

CORE WHITE PAPER

# Innovative Learning Environments

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## About this white paper

This CORE Education white paper series offers 'pointers to promising practice' drawn from research into the most effective way to align pedagogy and learning environments.

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Mark is a Senior Advisor in Future-Focused Education, particularly in the areas of innovative learning environments, leadership, and modern learning practice. He helps organisations design and build great spaces to learn while helping educators develop the capacity to make the most of those spaces. Mark's personal mission is to turn all schools into awesomeness incubators, and he is currently completing his PhD on change leadership in innovative learning environments at the University of Melbourne.

Mark was part of the foundation leadership team at one of New Zealand's leading future-focused schools: Albany Senior High School. Mark also established the country's first open source high school, and an innovative bring-your-own-device (BYOD) programme in 2009. Mark has helped dozens of organisations launch their BYOD programmes, helping schools and centres to break free of industrial age education.

## CORE Education's White papers

CORE Education is a New Zealand based not-for-profit organisation that has been providing world-class professional learning and development, research, and thought leadership for over ten years. CORE has a strong desire to transform education, and we believe that new technologies are an exciting way to engage learners across all education and training sectors. The CORE Education research reports are intended to provide helpful information for improving education in New Zealand and the world. They provide insights, promote discussion, and inform school leaders and teachers about educational themes and trends.

# Innovative Learning Environments<sup>1</sup>

“Ka pū te ruha, ka hao te rangatahi”  
*When the old net is worn, the new net goes fishing.*



## Introduction

The last decade or so has profoundly disrupted Western education. Many factors, including changes in society; globalisation; low-cost mobile devices; information storage; retrieval and storage networks; and, advances in our understanding of the way the human brain learns have meant that long-established practices in education have come under increasing scrutiny. One area that is currently under such scrutiny is the design of the buildings within which education takes place. One of the dominant metaphors in Western education through most of the 20<sup>th</sup> century was the idea of the industrial ‘assembly line’:

“Children entered the production line in batches by age, and moved from grade to grade through a pre-planned sequence of standard steps, as if on a conveyor belt”  
(Hood, 2015).

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1 A ‘learning environment’ may be understood to be the complete physical, social and pedagogical context in which learning is intended to occur. An ‘innovative learning environment’ is one that is capable of evolving and adapting as educational practices evolve and change. (New Zealand Ministry of Education, 2015a). Flexible Learning Environments are “more open than traditional classrooms and can often accommodate more than one class and several teachers. They are often made up of many different sized spaces so they can support different ways of teaching and learning and be used for different types of activities. Many spaces have glazing between them to create open and light spaces that can be indirectly supervised.” (New Zealand Ministry of Education, 2015b)

This 'conveyor belt' carried with it certain design requirements: the need to support the paradigm of one: "one teacher, teaching one subject to one class of one age using one curriculum at one pace, in one classroom for one hour" (Hood, 2015). While this model of education has served some people well for a very long time, the changing nature of knowledge, technology, society, and the world means that schools are now responding to fundamentally different challenges to the ones they faced even 20 years ago. While authors like Jane Gilbert have been exploring these changes since 2005 and earlier, more recently, Tony Wagner and others described several key trends taking place:

- › It is no longer possible to predict exactly what knowledge people will need to know: it is changing all the time, and new knowledge is being created at ever-increasing speeds. (Bolstad et al., 2012).
- › Information is freely available like air or water. The purpose of education is no longer primarily about acquiring knowledge; that knowledge can be gained elsewhere. Increasingly education is about gaining skills, disciplines, capabilities and competencies as well as knowledge (Wagner, 2014).
- › Increasingly what the world cares about is not what you know but what you can do with what you know. In an age where smartphone apps can solve any algebra problem you can point the camera at, and can translate paragraphs written in foreign languages in real time, simply getting the right answer is no longer enough (Wagner, 2014).

Similarly, this notion of the 'conveyor belt' doesn't accommodate the emerging research from neuroscience that "individual learning patterns differ and that learning systems should accommodate variability among learners from the outset" (Gronneberg & Johnston, 2015). Flexible approaches should ensure access and full participation by all students, without lowering expectations or standards. As the New Zealand education system evolves its vision for future-focused learning, it's also important to ensure that the innovations being developed are informed by sound research and developed in partnership with communities in order to meet the diverse and variable needs of learners.

## Aging architecture

Many educators are responding to these challenges despite the fact that around 70% of New Zealand's school buildings were built well before the emergence of these trends. In fact the majority of New Zealand-Aotearoa's school building stock was constructed during the 1950s and 60s (New Zealand Ministry of Education, 2011). The move to Innovative Learning Environments (ILEs) being adopted by many schools across the country is in part a response to the challenges outlined above, but also an acknowledgement that for many learners the traditional assembly line system has not worked well at all. In fact Treasury goes so far as to say that amongst all OECD countries "New Zealand has the largest variation in student achievement within schools". Inside many New Zealand schools there are learners achieving at the very highest levels internationally, and within the same school there are learners who are achieving very poorly internationally (New Zealand Treasury, 2012). This inequity in outcomes is arguably New Zealand-Aotearoa's greatest educational challenge.

## Innovations

Educators throughout the country have been innovating in an attempt to address this inequity for years, exploring the potential of authentic and project-based learning, learner agency, new technologies, inclusive and culturally responsive practices, among other things. More recently, educators and schools, centres and kura have begun exploring the role that physical learning environments might play in addressing some of these educational challenges. Barrett, Zhang, Davies,

& Barrett, (2015) found that the physical characteristics of primary school environments “do impact on pupils’ learning progress in reading, writing and mathematics”. These researchers suggest that the impact of the environment is quite large, explaining 16% of the variation in the overall progress over a year. A recent secondary school study compared the achievement of learners in innovative learning environments to their counterparts in conventional classrooms within the same school, and found improvements for the ILE cohort of 11%, 16% and 19% respectively in humanities, English and mathematics (Anglican Church Grammar School, 2016).

The emerging evidence suggests that the physical learning environment can make a difference, but as Blackmore et al., observe: “buildings alone are not enough; it is about relationships and changing cultures and practices” (2011). The most effective approach to raising outcomes for learners is to ensure that spaces and practice are seen within the wider ecosystem of education, and not as a single silver bullet. Researchers such as Blackmore conclude that practice *and* space need to change in order to achieve more inclusive, equitable outcomes for learners.



### An evidence-based approach

Helpfully, there is a growing body of research that offers schools, centres and kura some guidance when it comes to designing and implementing ILEs. This research suggests that in order to maximise the likelihood that all learners’ needs are met, we should ask questions such as:

- › **Is the environment inclusive?** Has the design started with the aspirations and needs of every learner and their whānau? Have we asked what will support learning and wellbeing and also what might get in the way? Have we thought about how we can use design to remove these barriers? Inclusive learning environments acknowledge that all learners learn in different ways, and at times learners may need to work together or alone, in silence or with noise, standing or sitting, passively or actively, with technology and without it, indoors and outdoors. Inclusive, flexible, responsive environments are those that provide opportunities for these

activities (Barrett et al., 2015, p. 28).

- › **Is the design culturally responsive?** Does it encourage and support practices that allow learners to draw from their culture and background to achieve as themselves? This includes supporting strategies such as ako, whanaungatanga, wānanga, tuakana/teina that meet the needs of Māori and Pasifika learners but also learners from a wide variety of diverse cultural backgrounds. Research has found strong links between “a clear sense of identity, and access and exposure to [learners’] own language and culture” and improvements in those learners’ wellbeing and achievement (New Zealand Ministry of Education, 2013).
- › **Are the spaces varied and purposeful?** Effective learning environments cater for a wide variety of needs that might include collaboration and independent learning; discussion and quiet reflection; direct instruction and independent practice; practical and abstract activities. Learners should also be able to see themselves, their progress and their achievement celebrated in the spaces around them (Killeen, J. P., Evans, G. W., & Danko, S., 2003). Breakout zones or rooms that learners can access off a general learning area have been shown to impact positively on learning (Barrett et al., 2015). Subtle changes in an environment (posters, art work, wall displays, furniture, music etc.) also provoke greater brain activity because the brain is constantly scanning the environment looking for change, as long as learners don’t find them stressful (Sousa, 2014). A multi-method study found that if traditional seating in rows dominates, so do teacher-centred approaches (Sztejnberg & Finch, 2006). Learners should also be able to enjoy equitable access all learning opportunities and any resources (including digital technology and virtual environments) they might require for their learning.
- › **Do the spaces encourage active learning and physical movement?** Physical movement enhances learning and memory by providing additional oxygen to the brain. In turn, this allows the brain to access more long-term memory areas, thereby helping learners to make better connections between new and prior learning (Scholey, Moss, Neave & Wesnes, 1999; Blakemore, 2003). Research suggests that physical movement enhances learning (Sousa, 2014) and physically active children are likely to achieve higher academic results (Chomitz et al., 2009).
- › **Does the learning environment encourage pro-social behaviour?** Design can also play a role not only in promoting learning but also positive behaviour. Gifford (2002) found that “open learning spaces have positive effects on outcomes where teacher pedagogy is matched, and there are fewer behavioural problems”. Examples of pedagogy ‘matching’ space might include designing group-based activities to take place in collaborative zones, or encouraging reflection or quiet reading in quiet zones. This same study demonstrated decreases in anti-social behaviour when classroom environments were less ‘dense’ (lower levels of furniture and/or people per square meter). In response to this, many architects now include circulation or ‘traffic’ space within the learning environment, thereby decreasing the effective density of a space.
- › **Does the design emphasise connections with the natural environment?** Elements such as natural lighting, air quality, and optimal levels of colour, sound and temperature all lead to increases in the rate of learning. These elements are what Barrett et al. (2015) gather together under the label ‘naturalness’. Unnatural environments (dimly-lit, stuffy, uncomfortable, or lacking in natural materials) can lead to the production of stress hormones including cortisol which decrease the rate of learning (Samuels & Stephens, 1997). Views of nature also decrease anxiety levels, which can impact on learning (Chang & Chen, 2005). Also, learners given opportunities to learn outdoors experience improvements in areas such as cognitive and affective function; interpersonal and social skills; and physical and behavioural effects (Dillon et al., 2005).

- › **Is the environment acoustically supportive?** Providing a range of different acoustic zones enables teachers to ensure that the acoustic environment supports the learning needs of students. Dr. Kenn Fisher recommends three acoustic zones in any learning environment: reflective/creative; creative/interactive; and interactive (Fisher cited in Von Ahlefeld, 2009). Schneider (2002) and the 21st Century School Fund (2009) found the good acoustics (quality rather than amount of noise) are fundamental to academic performance. When the acoustics in an environment are substandard, all students learning can be compromised (Eberhard, 2009). Students who are hard of hearing, learning a second language or who have autism may be at a particular disadvantage of poor acoustics and excessive noise (Eberhard, 2009; Gifford 2002; Heine and Williams, 2007.)
- › **Is the environment emotionally supportive?** This is as much about the socio-cultural environment as the physical environment, and centres on ensuring everyone is free from threats, fear or stress. Schools should aim to create a safe emotional environment by emphasising consistent restorative practices that emphasise the ‘putting right’, but also limiting students’ exposure to potential stressors such as fast cars or traffic passing by, over-vigorous play, shouting or intimidation.
- › **Does the environment promote learner agency?** When learners have agency, they have ‘the power to act’ or to be active in making decisions about their learning. Agentic spaces provide opportunities for learners to have a voice in the what, why, where, how and with whom of learning, and this voice has been positively correlated with increased intrinsic motivation for learning, overall achievement, creativity and higher-order thinking (Toshalis & Nakkula, 2012).
- › **Do the learning spaces support collaboration?** Learning is often socially constructed: it arises as a result of our interactions with others. Strategies such as peer-tutoring and reciprocal teaching often lead to deeper understandings than simply working on one’s own, and spaces should be designed with these activities in mind. In addition to collaborative learning, spaces that promote collaborative teaching are likely to lead to improved student outcomes (Darling-Hammond, Aness, & Ort, 2002). In addition to better quality teaching and therefore improved student achievement outcomes, research suggests other benefits, including increased inter-disciplinarity and opportunities to pool insights about individual student’s learning (York-Barr, Ghore, & Sommers, 2007).
- › **Are all elements of your design coherent and aligned?** Are the behaviours, expectations and approaches that are valued in the playground the same as those valued elsewhere in the organisation? Are the principles underpinning the design of exterior landscaping coherent with the principles that underpin the design of specialist space? Is what is valued about learning in one team consistent with what is valued by another team? Are these values reflected in the design of the learning environment? Researchers like Atkin (1996) and Newmann et al., (2001) point to this kind of coherence and alignment as being crucial to the operation of successful organisations.
- › **Is the design continuously evaluated, improved and adjusted as needs change?** Thomson & Blackmore (2006) identify the importance of what they call ‘serial redesign’ in the implementation of innovative learning environments. Serial redesign is the process of continually reflecting upon what is working well, what is not working well and the prototyping of strategies to advance the former and improve the latter. Crucial to this process is inclusion and participation: parents, students, staff and community members should all be involved in designing and refining if the planning, implementation and evolution of physical learning spaces is to be successful.

## Conclusion

Even with all of these considerations reflected in the design of a physical learning environment, it's important to return to Blackmore et al.'s observations that "buildings on their own are not enough". The challenges facing schools, centres and kura will not be solved simply by building new buildings, or even remodelling our existing ones. The physical environment will undoubtedly play a role, but it will be as part of a much wider educational ecosystem of practices, systems and cultures, all working to ensure that every learner is provided with every opportunity to be an active participant in learning; to achieve highly; and to be celebrated for who they are.



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