to formal, teacher-driven communities.

Primary Education through e-Learning (PETE)

One important aspect of SCIL has been its vision to support innovation and the integration of ICT into all areas of NBCS activity. This has been as focused on work in Kindergarten, as it has been on the senior years. The Primary Portal Project — PETE (Primary Education Through E-learning), commenced in 2006, exploring the use of the school's intranet as applied to all three stages of student learning in the school's Primary section. It has been established using another separate Moodle instance — http://pete.nbcs.nsw.edu.au.

Primary teachers quickly took up the opportunities for ICT integration that PETE provided. Guided by their teachers, students in Kindergarten became proficient in the creation of class digital story books, highlighting aspects of their learning. Students use digital video footage or digital images and a range of suitable software applications to capture their new learning and inform parents and the wider school community of their particular skill acquisition. Students in Year 2 participate in the creation of class digital narratives. This involves an understanding of genre, story development and collaborative narrative creation. Once the narrative is determined, students separately illustrated different sections of the finished storyline and these images were then scanned and uploaded to create the final digital storybook.

Since 2006, students in Years 3–6 have participated in the increasing use of blended learning methodologies, in order to assess whether the increased use of ICT and the introduction of online modules into curriculum work at these stages has the ability to differentiate and personalize learning more effectively. Primary staff have created a wide range of online course modules across a range of key learning areas, as either distinct courses in themselves or as a support to other face-to-face learning.

Learning Culture Indicators

As Brian Caldwell has noted in *Raising the Stakes* (2008), student capacity to learn should be the focus of attention:

> both at the beginning of the planning process and at the point at which the intended learning outcomes are identified and used as the basis for learning and teaching. . .The student and his/her characteristics are also considered in the context of values, purposes and expectations. . .

In 2007, in a project sponsored through the NSW Premier's Awards scheme, SCIL undertook further specific study into 'best practice' use of ICT, including mobile technologies, in a number of schools in the United Kingdom and Finland. One outcome of that project was to identify factors that work to nurture demonstrable independent learning skills within students, especially as related to the use of integrated ICT. SCIL undertook further analysis of identified 'best practice' exemplar in order to focus on quantifying and exploring indicators of an individual and collective aptitude for learning evident in schools where ICT integration was evidently highly successful and routine. A list of indicators was prepared after a process of case-based observation. SCIL has now established a framework that can help track a student or grade in terms of those indicators:

- Resilience: willing to persevere; ability to problem solve; ability to complete.
- Goal orientation: articulates goals; expectations of achievement.
- Values learning: values success; maturity in learning; values teams.
- Highly motivated: clear direction and purpose; clear personal goal orientation.
- Strong work ethic: engaged in & extends own learning; takes responsibility.
- Independent learning skills: self-paced; self-disciplined; self-managing.
- Information savvy: ability to access & use ICT for information.
- High standards: high expectations; understands tasks.
- Protects learning: owns learning; helps build positive learning environment.
- Values opportunities: grasps opportunities; values education as pathway to future.

SCIL — Future Directions

With the scope of SCIL activity growing quickly since its inception in 2005, a framework has been established to help steer its growth into the future. To help guide that, seven areas of focus have been determined:

1. A visionary focus — SCIL as a facilitator of school-based innovation and renewal at local, national and international levels.

2. An educational focus — SCIL to provide significant and flexible opportunities for improved student learning outcomes, especially as enabled through ICT, specifically the use of mobile technologies.

3. An internal professional development focus — creating an extensive hierarchy of ICT competencies that all NBCS staff are expected to acquire. Establish PD processes to help monitor and advance staff ICT competency.

4. A global focus — developing SCIL programs that can be readily accessed by students with 'anytime, anywhere' flexibility.

5. A commercial focus — SCIL to explore the potential of current activity to create an income stream for the school, specifically in the areas of teacher professional development and the moderation of managed learning systems for other schools. Any commercial activity is conducted under the framework of the school's not-for-profit charter.

6. A mission focus — exploring the potential of SCIL to facilitate improved learning beyond NBCS through the use of student created online learning modules delivered to third world situations.

7. An infrastructure focus — ensuring that the ICT infrastructure of the school is stable, continually accessible and managed with minimal intervention.

Conclusion

SCIL emerged from a process that originated with the notion that recurrent educational innovation, especially as linked to the integration of ICT, would in time drive a significant pedagogical shift, leading to improved student learning outcomes. Using the data from mandatory annual national assessments, initial observations drawn from NBCS student outcomes in Years 3, 5 and 7 between 2004 and 2007 would suggest that if any early indicators exist, standards have

improved. When tracked across years, the data demonstrates a consistent upward pattern in student attainment.

Figure 3: Student outcomes years 3 and 5

	Yr 3 2004	Yr 5 2006
Literacy Top 2 Bands	65%	68%
Numeracy Top 2 bands	38%	85%

	Yr 3 2005	Yr 5 2007
Literacy Top 2 Bands	56%	64%
Numeracy Top 2 bands	64%	77%

Unfortunately, Year 7 data cannot be interpreted in any continuum with primary level data as a significant influx of new students occurs at this point, thus invalidating any comparison. However, the advent of national Year 9 assessments from 2008 will allow for a similar tracking of a grade cohort as students transition through secondary in the future. Nevertheless, data comparing the differing attainments of adjacent cohorts demonstrates a similar pattern.

Figure 4: Student outcomes year 7

	2006 Top Band	2006 Top Band	2007 Top Band
Literacy	58%	63%	55%
Numeracy	29%	39%	70%

The notion that empowering innovative teachers, working in close collaboration with assigned SCIL mentors, has proven to be a key to successfully changing teaching paradigms. The goal is to create a situation where students are experiencing ICT-enabled learning and innovative approaches consistently across all learning areas and teachers.

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