LEARNING FROM PAST EXPERIENCES: SCHOOL BUILDING DESIGN IN THE 1970S AND TODAY.

EDITORS’ PREAMBLE: This paper is co-written by Ben Cleveland, an educator and Ken Woodman, an architect who were awarded APAI scholarships to undertake postgraduate study as part of the Smart Green Schools’ Australian Research Council Linkage Grant (2008–2011). At the midway point through the three-year research program, the authors reflect on the lessons which can be learnt from the open-plan movement of the 1970s.

The paper introduces for readers key influences that resulted in changes to the shape and appearance of learning environments in the 1970s and compares and contrasts them with current thinking influencing both pedagogy and the design of learning spaces.

The paper ends by listing three strategies to help prevent the failures of the open-plan classrooms of the 1970s being repeated.

INTRODUCTION

Recent adoption of progressive pedagogies in schools has led to innovation in the design of learning environments. In many ways such innovation mirrors that of the open learning movement of the 1970s.

In this paper, past experiences of open plan classrooms are explored and lessons learned during the 1970s are revisited. In addition, influences on contemporary school design are discussed and trends regarding recent spatial changes are presented. Research findings are discussed concerning the impacts and implications of ‘open’ school architecture and the following question is addressed: ‘What lessons from the 1970s experience of open classroom design and occupation can inform current school design and use?’

In order to address student’s individual learning needs, school-based education is becoming differentiated and personalised. As a result, educators are calling for learning environments that offer a range of modern contexts for learning.

Learning environments are now required to support teachers and students working together in a variety of group sizes and learning modalities to develop the students’ personal and social competencies and prepare them for a lifetime of learning.

Lifelong learning skills may be fostered through students working with greater independence and self-regulation. In order for this to occur, fundamental changes to traditional school architecture are required.

In the concluding comments to this paper, suggestions are made regarding how a successful transition from traditional classrooms to contemporary learning spaces may be achieved through education, collaboration and design.
Recent innovation in school building design in Australia has much in common with the open plan schools movement of the 1970s. During the late 1960s and the 1970s many open plan schools were constructed in Australia\textsuperscript{1}, \textsuperscript{2}, as well as in other countries such as the United States, Great Britain, Israel\textsuperscript{3}, and Canada\textsuperscript{4}. This movement was influenced significantly by the work of the Educational Facilities Laboratories in the United States. This research organisation operated from 1958 until 1986 and is attributed with developing and popularising the concept of the open plan schools.\textsuperscript{5}

\begin{enumerate}
\item Thompson, J., Cooperative Learning in Computer-Supported Classes, in Faculty of education. 2005, The University of Melbourne: Melbourne.
\end{enumerate}
Educational and social reforms drove this wave of innovation, with academics and educational bureaucrats calling for new pedagogical practices and spaces which would enable experiential and individualised learning. These reforms were influenced by the work of educational philosophers such as Dewey and Friere. Dewey advocated experiential inquiry based learning that was connected to student’s interests and their lives beyond school. Friere promoted the democratisation of education and advocated the breakdown in the traditional teacher-student relationship in favour of a reciprocal arrangement in which all members of a learning community acted as both teacher and learner. At the same time, the prescriptive curriculum was being reviewed and a more flexible, school-created, curriculum was being endorsed.

The typical open plan classrooms of the 1970s had spaces that catered for large cohorts of students and team teaching approaches. A variety of activity settings were present, including general learning space, withdrawal spaces, wet areas, quiet areas and covered outside work spaces. These classrooms accommodated a range of group sizes and a variety of learning experiences.

New furniture designs were devised to accompany open school architecture, with mobile dividers, acoustic screens, chalkboards and tables all introduced to facilitate flexible social arrangements.

These spatial changes were intended to support teachers in shaping pedagogical practice. Within these classrooms, it was expected that students and teachers would work together in a cooperative and collegiate manner. It was intended that students would learn across a variety of settings and be granted some choice regarding the activities in which they engaged.

However, by the mid 1980s open plan school architecture had fallen from grace and the traditional ‘cells and bells’ factory model had returned to favour. In evaluating this reversion to the traditional model, Gump reported that the education programs conducted in open plan schools often did not match the intentions of the architecture. He suggested that educators did not take advantage of the potential of the spaces to ‘provide a variety of groupings, activities, individualisation of instruction, and most basically, maximization of pupils’ choices in obtaining their own education’. Brogden reported similar findings and suggested open plan schools failed because teaching methodologies did not keep pace with innovation in school design. He attributed this to the conservatism of teachers and the propensity to failure of centrally imposed ideas.

In response to this mismatch of space and practice, schools frequently resorted to modifying open plan classrooms by creating more walled-in spaces and returning to traditional teaching practices.

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The following research regarding the social and academic impacts of open plan school architecture on students reveal a number of inconclusive and sometimes contradictory findings.

Through researching students’ social responses to open plan classrooms, Traub, Weiss and Fisher\(^1\) found that students in suburban open plan schools showed greater autonomy, more liking for school, and more positive attitudes towards themselves than students in traditional classrooms. However, these findings were not consistent for students in inner-city open plan schools. Also, it was found by Gump\(^2\) that highly able students demonstrated higher self-esteem, while less able students showed lower self-esteem in open plan environments.

With regard to student academic performance, McPartland and Epstein\(^3\) found no significant difference in academic outcomes between students who attended open schools and those who attended schools with traditional settings. However, the findings of Beck\(^4\) contradict those of McPartland and Epstein—at least upon initial examination. Beck found that students in open schools scored lower on basic skills tests than students in traditional classrooms. In the analysis of this study, however, Beck concluded that these research findings were confounded due to the way in which open plan facilities were imposed on school communities without adequate preparation and support being provided for the teachers working in them.

Further to this, Rodwell\(^2\) reported that some teachers in open plan schools became confused in their educational role due to the pedagogical and spatial changes. Beck suggested that open plan schools were not operating under ideal circumstances and that with better support for staff the open school movement may have been more successful.

**CURRENT INFLUENCES ON SCHOOL ARCHITECTURE**

The physical spaces in schools are currently changing in response to a number of factors. These include the following:

- Educators are looking to update pedagogies in response new understandings about how students learn.
- Information and communications technologies (ICT) are becoming essential tools for education and need to be integrated into school buildings.
- Environmentalists, and the wider community, are promoting the advantages of constructing buildings with sustainable features and recycling existing buildings.
- Community groups are seeking to use school facilities for a variety of social and educational purposes.
- The concept of space is changing to incorporate the social meanings that people associate with physical environments.

**PEDAGOGICAL CHANGE**

In the 21st Century, evolving educational philosophies and pedagogies are again driving the need for innovation in school design\(^5\). Many schools are seeking to personalise the learning experience for students so that they may develop their individual potential. Personalisation may address students’ cognitive styles, learning strategies and their preferences for learning in particular environments\(^6\). Educators are seeking to engage students in learning that is collaborative\(^7\), involves deeper thinking\(^8\), and addresses multiple intelligences\(^9\), so that students may develop strategies for life-long learning.

Improved conceptual and physical connections between learning settings and the wider world are also becoming common in schools. A focus on the critical analysis of real world situations and events is influencing pedagogical practices. The time spent by students synthesising and analysing subject matter is being given an ever-greater weighting in schools in preference to didactic knowledge transfer.

\(^3\) Dudek, M., Schools and Kindergartens. 2008, Basel Switzerland: Birkhauser Verlag AG.
\(^8\) Zygier, D., Connectedness—Isn’t it time that education came out from behind the classroom door and rediscovered social justice. Social Alternatives, 2003. 22(3): p. 41–49.
In examining this shift, Zyngier\textsuperscript{18} emphasised the need for improved connectedness within school communities and between schools and the wider community. He argued that pedagogical settings within which students are encouraged to think critically are of utmost importance. Fisher\textsuperscript{19} concluded that there are spatial implications related to these concepts. He suggested that spatial arrangements can influence the social power structures found in schools and that such structures can have a significant impact on the development of pedagogies.

In response to these issues, Lippman\textsuperscript{20} recommended that learning environments should be designed as integrated systems that afford individual, one-to-one, small group, and large group activity settings. In addition, he suggested that students are more likely to appropriate knowledge for themselves and share their understandings with others when provided with environments that allow for a flow of activity.

In response to concerns over environmental issues, school buildings are now being constructed with ecologically sustainable design features. Both passive and active design principles are being implemented\textsuperscript{22}. Passive design features include orientation, ventilation, daylight and thermal mass, while active design features include solar and wind power generation, solar hot water, and water recycling. Passive design features not only reduce carbon emissions but also improve internal environmental conditions such as air quality, temperature, acoustics and daylight levels.

**Informations and Communication Technologies**

The desire to appropriately integrate ICT into schools is placing pressure on existing school architecture. School buildings are now being required to accommodate a multitude of new technologies including desktop and laptop computers, interactive whiteboards, data-logging equipment, and a variety of handheld devices.

Zandvliet and Fraser\textsuperscript{21} found that careful consideration of pedagogical requirements, rather than technical requirements, was essential for the successful design of technology aided learning environments. In particular, they found that spaces needed to facilitate the movement of teachers, so that they could access and assist students as required. In addition, Thompson\textsuperscript{4} found that there was a need for the inclusion of spaces situated away from computers where students can plan computer aided tasks prior to commencing work at the computer. Based on pedagogical requirements, she recommended that computer-aided learning environments should include spaces for specific tasks, such as face-to-face lessons or class meetings, planning group work, carrying out group work, distance learning, and self-paced or individual work.

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Improvements to these internal environmental conditions have been shown to directly improve student learning. Literature reviews by Fisher and Schnieder reported that students can perform mental tasks better at moderate temperatures and humidity levels, and that poor room ventilation leads to increased health problems and a reduction in students’ ability to concentrate. In addition, these studies showed good acoustics and adequate lighting to be essential for good student performance, with natural lighting providing important psychological and physiological benefits. Finally, they found that good air quality was correlated with reduced absenteeism.

In 2008 a voluntary environmental assessment tool, Green Star—Education, was released to evaluate educational facilities [24], and see Hes in this journal. This assessment tool rates the environmental attributes of new and refurbished educational facilities and provides a comparative star rating for the development. The Green Star—Education tool considers both building and management attributes, including how the building itself can be used as a learning resource for students. The creation of this assessment tool indicates support from government towards ecologically sustainable development in schools.

COMMUNITY INVOLVEMENT

Members of school communities are increasingly being invited to contribute to the design of new school buildings through community consultation during the design process. By consulting stakeholders, invaluable insights into a school’s culture may be gained which can inform the design. Also, partnerships between the public and private sectors have encouraged community usage. In some cases, schools are using existing buildings within the local community to fulfil needs for additional space. Such arrangements are further reinforcing the relationships between schools and their local neighbourhoods.

Traditionally, school buildings have been used for limited hours during the day and for a limited number of days during the year. Outside these times school buildings have remained substantially vacant. Recently, however, the wider community is beginning to utilise educational facilities such as classrooms, gyms, halls and libraries during extended hours for both educational and non-educational purposes. Furthermore, ‘extended schools’ are providing additional services to communities. Service facilities being used by the wider community include family support and health agencies, community drop-in centres, early years learning centres and specialist learning spaces. As well as benefiting community groups, a shared approach to the use of school facilities can provide funds to the schools through the rental of school infrastructure.

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PERCEPTIONS OF SPACE

Theorists, including Massey, are currently reassessing the concept of ‘space’. Space is no longer being considered as just a physical enclosure but as a social product created through interactions of both the physical and the social. With this concept, Massey asserts that space is constantly under construction and is always being recreated.

McGregor has applied this concept of space to schools. She describes the spatiality of schools as the social and physical interrelations and interactions of students, teachers, learning spaces and objects. Furthermore, McGregor notes that these interrelations go beyond the classroom walls into the wider community in a network of people and objects across space and through time. This creates a dynamic concept of the learning space, moving from the idea of a ‘static container’ into an active and vibrant network of social interrelations and interactions.

Adaptable structures may be reconfigured to satisfy significant changes in long-term use through loose fit design. Flexibility may support a diversity of group sizes and learning uses through the manipulation of elements such as operable walls and furniture. Learning environments may become agile, or polyvalent, by responding directly to immediate teaching and learning needs through spatial appropriation.

In response to changing pedagogies, learning environments are supporting fluid movement of students and teachers between spaces. Improved understandings of the connections between pedagogy and space are driving the creation of school facilities that feature a range of learning settings. Such settings provide for a variety of group sizes and activities, and are being interlinked to allow for fluid movement between them.

In many instances, the size of learning environments has grown in order to accommodate larger student cohorts and team teaching approaches. Fluid environments have aided the personalisation of student learning by supporting a more egalitarian learning environment within which the teacher acts more as a guide than as the centre of all power and knowledge. In these spaces, teachers are able to move around to assist students and are no longer shackled to a desk at the front of the class.

34. Dittoe, W., Appealing Spaces.(designing school facilities). American School & University, 2007. 80(2).
Teachers are becoming partners in the students’ learning experience and students are increasingly being able to interact more freely, allowing for the natural human process of knowledge exchange. In these environments there is improved equity in the power relations between teachers and students, as both give and receive knowledge.

The scale of schools is also being reconsidered and smaller learning communities are being favoured. This approach is backed by research in America which has shown that high schools catering for 600–900 students provide the highest literacy and numeracy results while also providing social equity. In Australia, some larger high schools are being divided into smaller learning communities within the overall institution. The creation of small autonomous communities is intended to support better interpersonal relationships and foster an improved sense of belonging in students and teachers.


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Concluding comments —

The question posed earlier was ‘What lessons from the 1970s experience of open classroom design and occupation can inform current school design and use?’ This paper illustrates that the influences that drove school design in the 1970s are similar to those that are currently driving school design today. In order to prevent the failures of the 1970s being repeated, it is suggested here that three major issues need to be addressed: education, collaboration and design.

Firstly, teachers and extended school communities require education regarding contemporary pedagogies and spaces. Comprehensive in-school professional education programmes are required to assist teachers to better understand progressive pedagogies and the associated spatial implications: where possible these should be initiated prior to the creation of new learning spaces. As found by researchers of the 1970s experience, it is wrong to assume that changes to school architecture will lead teachers to adopt new pedagogical practises. Armed with enhanced pedagogical and spatial understandings, teachers can subsequently make informed contributions to the design of learning environments, and make best use of these new environments once built.

In addition, parents and the wider community require education regarding changes to contemporary schooling. Thorough explanations of contemporary educational practices and associated school designs are required to ensure ongoing community support.

In order to reduce instances of mismatch between design and use, teachers and students require spatial education when initially occupying innovative learning environments. This support is required so that they may gain understandings of the facilities and subsequently utilise the potential of their new environments. Education of this type is likely to reduce anxiety for teachers and the likelihood that spaces will need to be modified in the future.

Secondly, collaboration between government, educators, design professionals and the extended school communities is required in order to achieve a successful shift to new pedagogical and spatial models in schools. The bureaucratic imposition of fundamentally different educational and architectural concepts without adequate understanding by teachers and the wider community should be avoided. During any design process a collaborative approach is more likely to garner support and foster ownership. Such collaboration is subsequently likely in buildings that satisfy the multiple needs of stakeholders.

Finally, the design of new learning environments should support contemporary educational philosophies and practices. Spaces are needed that enable multimodal communication between teachers and students, and between students and
students. A constant focus at the ‘front’ of the class is no longer required. Improved integration of information and communication technology will assist students to work more independently and with greater self-regulation. These measures will support the development of students’ personal and social competencies and preparing them for a lifetime of learning. Learning spaces that accommodate a variety of spatial settings, and the fluid movement of students and teachers from one setting to another, will facilitate the use of a range of contexts for learning.

Ecologically sustainable design will provide appropriate internal conditions whilst reducing impacts on the environment.

Moreover, environmental factors including thermal comfort, air quality, lighting and importantly acoustics will assist students to achieve their academic potential through improved personal comfort.

The designs of today’s contemporary learning spaces have many similarities to open plan classrooms of the 1970s. There is a risk that today’s spaces will suffer the same fate as the open plan classroom. To ensure that modern learning environments do not fail, stakeholders need to address the critical issues of education, collaboration and design.
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