Are your school interiors giving you a pedagogical edge?

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This paper examines what influence the interior design of primary school learning environments has on creating pedagogical advantage. Contemporary Australian education culture is characterised by a shift away from a teacher-centred transmission of information towards child-centred co-construction of knowledge, skills and understanding (Burke, 2013; Department of Education and Early Childhood Development [DEECD], 2008; Edwards, Gandini & Forman, 2012). New school interior design patterns including entry galleries, learning streets and indoor courtyards are being developed as venues for learning (Dudek, 2015; Taylor, 2009). But how do these interior environments function, and how effective are they at promoting a culture of collaborative learning?

Drawing on case study research conducted in two schools in Victoria, Australia, this paper outlines a research methodology for assessing the role of interior design in supporting and facilitating cultural change (Stake, 2010). This research reveals that the closer the fit between interior design and the daily routines and practices of children and teachers the greater the pedagogical advantage. This is because when design and practice are closely aligned, school communities are more successful in achieving sustainable cultural change.

This research methodology enables architects, designers and school communities to assess the effectiveness of school environments that have been designed or redesigned to promote cultural change. For school communities this means developing a better understanding of how to exploit the potential of professionally designed school interiors to support learning and teaching practices (Lackney, 2008, 2009). For architects and designers it informs ongoing design development of school interiors that will give school communities a pedagogical edge.

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Kellee Frith is a designer, design researcher, and recent PhD candidate in the Faculty of Design at Swinburne University of Technology. As part of her studies she developed a research methodology for assessing the role of interior design in supporting and facilitating cultural change. Kellee has run training workshops for several Victorian schools and for the Council for Education Planners International (CEFPI). She has also developed a design brief for an immersive learning environment at Melbourne Zoo. Now Kellee is using her research to develop more effective design briefs for school interiors that support and promote cultural change.
The Australian school design landscape is crowded with prototypes for twenty-first-century learning environments, but are the interiors of these new and refurbished buildings delivering the pedagogical advantage that they promise? Designed in response to new education theories, notably Howard Gardner’s (2006) theory of multiple intelligence, these new environments help redefine learning as social, situational, experiential, connected and continuous (Gislason, 2007, 2009; Jamieson, Dane & Lippman, 2005). This redefinition of learning as a collaborative process is central to education reform in Victoria and captured in the Department of Education and Early Childhood Development’s advice to schools that accompanied the Victorian Schools Plan (DEECD, 2008) and the Building the Education Revolution program (DEECD, 2009). This paper argues that it is time to find out what influence the interior design of school learning environments is having on changing the culture of learning in Australia.

Despite heightened interest in the design of school learning environments, there is little understanding of how interior design as a discipline and as a professional practice can assist in changing the culture of learning. Education reform is instead concerned with architectural transformation—the development of new school buildings as outward expressions of cultural change (Burke & Grosvenor, 2008; Dudek, 2000), and new spatial patterns as inward expressions of flexibility and collaborative learning (Monahan, 2002). Questions about how spatial organisation; furniture design; use of colour, texture, materials and light; and the integration of specialist tools, resources and technologies might influence child-teacher relationships and either enhance or hinder alternative modes of learning and teaching are overlooked. Neither has any particular attention been paid to the assessment of the interior design of schools in post occupancy evaluations (Cleveland & Fisher, 2014).

This paper outlines a research methodology specifically developed to examine the influence of interior design in changing the culture of learning in primary school learning neighbourhoods, which may be suitable for broader application in the assessment of physical learning environments. It was developed as part of PhD research that was supported by an Australian Research Council Linkage Project grant, ‘The School: designing a dynamic venue for the new knowledge environment’. The key findings of that research are presented in this paper along with some recommendations for schools, design professionals and researchers. The research was conducted at Bialik College and Wooranna Park Primary School, two Victorian schools that have been acknowledged for their pedagogical and design innovation.

**A private school, a public school & a professional interior designer**

Bialik College is a private Jewish Day School in inner eastern Melbourne. Originally established in 1942 as a Zionist Sunday School and kindergarten, it now has a student population of approximately 1100 children from three-year old kindergarten to Year 12. Bialik’s education philosophy is informed by the municipal infant toddler centres and preschools of Reggio Emilia, Italy and the *Cultures of Thinking*, a research project co-authored by Bialik College and the Harvard Graduate School of Education’s Project Zero research group. In conjunction with its general studies program Bialik runs a specialist Hebrew language and cultural studies program.

Wooranna Park Primary School is a state government funded school in the outer south eastern suburbs of Melbourne, which opened in 1971. Its current student population of approximately 370 children from Prep to Year 6 represents more than 40 nationalities and a wide variety of social and cultural backgrounds. Wooranna is classified as a socioeconomically disadvantaged school, but this has not been a barrier to high academic achievement. Wooranna’s education philosophy, like Bialik’s, is informed by Reggio philosophies, as well as George Betts’ autonomous learner model. It is also heavily influenced by Howard Gardner’s theory.
of multiple intelligences and Barbara Rogoff’s development of Vygotsky’s sociocultural theory. Cultural diversity is celebrated at Wooranna and children are encouraged to learn about their own backgrounds and share them with the rest of the learning community.

Featherston’s school design practice is influenced by the child-centred education philosophies of Reggio and driven by the Modernist belief in social transformation through good design (Greenhalgh, 1990). Central to her belief that good design can improve the lives of ordinary people is her detailed understanding of children’s and teachers’ needs. For more than four decades she has been studying and observing children’s and teachers’ activities and behaviours to assess ‘user needs’. This is the starting point for her user-centred, collaborative design process that engages whole school communities in shaping learning environments. United by a shared vision of child-centred education the members of Bialik and Wooranna’s leadership teams, together with Featherston, and even the schools themselves are key players in the story of education reform in Australia.

Research methodology

Within the documents that constituted the design briefs for the neighbourhood interiors Featherston designed at Bialik and Wooranna are identifiable patterns of activity and behaviour nominated by the school communities as tangible expressions of the new modes of learning and teaching they were trying to foster. Dance and movement, for example, are equally valid modes of enquiry as reading, writing, mathematics and scientific experiment. The trajectory of learning experience follows children’s interests and passions rather than the set curriculum. And children and teachers are partners in the collaborative venture of learning. Children’s relationships with their peers are genuinely collaborative also, because the nature of the big ideas and questions that underpin their learning investigations are too big for one child to tackle alone and too complex to solve without deep discussion with their teachers and peers.

By comparing the patterns of how children and teachers used and inhabited their neighbourhoods with the patterns of activity and behaviour nominated by the school communities as indicators of cultural change, it was possible to study the role of interior design in shaping learning cultures. Through observation, interview and visual analysis this study aimed to provide evidence of children’s and teachers’ school routines. If these routine patterns of activity and behaviour matched the patterns nominated by the school communities as desirable modes of learning and teaching, an argument could be made in support of the role of interior design in changing the culture of learning. If the patterns did not match, as happened in this study, the questions about the potential of interior design to influence cultural change in primary school learning neighbourhoods are more complex. This study seeks to understand the influence of interior design on human activity and behaviour within the particular environments of primary school learning neighbourhoods. Their pedagogical and design innovations identify them as exemplars of a broader shift in Australian education towards enquiry-based, hands-on, collaborative learning and the development of physical learning environments to suit. Therefore the learning neighbourhoods at each school can be considered is discrete examples of the larger trend suitable for study. This approach described by Stake (2010) uses the context immediate to the ‘thing’ being studied to define the parameters of a case study. In this study therefore, each learning neighbourhood is a case, a discrete physical, spatial and cultural context in which to study the influence of interior design.

The learning neighbourhoods

Prep neighbourhood, Wooranna Park Primary School

There are 55 children working with three teachers and two student support officers in the Wooranna Prep neighbourhood. Children spend a large portion of each day working in small groups in learning settings across the neighbourhood engaged in negotiated learning activities. This is an unmistakably child-centred environment. The proportions of the learning settings and the scale of the furniture are child-size. Its collection of...
purposefully designed and interconnected learning settings include an entry gallery, a lounge, an amphitheatre, a listening post and reading loft, a studio laboratory, a darkroom, and settings for target teaching, small and large-scale construction, communication, problem solving and role-play. There is also a drinking fountain, cloakroom and materials store. There are open spaces for children to move and be active and there are enclosed places for retreat to. Abundant natural light reflects off the white walls and creates a bright and welcoming ambience. The floors are laid with durable deep sand coloured carpet and dark grey washable Flotex flooring.

Years 5/6 neighbourhood, Wooranna Park Primary School

There are 110 children working with five teachers and three student support officers in the Wooranna Years 5/6 neighbourhood. It occupies an area equivalent to six conventional classrooms and a corridor. At ground level the original corridor, now the entry gallery, opens onto a large light filled space on the south side of the neighbourhood that houses a drinking fountain, lounge and learning settings for individual and collaborative study, target teaching, small group discussion, and games and construction. On the north side of the entry gallery is a studio laboratory, a recording studio, and a setting for movement and performance. Upstairs is a second study and an adjoining classroom workshop separated by a sliding glass door. Children’s personal storage cupboards are incorporated into the interior design of the learning neighbourhood to create divisions between learning settings.

Prep neighbourhood, Bialik College

There are 73 children working with three teachers and six assistants in the Bialik Prep neighbourhood. The neighbourhood is located at the upper east end of the two-storey Early Learning Centre (ELC) building and comprises three separate homeroom spaces, each with an adjoining mini studio. Each homeroom also shares a separate withdrawal space with a neighbouring classroom. All the homerooms also open onto a shared plaza space that is used for games and largescale construction. Each Prep homeroom has an identical suite of Featherston’s child-scale modular furniture that the homeroom teachers use to create purposeful learning settings including a home base and settings for reading and relaxation, small and large-scale construction, computing, communication (writing and drawing), maths problem solving and small group discussions. Each teacher organises the learning settings in her homeroom according to her personal preference and teaching style.

Year 6 Neighbourhood, Bialik College

There are 77 children working with five teachers and two student support officers in the Bialik Year 6 neighbourhood. The Bialik Year 6 learning neighbourhood comprises three separate classroom spaces and a wide corridor on the second floor of the main school building. Low
ceilings, fluorescent strip lighting, grey blue carpet, off white walls, institutional furniture together with royal blue pin boards and door frames give the neighbourhood a uniformly cool ambience. The corridor, which services a small storeroom, an office for specialist language teachers, toilets, a fire hydrant and stairwell, has been appropriated by children and teachers as a collaborative learning setting. It has been modestly furnished with surplus chairs and tables to create a large collaborative work surface and several smaller surfaces for independent study.

Research methods

Three methods were used to generate the research data; photographic observations, semi-structured interviews and visual analysis. Each source of data was used to interrogate the others.

Photographic observations

Synchronous photographic data (Sanoff, 1991) was generated by five wallmounted digital cameras to create a holistic view of each learning neighbourhood, (see Figure 5). This unobtrusive observation system generated small data sets that could be manipulated by the project researchers using standard QuickTime software on a desktop computer. A two-week observation period was scheduled for each school that was split between observations made using the automated camera system and observations made using a hand-held camera.

Semi-Structured Interviews

The interviews conducted with each teaching team focused on the ways that they used their physical learning environments to suit their teaching practices. The focus of the interviews with school leadership teams and Featherston was to discuss the collaborative design processes they used. Select photographs from the observation data were used as catalysts for discussion (Barbour, 2008). Specific questions about the photographs were posed when seeking input from the teachers to contextualise or interrogate the data. Teachers also volunteered information, commenting on how typical or atypical they perceived the photographed scenario to be.

Visual analysis

Visual analysis methods integral to design studies, practice and research (Hall, 2006) that have been adopted and appropriated by designers and design historians from art historians (Bell, 2001; Emmison & Smith, 2002) were used in this research to describe every detail of the interior design in each learning neighbourhood. A similar technique of visual analysis described by Stanczak (2007) as ‘open viewing’ was used to analyse the photographic data. An observation sheet was used to record a daily narrative of children’s and teachers’ activities and behaviours by logging the visual data against a time scale. Consistent terminology and ordering of information (people, activity, setting), was used to log the data so that patterns were easy to identify and comparisons between different time-lapse sequences could be made easily.

FIGURE 5 - QuickTime Split Screen Wooranna Years 5/6 Neighbourhood
Methods of analysis

Archival document analysis

The archival documents were analysed to detect any direct or indirect reference to how the school communities intended children and teachers might use and operate in the learning neighbourhoods. These references were used to build up a detailed picture of the kinds of activities, behaviours, groupings of people and organisation of time that we could expect to see as demonstrative of new and desirable ways of learning and teaching. For example Wooranna’s raison d’etre document under the heading of pedagogical practice states ‘Exploration of and listening to the ‘100 languages of children’ / Multi-literacies developed’. This creates an expectation that there will be evidence in the neighbourhoods of children using a wide variety of work modes and a range of different materials and resources in their learning activities. Therefore an examination of children’s patterns of interaction with their physical environment was expected to provide evidence of children using a wide variety of work modes and a range of different materials and resources in their learning activities. This evidence along with other pieces of evidence were used to build a case for the influence of interior design on children’s activity and behaviour. Where no evidence of this kind was found possible reasons to explain why children were not using the resources available as expected were explored.

Mapping patterns of activity and behaviour

Using a technique called ‘behaviour mapping’ (Sanoff, 1991) the observation data was manually plotted onto the relevant floor plans to illustrate the movement of children and teachers within their learning neighbourhoods as shown in Figure 6 (left). These graphic representations were used to examine the ways that individual children and teachers move around their neighbourhoods and the movement trends across a neighbourhood group. A similar graphic technique was used to map the distribution of children and teachers within their learning neighbourhoods. Coloured dots were used to plot their positions recorded in the time-lapse photography sequences as shown in Figure 6. A technique of visual representation used by Preiser, Rabinowitz and White (1988) in post occupancy evaluations of Indiana elementary schools was adapted for this research to illustrate the patterns of children and teachers’ interactions with their neighbourhood interiors and with the objects and artefacts they contain as shown in Figure 6. This technique also functioned to protect the identities of the children and teachers illustrated.

Key findings

In each of the case neighbourhoods the enormous potential of interior design to facilitate and promote alternative modes of learning and teaching was observed. However, the photos also showed that children and teachers regularly used particular learning settings in ways that appeared
to contradict their designed purpose and function. The search for reasons why highlighted the fact that interior design is one of many in a complex web of interdependent influences, which are each critical to creating and sustaining real cultural change. The paragraphs which follow trace one line of inquiry to demonstrate the complexity and interconnectedness of just some of the influences that shape learning culture.

The first of these interconnections was between pedagogical practice and the design of the physical learning environment. The three neighbourhood interiors designed by Featherston were purposefully planned and detailed to suit the schools’ child-centred education philosophies that were characterised by in-depth learning investigations in response to things that children wanted to find out about. This meant that when particular settings were used in more conventional teacher-centred ways, such as a setting equipped for games and construction being used for direct instruction, they provided less effective support for children’s learning activities than when they were used for their intended purpose. This inevitably raises questions about how permissive purposefully designed environments should be, but those are questions for a separate discussion.

Closer examination of why purposefully designed settings were being used in conventional ways pointed to the significance of clear and consistent pedagogical leadership. For example, when asked why they were engaged in more direct instruction than was expected from the analysis of the archival documents, the Wooranna teachers identified downward trending NAPLAN results as the reason. Cross-checking this with the principals’ comments it appeared that teachers had been asked to spend more time working with children to develop their literacy skills in response to the NAPLAN data. The problem was though, at that particular point in time there was insufficient guidance for teachers about how to do that. Instead of using an integrated approach that increased the focus on literacy, but maintained the integrity of Wooranna’s curriculum and democratic approach to learning and teaching the teachers reverted to drilling teachers. The principals regarded this as evidence of the need to develop a deeper, more robust understanding of Wooranna’s education philosophy and pedagogical vision by its teachers. Interestingly these were issues of concern for the Bialik leadership team also.

The concern for this research though, is that in this scenario the physical learning environment ceased to provide any meaningful support for teachers. One possible explanation for this is that the teachers had not yet developed an instinctive understanding of what the physical environment had to offer and how they might use it to support their specific pedagogical aim of improving children’s literacy skills. Thus under pressure they reverted to their teacher training and took control of the situation by assuming the position of the teacher at the front of the room. Across all the case neighbourhoods there were examples of teachers working together and sharing their strategies for solving challenges like this one. The most poignant of these were when teachers comments revealed that the physical learning environment was starting to become part of their pedagogical conversations. This suggests that teachers need more opportunities for professional conversations. It also suggests that these conversations would be helped by ongoing professional development about how to exploit the potential of purposefully designed learning environments.

Some recommendations

For Schools:
- Provide clear and consistent pedagogical leadership for staff that includes supporting, guiding and nurturing new practice.
- Encourage teachers to experiment with the physical environment. This research found that discoveries teachers made for themselves were very valuable in building their confidence in using their spaces.
- Help teachers to preserve time for informal professional conversations as opportunities for peer professional development and exploring the physical environment as a pedagogical tool.
- Build relationships with design professionals who can provide other kinds of professional design development for staff.

For Designers and Architects:
This advice is for all school design disciples, not just interior design
- Consider what materials you have or could develop that might help teachers to recognise the potential of their physical learning environments.
- Foster feedback loops with school communities by inviting teachers and children to tell their stories, they often contain valuable lessons for design professionals.
For Researchers:

- Work with school communities and design professionals to understand what they want to know and how it might fit into larger research agendas.
- Consider opportunities to use research as an agent in the design process as well as how to use it to assess and evaluate new learning environments.

Conclusion

This paper has articulated a research methodology that compares the patterns of activity and behaviour, nominated by school communities as indicators of desirable modes of learning and teaching, with how children and teachers actually use their environments. This was done to understand the influence of interior design in changing the culture of learning in schools. This paper also has explained how archival documents were used to formulate a picture of what best practice learning and teaching at each school looked like, and the methods used to generate data that was analysed to find evidence of new modes of learning and teaching in each neighbourhood. Owing to the complex web of influences that shape learning culture, of which interior design is just one, this research has not been able to make definitive claims about the role of interior design in cultural change.

Although this research was conducted in primary school contexts its methodology is equally suitable for studying preschool, secondary and tertiary environments, provided that appropriate ethical considerations are made. For future projects the opportunity exists to study environments before any design intervention to help understand how the design of the physical environment relates to the learning experiences the school community wants children and teachers to have. Using the same research methodology throughout the design process and into post occupancy would provide another unique opportunity to study and manipulate interior design to better support sustainable cultural change which is the pedagogical advantage that all twenty-first century learning environments aim to achieve.

Research stories

As a postscript to this discussion the following pages contain some illustrated stories from the research that this paper draws on. They provide some specific examples of how the interior design of the case neighbourhoods influenced, or was influenced by children’s activities and behaviours. And in a small way they provide glimpses into the role of interior design in changing the culture of learning in primary school learning neighbourhoods.

Coloured Pencils

The way that Prep children used tools, materials, objects and artefacts revealed their intimate knowledge of their physical environment and the relationship between material objects and learning culture. The communication setting in the Wooranna Prep neighbourhood is where the writing and drawing materials are. On one shelf there are jars of coloured pencils positioned at child height—one jar of pink pencils, one of orange, one of yellow and so on.

During one negotiated learning period a group of five children, pictured in Figure 7, chose to work together in the communication setting to make a greeting card for their principal. They collected the things they needed from the shelves—paper, glue and scissors. One member of the group ferried the jars of coloured pencils to the table. Another child asked “What if someone else wants a pencil? They won’t know where they are, because we’ve got them all.” The children solved this problem by each choosing a different coloured pencil and returning the rest, in the jars, to the shelves. The children’s negotiation about the pencils, without assistance or direction from adults, suggests that they had learned and understood the significance of their material environment, as well as their responsibilities towards each other, as members of a collaborative learning community, to share their material resources.

FIGURE 7 - Sharpening the Coloured Pencils
Communications Setting - Wooranna Prep Neighbourhood
Compendiums

Wooranna Years 5/6 students used zip-up compendiums, as shown in Figure 8, to carry their personal learning materials rather than sharing materials that belonged to everyone as in the Prep neighbourhood. The teachers’ assessment was that the compendiums allowed children to be mobile within their neighbourhood. Children used their compendiums as portable workstations, which meant that they could pursue individual study activities regardless of the environmental cues and designed purpose of those settings. For example, in the movement and performance space, a setting without desks or chairs, children used their compendiums as instant workstations as illustrated in Figure 9. This behaviour suggests that the use of compendiums by the Years 5/6 children enabled them to ignore the environmental cues that might signal alternative behaviours appropriate to each setting.

One Space, Two Pedagogies

Figure 10 shows two quite different ways that the small home base setting in one Bialik Prep room was used by the general studies teacher (blue left) and by the Hebrew teacher (purple right). The general studies teacher used this setting for whole group discussions (as shown), games, construction and AV presentations. The Hebrew teacher used the same setting for direct instruction, transforming the setting into a mini classroom space with the small timber stools as work surfaces, as shown on the right. Figure 11 shows that the teachers also negotiated use of the limited wall space in their homeroom by designating specific areas for general studies (left) and others for Hebrew language studies (right).

Collaborative Space

Without professional design assistance and with limited resources the Bialik Year 6 teachers reclaimed what they described as the ‘wasted’ circulation space in the corridor outside their homerooms and transformed it into a collaborative, autonomous learning environment for Year 6 children, shown in Figure 12. Figure 13 shows how the same space could be used to better support the teachers aim of engaging children in a wide variety of learning activities. By introducing task specific furniture and open storage shelves for tools and materials the environmental cues missing from Figure 12, would suggest possibilities and invite children’s engagement.
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Collaborative Learning Space

Judith’s Homeroom

Aaron’s Homeroom

Joel’s Homeroom

Collaborative Learning Space

FIGURE 10 - Spatial Differences - General Studies (left x 2), Hebrew Language studies (right) - Bialik Prep Homeroom

FIGURE 11 - Separate Display Zones - General Studies (left), Hebrew Language Studies (right) - Bialik Prep Neighbourhood

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Maths Studio

Small Group Discussion & Games

Games

One-to-One Consultation

Reading Nook

Newspapers, Books & Magazines

Art Studio

Art Tools & Materials

Display Wall

FIGURE 12 - Reclaimed ‘Wasted’ Space - Bialik Year 6 Neighbourhood - Collaborative Learning Space

FIGURE 13 - Alternative Spatial Organisation

Bialik Year 6 Neighbourhood, Collaborative Learning Space
Without professional design assistance and with limited resources, the Bialik Year 6 teachers reclaimed what they described as the ‘wasted’ circulation space in the corridor outside their homerooms and transformed it into a collaborative, autonomous learning environment for Year 6 children, shown in Figure 12.

Figure 13 below shows how the same space could be used to better support the teachers’ aim of engaging children in a wide variety of learning activities. By introducing task-specific furniture and open storage shelves for tools and materials, the environmental cues missing from Figure 12 would suggest possibilities and invite children's engagement.

FIGURE 13 - Alternative Spatial Organisation - Bialik Year 6 Neighbourhood, Collaborative Learning Space
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