



Beyond the Building. Reconceptualising Learning Environments: A Literature Review

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Education is the kindling of a flame, not the filling of a vessel – Socrates

INTRODUCTION

The policy intent of the New Zealand Ministry of Education to develop innovative learning environments (ILEs) is underpinned by the belief that changing the physical environment will change pedagogy by enabling collaborative teaching and learning (Benade, 2017b). This policy intent is driven by the pressure to prepare students with '21st-century skills' to assist them in navigating an unknown future (Bolstad & Gilbert, 2012). Although the OECD (2013) defined ILE as "an organic, holistic concept that embraces the learning taking place as well as the setting: an eco-system of learning that includes the activity and outcomes of the learning" (p. 22), this review will use the term inclusive of the physical spaces of learning. The review narrative highlights the themes of physical learning environments, future focussed teaching and learning, the student at the centre of learning, and digital technologies.

PHYSICAL LEARNING ENVIRONMENT

A range of scholars argue that the success of 21st century learning demands dramatically reconceived building design which will improve student learning (Benade, 2017b; Blackmore, Bateman, Loughlin, O'Mara & Aranda, 2011 ; Nair, 2014; OECD, 2013). This theme focuses on design principles from various perspectives and the impact of furniture on teaching and learning.

Design principles

Inflexible 'cells and bells' school design encourages traditional didactics, which Nair (2014) claims can be supplanted by innovative spaces that enable collaboration, personalisation and flexibility. These designs align with twenty-first-century learning goals (Nair, 2014). Echoing Nair, Stephen Heppell's (2016) 'rule of three' for ILE spaces supports the flexibility of school design:

- no more than three walls where space is multifaceted;

- no more than three points of focus—varied groups could be presenting and learning together;
- three teachers, three activities with a larger group of students;
- three periods a day so less time wasted.

The New Zealand Ministry of Education (2016) links improved student outcomes to acoustics, lighting, heating, and ventilation, though Blackmore et al. (2011) suggested that the intangibles of school and classroom culture, sense of belonging, and self-efficacy connect learning outcomes, built environment and use of learning spaces. Moore and Lackney's (1993) early qualitative evidence indicated a blend of factors, noting that students prefer physical settings that are inspiring and comfortable with little noise or distracting behaviour.

Furniture

Furniture, fittings, and equipment may influence student outcomes. Oyewole, Haight & Freivalds (2010) noted that fixed furniture design fails to accommodate a large population of students. Schools ought therefore to provide furnishings in the flexible learning spaces that work for everyone (Ministry of Education, 2016). In addition to catering to the anthropometric dimensions of students, modernised furniture may support the pedagogical shifts required in an ILE. For instance, the arrangement of space is significant for classroom performance and related behaviours (Gifford, 2002). Tables arranged in clusters might signal, for example, collaborative learning (Ministry of Education, 2016).

FUTURE FOCUSED TEACHING AND LEARNING

Significant manifestations of the notion of 21st century teaching and learning are evident in this theme. The knowledge economy requires educational organisations to equip students with knowledge, competencies and skills that will develop lifelong students. These requirements coupled with the necessity of collaborative teamwork suggests new challenges for teachers' professional learning.

Education for the Knowledge Age

Knowledge creates value in the knowledge age (Gilbert, 2005), and ideas become the source of economic growth (Goodman & Dingli, 2017). Learning in the 21st century involves generating knowledge, not storing it, and initiating change, not conforming to it (Bolstad & Gilbert, 2012). Furthermore, education ought to focus on 'soft skills', competencies, and capabilities (Dumont & Istance, 2010), preparing students to manage digitisation, and challenging problems like climate change and work automation (Bolstad & Gilbert, 2012). These shifts have profound implications for schools. Biesta (2014) challenges these shifts, however, for ignoring "the formation of the human being as *human being*" (p 14. Emphasis in the original).

Competencies

Dewey identified early in the 20th century that reflective thinking is a key competence (Voogt & Roblin, 2012). Towards the end of the 20th century, however, global governance efforts took up the discourse of competencies (Carneiro, 2011; Delors, 1996; Rychen & Salganik, 2003). The DeSeCo project (Rychen & Salganik, 2003) provided a basis for the 'key competencies' central to the vision of The New Zealand Curriculum to produce economically successful global citizens (Ministry of Education, 2007).

Lifelong learning

The New Zealand Curriculum vision is of "connected, confident, actively involved, lifelong learners" (p. 8). The idea of lifelong learning emerged in the 1970s (Biesta, 2013), indicating that this 'innovative' idea has been around for some time. Dumont and Istance (2010) suggested that learning continues throughout the lifespan in both formal and informal learning environments, and is important as future employability depends increasingly on individuals' uptake of lifelong learning. Knowledge therefore becomes capital (and potential earning power) in the hands of individuals. Brown, Lauder and Ashton (2011) strongly challenged the existence of a link between learning and earning, however. Even so, students are encouraged to seize lifelong learning opportunities, so they can adapt to a changing and complex world (Carneiro, 2011; Delors, 2013; Dumont & Istance, 2010).

Collaborative teaching and learning

Collaborative team teaching is a key to success in an ILE. It increases visibility, strengthens team relationships and encourages the sharing of workloads and good practice (OECD, 2013). Collaboration and team-teaching increases inclusion and participation, reducing the risk of some students being neglected as might be the case in a single cell whole group setting (OECD, 2013). Collaborative capacity increases when teams reflect on the 'non-discussables' that impede learning (Barth, 2002). Relational trust is pivotal to this process as one person's success is dependent on another (Robinson, Hohepa & Lloyd, 2009), although collaborative cultures can engender hostility, as noted by Benade (2017a) who observed that ILE occupants collaborate "against the 'primal urge' for privacy and solitude" (p. 6).

Professional learning and development (PLD)

Long-experienced teachers may therefore struggle to make the pedagogical and spatial transitions ILE demand. ILE teachers have to reposition themselves not only to collaborate in teams, but also as being capable of integrating digital technologies into learning (Bull & Gilbert, 2012). Teacher PLD ought to prepare them to model 21st century skills and competencies, and to think about knowledge as a tool to do things with (not an object to be mastered), yet PLD provision aims to "add to the store of what teachers [already] know" (Bolstad & Gilbert, 2012, p. 46).

THE STUDENT AT THE CENTRE

In this theme, literature relating to authentic learning, project based learning and personalised learning is reviewed, as these approaches demonstrate the potential for students to exercise choice and responsibility for their learning, a common (and desired) feature of many innovative learning environments.

Authentic learning experiences

Authentic learning experiences engage students with “real-life problems, offering hands-on experiences, and incorporating the students’ historical, natural, and cultural environment in learning activities” (OECD, 2013, p. 91). This approach is not novel, being evident in the work of Dewey (1915), who argued that school should not be isolated from life. Authentic learning involves the cultivation of ‘portable skills’ (Lombardi, 2007), and supports students to improve knowledge transfer and retention.

Project based learning

An example of authentic learning is project based learning (PBL) in which small groups of students collaborate to investigate ‘real life’ complex problems or challenges, which rarely have set solutions or ready answers in a book (Lund, 2015). PBL encourages students to be more invested in their learning (OECD, 2013), but requires teachers to be versatile and flexible (Benade, 2017b). McPhail (2015) cautioned too that conceptual progression is difficult to manage when teachers lead students through individual projects.

Personalised learning

Personalised learning places students at the heart of the education system (Leadbetter, 2008), as ‘co-producers and collaborators’ of their learning pathway (OECD, 2013). Dumont & Instance (2010) identified the principles of personalisation to include:

- students at the core
- well organised opportunities for autonomous learning
- individual differences (culture, learning styles, prior knowledge and social background) are recognised
- challenge without excessive overload
- horizontal connectedness (integration) across knowledge, subjects and the wider world.

Curriculum integration

The New Zealand Curriculum (Ministry of Education, 2007) supports integration, calling on schools to “make use of the natural connections that exist between learning areas” (p. 16). An integrated curriculum must still draw on the distinct knowledge of the subject areas and maintain the integrity of those areas, however (Murdoch & Hornsby, 1997). Curriculum integration has other challenges, Bishop and Brinegar (2011) finding that students can be indifferent and sceptical, while Fraser (2013) noted that some teachers are reluctant to share decision-making and prefer activities planned well ahead of time.

Culturally responsive pedagogy

The New Zealand Curriculum also directs schools to take into account students' cultural context when preparing learning programmes (Ministry of Education, 2007). This suggests that any approach connected to 'personalised learning' enacted in New Zealand ILEs will need to address the bicultural tenets of the New Zealand Curriculum (2007) and the broader national context (Smardon, Charteris & Nelson, 2015). Relational pedagogy is considered by these authors to be vital in ILEs, arising from the view that teachers' effective use of students' cultural knowledge and prior knowledge encourages student engagement with learning (Bishop, 2011).

Assessment

Assessment for learning (formative assessment) is integral to personalised learning (OECD, 2013). It is an oversight to overlook the nature of the learning environment and how it places assessment within its broader aims and expectations about learning (OECD, 2013). Tension exists, however, between the pressure to deliver a fixed curriculum while also equipping students with 21st century skills that are not so easily measured (OECD, 2013). Hood (2015) called for a more flexible assessment system that combines an academic record of learning with the student's development of the competencies (identified earlier) required for 21st century education and future aspirations. Grades say little about what and how a student thinks and problem-solves.

DIGITAL TECHNOLOGIES

The ubiquity and rapid development of digital technologies and access to the Internet means learning can happen anywhere at any time (Dumont & Istance, 2010), complementing the fluid boundaries of an ILE. Furthermore, the development of Web 2.0 and a wide array of collaborative digital applications allows students to acquire and modify information such that students born after 2000 are coming to school with significantly different experiences and expectations than in the past. Accordingly, this theme explores the notion of 'digital natives', the use of digital technology and teacher beliefs, and the use of digital technology and student outcomes.

Digital natives

As suggested, shifts in young peoples' experience of digital technology has profound implications for traditional education systems, and for those raised with ubiquitous technology. Prensky (2011) coined the term, 'digital natives', implying a generation more comfortable and competent with technology than their teachers or parents (referred to as 'digital immigrants'). This view has been challenged for its blanket assumptions of age-related competencies (Helsper & Eynon, 2010).

The use of digital technology and teacher beliefs

Teachers' believing that technology has value does not translate to quality educational use (Seifert, Sheppard & Wakeham, 2013; Shiflet & Weilbacher, 2015). Teachers require pedagogical knowledge to use technology successfully (Prensky, 2011). Thus, it can be extrapolated that while technology is crucial to innovation, its presence does not guarantee innovation.

Digital technology and student outcomes

Digital technologies can transform the learning experiences of students (Underwood, 2009), increasing their engagement, motivation and interaction (Wright, 2010). That is, provided underlying pedagogies are modernised (OECD, 2015). The same OECD report (2015) furthermore found no significant improvements in reading, mathematics or science in OECD countries that invested heavily in technology for education, suggesting caution against the uncritical uptake of technology.

CONCLUSION

Significant school design transformations and technological innovations require educational institutions to rethink their pedagogical position. Learning environments research has tended to focus on technical issues, such as light, ventilation and acoustics (Blackmore et al., 2011), with minimal focus on preparation for, and transition into, new learning spaces and development of innovative pedagogical practices. Research is still to explain and justify the pedagogical practices suited for ILE conditions. Further research is also required to establish the sustainability of exemplary pedagogical practices in an ILE, and to evaluate how changes to physical learning spaces influence student outcomes.

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