



The Place of Virtual, Pedagogic and Physical Space in the 21st Century Classroom

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Abstract

This paper outlines work connected to the successful convergence of digital, pedagogic and physical space. The Sydney Centre for Innovation in Learning (SCIL) has been focusing on the gap that has existed in schools where the physical layout is often stuck in an industrial-era education model, rather than reflecting the possibilities of ICT-enhanced personalised learning. SCIL has been working to create digital spaces so that students can consistently transition from the real to virtual world.

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Introduction

This last decade has seen an increasing focus on the nature of evolving ‘twenty-first century’ pedagogy – learning suited to a post-industrial era context and a growing interest in designing spaces with ‘twenty first century learning’ specifically in mind.

Different education jurisdictions around the world have responded to these challenges with varying degrees of vision and in some cases policy. However, for most countries, the core work in both areas is largely still to be undertaken. Pedagogy will not change with significant groundswell, enough to provide a ‘twenty-first century’ learning experience for the majority of students, until this key essential work is undertaken. That work needs to focus on:

1. providing cost effective and targeted professional development so that all teachers shift from a default practice grounded in their own learning experiences within an industrial-era framework, to a pedagogy able to support learning in a twenty first century age of constant change
2. supporting existing schools to adapt inherited learning spaces, so that the default industrial-era model is no longer the predominant resourced model
3. creating new spaces for learning, designed around new paradigms.

Evolving notions of space can have a critical role in facilitating ICT-enabled pedagogical change into the core of classroom practice. The Sydney Centre for Innovation in Learning (SCIL) has been developing a practical model that unites digital, pedagogic and physical space so that learning occurs in environments conducive to the challenges and changes of the twenty first century. This paper outlines the process of developing concepts that has enabled the successful convergence of digital, pedagogic and physical space within a school.

Research

Today's students are immersed in a world of technology from birth. It is natural for them to live *within the internet*, rather than *using the internet* as is likely the case for their teachers and parents. Seymour Papert was among the first to make statements calling for a complete re-think of education models, with the advent of ubiquitous computing. In an essay co-authored with Gaston Caperton, they commented that educators have tried 'to use new technologies to solve the problems of *school-as-it-is* instead of seeking radically new opportunities to develop *school-as-it can-be*' (Papert and Caperton, 1999, p.2).

The essay goes on to suggest that conversations about schooling 'ought to be about developing and choosing between visions of how this immensely powerful technology can support the invention of powerful new forms of learning to serve levels of expectation higher than anything imagined in the past'. Somekh and Mavers picked up this conversation adding that 'teachers are not resistant to change, but are caught in a constant tension between the technician demands of the system and their instincts to assist children to learn by engaging actively with ideas and concepts' (Somekh and Mavers, 2003, p.3).

Papert used the concept of 'Megachange', to describe the immense shift that has occurred in the last twenty years as so many of the systems of our society – banking, health, shopping, communication, have been fundamentally altered through the advance of ICT. But he pointed out that 'megachange' was not evident in the school system.

More recent researchers have been quick to highlight that in a world of rapid technological change, today's students are demonstrating serious signs of disengagement. As Marc Prensky highlights in 'Engage Me or Enrage Me – What Today's Learners Demand' (Prensky, 2005, p.2):

"Rather than being empowered to choose what they want ... and to see what interests them ... and to create their own personalized identity – as they are in the rest of their lives – in school, they must eat what they are served. And what they are being served is, for the most part, stale, bland, and almost entirely stuff from the past. Yesterday's education for tomorrow's kids."

The challenge is patently clear – schools have to embrace the 'megachange' required and construct new paradigms for learning in the twenty first century world. Mavers made the comment that:

"As digital technologies proliferate and become established in the everyday world of home, work and community, schools are inhabited by young people who are experienced users of a range of media and whose use is characterized by agency and adaptability." (MAVERS, 2007, p.52)

No longer is the change a topic for conversation, it is an imperative. Guski talked about the importance of spatial perception in school architecture, highlighting that ‘we don’t only see an object, we also feel, smell, taste and hear it’. (Guski, 2000, p.2) and Walden picks up that same spatial theme stating that:

“A space is much more than four walls, floor and ceiling. The spatial conditions that should be considered for human well-being include color scheme, lighting, heating, cooling and ventilation, acoustics, smells and furnishings. All these aspects can significantly influence the sense of well-being and readiness to learn and therefore learning performance.” (WALDEN, 2009, P.78)

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Light in the Tunnel

In the last decade, there has been some advancement in spatial thinking related to school designs for the future – creating new spaces by altering existing environments or creating new environments for learning. Leaders in the field would undoubtedly include architectural firms such as Fielding Nair International that specialize in school design, alongside the well researched work of JISC in relation to higher education in the United Kingdom. One of the conclusions made by JISC was that ‘many spaces will not look or function as they have done in the past – nor should they’. (Smith, 2008, p.7). In a video documentary filmed against a background of his current work, Randall Fielding, (Fielding Nair International) highlights the importance of the learning environment to the learning experience:

“The environment is like the second curriculum in a way– it is that silent curriculum in the background that is always there and is providing stimulation which is so important; it’s stimulating our senses, in some cases its bringing us more oxygen to the brain which helps us think; in other cases it’s allowing more sunshine in – all those parts of the environment are key to helping us be innovative and creative.” (FIELDING, 2009, VIDEO TRANSCRIPT)

Prakash Nair goes further saying that any allocated budget ‘should go to develop tomorrow’s facilities as infrastructure *responses* to an educational philosophy—one whose goal is not to control students, but to empower them to take charge of their own learning.’ (Nair, 2009, p.3)

One notable example of a wide-scale governmental approach involving the creation of ‘twenty first century’ spaces for learning would be the Building Schools for the Future (BSF) program in England. Their aim has been to rebuild or renew nearly every secondary school in the country, with a massive budget allocated to the program over multiple decades. The BSF stated that ‘the proposed changes should not be merely incremental or simply aspirational – they

should be innovative and ambitious' (BSF Partnerships for Schools, 2008, p.3). It has already produced many lighthouse projects, built around new learning paradigms, leading to some highly flexible spaces for collaborative, multimodal learning, supported by ubiquitous access to mobile technologies.

Interestingly, although the program has ostensibly been about the construction component of developing new spaces, the real change that has to occur is with the teachers and students who will inhabit these spaces. Speaking about the program, CEO Tim Byles (Partnerships for Schools), stated that:

"Although bricks, mortar, concrete, steel frames and so on play a critical role in this programme, what it is really about is people ... enabling transformation of how – and where – teaching and learning happens ... be it virtual or real ... and increasingly now thanks to innovative technologies, between groups of learners as peers." (BYLES, 2009, PARA. 4)



Description of Project — SCIL: Spaces for Learning

It is against this backdrop that the SCIL, located within Northern Beaches Christian School (NBCS), Sydney, Australia, has undertaken research into how the gap between pedagogy, space, technology and architecture might be narrowed or even eliminated. At the same time, an opportunity existed in 2007 for NBCS to commence design work in order to construct a new space for 'twenty first century learning'. The Spaces for Learning Project has progressively looked at the nature of change in educational space and led to the reconstruction of older spaces, as well as the development of new spaces. SCIL took up this challenge – to concurrently:

- develop the pedagogy of every teacher within the school, leading to the universal adoption of technology as a natural tool within learning
- convert existing space to suit more inquiry based paradigms
- create new space that reflected the strategic intent of the institution

A key strategy in the earlier stages of the Spaces for Learning project, was to place an ICT integrator position at the senior management level of the school. A Deputy Principal, responsible for the wider operation of the school, as well as Information Services, was charged to 'expose, empower, and enable staff to make the most of the technological teaching tools available to them and the students' (Linfoot, 2006).

Professional development was targeted to developing the ability of every staff member to consider appropriate and relevant pedagogy within that virtual space – especially when delivering courses in a blended mode. For a number of teachers, it was probably the first time since their formative professional training that there were active conversations about pedagogy as related to specific content and curriculum. Teacher professional development in this realm needs to be of necessity delivered on-the-shoulder, providing support right at the point of need.

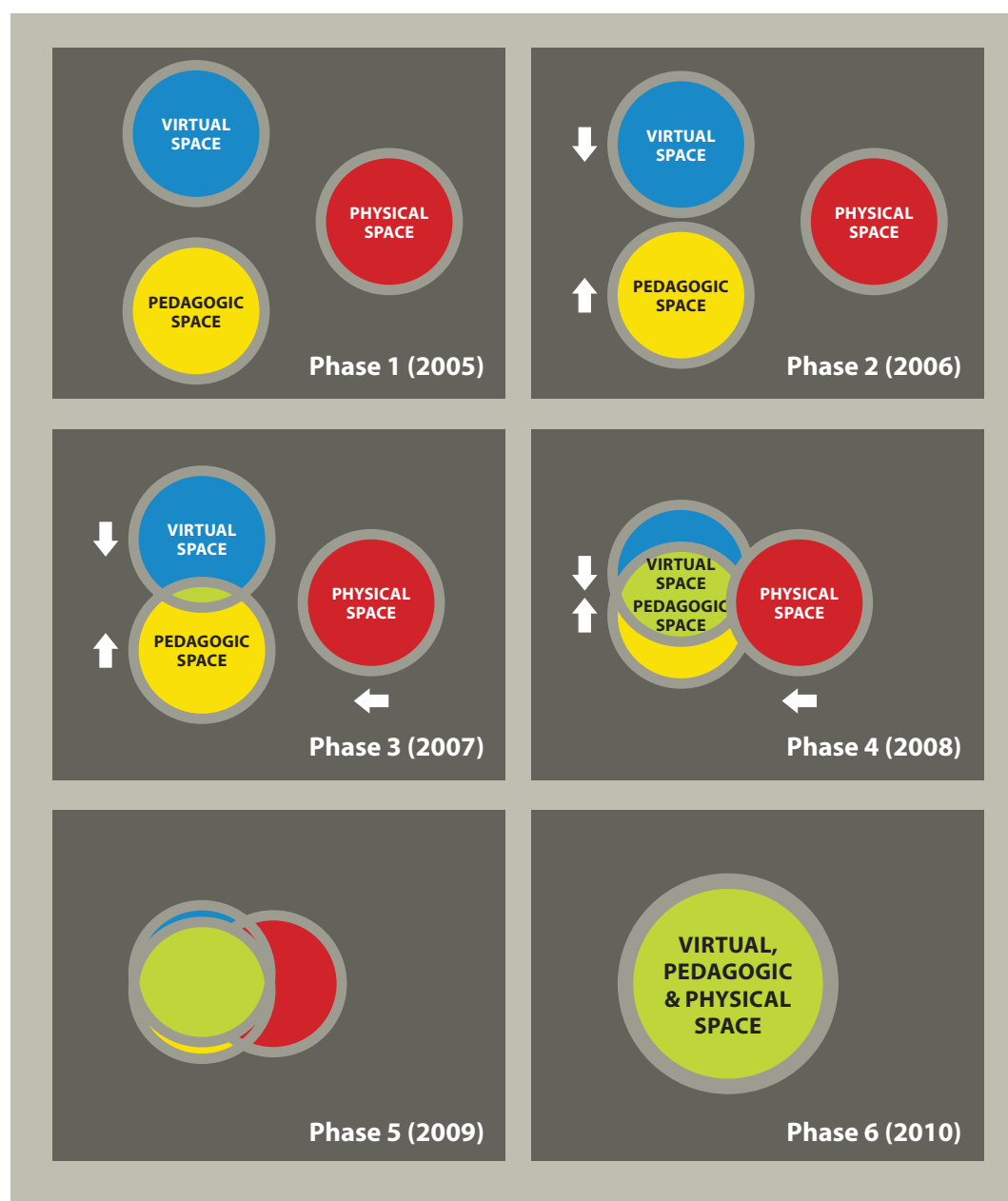
At the same time, a concurrent strategy was employed enabling the identification of teachers who wanted to make swift changes to their pedagogy, enthused about the possibilities of new and emerging Web 2.0 technologies. The strategy of supporting fresh ideas and empowering natural change agents to take the lead at a grassroots level, proved to be highly successful. Again, one critical action was to provide support at the point of need.

Alongside this focus on professional development and pedagogy, on-going fieldwork was conducted in order to stimulate thinking in relation to the conversion of existing classes to less formal spaces more conducive to concepts of twenty first century pedagogy; consideration of the type of furniture best suited to this less formal context, as well as taking the opportunity to design a signature building that could provide an international benchmark for new paradigms of learning.

To advance this work, SCIL has focused on progressing ideas in three distinct spatial concepts: pedagogic, virtual and physical space. Figure 1 (page 8) demonstrates pictorially the progressive work in this area over six years. Initial focus was given to developing distinct virtual spaces that could be brought into the everyday pedagogy of all teachers across the school. Every physical class or course has a virtual space, complementing the work occurring within the physical realm.

The next significant point was the creation of specific integrated collaborative teaching and learning programs at the junior secondary level (Australian Stage 4) in 2007, which required the modification of existing learning spaces to suit a self-directed inquiry based paradigm. The Global Learning Village was created using five conventional classrooms, opened up into one less formal space, with ready access to sufficient PCs to create a one-to-one student to computer ratio. Throughout 2008 and 2009 work continued on multiple levels. Planning continued leading toward the establishment of refurbished open plan collaborative space suited to Australian Stage 3 (upper primary), as well as planning for a more tailored integrated science, history and geography program for Year 8 (late Australian Stage 4) to be located in the new SCIL Building, opened in January 2010.

FIGURE 1: THE PROGRESSION OF PEDAGOGIC, VIRTUAL AND PHYSICAL SPACES AT SCIL



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Underlying Premise

The premise for work on effective spaces to support learning, was 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. SCIL has operated on a model that has involved accomplished teachers, with an appreciation for the potential of ICT in the classroom, matched with strong competency in ICT, able to bring the strength of their real classroom into the virtual sphere. This emerged as a highly successful exemplar.

At all stages of the project, conversations about pedagogy have been the starting point, underpinning all thinking. With the capacity to use both real and virtual space for any lesson, questions relating to the most effective way for specific outcomes to be covered in a course became highly relevant. One effective strategy has been to create multimedia files that cover core content. By uploading this content to the portal, students have been able to access and review core information in many courses.

More recently SCIL has established two separate virtual environments within Second Life, extending the boundaries of available space for learners and learning. Booralie, an island on Teen Second Life is a secure island available only to approved students and teachers. The experience of Booralie has demonstrated that with some guidance, students are very capable of developing the spatial infrastructure on the island and teachers have been able to focus on using that spatial for pedagogic diversity.

The value of teaching and learning space within a 3D virtual world such as Second Life and more recently Open Sim, is that it opens up a whole new range of options for any given lesson. It is not that suddenly every student connects with this new context – rather, it recognizes that students are very comfortable with such space and it may be another tool to enable engagement into learning. An example of this would include students undergoing intensive French language conversations using text chat facilities embedded within the virtual environment and at the end of a given period of time, copying and pasting their conversations into an email that is then sent to the teacher.



The challenge of inherited industrial-model classrooms

The area that presents the greatest challenge – and has arguably lagged behind in institutional planning across the world, is to consider how to create or transform the physical spaces so that they better support learning in a twenty first century environment of constant change.

SCIL has approached this challenge from three perspectives:

1. How might existing physical spaces be adapted or re-invented to cater for collaborative inquiry based learning?
2. Given the opportunity for a new building, how might learning spaces be designed so that the building has contemporary relevance and adaptability into the future?
3. What technologies need to be built into the physical infrastructure of a space, as opposed to brought into the building in the hands of the learner?



The opportunity of new thinking

The spaces for learning that we have in schools have to change. To highlight the critical role that evolving notions of space can have in facilitating ICT-enabled pedagogical change into the core of classroom practice, SCIL has taken this model that seeks to unite digital, pedagogic and physical space, as the logic behind a new building.

The SCIL Building opened in January 2010 and has been informed by these notions. The building is saturated with technology and information access. One notable feature beyond pervasive wired and wireless internet access, is the extensive sound system providing personalised sound to multiple zones within the building. In this way, sound can be used as an active or passive sensory stimulus.

A further challenge in the design of this building has been the imperative to have a space that is capable of adapting to evolving ideas of pedagogy. The SCIL Building is designed so that the physical space intentionally engages the observer upon entering, through a combination of technology, informal space, strong use of light and a stimulus rich environment. Spaces have been created to provide zones that can be used as connected spaces or independently. The distinct zones have been given playful names such as the Brainforest, Parklands, Glasshouse, Sandpit, Loft and Mini-park, connecting all aspects of the building. The traditional rectangular classroom space is largely absent.

Job functions within this building have been created to match the pedagogical capabilities of the space. Rather than have a traditional librarian role, the building is overseen by a teacher leader – Director of C21st Pedagogy, whose role is to work alongside teachers at every stage of the teaching and learning process, in order to provide confidence, innovation and leadership for any teacher wishing to explore the opportunities of the learning spaces with their students. At the same time, the SCIL building serves as a professional playground for teachers as they seek to develop their understanding and practice of the pedagogical possibilities of new technologies in a supported environment, as well as considering how to alter existing learning space to better align with a digital world.

Additionally, as an endorsed provider of accredited professional development under the auspices of the NSW Institute of Teachers (NSWIT), SCIL is using the inspiration of the SCIL building to facilitate pedagogical change not only at NBCS, but beyond. The Sandpit – created as a *technology ‘toy room’* – has been designed with the notion that teachers can trial new technologies in a supported environment. NSWIT-endorsed professional development courses use the Sandpit as the point of initial delivery.

The nature of learning in the SCIL Building

Learning needs to be collaborative, flexible, adaptive, intuitive, open ended; focused on possibilities rather than imparted content. Prakash Nair highlights that ‘new research suggests that students need to be comfortable (just like adults) to learn. That includes ergonomic seating and other furnishings, ample daylight, lots of fresh air, and well-designed artificial lighting and acoustics. Facilities that are created with respect for students are, in turn, respected by students’ (Nair, 2009, p.2).

Selecting the right furniture for learning is as important as any other component of the design process. There is no point developing spaces for learning that, if they are furnished using ideas more linked to outdated notions of an industrial era. Furniture can very easily reinforce teacher-centric pedagogy. The SCIL building has chosen to break away from the industrial-model paradigm with furniture as much as possible. As you enter, you will see the Brainforest, furnished with its pixel-mimicking cubes – splashes of red and wild berries - echoing some of the colours of the Parklands. The intention is fun, function and flexibility.

The choice and use of the plectrum three-sided tables is to send an instant message of collaboration, along with flexibility. These tables can become the discussion space for three, clustered for larger group discussion – or scattered like a trailing caterpillar.

Another design intention is to not only move away from the model of the industrial-era classroom, but also the rigid rows of the early ‘computer rooms’. In many ways, the computer laboratories that were liberally created since the mid 1980s, were an reincarnation of the industrial model thinking, albeit with new technology. The SCIL building has sought to allow for fixed and mobile access to information technologies in informal settings. The *computer room* concept has disappeared and taken over by spaces for collaborative enquiry where computers become the tool to support the work and output of participating learners.

A ‘green’ building

Environment educator, David Orr has suggested that we ‘must see design as a large and unifying concept ... at all times join[ing] our five senses with the human fabricated world.’ Built with industry standard Environmentally Sustainable Development (ESD) principles in mind, the SCIL building itself seeks to engage students into a better understanding of energy conservation principles by its use of sustainability in the design process.

The building is managed by a building management system (BMS), that uses

sensors to open and close windows based on external temperature and weather conditions. All water is collected from the extensive roof areas and recycled for use within the grounds of the school. The carpet tiles are made in part from recycled tyres and insulation and air flow has been used to maintain even temperatures throughout the building. There is also capacity for solar panels to be installed. As students learn how the building functions, so their awareness of sustainability features is grown.

Perhaps that is best captured by the notion that for many, a subject such as science is about experiments that confirm already provided contentions, rather than open-ended discovery, grounded in – and extending – current knowledge.

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Conclusion

Space is both a fixed and fluid notion. It has an enormous impact on how we feel and think – the very core of our experiences of life. The challenge for schools is to identify the different spaces it inhabits – virtual, pedagogic and real, and to draw these together in meaningful ways so that learning can focus forward, enabled through technology and not get dragged backwards.

Lackney highlights that ‘social discourse and collaborative learning are critical to the development of well-rounded citizens. (Walden, 2009, p.161). In the end, schools and education jurisdictions will have no choice but to change. The rate of technology shift and the nature of the complex interactions of the wider community, will force the issue. The question is ultimately not how schools should change, but when.

The SCIL building picks up that challenge in a highly intentional way - designed to facilitate teams of teachers working together with their students, and move learning completely out of the more isolating models of earlier paradigms. The task is to ensure that all teachers will be supported in this shift and to reinvent all classroom areas into twenty first century spaces for learning.

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