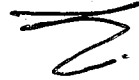


# Exploring fit-for-purpose contemporary learning spaces

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## Introduction

This review thematically explores recent literature relating to contemporary learning spaces to contextualise the arguments for why system leaders should prioritise investment in newly built and upgraded physical school infrastructure. We highlight key tensions between the frequently rapid infrastructural changes typically occurring in Australian, OECD, and global contexts and the more gradual, evolutionary long-term cultural-pedagogical changes in schools and systems. The review presents a synthesis of prominent findings from empirical research and offers key principles to both define and guide what may be considered “fit for purpose”. Rather than taking a deterministic stance that *space will change practice* and thereby improve learning outcomes, we draw attention to research that promotes an ecological conceptualisation of space as co-constructed by learners and teachers through lived learning experience. Finally, we recommend that the long-term needs of school communities—as manifested in their owned and shared vision for positive, sustained educational change—should arguably drive infrastructural decision-making.

## What is a contemporary learning space?

OECD (2013) conceptualises the learning environment “an organic, holistic concept that embraces the learning taking place as well as the setting” (pp. 22). Among the key affordances of contemporary learning environments is the flexibility to enable problem- and project-based learning, wider community partnerships, authentic learning, technology-rich learning, formative assessment, and the encouragement of learner voice and agency (OECD, 2013).

Beyond these characteristics, research has focused on how physical elements influence improvements to learning and teaching, including different types of furniture, flexibility to provision the space for different pedagogical practice or learning modes, and optimum biophilic design across indoor and outdoor spaces. Quantitative findings have identified that these factors can account for as much as 16% of variation in student learning outcomes (Barrett et al., 2015), while similar qualitative findings indicate they contribute to improvements to learner wellbeing, sense of belonging, and engagement (Kariippanon et al., 2018). In their synthesis of twenty-one studies, Byers, et al. (2018) points to findings that learners in well-configured learning spaces can “significantly outperform like-ability peers in a range of key academic subjects” (p. 39).

In addition to physical space as a key feature of characterising contemporary learning spaces, research has focused on how space influences teachers’ practices. Recognising the significant role of the teacher in enabling improved learning outcomes (Hattie, 2009), some have explored the extent to which space is a catalyst for the kinds of cultural-pedagogical changes that occur in schools where improvements are often most marked. Although early claims tended to emphasise deterministic perspectives such as JISC’s (2006) assertion that “spaces are themselves agents for change [and] changed spaces will change practice” (p. 30), subsequent research has been unable to find, as Mulcahy, Cleveland, and Aberton (2015) put it, a “causal link between learning spaces and pedagogic change” (p. 1). However, while the lack of direct

causality speaks to the failure of space to *determine* practice, recent research has argued in favour of more ecological and relational viewpoints of space as something that can have “a direct impact on the *patterns of participation* and learning within the school” (Willis et al., 2013, p. 4, our emphasis). By exploring these patterns, this research suggests that space in contemporary schools is something that is dynamic, frequently co-constructed by teachers and learners, and temporally fluid rather than fixed in nature (Boys, 2011; Damşa et al., 2019; Mulcahy et al., 2015).

## Why contemporary learning spaces?

The industrial models underpinning the design of schools in the nineteenth and twentieth centuries are now deemed, by many, to be inadequate for serving the needs of learners today and into the future. In recent years, this perceived inadequacy has prompted schools, systems, and governments alike to explore the role that space can play in meeting current and emerging educational imperatives (Bolstad, 2006; Bolstad et al., 2012; Fletcher et al., 2017). Schools and jurisdictions where change has had a positive and lasting impact increasingly represent a component in case for change arguments.

In the *Strategic Plan 2018-2022*, the NSW Department of Education’s (2018) goals recognise the importance of establishing resilient school infrastructure that “meets the needs of a growing population and enables future-focused learning and teaching” (np.). The NSW Department of Education’s (2020) *School Assets Strategic Plan Update* similarly focuses on delivering an infrastructure program that balances the need for growth and the need to provide facilities that are up to a contemporary standard while seeking to encourage evidence-informed facility design and ensuring students’ needs remain at the centre.

Although research often plays a guiding role in articulating effective educational practices and understanding their impact on learning outcomes, there is a relative paucity of findings to inform our understanding of what “fit for purpose” spaces should be. In their meta-analysis of the characteristics of contemporary learning environments, Byers, Mahat, Liu, Knock and Imms (2018) summarise the considerable variation between school contexts when seeking to understand the impact:

Despite the current interest and systemic investment in school learning environments, there is a lack of empirical data to adequately evaluate how existing and alternative learning environments (blended, ILEs and open) impact teaching and learning (pp. 8-9).

While changes in physical school infrastructure can happen in rapid timeframes, pedagogical change is often seen as an evolutionary rather than revolutionary process. Understanding of the nature of educational change is arguably, therefore, a key step in understanding the role that space might play in catalysing—or at the very least supporting—educational change within a school. To effect the changes needed, school leaders need to take into account factors that they would rather avoid (Fullan et al., 2009) and see systemic change as a long-term process that is more than fleeting innovations (Toh et al., 2014). As Hargreaves, Boyle and Harris (2014) elaborate, changes in high-performing jurisdictions such as Finland did not “happen overnight with sudden switches in leadership—but only after years of continuous and unrelenting commitment to stronger working relationships and greater success” (p. 14).

In the systematic review of Byers, Mahat, Liu, Knock and Imms (2018), five studies that specifically focus on the newly-provisioned spaces are summarised in the table below. The table documents each study’s focus, the characteristics of space that were studied, and reported impact on teaching, learning, and/or wellbeing.

Table 1 — Documented aspects of contemporary learning spaces in recent research

Study/ Focus	Documented aspects of contemporary learning space	Reported impact
Kariippanon, Cliff, Lancaster, Okely, & Parrish (2018)	<ul style="list-style-type: none"> <li>• Reduction in furniture overall – creating more flexible space</li> <li>• Group learning areas</li> <li>• Breakout spaces</li> <li>• Individual pods</li> <li>• No distinct “front of classroom”</li> <li>• Presentation spaces</li> <li>• Seamless technology access</li> <li>• Brightly coloured furniture</li> <li>• Natural light</li> <li>• Indoor plants</li> </ul>	<ul style="list-style-type: none"> <li>• Shift towards student-centred pedagogies</li> <li>• Increases in self-regulation, collaboration, student autonomy, interaction, and engagement</li> <li>• Modified spaces that were more comfortable, enjoyable, and inclusive</li> <li>• Increases to student wellbeing, where three psychological needs are met: (1) autonomy; (2) competence; and (3) relatedness.</li> </ul>
Barrett, Davies, Zhang, and Barrett (2015):	<ul style="list-style-type: none"> <li>• Natural light – regulating sleep/wake cycles</li> <li>• Acoustics – ensuring that noise levels are not in excess of optimal conditions for understanding speech</li> <li>• Temperature/air – optimum with adequate airflow</li> <li>• Ownership – how identifiable and personalised the room is</li> <li>• Flexibility - how the room addresses the need of a particular age group and any changing pedagogy</li> <li>• Connection – wide pathway and orienting objects with identifiable destinations</li> <li>• Colour – to reflect appropriate mood for learning and teaching</li> </ul>	<ul style="list-style-type: none"> <li>• Classroom environmental factors account for 16% of <i>all influences</i> on the variation in pupils' academic performance.</li> </ul>
Tanner (2000):	<ul style="list-style-type: none"> <li>• Outdoor learning environments – including green areas, natural quiet areas, and play areas</li> <li>• Instructional neighbourhoods – suites, each with classrooms, lounge space for adults, office space for teachers, lockers, private bathrooms, window seats, terraces, hallway display cases, and small seminar rooms</li> <li>• Scale – location/size of facilities (e.g. height of door handles and light switches) are appropriate to students' ages.</li> <li>• Natural daylight- “the most important environmental input, after food and water, in controlling bodily functions” (Tanner, 2000, p. 315).</li> <li>• Clearly marked pathways to activity areas and “supervisable circulation patterns” for increased safety</li> <li>• Intimacy gradients – “A sequence from larger to smaller-public to private spaces, giving the effect of drawing people into the area” (Tanner, 2000, p. 319)</li> <li>• Living views of indoor and outdoor spaces (gardens, animals, fountains, mountains, people, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Learning throughout the school taking advantage of both classroom and open spaces.</li> <li>• Opportunities for teacher-learner partnerships</li> <li>• Improved functioning (e.g. sleep/wake cycles, accessibility to classroom facilities, etc.)</li> <li>• Improved orientation and increased safety</li> </ul>

Study/ Focus	Documented aspects of contemporary learning space	Reported impact
<i>Pearlman (2010):</i>	<ul style="list-style-type: none"> <li>• Open plan - "double size" classrooms with "double the students" and two or more teachers</li> <li>• Worktables and rolling chairs – not individual desks; modular and mobile seating</li> <li>• No walls / glass walls / demountable walls to make learning visible including possibility of no wall between classroom and outdoor corridor</li> <li>• Specialty labs including for engineering</li> <li>• Alcoves – little corner areas with soft furniture for small-group work</li> <li>• Change language – now referring to "classrooms" as "learning studios", "learning plazas", "home bases", etc.</li> <li>• Project planning rooms – small conference rooms</li> <li>• Media library – large comfortable open space with high-end technology</li> </ul>	<ul style="list-style-type: none"> <li>• Effective implementation of PBL</li> <li>• Shift from teacher- to student-centred pedagogies</li> <li>• Visible learning throughout the school</li> </ul>
<i>Gilavand, Espidkar, and Gilavand (2016):</i>	<ul style="list-style-type: none"> <li>• School-based gardens</li> <li>• Open outdoor spaces</li> <li>• Presence time in outdoor spaces vs classrooms</li> </ul>	<ul style="list-style-type: none"> <li>• Significant overall academic improvement</li> </ul>

The features documented in these studies speak to the defining physical aspects of contemporary learning spaces, such as visibility, openness, seamlessness, and fluidity. Features such as the lack of a distinct "front of classroom" (Kariippanon et al., 2018), use of different terms such as "learning studio" (Pearlman, 2010), and intimacy gradients (Tanner, 2000) all suggest that educational change can occur in tandem with changes to infrastructure. However, they also suggest that these changes need to be made explicit, represent the conscious and combined efforts school leaders and teachers, and be openly communicated with a clear rationale to the wider school community.

### What is known about their impact?

Hattie's (2009) meta-analysis of studies has compared classrooms with an open-plan layout to those of a more traditional single-cell, self-contained classrooms. Chiefly drawing on research from the late 1970s and early 1980s, the work presents only questionable evidence, at best, of positive changes to teachers' practices and concludes, "as was noted in many of these studies, too often classroom architecture may be open but that is no guarantee that the principles of open teaching are present" (p. 88). Although the quality of openness is just one feature of contemporary spaces, these early findings present an important premise that arguably underpins more recent efforts: spaces may enable changes to practice, but such changes are dependent on the culture of learning that drives change within the school.

The disconnect between architectural and educational aims has been highlighted by Young, Cleveland, and Imms (2020) who suggest that traditional learning space designs represent a historically stable, "middle ground" between architects and educators, where both parties

“envisaged pedagogies based on teacher-focused instruction and associated spatial arrangements” (p. 693). This argument points to the weight of the *status quo* traditional classroom as one predicated on didactic teaching, the overuse of which has been associated with inferior knowledge retention and lower engagement. However, the authors also highlight the importance of affordance analysis of the *action possibilities* of any given space and suggest that in both traditional and contemporary spaces, some of these affordances may lie latent without being actualised. Moreover, their findings show that actualisation of affordances depends on the perceptions of the teachers and learners in the space and is often the product of interplay between the physical environment and “the practices, activities, and behaviours of teachers and students, as informed by their school culture and past experiences” (p. 716).

Broadly speaking, many see contemporary spaces as enabling and/or encouraging a departure from traditional teacher-led instruction to more learner-centred, pedagogically fluent, and diverse forms of instruction. As Benade (2019) explains, such spaces:

encourage and enable teachers to exchange ‘front-of-the-room’, single teacher presentational approaches for collaborative, dispersed and facilitative styles, often in teams, working with multiple students in shared, common learning spaces (p. 53)

Similar arguments have been made with respect to collective teacher efficacy, which Donohoo, Hattie, and Eells (2018) describe as a group’s shared belief that “through their unified efforts, they can overcome challenges and produce intended results” (p. 40). In a case study of a New Zealand school, for example, Martin and Bradbeer (2016) document learners and teachers “who work and learn collaboratively within a series of open innovative learning environments” and point to a learning culture that is “purposeful, focused on causing learning for every learner, and collaborating to reap the benefits of collective efficacy” (pp. 49, 52). Collective teacher efficacy has since been recognised as a very high-impact strategy in Hattie’s (2017) updated meta-analysis. Similar research by Bradbeer, et al. (2017) focuses on changes to teachers’ attitudes—or “mindframes”—within contemporary learning spaces and suggests that space has the potential to “unlock” changes in practice. One of the largest surveys of teachers’ attitudes and practices, OECD’s (2018) TALIS report finds that “teachers who frequently engage in professional collaboration, especially collaborative professional learning and joint activities across different classes and age groups, tend to use cognitive activation practices more often” (TALIS, p. 33).

## Principles, practices, and policies

In research commissioned by the OECD for their *Designing for Education* project, Atkin (2011) argues the need to “move beyond the simplicity of flexible open spaces to integrate resource rich, special purpose spaces with flexible, adaptable multipurpose spaces to provide a dynamic workshop environment for learning” (p. 26). She articulates a range of principles for designing contemporary spaces that encompass active learning and social interaction, flexibility to employ a wide range of pedagogical approaches, interdisciplinary learning, different grouping configurations, seamless ICT, and use of both indoor and outdoor space. More recently, Hod’s (2017) analysis of several case studies argues in favour of distinguishing between *development* principles—which are relatively fixed in nature—and *design* principles, which have a wider range of diversity. According to the author, development principles for contemporary learning spaces include having a clear purpose, securing stakeholder buy-in, partnering with learning experts, and developing iteratively where possible. Design principles include choosing seamless physical, virtual and social elements integrated across activities, ideas, and people.

Summarising the research of the last decade, Damşa, Nerland, and Andreadakis (2019) believe a key weakness in the conceptualisation of contemporary learning spaces has been a prevailing view on space as *functional* rather than *ecological*. By taking an ecological view, the authors view learning spaces as “co-constructed by learners, emerging through learners’ practices, interactions and activities, and facilitated by pedagogical arrangement” (p. 2075). They advocate four guiding principles for ecologically conceptualised learning spaces:

- Learning spaces are principally immaterial in nature and are spaces of action, where learners’ goals, knowledge, doing and making emerge.
- Learning spaces can, in part, be preconfigured by teachers but are (re/co-)constructed by the learners when enacted. Therefore, learners’ agency (and skill) is of crucial importance because learners sustain this process.
- Learning spaces are relational in nature, which implies that the learner relates and engages with resources, for example, knowledge, people, materials, digital, from local or extended (beyond school) contexts.
- The educational context, with its institutional, material, or digital infrastructure and pedagogical arrangements (e.g. learning design, teacher support) facilitate frameworks and ecologies of resources that provide scaffolding for learning spaces.

## Conclusion

Regardless of the specific setting and architecture, all school communities have an opportunity to think carefully and strategically about the kind of learning that is most valued and the learning spaces that will best support this learning. Schools can be powerful communities where innovative ideas and practices with contemporary learning spaces can be demonstrated and shared transparently and openly to broader communities. In this respect, contemporary learning spaces are increasingly viewed as vehicles for catalysing—and making more openly visible—changes in pedagogical practice.

This thematic review has explored recent key literature relating to contemporary learning spaces with a view to understanding why system leaders should invest considerable funds in upgrading and newly building learning spaces in schools. The meta-analysis we explored suggests that at a basic infrastructural level, contemporary learning spaces should embrace the same kind of openness as experimental classrooms of the 1970s and 1980s but other key factors must be addressed — most notably, the inclusion of different sub-spaces (zones) to support different approaches to learning and teaching alongside appropriate elements such as furniture, natural lighting, noise levels, temperature, colour, and signage. When carefully designed in consultation with educators and the school community, we argue that contemporary spaces offer emerging affordances—or *action possibilities*—that can be actualised in the form of highly effective learning and teaching practices.

However, both past and present research highlights the weakness of deterministic arguments to the effect that *space will change practice* and thereby guarantee some form of improved learning outcomes. Taking an ecological viewpoint provides a richer understanding of how learners and teachers co-construct their lived learning experience within the space(s). With this viewpoint in mind, the long-term needs of school communities—as manifested in their vision for positive, sustained educational change—should arguably drive decision-making relating to designing and using learning spaces. Such needs also arguably form the most important basis for determining whether a space is fit for purpose. As Kariippanon, Cliff, Okely, and Parrish (2019) stress, consultation, participation, and ownership are “central elements of sustainable change processes” and the culture of the school community is pivotal to the success of any initiative:

Further effective design and transformation of learning environments requires a reflexive school community, pedagogical shift, professional development, and ongoing support to teachers and students. The discussion emphasises the sociomaterial interplay between the pedagogical and physical classroom environment (p. 1).

The review also draws attention to the evolutionary-rather-than-revolutionary nature of educational change and suggests this may be at times in opposition to the rapid infrastructural changes often requiring urgent justifications and hard evidence. Drawing on these themes, Imms (2018) argues that contemporary learning spaces represent “not a revolution, but simply another chapter in a sustained, multi-faceted and slow-moving reconceptualization of the role of space in education” (p. 1). Coupled with the fact that a newly built school may not be upgraded further for 20-50 years, the well-established educational change literature shows that meaningful changes in a single school may take 5-7 years, while the same changes may take more than a decade for an educational jurisdiction. Accepting the reality of these changes as long-term and investing in the learning culture needed to bring them about means that school communities embarking on new-build or rebuild projects need to have a long-term vision of the changes they wish to bring about. With a shared ownership of these changes and commitment to high impact factors such as collective teacher efficacy, any physical changes are far more likely to be “owned by”—rather than “done to”—the school community. In this respect, physical changes are like a very important piece in a much larger puzzle and by understanding its place in the puzzle, educators can work to bring about significant positive and lasting change into the future.

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