

Immersion in School Design – Educational Outcomes of an Innovative Design Studio

Dr Susan Wilks
Dr Dominique Hes

Abstract

This innovative 3rd year design studio involved collaboration between university and secondary school staff and students. The participating educators' shared the belief that sound education involves immersing students in research associated with 'big' ideas and engagement in challenging activities. This was accompanied by the belief that architecture is not just about the building and that if the creators collaborate with the users, educational experiences can be enhanced and spaces that reflect educational ideologies designed.

The studio was part of the Victorian Eco Innovation Laboratory, a government initiative aiming to engage students in design universities in partnerships with schools. Its stated outcomes were the development of educational philosophies and their potential expression in sustainable building design and understanding how building design can provide effective learning spaces.

Many aspects of this studio were successful, particularly the university/school student collaboration. However, the university students, although giving the intellectual stimulation a high rating when they evaluated the subject, provided the educators with insightful feedback about the studio's expectations and activities. It helped the staff realise the importance of scaffolding student progress and being explicit about the rationales behind innovative activities and assessment tasks so that students aren't left wondering whether they should have opted for an easier 'traditional' option.

Keywords

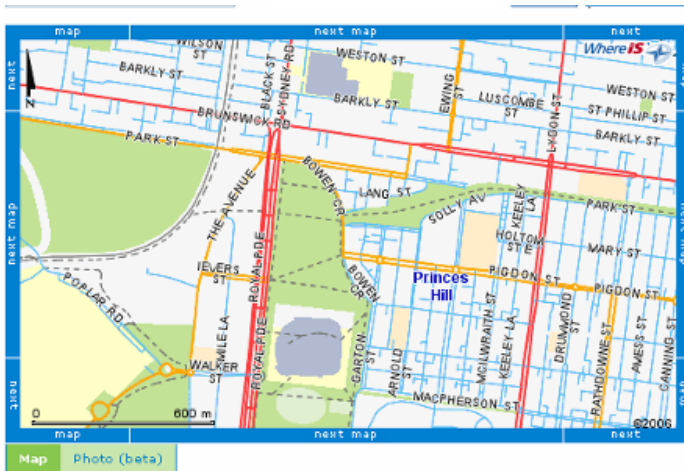
sustainability, partnerships, innovative education

Introduction

Despite coming from different disciplines the authors of this article shared beliefs about how to engage and challenge students through innovative approaches. With a background in environmental science, Hes' research and teaching has emphasised the practical concerns connected with sustainable principles. Wilks, a teacher educator, has written curricula for state and national bodies and taught in the areas of critical and creative thinking applied across the disciplines. Both had noted the lack of student engagement in design studios in their faculty and endeavoured to change the culture.

Central to this 3rd year Design Studio in the faculty of Architecture, Building and Planning (ABP) at the University of Melbourne was the belief that architecture is not just about the building but can enhance the educational experience by providing spaces that reflect educational ideologies and opportunities for user input. While focusing on practical concerns and sustainable principles, the studio required a high level of design thinking and experimentation. The university students were asked to operate within the canon of architecture and develop an appropriate architectural language. As well, they were expected to work with school students, the potential occupiers of the spaces they designed, and communicate the ideas they were developing for them as well as listening to them as clients.

This studio exemplified current school curriculum 'essential learnings' and the university's teaching and learning principles which include the creation of intellectually exciting social contexts and the use of learning cycles of experimenting, feedback and assessment¹. Satisfying calls for curriculum activities to be sited in the 'real world', the junior secondary teachers incorporated aspects of the design studio into a built environment and sustainability elective that they conducted concurrently.



The Design Studio

A local Secondary College and nearby open space was used as a case study. The design studio brief was that this inner city school had outgrown its capacity and a nearby parcel of land on which to develop a junior secondary environmental studies precinct had become available. The students were in their last year of university before spending a year in a private practice working as architectural assistants. The studio was set up as a 'working' day from 9am to 5pm.

Aims for the studio were to develop an understanding of:

- educational philosophies and their potential expression in building design
- the impact of low tech options and high tech options on building design
- function, space and connectivity
- how to carry out site assessments
- how building design can be a provider of effective learning space as well educate in its own right
- design excellence and what this comprises
- ways to communicate with peers and clients (the school staff and their students)
- what education and building design could look like in 25 years time

The studio was 12 weeks long. In the first stage (three weeks) students were expected to get to know their fellow architecture students and their clients – the Year 8 students and their teachers. Over the next three weeks (Stage 2) they were to familiarise themselves with the issues of school design, sustainability, pedagogy, the site, the community and the concept of a 3D textbook². The final six weeks was spent developing their designs for

1 *Nine Principles Guiding Teaching and Learning in the University of Melbourne*. James, R. & Baldwin, G. Centre for Studies in Higher Education, 2002.

2. The concept of the 3D text book is not new, for example Nair and Fielding (2005) have written on the potential for the building to be part of the leaning experience. The idea of the buildings as a 3D textbook, in relation to sustainability, is that if you design a building to be more environmentally responsible then why not use it as part of a curriculum to teach students about heating and cooling, temperature transfer, sun angles, lighting and so forth. Further, as a 3D textbook the building can embody its philosophy overtly, hanging its green credentials on its sleeve, with access to electricity meters, control mechanisms, data, sustainability philosophies etc. For example, the work by Mimmi Ferdin towards the end of this article where a green ribbon runs throughout the buildings, providing shade, food, connection to seasons and epitomising the idea of the 3D text book being the building, even carrying this through to the presentation of her scheme. (Nair, P. & Fielding, R. 2005)

the new precinct and presenting these to a variety of ‘audiences’.

Stage 1 – Getting to know one another, communicating with the client and groupwork

One of the main issues faced by a studio teacher is how to engage an entire class for the day, while also providing students with individual attention and feedback. The class of 16 was split into pairs with each pair expected to become an ‘expert’ in one *aspect* of architecture - aesthetics, function, materiality, buildability, innovation, context and comfort. The students researched their aspect by exploring the university campus - identifying and recording its presence. They also developed a feedback sheet for later use as a framework for critiquing one aspect of fellow-students’ designs in later studio sessions.

In groups of eight they developed a 20 minute presentation for the Year 8 students they were soon to meet. The purpose of this activity was not only to facilitate knowledge-sharing among groups and studios but also to clarify understandings of their aspects so that they could present it in a way that would engage the school students.

This intensive period of research and getting to know one another and the client led to a fruitful half day in the school. The university students explained their aspects and the Year 8s carried out a task to illustrate their understanding of this aspect. For example, for ‘buildability’, groups of secondary students were given a range of building materials and competed to complete a construction task - with prefabricated, large elements winning over smaller elements. For ‘innovation’ the students were given straws and an egg and had 5 minutes to create a structure that would protect the egg when dropped from 1.5 meters. The photos below show the students engaged in the activities and presenting the outcomes.



Stage 2 – Getting to know the site and the theory

Pairs of university students were given a relevant research topic. They had to communicate the topic to their colleagues in a non-verbal format as a ‘clever and small artefact’. This introduced the creative expression of their knowledge and a range of research modes. Examples of areas researched were:

1. community engagement in secondary education – observational research
2. educational brief (general to Victoria / the world as well as specifically for princes hill secondary college) – document research
3. integrated monitoring in schools – internet, manufacturer and observational research and the current energy and water usage and production by the school.
4. surveys and typological studies of school buildings – document research
5. establishing what the students and teachers wanted from the architecture of their school – interviews and questionnaires of the students
6. ascertaining the statutory requirements for the site – planning overlays, setbacks, height limits, BCA requirements etc.

These artefacts (some are pictured below) were then presented to the group and kept in the studio for reference throughout the remaining weeks. Examples of artefacts produced included a sandwich box containing a sandwich of the process of data collection from the community and the good (energy drink) and bad (packet of cigarettes) sides of community participation in schools. There were several trees of knowledge showing what the students wanted from their school; a Brutalist puzzle showing both the materiality and precedents depending on how you resolved it; and, a pull-out box showing layers of regulations as they pertained to the site – height, trees, slopes, number to toilets and sizes, car parks etc.



In studio they presented collages of their precedent school studies and their approach to pedagogy for the school (eg Bloom's Taxonomy stages, Montessori principles).

During this stage they were given the design brief and asked to create boxes to represent the volumes that this brief denoted, eg 8 classrooms of 90m², café, music room, library, toilets, store rooms, etc. They were expected to arrange these volumes on a scale model of the site in order to develop a sense of the density they could then deepen in their design strategy. The design strategies they were asked to explore appear in the table below:

Institutional	Environmental	Dispersed	Respond to sun	Fluid	Labyrinthine	Vertical movement
Domestic	Social	Compact	Cheap	Safe	Technical	Horizontal movement
Easy to build	Exclusive	Transparent	Expensive	Arty	Consumption	Good design principles



They also spent a day with site surveyors and a landscape architect documenting the site. The purpose of this was to give them access to equipment and to immerse them in the site of their proposed designs.



While on the site, the students were asked to study what was occurring on and around the site. This resulted in documentation of the local community, including information about site occupation, transport, wind, sound and light patterns and a full botanical study of all the trees and shrubs noting those that could be transplanted, cut or needed to be protected.

Stage 3 – Design, design, design

For the remainder of the semester the students worked on their designs. They had two main deadlines - a presentation to the Year 8s, and a major presentation to a panel of experts as the official studio ‘crit’. The tutors spent time with each student helping them to develop their designs and having them present their ideas to the studio group as they developed. It was at this time that the feedback sheets developed at the beginning of the program were used by the non-presenting students as expert/audience/assessors. The added value of having ‘experts’ in the class was there was a ready point of contact (other than the tutor) for questions about design decisions. For example they could offer assistance with pragmatic decisions such as ‘How many car parks are needed?’ ‘I want to put in a ramp - what slope is required?’ or more complex issues such as ‘How could I support learner-centred development in my design?’

The assessment of the projects by the Year 8s was a wonderfully chaotic morning³. The excited students came to the studio and were each given two blue dots and asked to look at all the projects and vote for their favourite by sticking their dots on these designs. The architecture students were stunned at the depth of questions and discussion that arose as the Year 8s analysed their designs. One architecture student commented ‘*They were asking me about the use of thermal mass, and light into the class room and how we were planning to naturally ventilate and what sustainable materials I was planning to use. I couldn’t believe it, they seemed to know more than I did!*’ The purpose of

³ An expose of traps for beginners – far too many excited students descended at once (it seemed like hundreds). Dots were ‘stolen’ and hundreds appeared on student works. Such happenings are all in a day’s work for a Year 8 teacher, but a shock for the university staff.

this exercise was to give the architecture students the opportunity to test the clarity of their designs with their clients and receive feedback on whether they had satisfactorily addressed the design elements the Year 8s wanted in their school. It also was an opportunity for the Year 8s to 'read' a 'real' plan and make informed decisions about content following a discussion with the designer.



The university students should not have been so surprised at Year 8s knowledge and probing. The teachers had used the collaboration with Melbourne University as an opportunity to have their students design sustainable houses – teachers of science, maths and design all worked towards a 'sustainability street'. The two programs built on one another and both cohorts were pleased with the outcomes.

Feedback and evaluation

Schon (1983; 1987 in Hatton & Smith, 1995) stressed the need for professionals to learn how to frame and reframe the complex problems they face, evaluate and test out various interpretations of what is occurring, and then modify their practice as a result. This studio drew on a range of perspectives - students, colleagues and teacher educators - to critically reflect over an extended period in order to explore alternative ways of conducting the studio.

The Smart Green Schools studio aimed to engage the students in real projects while bringing space, sustainability principles and learning together. The studio offered a new engagement and assessment tasks. The tutors wanted to avoid what one often observes in conventional studios – either the students' disappearing a week or so after receiving the design brief, or students' sitting idly in the studio waiting for the tutor to have some one-to-one time to discuss their designs.

Students commented on both the scope and content of the subject. Most liked the subject's 'big' design concepts, the practical and 'real world' tasks, the emphasis on education pedagogies and the concept of a 3D textbook. They felt the focus on, and immersion in, construction and sustainability assisted the development of their designs. The day-long studio should have enabled focus on their design and in-depth exploration of topics, but they felt this time was not necessarily well used by themselves and the teaching staff. Some questioned the value of the lengthy site visits.

Although they appreciated the need for in-depth research, the students would have liked less emphasis on this aspect of the subject and more time to develop their designs. She had hoped the students would link the research to their designs. She realised that the volume of activities and exercises (all helpful in their own right) had taken away any time the students may have had to engage in reflection. Because of the demands of the exercises the tutors had little opportunity to assist the students to reflect on the research in relation to their designs.

The students desired more one-to-one time with their tutors so that they could progress with their schemes rather than often having to frequently present their work and 'crit' other presentations. The concept of crit sheets being designed around a particular focus (eg aesthetics) was sound. However, although a model crit sheet was given to the students, the staff was disappointed with the products and believed they might have been of a higher standard had they been included as an assessment task.

Some students felt two half-day studios might have been better than a full day, as they found the volume of work prohibitive when combined with other third year subjects' requirements. The staff agreed that the volume of work was onerous and that it probably did not represent a typical day in a design studio. They decided that tasks could be combined in the future to enable the presentation of fewer, but more substantial products.

The students appreciated the assignment submission times being spread across the semester. However, some commented that some assessment requirements were unclear. They also requested a clearer idea of the scope of subject from the beginning. When the staff observed the amount of effort the students were putting into early tasks, they decided to reward them by altering the % weighting of the tasks. The students cited this as a major annoyance. The tutors were disappointed by this reaction, but it points to the need for clarity of intention and scope where assessment is concerned. They hoped the students would see them as responsive to the learners' needs, but the students viewed them as indecisive.

Having 'lectures' interspersed through the semester was met with a mixed response. Some topics were seen as helpful for their designs and understanding of educational theories, but there were calls for clarity about how and where the lecture content fitted into the design process.

One student's comments provided an excellent summary of his/her peers' evaluations of the studio:

The amount of time spent on researching reduced the available time for design work. The idea of the office was great, but in some ways, by researching very specific areas and then pooling that knowledge, along with lack of time, it led to similar approaches by the group to the school design as opposed to developing our own strong research set for our project. For example, the emphasis on sustainability and 3D textbook became a constraint rather than an automatically integrated part of an innovative school design. Overall, though, it has been an interesting design project.

Although written in the late 1980s, Northfield, Baird and Mitchell's (1988) six factors associated with successful innovation in an educational setting⁴ still provide a useful checklist against which to think about the successes and limits of this design studio or any other innovation.

1. Hes, the studio leader, accepted the difficulties of making a bold move but always supported the staff with theoretical back-up, copious notes and well thought through strategies and activities (although perhaps too ambitious and too many for such a radical shift in studio culture).
2. Both the studio tutors and the secondary school teachers associated with the studio were briefed about aims and intent by Hes. The Smart Green Schools studio leaders accepted responsibility for the new model and enthusiastically embraced its implementation. They may, however, have not been explicit enough when discussing reasons behind and content of activities and assessment tasks. The school teachers understood the intent of the joint sessions and immersed their students in their roles.
3. The pressure of time and fine-tuning of the subject as it progressed (it was the first time the studio was held) meant that regular consultation and reinforcement for those involved did not occur.
4. The change was partially monitored as it progressed but thoroughly evaluated at its conclusion. The studio content was evaluated as only being partially feasible. It is clear that in future the workloads must be achievable, the research component tightened, and that the aims of the subject and the weekly requirements explicit. The university students' frequent mention of the research aspect as onerous and the late commencement of the design process, points to the fact that this aspect was not adequately explained or explicitly embedded in the subject. Most simply did not see the first stage as being part of the design process. Students also could not see the relevance of the crit sheets to the design process. This is regrettable, as both aspects of this studio were creative and innovative. They ensured a broad range of perspectives of a scheme was presented, and the students became 'experts' who informed others about, and judged others through, a particular lens. The importance of these elements in the design process must be adequately explained. The change was not necessarily seen as any better than a traditional studio model by the students. They did not know why, in fact, it was!
5. Communication with the 'players' at all times is a vital ingredient. Contact with so many staff and students

4 1. Establish an individual or group who accept responsibility for the change and its implementation. 2. Teacher training and development must occur. 3. Regular consultation and reinforcement for those involved must occur. 4. The change must be monitored and evaluated - Is it intelligible, plausible, fruitful and feasible? Is the change an improvement? 5. Communication with all sectors of the school/community must occur. 6. Provide opportunities for staff to explain their experience with the change to their peers.

within both the university and the school is a demanding task for a subject co-ordinator. It occurred, but the university students remained partially in the dark about intent and rationales for the tasks and it was difficult to maintain intensive contact with the school. The number of variables increases the likelihood of mis-communication – e.g. change of staff mid-semester, a staff member not attending a briefing session etc – leading to a watering down of content.

6. Reports at staff meetings and conferences about the studio and how it was conducted, the traps for beginners and the rewards for staff and students must occur. This paper is one way that the team will share their experiences during this innovative studio to their peers. Importantly, the experiences reported in this paper will inform an Australian Research Council 3 year project that is exploring the use and perception of the built environment for learning as a 3D textbook as well as investigating educational and environmental sustainability opportunities through innovative school building design.

Designs

The final studio designs ranged from inspirational to less resolved work. (See some examples below.)

Mimmi Ferdin

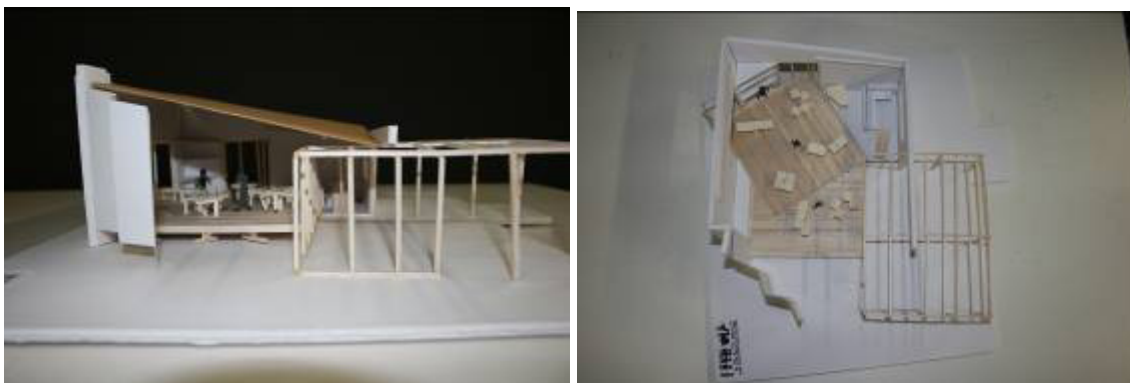
Green ribbon running through out the buildings, providing shade, food, connection to seasons and epitomising the idea of the 3D text book being the building, even carrying this through to the presentation of her scheme.





Marina Carroll

Design at large scale, medium scale and individual class room scale.



Conclusion

For some time, educational theorists have been calling for classrooms to become learning and information environments (Ritchart & Perkins, 2004, Perkins & Tishman, 2001, Lankshear and Knobel, 2001). This studio was an example of educators' responding to this call by creating a new and exciting program. It was a successful model of an integrated curriculum. Imaginations were fired up and concepts and various forms of representation were explored. Teachers who had previously regarded themselves as subject 'specialists' planned and worked with teachers from other disciplines and other sectors of the education community. Covering the studio's BIG ideas and lengthy timelines demanded that they consider the students' broad backgrounds and find ways of engaging them in the learning process. The benefits of this approach were that students and teachers, working together to solve problems, integrated knowledge from a range of sources, and, when generating ideas on how to meet a unit's challenges, engaged in a variety of research modes. Taking an interdisciplinary approach to teaching meant that the broad skills and knowledge gained were stronger because of the connections made.

Currently, a substantial part of the school building stock within Australia needs replacement or refurbishment. Embodied energy, environmental impacts, operating and life-cycle costs demand cost-effective decisions. Concurrently, education is changing from traditional classrooms into learning and informational environments meaning that current classroom designs are outdated. This studio combined environmental and educational imperatives together in innovative ways that hopefully served as a model for future partnerships. Central to the studio was the idea that architecture is not just about designing a building but also working with the occupiers during the design process. It can enhance the educational experience by providing spaces that reflect educational ideologies. If environmental and educational imperatives are not combined in innovative ways then embodied energy costs and government funds will be wasted on buildings that do not last.

Acknowledgements:

Princes Hill Secondary College year 8 students and teachers, particularly Cathy Nelson
Melbourne University Architecture 3rd year students, 2006

References

- Clark, H. (2002) *Building Education: The role of the physical environment in enhancing teaching and research*, Institute of Education, University of London, London.
- Clements-Croomea, D. J., Awbi, H.B., Bakó-Biró, Z., N. Kochhar, N. & M. Williams (2008) Ventilation rates in schools *Building and Environment* Volume 43, Issue 3, March 2008, Pages 362-367.
- Clune, W. & Webb, N. (2001) *Embedded research spurs system wide change*. Wisconsin: WCER. <http://www.wcer.wisc.edu/publications/highlights/v12n4.swf>.
- Daisy, J.M., Angell, W.J. & Apte, M.G. (2003) "Indoor air quality, ventilation and health symptoms in schools: An analysis of existing information." *Indoor Air* 13:53-64.
- Dovey, K. (1999) *Framing Places: Mediating Power in Built Form*, London: Routledge.
- Earthman, G.I. (2004) *Prioritization of 31 criteria for school building adequacy*. <http://www.schoolfunding.info/policy/facilities> Baltimore: ACLU Foundation.
- Fisher, K. (2002) *Revoicing the classroom: a critical psychosocial spatiality of learning*, Rubida Research Pty Ltd, http://www.rubida.net/Rubida_Research.
- Fisher, K (2006) "Proposed Evaluation Instrument" unpublished pdf file provided by the author.
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S. Scott, P., & Trwo, M. (1994) *The new production of knowledge – the dynamics of science & research in contemporary societies*, SAGE Publications Ltd, London.
- Hatton, N & Smith, D. (1995) Facilitating Reflection: Issues and Research. *Forum of Education*. Vol 50, No 1, April 1995. pp 49- 65
- Hes, D. (2006) "EcoHome reflection on research outcomes in light of initial research grant intentions" In proceedings of the *Australasian Housing Researchers Conference*, Adelaide.
- Hes, D. (2004) "Facilitating sustainable building: turning observation to practice". In (S Holdsworth & T Caswell eds.) *Protecting the Future - Global sustainability in practice at RMIT University*. CSIRO: Melbourne, 137-158.
- Heschong Mahone Group Inc. (2003) *Windows and Classrooms: A study of student performance and the indoor environment*. California Energy Commission, Fair Oaks, California.
- Higgins, S., Hall, E., Wall, K., Woolner, P., & McCaughey, C. (2005) *The Impact of School Environments: A literature review*, The Design Council, <http://www.design-council.org.uk/> London.
- Hygge, S. (2003) "Classroom experiments on the effects of different noise sources and sound levels on long-term recall and recognition in children." *Applied Cognitive Psychology*. 17:895-914.
- Jamieson, P., Fisher, K., Gilding, T., Taylor, P. & Trevitt, C. (2000) "Place and space in the design of new learning environments". *Higher Education Research and Development*, 19-2.
- Kats, G., (2003) *The costs and financial benefits of green buildings*. California Integrated Waste Management Board, <http://www.ciwmb.ca.gov/greenbuilding/design/costbenefit/report.pdf>, Sacramento.
- Lankshear, C. & Knobel, M. (2001) New literacies, digital technologies and the education of adolescents. In D. Alverman (Ed.). *New Literacies and Digital Technologies: A Focus on Adolescent Learners*. New York: Peter Lang.
- Mendell, M. J. & Heath, G. (2005) Do indoor pollutants and thermal conditions in schools influence student performance? A critical review of the literature. *Indoor Air*; Feb2005, Vol. 15 Issue 1, p27-52.
- Nair, P. and Fielding, R. (2005) *The language of school design*, Design Share, Minneapolis.
- National Research Council. (2006) "Review and Assessment of the Health and Productivity Benefits of Green Schools: An Interim Report." Washington: The National Academies Press.
- Northfield, J., J. Baird, & I. Mitchell (1988) *Improving Quality in Teaching & Learning*. IARTV Occasional Paper, Melbourne.
- Perkins, D.N., & Ritchhart, R. (2004). When is good thinking? In D.Y. Dai & R.J. Sternberg (Eds.), *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development*. Mahwah, NJ: Erlbaum.
- Perkins. D. N., & Tishman, S. (2001). "Dispositional aspects of intelligence." In S. Messick & J. M. Collis (Eds.), *Intelligence and personality: Bridging the gap in theory and measurement* (pp. 233-257). Mahwah, New Jersey:

Erlbaum.

- Schneider, M.** (2002) "Do School facilities affect academic outcomes?" <http://www.edfacilities.org/>, Washington: National Clearing House for Educational Facilities, 2002.
- Sibley, J. Hes, D. & Martin, F. A.** (2003) Triple Helix Approach: An interdisciplinary approach to research into sustainability in outer-suburban housing estates. In *Methodologies in Housing Research Conference Stockholm*.
- Stricherz, M.** (2000) "Bricks and mortarboards." Education Week <http://www.edweek.org/ew/index.html>.
- Victorian Essential Learning Standards* (2007), State Government of Victoria.
- Wilks, S.** (2005) *Designing a Thinking Curriculum*. Melbourne: ACER Press.

Address correspondance to:

Dr Susan Wilks
Faculty of Architecture, Building and Planning,
The University of Melbourne, Victoria, 3010, Australia.
613 8344 0097
sueew@unimelb.edu.au