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Innovative Learning Environments
and Teacher Change

Final Research Findings

Wesley Imms and Marian Mahat

Innovative Learning Environments and Teacher Change: Final Research Findings

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1. Preamble

Context

ILETC's primary research focus was: *Can altering teacher mind frames unlock the potential of innovative learning environments?* The development of subsidiary research questions was guided by the following conjecture, stated in the original project application:

The hypothesis of this study is that by changing teachers' ways of thinking about their teaching and their use of ILEs, they are more likely to change the proportions of surface to deep learning in their classes...

... teachers who deliberately aim to facilitate students' deeper learning are those most likely to optimize ILE spaces.

At the beginning of ILETC a clear mandate existed in government and academic conversations for these 'innovative learning environments (ILEs)' to have a primary aim of fostering students creative and critical thinking, and communicative and collaborative practices; this often was embedded in '21st Century Learning' ambitions. There existed, however, a worrying paucity of quality research to act as a baseline for understanding this phenomenon. For this reason, ILETC adopted an exploratory design in seeking to document correlation between 'good' teacher use of ILEs and high levels of student deep learning.

The resulting research questions were:

1. What is the current situation in Australian and New Zealand schools in terms of the number of, types of, and teacher/student activities within ILEs?
2. What characterises 'good transition' by teachers into these ILEs?
3. What correlations can be established between ILEs and high levels of student deep learning, and high incidence of favourable teacher mind frames?

Evidence correlating the claims come from the following sources;

- 9 PhD dissertations
- 7 international conferences
- 3 international industry think tanks
- 7 Technical reports
- A book
- 6 Teacher workshops
- 30 Case studies
- Development of the Teacher Transition Pathway
- Development of the ILETC Spatial Typologies

We rank our findings in terms of perceived strength of the claims.

'Robust' claims

Findings that have empirical evidence to support them, and/or have been published in a peer-reviewed journal or book, and/or are based on verifiable data published in a project Technical Report.

'Promising' claims

Claims, published in a variety of sources, with a high degree of likelihood that further examination will find them to be accurate.

'Emerging' claims

Claims, often not yet formally published, but with enough credibility to suggest they 'signpost' future research and carry the potential to inform this area of research in valuable ways.



Woodleigh School. Law Architects. Drew Echberg photography.

2.

Summary of findings

“Given the fact evidence now exists that ILEs are successful in practice, what characterises major advances in builds into the coming decade? This report emphasises (1) design of ILEs can be argued to have now ‘peaked’ in Australia and NZ; (2) high-impact spaces are increasingly a product of highly informed collaborations between educators, designers and allied industries; (3) ‘successful’ builds in the coming years will surpass ‘innovation’ and ‘flexibility’ criteria, to be tested against increasingly sophisticated nuances of wellbeing, engagement and equity.”

Imms, W. (2020). Invited Address, Education Estates (England). October 2020.

“We need to advance on the discourse that has dominated a decade of ILE evolution - the ‘innovation and adaptable spaces’ focus. Innovation and adaptability have been achieved, and while we continue to refine such properties, they now constitute our new baseline. It is time to address the next challenge, what ILTEC calls the ‘abilities design’ concept; designing spaces whose primary function is to enable all students to actively engage in curriculum.”

Imms, W. (2020). Invited Address, EduTech (Sydney). October 2020.

In the briefest terms, the ILETC Project found the following...

A. (Antecedent knowledge) What academic knowledge relevant to ILETC already exists?

- A1. There is a paucity of existing quality research on ILEs, quality teaching and student deep learning.
- A2. Apart from some signature studies, what mostly exist uses conflicting definitions, frequently exhibits poor methodologies, and addresses a confusing range of topics.
- A3. The problem of consistent defining of key variables is not yet resolved.
- A4. Few studies have successfully isolated space as a variable.

- A5. While some studies have addressed links between various ILE affordances, teaching practices and student learning, these are isolated - there exists no cohesive body of knowledge on this vital issue.
 - A6. Typically, causality is not claimed in quality ILE literature; correlations are the norm.
 - A7. Pre-2000 literature is consistently negative when reporting impact of 'open learning' environments on student experiences and outcomes. Post-2000 literature trends the opposite, often citing correlations between ILEs and improvements in a range of student learning outcomes, well-being, and engagement.
1. (Research question 1) What is the current situation in Australian and New Zealand schools in terms of the number of, types of, and teacher/student activities within ILEs?
- 1.1 ILEs have become reasonably common.
 - 1.2 No one genre of ILE design exists. A hybrid of designs are in use between the often polarised 'traditional' and 'open plan' extremes.
 - 1.3 A trend in teaching approaches is identifiable when comparing traditional spaces to ILEs.
 - 1.4 A trend in student learning approaches is identifiable when comparing traditional spaces to ILEs.
 - 1.5 In Australian and New Zealand primary and secondary schools, three quarters of teachers engage in didactic or 'teacher-centred' teaching practices.
 - 1.6 In Australian and New Zealand primary and secondary schools, three quarters of students engage in 'teacher-directed' learning practices for the majority of their schooling.
 - 1.7 The majority of Australian and New Zealand primary and secondary students continue to be taught in traditional ways, in traditional settings.

2. (Research question 2) What characterises 'good transition' by teachers into ILEs?

- 2.1 Contrary to general assumptions, many teachers are transitioning well into ILEs.
- 2.2 A common 'pathway' or journey of this transition can be described. This appears to be consistent across a range of western countries.
- 2.3 Teachers are utilising a wide variety of strategies and tools to assist this progress.
- 2.4 Fourteen 'themes' can be identified that typify that journey.
- 2.5 Apart from two issues, teachers are receiving minimal support during this process.
- 2.6 While industry knowledge is high about many of the 'affordances' that support this transition (e.g. design, furniture, acoustics, technology), teachers are missing its quick dissemination into actual teaching situations.

- 2.7 The concept of 'spatial typologies' assists this dissemination.

3. (Research question 3) What correlations can be established between ILEs and high levels of student deep learning, and high incidence of favourable teacher mind frames?

- 3.1 ILEs are linked to better teaching and the learning desired of many educational authorities.
- 3.2 The project found evidence of positive relationships between ILEs, higher levels of student deep learning, and 'high-impact' teaching strategies (teacher mind-frames).
- 3.3 There is evidence of a linear progression between spaces and teaching/learning – the more flexible the space, the more common the desired learning outcomes and teaching practices.
- 3.4 While ILEs can be linked to greater deep learning by students, they have no impact on surface learning – ILEs assist deeper learning while not reducing surface learning.

I. Summary, and where to now? (Implications)

- I.1 Do altering teacher mind frames unlock the potential of ILEs? Yes, direct positive links were found between these two phenomena. But (1) the the word 'change' proved problematic. The study found no reason to 'change' mind frames, teachers were already modifying practices; rather, pre-existing practices that aligned to the mind frames were tested against ILE and non-ILE settings to allow this claim of correlation to be made.
- I.2 Causality was not detected – teachers were found to teach 'well', and students to learn 'better' in ILEs, but at present we cannot say the space created those outcomes.
- I.3 Due to the solid correlation however, it is logical that ILEs play a role in facilitating these positive outcomes.

The task now is to leverage from this finding and rich array of additional data, to facilitate widespread sustainable practices. ILETC findings constitute a platform for the next layer of evidence gathering about making ILEs more effective. Findings imply four streams of 'follow-on' investigation; (1) gather robust evidence of ILE impact on student learning outcomes and experiences; (2) develop a workable understanding of teacher spatial competency that improves student learning; (3) improve teacher understanding of the teaching/learning affordances of ILEs; (4) find a way to dramatically increase the impact of critical industry knowledge on teachers daily practices.

3. ILETC findings

Antecedent knowledge: What ILETC relevant research exists?

- A1.** There is a paucity of existing quality research on this topic.
- A2.** What does exist uses conflicting definitions, frequently exhibits poor methodologies, and addresses a range of topics with so little cohesion, an exploratory research design is required for ILETC.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
There exists a surprising lack of evidence on the impact of ILEs across a number of domains, most critically in terms of quality of teaching, student learning, and learning outcomes.	ILETC	Robust	Published, public domain	Byers, T., Mahat, M., Liu, K., Knock, A. & Imms, W. (2018). <i>A Systematic Review of the Effects of Learning Environments on Student Learning Outcomes - Technical Report 4/2018</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/216293
				Bradbeer, C., Mahat, M., Byers, T. & Imms, W. (2019). <i>A Systematic Review of the Effects of Innovative Learning Environments on Teacher Mind Frames - Technical Report 5</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/233535
There exists a surprising lack of cohesion across current research in terms of definitions of key factors. For this reason, stipulative definitions must be made before research can advance.	ILETC	Promising	Published, public domain	Mahat, M., Bradbeer, C., Byers, T. & Imms, W. (2018). <i>Innovative Learning Environments and Teacher Change: Defining key concepts - Technical Report 3/2018</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/216292

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Teachers perceive ILEs in ways that often differ to the confusing range of discourses currently in use in research of ILEs.	ILETC	Promising	Published, public domain	Mahat, M., Grocott, L. & Imms, W. (2017). <i>"In the real world...": Teachers' perceptions of ILEs. ILETC phase 1 teacher workshops.</i> The University of Melbourne, LEARN. http://hdl.handle.net/11343/194339
Teachers do not always identify deep learning when it happens	PhD Villafranca	Robust	Peer reviewed, published, public domain	Villafranca, E. (2020). <i>Curated learning: a pedagogical approach to maximise learning environments for students' deep learning.</i> [Doctoral dissertation, The University of Melbourne.]. http://hdl.handle.net/11343/237474
Teachers actually 'use' pedagogical affordances of ILEs without realizing it.	PhD Villafranca	Promising	Reviewed internally Peer reviewed, published, public domain	Villafranca, E. (2016). Understanding Affordances In Museum Education Context. In H. Mitcheltree, B. Cleveland & W. Imms (Eds.). <i>Informing education theory, design and practice through learning environment evaluation</i> , (pp.113-118). http://hdl.handle.net/11343/191852 Villafranca, E. (2020). <i>Curated learning: a pedagogical approach to maximise learning environments for students' deep learning.</i> [Doctoral dissertation, The University of Melbourne.]. http://hdl.handle.net/11343/237474

A3. Stipulative definitions are required to ensure ILE research does not compare apples to oranges. Critical to this, the most compelling literature argues that ILEs must be seen as the confluence of innovative designs and innovative practices; the word 'environment' transcends the physical, to describe the state of balance between space, teaching, and learning.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
There exists a surprising lack of cohesion across current research in terms of definitions of key factors. For this reason, stipulative definitions must be made before research can commence.	ILETC	Promising	Published, public domain	Mahat, M., Bradbeer, C., Byers, T. & Imms, W. (2018). <i>Innovative Learning Environments and Teacher Change: Defining key concepts - Technical Report 3/2018.</i> University of Melbourne, LEARN. Retrieved from: http://hdl.handle.net/11343/216292
Typologies of learning environments, providing a common language with which to discuss ILEs, and translate potentially complex spatial concepts into a practitioner-friendly graphic.	ILETC	Promising	Reviewed internally	Imms, W. & Mahat, M. (2021). Where to now? Fourteen characteristics of teachers' transition into innovative learning environments. In T. Kvan & W. Imms (Eds.). <i>Teacher Transition into Innovative Learning Environments: A Global Perspective</i> , (pp. 317-334). Springer. https://doi.org/10.1007/978-981-15-7497-9_25

A4. Few studies have successfully isolated space as a variable.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Historically, there are remarkably few examples of research convincingly isolating learning spaces as a variable.	ILETC	Robust	Published, public domain	Byers, T., Mahat, M., Liu, K., Knock, A. & Imms, W. (2018). <i>A Systematic Review of the Effects of Learning Environments on Student Learning Outcomes - Technical Report</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/216293
It is possible to develop tools that statistically isolate learning spaces as a variable	PhD Murphy	Robust	Peer-reviewed PhD thesis	Murphy, D. (2020). <i>Relationships between innovative learning environments, teacher mind frames and deep learning</i> . [Doctoral thesis, University of Melbourne].

A6. Typically, causality is not claimed in quality ILE literature; correlations are the norm.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Studies avoid methods that specifically attempt to isolate 'space' as a variable when measuring impact on student learning and schooling experience. Most studies surrender to confounding variables, and rely on suggestions of correlation – with varying degrees of success.	ILETC	Robust	Published, public domain	Byers, T., Mahat, M., Liu, K., Knock, A. & Imms, W. (2018). <i>A Systematic Review of the Effects of Learning Environments on Student Learning Outcomes - Technical Report 4/2018</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/216293 Bradbeer, C., Mahat, M., Byers, T. & Imms, W. (2019). <i>A Systematic Review of the Effects of Innovative Learning Environments on Teacher Mind Frames - Technical Report 5</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/233535
Few, if any studies claim causality. Such claims would require methodologies (such as randomised controlled trials) that at present are beyond the field to undertake.	ILETC	Robust	Published, public domain	Byers, T., Mahat, M., Liu, K., Knock, A. & Imms, W. (2018). <i>A Systematic Review of the Effects of Learning Environments on Student Learning Outcomes - Technical Report 4/2018</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/216293

A7. Pre-2000 literature is consistently negative when reporting impact of ‘open learning’ environments on student experiences and outcomes. Post-2000 literature trends the opposite, consistently citing correlations between ILEs and improvements in a range of student learning outcomes, well-being, and engagement.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Of the 21 studies that meet this reviews definition of ‘quality’, a trend exists in terms of findings. Studies from research conducted during the 1970-1980s consistently finds no relationship between space and improved student learning, and frequently returns negative findings. Of the ‘quality’ studies done post-2000, most have positive findings in terms of the above.	ILETc	Robust	Published, public domain	Byers, T., Mahat, M., Liu, K., Knock, A. & Imms, W. (2018). <i>A Systematic Review of the Effects of Learning Environments on Student Learning Outcomes - Technical Report 4/2018</i> . University of Melbourne, LEaRN. http://hdl.handle.net/11343/216293 Bradbeer, C., Mahat, M., Byers, T. & Imms, W. (2019). <i>A Systematic Review of the Effects of Innovative Learning Environments on Teacher Mind Frames - Technical Report 5</i> . University of Melbourne, LEaRN. http://hdl.handle.net/11343/233535



Pegasus Primary School. Jasmax Architecture. Stephen Goodenough photography.

Research question 1:

What is the current situation in Australian and New Zealand schools in terms of the number of, types of, and teacher/student activities within ILEs?

1.1 Pre-2000 literature is consistently negative when reporting impact of ‘open learning’ environments on student experiences and outcomes. Post-2000 literature trends the opposite, consistently citing correlations between ILEs and improvements in a range of student learning outcomes, well-being, and engagement.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Twenty-five percent of all surveyed learning spaces are capable of medium to high degrees of ‘flexibility’ – ie, are Types D and E.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEaRN. http://hdl.handle.net/11343/219467
Definitions of learning space designs are possible through analysis of the literature.	ILETC	Promising	Published, public domain	Mahat, M., Bradbeer, C., Byers, T. & Imms, W. (2018). <i>Innovative Learning Environments and Teacher Change: Defining key concepts - Technical Report 3/2018</i> . University of Melbourne, LEaRN. http://hdl.handle.net/11343/237432
Typologies of learning environments provide a common language with which to discuss ILEs. In terms of the myriad of learning space design orientations, this typology translates potentially complex spatial concepts into an easily understandable graphic, one that allows educators to discuss with some confidence their implications.	ILETC	Emerging	Conference Proceedings	Imms W. & Mahat M. (2021) Where to now? Fourteen characteristics of teachers’ transition into innovative learning environments. In W. Imms & T. Kvan (Eds), <i>Teacher Transition into Innovative Learning Environments</i> (pp. 317-334). Springer. https://doi.org/10.1007/978-981-15-7497-9_25

1.2 No one genre of ILE design exists. In terms of types of ILEs, it is clear that representation of an either/or polarisation of design types is misleading; that is, treating learning space designs as being either open plan or traditional. The more likely reality is a mass of ‘hybrid’ designs are well represented between these two extremes.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Distribution of design types is noticeably spread across the five categories represented in the ILETC Design Typology. While the type A and B (traditional) setting are most represented, types C, D and E (designs that provide greater flexibility) exist in significant numbers.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEaRN. http://hdl.handle.net/11343/219467
Definitions of learning space designs are possible through analysis of the literature.	ILETC	Promising	Published, public domain	Mahat, M., Bradbeer, C., Byers, T. & Imms, W. (2018). <i>Innovative Learning Environments and Teacher Change: Defining key concepts - Technical Report 3/2018</i> . University of Melbourne, LEaRN. http://hdl.handle.net/11343/237432
Typologies of learning environments provide a common language with which to discuss ILEs. In terms of the myriad of learning space design orientations, this typology translates potentially complex spatial concepts into an easily understandable graphic, one that allows educators to discuss with some confidence their implications.	ILETC	Promising	Reviewed internally	Imms W. & Mahat M. (2021) Where to now? Fourteen characteristics of teachers’ transition into innovative learning environments. In W. Imms & T. Kvan (Eds), <i>Teacher Transition into Innovative Learning Environments</i> (pp. 317-334). Springer. https://doi.org/10.1007/978-981-15-7497-9_25

1.3 A trend exists in Australian and New Zealand schools in terms of teaching approaches in particular spaces. Approximately three quarters of Australian and New Zealand primary and secondary school teachers are considered to predominately use what ILETC would define as ‘teacher-centred’ pedagogies, (types 1 and 2 on ILETC’s Pedagogy Typology).

Sources:

Findings	Who	Degree of ‘proof’ Robust, Promising, Emerging	Type of ‘proof’ -	Citation
A statistically significant correlation was found in terms of the the types of teaching and the types of spaces being used.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467
Definitions of teaching pedagogies are possible through analysis of the literature	ILETC	Promising	Published, public domain	Mahat, M., Bradbeer, C., Byers, T. & Imms, W. (2018). <i>Innovative Learning Environments and Teacher Change: Defining key concepts - Technical Report 3/2018</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/237432
A typology of teaching pedagogies, that translate potentially complex practices into an easily understandable graphic, assist teachers identify and discuss styles of teaching.	ILETC	Promising	Reviewed internally	mms W. & Mahat M. (2021) Where to now? Fourteen characteristics of teachers’ transition into innovative learning environments. In W. Imms & T. Kvan (Eds), <i>Teacher Transition into Innovative Learning Environments</i> (pp. 317-334). Springer. https://doi.org/10.1007/978-981-15-7497-9_25

1.4 A trend exists in Australian and New Zealand schools in terms of student learning approaches in particular spaces. The majority of schools report a higher incidence of what research would categorise as ‘high-impact’ teaching strategies in ILEs (as defined by ILETC and represented as types 3, 4, 5 and 6 in its Pedagogy Typology).

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Participants from schools with a higher prevalence of traditional spaces reported a lower assessment of teacher mind-frames, with the reverse in ILEs.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467

1.5 The majority of schools report a higher incidence of what research would categorise as ‘high-impact’ teaching strategies (teacher mind-frames) in ILEs, as defined by ILETC and represented as types 3, 4, 5 and 6 in its Pedagogy Typology.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Participants from schools with a higher prevalence of traditional spaces reported a lower assessment of teacher mind-frames, with the reverse in ILEs.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467

1.6 The majority of schools report a higher incidence of what research would categorise as student deep learning approaches in ILEs (as defined by existing literature into student superficial and deep learning).

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Participants from schools with a higher prevalence of traditional spaces reported a lower assessment of student deep learning, with the reverse in ILEs.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467

1.7 The majority of Australian and New Zealand primary and secondary students continue to be taught in traditional ways, in traditional settings.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
ILETC can make the claim that in Australian and New Zealand primary and secondary schools, three quarters of students are receiving teacher-directed instruction and are situated in traditional settings, being either desks facing ‘a front,’ or clusters of tables facing ‘a front’.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467

Research question 2:

What characterises ‘good transition’ by teachers into ILEs?

2.1 Evidence exists that contrary to assumptions, many teachers are transitioning well into ILEs.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Correlation of use of ILEs and perceptions of quality teaching habits suggest positive transition is frequently occurring.	ILETC	Robust	Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467 Mahat, M., Grocott, L. & Imms, W. (2017). <i>"In the real world...": Teachers' perceptions of ILEs. ILETC phase 1 teacher workshops</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/194339
Teachers are using ILEs well. A linear progression exists between spatial types and increases in use of high-impact pedagogies (mind frames); the more flexible the space (up to type D), the more the incidence of the qualities of teaching being sought by educational policies.	ILETC	Robust	Reviewed, published, public domain Reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467 Bradbeer, C., Mahat, M., Byers, T., Cleveland, B., Kvan, T. & Imms, W. (2017). The 'state of play' concerning New Zealand's transition to innovative learning environments: Preliminary results from phase one of the ILETC project. <i>Journal of Educational Leadership Policy and Practice</i> , 32 (1), 22-38. http://hdl.handle.net/11343/214377
Teachers actively interrogate ILE use. Perceptions of own ILE use consistently identify two challenges that they address; teacher mind sets and lack of professional development.	ILETC	Promising	Published, public domain	Mahat, M., Grocott, L. & Imms, W. (2017). <i>"In the real world...": Teachers' perceptions of ILEs. ILETC phase 1 teacher workshops</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/194339

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Teachers identify (1) more learning opportunities in ILEs compared to traditional settings, and (2) more potential 'learning opportunities' within ILEs, than the designers who created the spaces.	PhD Young	Robust	Published, peer reviewed, public domain.	Young, F., Cleveland, B. & Imms, W. (2020). The affordances of innovative learning environments for deep learning: Educators' and architects' perceptions. <i>Australian Educational Researcher</i> , 47(4), 693–720 (2020). https://doi.org/10.1007/s13384-019-00354-y Young, F. (2020). <i>Learning environment affordances: Bridging the gap between potential, perception and practice</i> . [Doctoral dissertation, University of Melbourne]. Minerva Access. http://hdl.handle.net/11343/271824
The majority of teachers indicate that (1) ILEs best support teaching practices; (2) ILEs are the preferred teaching space; (3) six months is the most frequently cited span of time it takes for teachers to transition to the new spaces.	ILETC	Promising	Reviewed internally. Forthcoming publication.	Imms, W. & Mahat, M (Forthcoming). <i>Preliminary analysis of the Teacher Transition Survey: ILETC Survey 2</i> . University of Melbourne, LEARN.

2.2 There is evidence that schools and teachers follow a reasonably common 'pathway' through this process. There are indications that this trend is consistent internationally.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
There is evidence this trend is consistent internationally, shown through validation of the Transitions Pathway 'grand themes' by teachers and administrators in the USA, Australia, New Zealand, UK and northern Europe.	ILETC	Promising	Published, public domain	Mahat, M., Bradbeer, C., Cattlin, J. & Imms, W. (2019). Validating the ILETC's Teacher Transition Pathway. In W. Imms & M. Mahat (Eds.). <i>What are teachers doing (well) when transitioning from traditional classrooms to innovative learning environments? Proceedings of international symposia for graduate and early career researchers in Australasia, Europe and North America</i> . (pp. 13-26). http://hdl.handle.net/11343/240733

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Persistent principles (values-based, participatory, incremental, inclusive, distributed) were found to consistently underpin traditional to ILE change processes in schools. These support the concept of a common 'teacher transition pathway'.	PhD Osborne	Promising	PhD examination	Osborne, M. (2018). Change leadership and the transition to innovative learning environments. In W. Imms & M. Mahat (Eds.). <i>What are teachers doing (well) when transitioning from traditional classrooms to innovative learning environments?</i> Proceedings of international symposia for graduate and early career researchers in Australasia, Europe and North America. (pp. 157-161). http://hdl.handle.net/11343/227598 Osbourne, M. (2020). <i>Changing leadership when implementing learning environments</i> . [Doctoral dissertation, University of Melbourne]. http://hdl.handle.net/11343/253863
There are transformational and transactional factors that can help support educators transition into innovative learning environments.	PhD French	Robust	Peer reviewed journal article	French, R., Mahat, M., Kvan, T., & Imms, W. (2021). Viewing the transition to innovative learning environments through the lens of the Burke-Litwin model for organizational performance and change. <i>Journal of Educational Change</i> , 23(1), 1-16. https://doi.org/10.1007/s10833-021-09431-5 French, R. (2021). <i>The transition to innovative learning environments: A systems view of design and organisational factors</i> . [Doctoral dissertation, University of Melbourne]. http://hdl.handle.net/11343/299863

2.3 This pathway is constituted of a wide variety of change strategies. In implementing these strategies, many teachers, either intentionally or inadvertently, are developing and using purposeful 'ILE change tools' that help them use these spaces well. These activities are highly individualised (both at the teacher or school level), depending on the unique needs of each. 'Teachers pedagogic growth' through this transition can be aligned to the mind frames identified in research into high-impact teaching.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
This change process has been found to consistently comprise three distinct phases – preparing, implementing and sustaining	ILETC	Robust	Published, public domain	mms W. & Mahat M. (2021) Where to now? Fourteen characteristics of teachers' transition into innovative learning environments. In W. Imms & T. Kvan (Eds), <i>Teacher Transition into Innovative Learning Environments</i> (pp. 317-334). Springer. https://doi.org/10.1007/978-981-15-7497-9_9

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
	ILETC	Robust	Peer reviewed conference proceeding, PhD examination	Mahat, M., Bradbeer, C., Cattlin, J. & Imms, W. (2019). Validating the ILETC's Teacher Transition Pathway. In W. Imms & M. Mahat (Eds.). <i>What are teachers doing (well) when transitioning from traditional classrooms to innovative learning environments?</i> Proceedings of international symposia for graduate and early career researchers in Australasia, Europe and North America. (pp. 13-26). http://hdl.handle.net/11343/240733 Osborne, M. (2019). Change leadership and the transition to innovative learning environments. In W. Imms & M. Mahat (Eds.). <i>What are teachers doing (well) when transitioning from traditional classrooms to innovative learning environments?</i> Proceedings of international symposia for graduate and early career researchers in Australasia, Europe and North America. (pp. 157-161). https://www.researchgate.net/publication/336303484_Change_leadership_and_the_transition_to_innovative_learning_environments
Four factors characterize good organizational change practices; (1) Nudges (make explicit decisions to structure the ILE for example teachers desk); (2) Structure (organization of the day, timetable, planning time); (3) Expectations (educators knowing what is expected eg role and making explicit) and (4) Culture (risk-taking, reflective practices and support)	PhD French	Promising	Peer reviewed, published	French, R., Imms, W., & Mahat, M. (2020). Case studies on the transition from traditional classrooms to innovative learning environments: Emerging strategies for success. <i>Improving Schools</i> , 23(2), 175–189. https://doi.org/10.1177/1365480219894408
Co-creating and co-designing have potential to surface the tacit (implicit) and make more explicit (Wayfinding)	PhD Tuckwell	Promising	Peer-reviewed conference proceeding, PhD examination	Tuckwell, D. (2018). Making sense of design thinking. In W. Imms & M. Mahat (Eds.). <i>What are teachers doing (well) when transitioning from traditional classrooms to innovative learning environments?</i> Proceedings of international symposia for graduate and early career researchers in Australasia, Europe and North America. (pp. 207-212). http://hdl.handle.net/11343/240733 Tuckwell, Dion. (2021). <i>Joining Practice Research</i>. [Doctoral dissertation, Monash University]. https://doi.org/10.26180/14533521.v1 Young, F., Tuckwell, D. & Cleveland, B. (2021). Actualising the affordances of innovative learning environments through co-creating practice change with teachers. <i>Australian Educational Researcher</i>, 49(4), 805-826. (2021). https://doi.org/10.1007/s13384-021-00447-7

2.4 Fourteen ‘themes’ can be identified that typify that journey.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Drawing on data from a range of countries, fourteen themes are common to teachers’ successful transition from traditional to innovative learning environments	ILETC	Robust	Published, public domain	Mahat, M., Bradbeer, C., Cattlin, J. & Imms, W. (2019). Validating the ILETC’s Teacher Transition Pathway. In W. Imms & M. Mahat (Eds.). <i>What are teachers doing (well) when transitioning from traditional classrooms to innovative learning environments?</i> Proceedings of international symposia for graduate and early career researchers in Australasia, Europe and North America. (pp. 13-26). http://hdl.handle.net/11343/240733

2.5 Apart from two issues, teachers are receiving minimal support during this process.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Findings suggest that empowering teachers to actualise ILE affordances involved generating communities of practice that provided them with the ‘time and space’ to collectively develop their practice.	ILETC	Promising	Reviewed internally. Forthcoming publication.	Imms, W. & Mahat, M (forthcoming). <i>Preliminary analysis of the Teacher Transition Survey: ILETC Survey 2</i> . University of Melbourne, LEARN.

2.6 Industry knowledge is not being effectively translated to teachers.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
While industries are building highly relevant information, it is difficult for this to be represented in mainstream teacher systems of knowledge.	ILETC	Robust	Published, public domain.	Imms, W. & Kvan, T. (2021). <i>Transition of teachers into innovative learning environments: A global perspective</i> . Springer. ISBN 978-981-15-7497-9 Imms, W., Morris, J. & Grunseit, D. (2020). Innovative Furniture and Student Engagement. W. Imms, P. Lippman & E. Matthews, (Eds.) In <i>Encyclopedia of Educational Innovation. Physical learning spaces: Design, evaluation and pedagogies</i> . Springer.

2.7 The concept of ‘spatial typologies’ assists this dissemination.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Complex ILE phenomena like acoustics, ICT and optimal furniture can be simplified to their core principles	ILETC	Promising	Concept	ILETC Typologies (Video) available at http://www.iletc.com.au/spatial-typologies/
The typologies ‘essence of ILE phenomenon’ assists teachers understand their basic principles and then extend that thinking to their own circumstances	ILETC	Robust	Published, public domain	Imms W. & Mahat M. (2021) Where to now? Fourteen characteristics of teachers’ transition into innovative learning environments. In W. Imms & T. Kvan (Eds), <i>Teacher Transition into Innovative Learning Environments</i> (pp. 317-334). Springer. https://doi.org/10.1007/978-981-15-7497-9_25

Research question 3:

What correlations can be established between ILEs and high levels of student deep learning, and high incidence of favourable teacher mind frames?

3.1 ILEs are linked to better teaching and the learning desired of many educational authorities.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
Evidence exists that in ILEs, teachers are exhibiting the types of teaching that policies are demanding – teaching towards the 4Cs of collaboration, cooperation, critical thinking, creative thinking.	ILETC	Robust	Peer reviewed, published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467
Those types of teaching coincide with 'curated learning' attributes in practice in other educational sectors like Museums, and that constitute a direct focus on deep learning.	PhD Villafranca	Robust	Peer reviewed, published, public domain, PhD examination	Villafranca, E. (2020). <i>Curated learning: a pedagogical approach to maximise learning environments for students' deep learning</i> . [Doctoral dissertation, University of Melbourne]. Minerva Access. http://hdl.handle.net/11343/237474 Villafranca, E. (2019). <i>Principles (6Cs) of Curated Learning</i> . https://figshare.com/articles/figure/Principles_6Cs_of_Curated_Learning/13191977
Teachers' demonstrate elevated capacity to identify attributes of ILEs that lead to quality education. Teachers and Architects identify ILEs as containing a substantially higher number of teaching and learning affordances, teachers more so than architects.	PhD Young	Robust	Peer reviewed, published, public domain	Young, F., Cleveland, B. & Imms, W. The affordances of innovative learning environments for deep learning: educators' and architects' perceptions. <i>Australian Educational Researcher</i> 47(4), 693–720. https://doi.org/10.1007/s13384-019-00354-y

3.2 The project found evidence of positive relationships between ILEs, higher levels of student deep learning, and ‘high-impact’ teaching strategies (teacher mind-frames).

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
There exists a statistically significant difference between ILEs and traditional settings, when measured against levels of student deep learning and teacher mind frames. In a sample of secondary schools, ILEs have higher incidence of both.	PhD Murphy	Robust	Peer reviewed, published, public domain, PhD examination	Murphy, D. (2020). <i>Relationships between innovative learning environments, teacher mind frames and deep learning</i> . [Doctoral thesis, University of Melbourne]. http://hdl.handle.net/11343/290169
There are strong indicators that while ILEs are correlated to high levels of student deep learning, they also have no impact on surface learning. In other words, ILEs improve deep learning with no adverse effects on surface learning.	PhD Murphy	Robust	Peer reviewed, published, public domain, PhD examination	Murphy, D. (2020). <i>Relationships between innovative learning environments, teacher mind frames and deep learning</i> . [Doctoral thesis, University of Melbourne]. http://hdl.handle.net/11343/290169

3.3 There is evidence of a linear progression between spaces and teaching/learning – the more flexible the space, the more common the desired learning outcomes and teaching practices.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
A clear ‘type A’ to ‘type D’ linear progression links design types to increases in levels of desired learning outcomes and teaching practices. The exception is ‘type E’ (open plan) that rates lower than ‘type D’.	ILETC	Robust	Published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467
In broad terms, the more flexible the space, the more common the desired learning outcomes and teaching practices. In specific terms, traditional design of classrooms have higher levels of superficial learning and teacher-centred pedagogies. More flexible spaces	ILETC	Robust	Published, public domain	Imms, W., Mahat, M., Byers, T. & Murphy, D. (2017). <i>Type and Use of Innovative Learning Environments in Australasian Schools ILETC Survey 1</i> . University of Melbourne, LEARN. http://hdl.handle.net/11343/219467

3.4 While ILEs can be linked to greater deep learning by students, they have no impact on surface learning – ILEs assist deeper learning while not reducing surface learning.

Sources:

Findings	Who	Degree of proof: Robust, Promising, Emerging	Type of proof	Citation
While an effect was found for the impact of learning space design on student deep learning, on the same measure no effect was found for ILEs on surface learning. Deep learning was higher in ILEs, but surface learning stayed stable between the two design types.	PhD Murphy	Robust	Peer reviewed, PhD examination	Murphy, D. (2020). <i>Relationships between innovative learning environments, teacher mind frames and deep learning</i> . [Doctoral thesis, University of Melbourne]. http://hdl.handle.net/11343/290169



Our Lady of Assumption College. BVN Architects. John Gollings photography.

4. Conclusion

Altering teacher mind frames unlocks the potential of innovative learning environments

ILETC's driving hypothesis, above, held an underlying assumption that despite advances in innovative learning environment design, most teachers remained rooted in traditional teaching approaches. This was dispelled during the project. Certainly, an element of the hypothesis was accurate, but 'most' was an erroneous description. Certainly, some teachers resist changing their practices despite evidence about ILEs benefits. But many had already embraced the advantages that ILEs provided, to further develop their pedagogies.

Teachers who deliberately aim to facilitate students' deeper learning are those most likely to optimise ILE spaces

More accurately, the statement needs to be made that 'many teachers use ILEs as a tool for refining their pedagogies'. This is not a causal finding – ILEs do not automatically change how teachers teach. It is, however, correlational – we found increases in 'preferred' pedagogies occurring mostly in more flexible spaces. Thus, ILEs were demonstrated to be 'agents of change'. Encouragingly, so too for student learning. We noted a relational phenomenon; we know that teacher actions are the single largest influencer of student learning, so it comes as no surprise that ILEs also correlate to higher measures of student deep learning. One begets the other, it would seem.

Evidence supplied in the findings section of this report shows that ILEs work – *the more flexible the learning spaces, the higher the levels of high-impact teaching practices and levels of student deep learning*. This was, in a nutshell, ILETC's critical finding.

How many ILEs are there and what are their links to better teaching and learning? What are the characteristics of 'good transition'?

Outcomes from the three research questions unpack this core finding. As the results section of this report shows, this makes for a complex arrangement. It is possible, however, for them to be summarised within seven statements.

1. ILETC found that innovative learning environments outperformed traditional classroom designs in terms of desired learning and teaching characteristics.

2. At the time of study, it found that ILEs comprise a quarter of Australian and New Zealand primary and secondary school teaching spaces.
3. It found that many teachers have become adept at using ILEs, that this adjustment has not taken a lot of time, most typically 6 months, that for many teachers ILEs suit their favoured teaching approaches, and that support is still needed to use them well.
4. It found that teacher transition to ILEs differed person by person, and school by school, but a common 'pathway' could be identified.
5. It found that a range of 'hybrid' ILE designs existed; the polarised 'open plan versus traditional' polarisation so commonly cited in 2017 was not accurate.
6. It found that each type (design) of space served a valid educational purpose and did not fit the erroneous 'direct instruction versus student-centred learning' misrepresentation of curriculum.
7. It found that the 'allied industries' bring indispensable, practical knowledge to teachers.

Readers of this report will understand that within its 'robust, emerging and promising' findings there exists a multitude of ancillary facts that provide evidence useful to their own special circumstance. For example, that superficial and deep learning are not opposites; they are part of a continuum that students transverse on a daily basis. That while ILEs improve deep learning, *they do not impact superficial learning*. That teacher-centred teaching practices remain the predominant form of instruction in Australian and NZ schools, making claims of falling literacy levels due to 'open plan' curriculum illogical. That the reality is ILEs exist in company with more traditional spaces in most schools, the number of totally-ILE institutions are few. Teaching practices are demonstrably different in ILEs; so too students approaches to learning. The list goes on, and we welcome your foray into the findings to build factual cases relevant to your own circumstances.

Implications

Some more generalised implications from these findings are as follows. This is not a comprehensive summary, rather a demonstration of the capacity of ILETC data to generate new parameters for educational discussion.

ILETC reinforced our capacity to build solid ILE data

Methodologically robust measurement tools were developed. ILETC's research team, including its Senior Research Fellow, two part-time school-based Research Fellows, and its nine PhD Candidates, refined spatially relevant tools including single-subject repeated measure survey and analysis methods, design-learning approaches, observational metrics, and survey tools. They were unique, most having not been used in learning space evaluations previously. They were robust, subjected to the rigors of PhD examination, peer-review publication, and statistical validation. They had impact, creating data that was transferred to teacher workshop designs, and to a range of technical reports to inform practice.

ILETC showcased how teacher input into ILEs design and development could be done

Teacher participation in design of new spaces was shown to be critical, so too their on-going active involvement in exploring how ILEs can be used well. ILETC displayed the potential of WonderLab's design-thinking approaches to personal and professional development. Co-design practices undertaken by Fiona and Dion in their PhDs, and the creation of a suite of teacher workshop activities extended teachers' thinking in terms of pedagogy and ILEs.

ILETC brought an international perspective to ILE research

Through the Transitions conferences, it was comprehensively demonstrated that projects like these can access leading research from other countries to build a robust international consensus. It also showcased the capacity for conferences to act as data collection mechanisms, and to validate project findings. For instance, in 2018, the temporal dimensions and grand themes that make up the Teacher Transition Pathway was validated in Phoenix, USA, and Copenhagen, Denmark by 143 participants from academia, industry, policy and school sectors.

ILETC emphasised the value of PhDs in developing ILE theories

Each PhD built a theoretical base to underpin ILETC's largely applied outputs. By this, we mean the projects primary aim was to assist teachers transition into ILEs, requiring outputs that were largely practice focused. The PhDs each added a theoretical underpinning of these practice outputs. Fiona built new understandings of 'affordances'. Vicky (who transferred to her home state university later in the project) was well into arguing a model of teacher spatial competencies. Dion proved that design thinking was a valid and highly effective mechanism for engaging teachers in ongoing pedagogic development. Mark identified the critical characteristics of 'good' leadership during schools' ILE transitions. Likewise, Chris built a comprehensive theory of the key characteristics of collaborative teaching in ILEs. Raechel built a significant understanding about the way business models of transition are equally valid for ILEs. Anne addressed the difficult question of sustainability – how do teachers maintain growth in ILEs? Dan proved a statistically significant correlation between ILEs, and higher levels of teacher midframes and student deep learning. Ethel identified overlaps between museum and school educators, defining the concept of 'curated learning'. Each of these projects, by themselves, was a significant growth in our understanding of ILEs. With nine working in tandem, they built a formidable knowledge foundation for ILETC.

ILETC highlighted the need for industry involvement

ILETC challenged the assumption that only educators can resolve educational problems. Industries that are deeply involved in the design and provisioning of ILEs bring a grasp of educational thinking that complements conventional approaches. This culminated in the significant Transitions 2019 conference in Melbourne, where Steelcase, Microsoft, Ecophon and other Partner Organisations transformed a 3000 square metre flexible space into examples of each design 'type' and used surveys to test ILETC's five spatial typologies.

ILETC used 'quick release' of findings and conference participation as tools in data validation and dissemination.

Applied research relies on a quick 'turn around' of findings, to allow those who benefit from the research to implement and test what has been discovered. For too long a lot of research has waited until projects were finished to release findings. ILETC built a method for quick release and partner-use of emerging findings. During ILETC the project hosted six conferences, four of these in overseas venues (USA twice, Copenhagen and London) to gather a wider base of data. Each conference had a research objective. Initially they sought to broaden ILETC's knowledge through cutting-edge PhD and early-career projects from other countries. Later, it added a 'findings verification' aspect to each conference where participants tested ILETC's results.

Where to now?

Given the fact evidence now exists that ILEs are successful in practice, what characterises major advances in builds into the coming decade? This report emphasises (1) design of ILEs can be argued to have now 'peaked' in Australia and NZ; (2) high-impact spaces are increasingly a product of highly informed collaborations between educators, designers, and allied industries; (3) 'successful' builds in the coming years will surpass 'innovation' and 'flexibility' criteria, to be tested against increasingly sophisticated nuances of wellbeing, engagement, and equity.

In terms of future directions, we need to advance on the discourse that has dominated a decade of ILE evolution - the 'innovation and adaptable spaces' focus. Innovation and adaptability have been achieved, and while we continue to refine such properties, they now constitute our new baseline. It is time to address the next challenge, an 'abilities design' concept - designing spaces whose primary function is to enable all students, regardless of needs and abilities, to actively engage in curriculum.

To advance this thinking, we must continue to re-design the data we must collect to support change. This conclusion is being written with the benefit of hindsight. ILETC began in late 2016, and its research activity ceased in early 2020 as COVID ravaged the world. As such, the findings provided in this report are valid as of March 2020, but it was only in 2022 its closure event could be held and this last report of five, launched.

ILETC unapologetically focused on the teacher, knowing that once that riddle was solved, the critical focus on students could be undertaken. Now is that time. The enormously complex phenomenon of ILEs impact on students' lived experiences must come next. In this regard, the COVID years were not wasted. ILETC facilitated a follow on, online, scoping study called *Innovative Learning Environments and Student Experience* or ILESE (www.ilesescopingstudy.com.au). This leveraged off the ILETC findings reported here, by seeking opinion from more than 250 industry, academic and education experts in 21 countries on what was the next logical large research project. The ILESE's White Paper is now released¹ and available on its website. Given the gift of time it represents a more sophisticated interpretation of the direction for ILE research than this conclusion, limited to 2020 findings, can present.

Having said that, ILESE and other projects internationally owe a debt of gratitude to ILETC's work. ILETC's findings were significant in helping build a platform for the next generation of research.

Associate Professor Wesley Imms

Project Lead,
Innovative Learning Environments and Teacher Change project.
Melbourne,
October 31st, 2022.

¹ Imms, W., Morris, J., Bradbeer, C. & Mahat, M (2023). *What should be the focus of next generation learning spaces research? An international cross-sector response. The ILESE Scoping Study White Paper*. LEARN, The University of Melbourne.



Missouri Innovation Campus. DLR Group. Michael Robinson Photography.

5. PhD summaries

Teaching together, working together, and being together: Teacher collaboration in Innovative Learning Environments

Chris Bradbeer

What was the problem?

For teachers, the transition from traditional to Innovative Learning Environments (ILEs) brings with it an underlying assumption that professional collaboration will occur. In principle, ILEs afford a professional context within which a team of teachers are envisaged to work collaboratively, teach in a strength-based manner, adopt a higher degree of collective pedagogical variation, and as a result, better meet the needs of learners. However, although schools may previously have encouraged collaboration between teachers, predominant classroom settings have constrained or discouraged it from happening, leaving teachers little experience to draw upon in practice. Although collaboration is a common thread running through ILE literature little research exists that explores its specific nature in this context. Understanding the purpose, nature, outcomes, and value of collaboration in this context is critical therefore to understanding how teaching and learning are operationalised in ILEs.

What methods did I choose?

The research was designed as a collective case study with teacher collaboration in New Zealand primary school ILEs as the object of inquiry. It was conducted over three phases, enabling the research to funnel from the broad to the specific and strengthening the veracity of findings. Phase 1 used expert elicitation to help identify key drivers and issues, Phase 2 consisted of six 'snapshot studies' to ascertain key concepts and adopted practices, and Phase 3 consisted of a series of longer-term in-depth studies, in three ILEs, to home in on specific aspects of practice. Data was collected over a one-year period. It was sourced primarily from interviews (with school leaders, teachers, and students), and observations.

What were the results?

The research produced a series of significant findings. It illuminated understandings about the purpose, opportunities and challenges encompassed in collaborative practice between teachers; the nature and nuance surrounding in-situ collaboration in ILEs; how collaborative practice is both envisaged and enacted; and the role of physical space and spatiality in nudging, supporting, or inhibiting teacher collaboration. Most simply, the findings demonstrated that the enactment of teacher collaboration in ILEs could be characterised as a product of three elements: teaching together, working together, and being together. Each represented a significant professional adjustment for teachers, involving repositioning, refiguring, and

relinquishment of practice, place and people, and requiring adaptability, acceptance, empathy, and resilience.

Firstly, understanding teaching together required teachers to interrogate how they would utilise their collective expertise to enable learning for an upscaled cohort of learners. The resulting methods frequently imitated forms of co-teaching, as described in the special education literature, but teachers had limited prior knowledge of these models to draw upon. Secondly, working together described observable functions and structures designed by teachers to enable their ILE to work. Examples included systems for organising time, grouping students, leveraging technological affordances, and ongoing communication with parents; all familiar concepts but ones that required significant re-design and re-scaling in response to an enlarged cohort of students. Thirdly, being together emerged as a critical component of practice within an ILE. Much of this related to the affective domain, specifically because of practice being visible and deprivatised. It includes aspects of cognitive demand, collegiality, teacher's 'mindset' and willingness to collaborate, ideas of relative 'ownership', belonging, and understanding of personal boundaries.



Figure 1. Teacher collaboration in Innovative Learning Environments.

What are the implications for future practice?

The role that effective teacher collaboration plays in the operationalising of teaching and learning in ILEs is under-researched and under-theorised, yet remains a pivotal concept in spatial transition. The findings from this research bring increased clarity to the complexity and simultaneity of elements contained in 'what teachers do' in ILEs. It takes into account pedagogical practice, the work that goes on to develop and support it, as well as the realities of co-location and co-habitation. This clarity helps form language and informs discourse, particularly by supporting teachers and school leaders to be able to articulate areas of challenge and opportunity, pedagogy and practice, intention and outcome.

The Transition to Innovative Learning Environments: A Systems View of Design and Organisational Factors

Raechel French

What was the problem?

Coinciding with the physical design shift seen in the transition from traditional learning spaces to an innovative learning environment (ILE), intended operations also differ greatly but are rarely holistically acknowledged or addressed. This is evidenced by the author's decade of research and first-hand practice in the design of learning spaces, repeatedly touring award-winning schools designs to see collaborative spaces empty, glass walls covered in paper, locked small group rooms, and lecture instruction in spaces meant for student-led, multi-modal work. The author's hypothesis, which is shared by the literature, is that the movement towards providing these innovative learning spaces is far outpacing the delivery of professional development and organisational shifts that would allow them to achieve their potential. The gap between design intent and reality is commonplace.

To address this gap, this research sought to answer the question, *How do physical and organisational factors contribute to alignment between the design and intended use of ILE's*. Answering this question will aid school systems in a variety of ways from the basic stewardship of a community's capital investment to furthering their goals of teaching and learning with fidelity and improving the experience of both educators and learners.

What methods did I choose?

The research was conducted in two phases responding to three lines of inquiry:

- Phase One: Understanding the functional design intent of ILEs as demonstrated through content analysis of architectural design submittals.
- Phase Two: Understanding in situ how ILEs are utilised and the specific physical and organisational decisions that supported their utilisation as demonstrated through case study.

A mixed-method, sequential design was followed, including both qualitative and quantitative methods. A framework of twelve organisational factors, as defined by the Burke-Litwin Model of Organisational Performance and Change (Burke-Litwin Model), grounded the research. These factors include ones considered transformational (e.g. leadership, school culture) and transactional (e.g. team climate, motivation).

Phase One consisted of a discourse analysis of narrative and imagery found in publicly available school architecture design award submittals. 41 submittals including 773 individual slides were studied. An open coding protocol provided a baseline vocabulary of how designers talk about their designs and intended use and provided anticipated causal relationships to compare to case study findings in Phase Two.

Three of the schools studied in Phase One were selected as case study sights for Phase Two, based on principal responses to a School Design and Use survey. The intent was to identify ILE sites “working well” as demonstrated by the educators’ teacher mind frames. Virtual focus groups and interviews with teachers, school leaders, and school designers were completed utilising photo elicitation in lieu of in-person observations due to Covid-19 restrictions. Analysis utilised a combination of deductive and emergent coding, responding to taxonomies identified in Phase One and the organisational factors in the Burke-Litwin Model.

What were the results?

Phase One identified a Taxonomy of School Design and Use broken down into space types/properties and intended use/impacts. While an ecosystem of space was described in the design submittals, three intended uses (Active Learning, Collaboration, Multiple-Group Sizes) and three intended impacts (Student-led Learning, Multi-Modal Learning, and School Community Development) were most frequently referenced in related to certain design decisions, particularly the presence of Open Break-out Spaces, Spatial Variety, Spatial Connections, and Learning Community arrangements.

Findings from Phase Two made clear the relationship between an innovative learning environment’s design and intent, school community development, and student-centred learning (coined the ‘ILE Cycle’). According to participants, school community development served as a mediator, enabling the ILE design to result in the desired student-centred experience. This cycle is the focus of the ‘Systems View of ILE’ (Figure 1). Critical to this system are physical and organisational supports that help accelerate the momentum of the ILE Cycle. They serve as ‘nudges’ that intend to reduce the complexity of an ILE and enable educators to shift practice. Physical supports include providing dedicated spaces for teachers to work together, ample visual transparency, intentional space sharing, learning community arrangements, and intentional spatial adjacencies. Organisational supports include clear expectations set by leadership balanced with educator autonomy, co-created systems for use, and intentional scheduling.

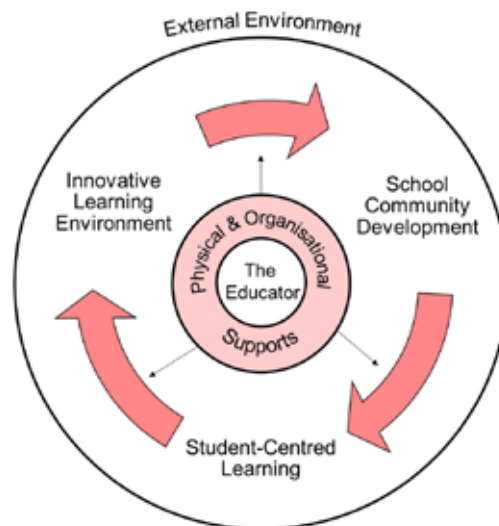


Figure 1: A Systems View of an ILE.

The comparison of Phase One and Two highlighted a clear gap in the design industry’s understanding of how organisational factors contribute to the success of the physical space, particularly in the role of leadership, the development of intentional culture, and the transactional factors representing the day-to-day experience of educators.

What are the implications for future practice?

A main contribution of the Systems View of an ILE is the focus on School Community Development, particularly the growth of strong relationships among educators and learners, as the primary goal of an ILE design and a prerequisite to achieving the desired student-centred learning environment. School leaders and designers should consider how each decision made will influence the growth and maintenance of relationships to ensure the ILE Cycle continues successfully.

ILEs ask a lot from educators. They are expected to collaborate, share ownership of the learners with other educators, and in many cases, also physically share the space. Thus, prioritising the development of relationships and strong collegiality with peers will allow for an easier transition. This relationship building must be supported by leadership. School leaders must also instil a culture of trust and risk-taking and set clear expectations for educators regarding their use of space and curation of the learning experience. Specific design decisions, such as providing space for teachers and visual transparency, can also help foster these relationships.

Some designers may argue that consideration of organisational factors falls outside the scope of architectural practice while at the same time claiming the process of design as 'problem-solving.' If the problem we are solving is a lack of substantial change in education, then organisational factors are a critical component. Designers must be good stewards of the design and intent of ILEs and partner with internal and external experts to intentionally address their design and use holistically.

The Beauty of a Complex Future: Redefining Teacher Success and Sustainability in Innovative Learning Environments

Anne Knock

What was the problem?

Across the last two decades, visiting many schools and working with educators, Anne Knock had witnessed a re-imagining of the school experience through spatial design described as a shift from traditional classrooms to multi-modal shared spaces. Such socio-spatial contexts heralded aspirations for pedagogical innovation and teachers working as teams in practice, rather than solo, which has been characterised as the 'paradigm of one' (Wright, 2017), one class, one teacher, one classroom and one subject at a time. Yet, in this researcher's observation, the original vision for the space appeared to become diffused over time and, in some cases, reverted to resembling the function of a tradition single teacher classroom, whether there were walls or not. A problem emerged, one that focused on the learning environment as the workplace of the teacher, asking: *What factors impact the ongoing success and sustainability of workplace change experienced by teachers working in innovative learning environments?*

What methods did I choose?

The qualitative research adopted a multi-methods approach. Firstly, an exploratory pilot study investigated issues associated with practice change from participants who represented a single case. The sampling, drawing from the ILETTC baseline survey data, focused on teachers working in an ILE, where the principal's perception was that the aspirations for the space were not wholly realised. The data had been collected from teachers who reflected on their own experience, each representing a co-teaching team. The insights gained from this study helped develop the overarching research question.

Next, a multiple case study focused on three schools and four teaching teams where the ILETTC baseline survey data were again used for sampling, adjusting the filter. For this study, teacher teams were working in the ILE and were perceived by the principal to have adapted successfully in the shared learning environment. Data were derived from onsite observations of teacher-teams in the learning space which was followed up with a focus group session. There was also a semi-structured interview with the principal at each school.

Finally, a retrospective autoethnographic account narrated milestones in Anne Knock's own career, working with teachers across two decades leading professional learning and culture transformation. It included tracing emergent factors of an innovative school and how teachers were brought on a journey of change. This chapter provided a reflection of a career in education, in parallel with a school's journey of emergent innovation. This helped to situate insights collected from the field with the researcher's own experiences of successful and sustainable teacher change in ILEs.

What were the results?

The analysis of the two case study methodologies provided insights, firstly from individual teachers who were each a co-teacher; and then teacher-teams and their principals. While the teachers who participated in the exploratory pilot study sought opportunities for student deep learning in the ILE, the nature of the relationship with their co-teacher (who had not participated in the workshop) which emerged as a barrier to this being achieved to its fullest potential. The multiple case study highlighted the importance of team connectedness, expressed as being 'on the same page', and the value of a cross-scale relationship between the principal and the teacher-team. Data from principals also identified the delicate balance between clarity of vision and culture aspirations, and recognising the agency afforded to the teacher team.

These insights were largely reinforced through the retrospective auto-ethnographic account. It became evident that the provision of space and technology were insufficient to support lasting change in the culture of the schools. Attention to several key strategies emerged, prioritising team connectedness and collaboration was seen as critical, an ongoing investment in targeted professional development, and the use of shared tools by teaching teams to guide collaborative practices through the application of design principles.

What are the implications for future practice?

The study highlighted implications for schools where teachers are working in teams and for the principal in leading to successful and sustainable workplace change in an ILE. For the teacher teams the following impacting factors emerged:

- Adopting the mind frame of a designer
- The teacher-team is the work unit
- Prioritising the teacher's back stage mode that impacts the quality of student experience on the front stage
- The school principals were also afforded three implications, to:
 - Adopt the mantle of culture builder, leading from a non-hierarchical posture
 - Articulate and reinforce a compelling vision for future-focused learning in the ILE
 - Resource the vision through ensuring sufficient time, targeted professional growth experiences and coaching for teams

Conceptualising Teacher Spatial Competencies and Cognitions to Develop Tools that Evaluate the Environmental Impact on Teaching Practices

Victoria Leighton

(also in association with The University of Queensland)

What was the problem?

This study acknowledged that many teachers wish to recognise and utilise the spatial qualities inherent within their classrooms, and critically, within their professional practices, in order to develop strategies that achieve focussed, spatially aware pedagogies that enhance teaching outcomes. Proposed as the phenomenon *teacher spatial competencies and cognitions*, little is known about how these skills manifest, or what they look like. It is a concept which has been broadly touched upon in a range of domains but has not specifically been identified, articulated or meaningfully applied. To do this, the attributes associated with teacher spatial competencies and cognitions needed to be purposefully defined and understood, and the characteristics of teacher spatial behaviour observed and expressed.

The study proposed to provide insights into the phenomenon through a devised conceptual framework to suggest how learning spaces reflect, sculpt or influence corporate (school) and individual (teacher) identities, pedagogy, and teachers' professional practices. Further, it set out to develop a spatial language that could encapsulate teacher spatial competencies and cognitions. It was important that the vocabulary could be understood and recognised by teachers as related to, and embedded within, their familiar teaching lexicon and practice. The goal was to develop accessible tools for teachers to use as part of their professional development which would recognise and incorporate the environmental, contextual, pedagogical and professional variables and exceptions intrinsic to every school context. The challenge was how to bring classroom spaces into focus within teachers' professional practices.

What methods did I choose?

The methodology needed to capture how the built environment influences and impacts teachers' practices to provide an empirical set of spatial professional practice descriptors and principles that inherently link classroom spaces and affordances with what teachers do on a day-to-day basis. The study was conducted in three phases:

- a. **Phase 1:** The provision of a theoretical conceptualisation of teacher spatial competencies and cognitions through an examination of the literature resulting in a proposed conceptual framework utilising three domains; Teacher Place, Teacher Practice, and Teacher Thinking, conceived as a teacher's situated environmental imagination. Key cognitive concepts such as environmental psychology, situated cognition, stimulus control theory, and cognitive load theory, amongst others, provided the theoretical footings for the research.
- b. **Phase 2:** The use of qualitative field research to test the conceptual framework and verify the three domains that had emerged, as well as key terms, and definitions. Through thematic analysis the data was used to develop key principles and descriptors that identify teacher spatial competencies and cognitions. These were manifest both as practices that could be observed in the classroom, and other activities associated with the broad range of professional skills employed by teachers.
- c. **Phase 3:** The use of a single embedded explanatory case study to employ four tools developed in Phase 2 that identify teacher spatial competencies and cognitions, and to test these through thematic analysis for utility and validity to legitimise the conceptual framework. The four tools were:
 - *Teacher Spatial Practice Lesson Observation Tool*
 - *Teacher Self-assessment Spatial Practice Survey*
 - *Spatial Professional Practice Principles for Teachers (SPPPT)*
 - *Professional Development Questions for Spatial Considerations*

What were the results?

Data drawn from the literature review in Phase 1 uncovered that teacher spatial competencies and cognitions in the classroom can be conceptualised, identified, articulated, and where relevant, observed. Many of these behaviours were linked to established teacher professional skills. Furthermore, these were often found to be unrecognised competencies inherent to professional teaching skills and practice. The findings show they are cognitions that stem from, and are embedded within school, pedagogical and classroom environments. Indeed, the conceptual framework in Phase 1 found teaching to be an intrinsically spatial practice that manifests in conceptual, physical and cognitive spatial domains.

By using the conceptual framework as a lens to understand the phenomenon, many of the innate, intuitive, and unconscious processes that develop with teaching experience were captured. In Phase 2, key principles and descriptors embedded within four proposed tools were devised as a result of the data analysis. These were designed to illuminate and articulate spatial practices, and were found in Phase 3 to be relevant, valuable, and useful in supporting teachers to consider the utility of their space for teaching. They also enabled teachers to reflect on, and challenge, their own spatial perceptions and habitual behaviours in the classroom. Notably, the tools draw upon three conceptual domains and six key principles (with 25 attendant focus areas and descriptors) related to teacher spatial practices.

Furthermore, in Phase 3 key explanations that arose from the study were categorised within three 'terrains', that is, teachers' spatial typologies that were seen to have been honed through experience over time and characterised as "neighbourhoods", "rough terrain", and "home territories". These typologies validated teacher spatial competencies and cognitions through the recognition of the importance of individual experiences, contexts, pedagogies, knowledge of students and cultures.

What are the implications for future practice?

Teachers have enormous amounts of tacit expertise about the conditions under which effective teaching and learning happens, and we can sometimes, as a profession, lack the confidence to factor this into how professional development is offered and delivered. This research has demonstrated that teacher spatial expertise, like any other teaching skill, often grows with experience and develops through everyday interactions over time. After all, it was the observation, evaluation and analysis of teacher case study participants that allowed this study to illuminate what expert teacher spatial practices are. However, the research also proposes that transitions into new classroom spaces effects teachers' cognitions regardless of career stage or level of expertise because new patterns of behaviour need to be learnt before they become habitual and effective.

Through understanding what teacher spatial practices are by utilising the designated tools, teachers can develop expertise through the use of deliberate practice. The tools can be applied in all school contexts. Therefore, two practical outcomes are proposed: First, for teachers who are looking to enrich their current practice, the four tools can define and validate what they are presently doing and suggest areas for growth. Secondly, for teachers who are transitioning into new learning environments or want to move their current spatial teaching practices towards a target performance, the SPPPT can deliver specific sub-goals for an instructional coaching model applied to mastering expertise.

More broadly, the conceptualisation of teacher spatial competencies and cognitions is offered as an explanation to address the current gap in the literature and is proposed as a contribution to the conversations that consider the impact of learning environments on teacher professional practices.

Innovative learning environments support deep learning

Dan Murphy

What was the problem?

Prior to this study, research on educational effects of contemporary innovative learning spaces had been criticised as disjointed, patchy, and lagging behind the practical activities of architects and educational leaders. This presented a potential public policy hazard, whereby billions of dollars are invested building and refurbishing schools based on an educational rationale lacking a sound research base; that contemporary innovative learning spaces improve learning, particularly the acquisition of so called 21st century skills. This study was designed to test the hypothesis that open and flexible learning spaces are more conducive to higher quality learning outcomes, employing the well-established construct of deep learning as a dependent variable. The study also operationalised teachers' pedagogical approaches using Hattie's concept of teacher mind frames. The influence of teaching approaches as moderating factors in the relationship between learning space design and quality of learning outcomes had also been under-researched prior to this study.

What methods did I choose?

This was a quantitative study that required measuring several key variables: spatial arrangements, deep learning and teachers' holding of Hattie's mind frames. The former was gauged by having principals indicate the composition of their schools' learning spaces based on a 5-point continuum ranging from traditional cell structure classrooms to open plan with adjoining spaces. Survey instruments for measuring students' adoption of deep learning approaches and teachers' holding of the mind frames were tested and validated ahead of the main study. The main study was conducted among secondary students, for whom adoption of deep approaches is more evident than younger students. 715 students and 93 teachers from 23 schools across Australia and New Zealand took part in the study. Data was analysed through comparison of means, analysis of variance and using hierarchical linear modelling.

What were the results?

Deep learning was significantly higher on average for classes taught in innovative learning environments, as seen in Figure 1. This difference represented an effect size of 1.0, or deep learning levels were a full standard deviation higher. There was no significant difference in surface learning approaches across innovative and traditional spaces. When deep learning was analysed at the individual student level, and school grouping effects taken into account, levels remained significantly higher for those in innovative spaces.

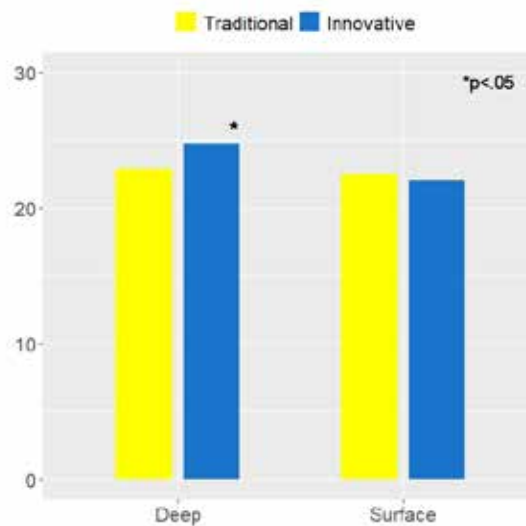


Figure 1. Student learning approach scores, innovative and traditional learning spaces.

Overall, holding of the mind frames was higher among teachers working in innovative design schools. Effect sizes were greater for mind frames aligned with open and flexible space: preference for dialogue ($d=.72$), differentiating instruction to meet learner needs (.66), collaborating with colleagues (.42) and providing feedback (.24), as seen in Figure 2.

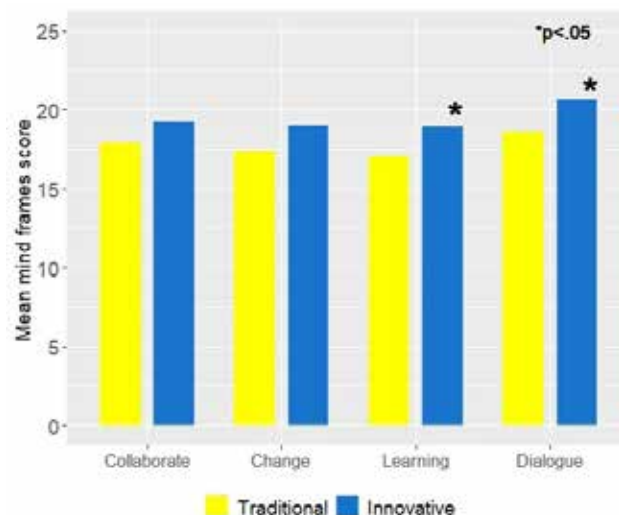


Figure 2. Insert Figure 2. Teacher mind frame scores, innovative and traditional learning spaces.

What are the implications for future practice?

Many education providers have invested in innovative facilities in the belief they encourage so-called 21st century skills, particularly deep learning and critical thinking. Given the results of this study, innovative learning environments should become the default model for secondary school design, particularly as their flexibility allows for traditional classroom configuration if required. Investigation of relationships between open and flexible learning spaces and the quality of learning outcomes should be expanded to include other elements of 21st century skills such as critical thinking, creativity and collaboration as dependent variables and findings considered alongside those detailed here.

Further research into how pedagogical approaches mediate the relationship between design and learning quality should also be conducted, concentrating on those that demonstrated the greatest variation here across learning space type: use of dialogue and adaptation of instruction to learners' needs.

Change leadership when implementing innovative learning environments

Mark Osborne

What was the problem?

For more than a decade, innovative learning environments (ILEs) have been the main style of educational architecture built in Australia and New Zealand. While ILEs potentially offer teachers access to a wider range of teaching and learning approaches—and more collaboration opportunities—than traditional classrooms, they also often require significant shifts in teacher practice to be successful. Leadership is often seen as an important factor in the successful implementation of such environments but there is comparatively little research into the specific change leadership practices principals can employ to successfully transition their schools to ILEs.

What methods did I choose?

A form of self-study (analytic autoethnography) was used to analyse the experiences of a group of school leaders who had recently transitioned their schools from traditional to innovative learning environments. A literature review was undertaken, the key findings from which were used to develop a conceptual framework, against which the experiences of these school leaders was explored via a series of interactive interviews. This joint sense-making process was complemented by a range of other data sources including field notes; workshop artefacts; workshop transcripts; memories and recollections; and the experiences of two 'key informants' or recognised experts in the field, resulting in the development of a change leadership framework to support school leaders undertaking ILE transitions.

What were the results?

The findings outline two sets of change leadership principles: a set that are considered essential throughout the entire change process ('persistent', or atemporal principles); and a set that are temporal (or phase-dependent) in nature and to which particular attention should be paid during the preparing, implementing and sustaining phases of the implementation.

Five key 'persistent' principles of change were identified:

1. Align change with organisational vision and values to ensure people don't view the ILE implementation as a departure from what has traditionally been valued by the organisation.

2. Use participatory decision-making processes to ensure people feel a strong sense of ownership and commitment to the process.
3. Ensure change offers benefits to all rather than establishing winners and losers.
4. Ensure change is incremental rather than sudden or 'step' change. Doing so ensures people have time to acclimatise to doing things in new ways rather than feeling panicked and rushed.
5. Distribute change throughout the organisation to ensure expertise and commitment does not sit with a small group of key people.

In addition to the five persistent principles of change, there is another set of considerations that are temporal in nature, aligning with the three distinct phases through which most successful ILE transitions progress: preparing, implementing, and sustaining the change.

What are the implications for future practice?

Educational building projects often have significant budget allocations for design and construction, but seldom is consideration given to investing in a comprehensive leading change process when a school transitions to ILEs. The change leadership principles outlined above—when intelligently and sensitively applied by school leaders throughout the entirety of an ILE implementation—will increase the likelihood a school will successfully transition to ILEs, ultimately leading to improved learning and well-being outcomes for teachers and students.

Making Space for a New Practice

Dion Tuckwell

What was the problem?

'Teachers as Designers of Learning Environments' (OECD) (Paniagua & Istance, 2018) asserts that pedagogy must be combined with expertise in the design of learning spaces for teachers to get the most out of ILEs. The report makes explicit the relationship that teachers could have with design:

"It is precisely through the idea of teachers as designers of learning that innovation at the level of practice can be seen as a normal side of the teaching profession to solve the daily challenges in a context which is in constant change" (Paniagua & Istance, 2018, p. 21).

The report goes on to state that there is a clear relationship between the role of design in schools that lends itself to teacher expertise: "Teacher learning—collaborative, action-orientated, and co-designed—is fundamental to change" (Paniagua & Istance, 2018, p. 43). Making Space takes a 'design thinking' approach and responds to the suggestions of this OECD report, inviting a codesigned and practice-led collaboration to investigate what is needed to activate these new ILEs. Like the OECD report, this study appreciates how well-intentioned architectural design has given shape to the emergence of ILE's—but how could engaging with co-designing bring them to life?

What methods did I choose?

Fieldwork was conducted at two secondary schools – both seeking to develop new pedagogical practices amidst the process of transitioning into ILEs. The studies engaged teachers as both participants and co-researchers, involving them in planning, enacting, and reflecting upon pedagogical development amidst the process of shifting into new learning spaces.

This methodology identifies practice-led research as a central framework. Practice-led research is conducted through designing alongside embedded and situated theory. This focuses on the nature of practices that lead to new knowledge significant for the operation of that practice. Central to this practice was collaborative design and explicitly engaging workshops as a method.

Collaborative workshops enable generative, creative activities that explore assumptions, surface beliefs and reveal the mindset of teachers and participants engaging with ILETC research. Workshop participants were explicitly asked to show, rather than tell, their stories of what they were feeling and to playfully engage with prototyping their ideas.

Conversations were framed through a practice of co-designing with participant-teachers, who were asked to explore, through collaborative making, the intrinsic values that drive their practice. An assumption guided this—when latent values are surfaced, design-led workshops have the capacity to generate rich conversations that have meaningful connections to professional learning.

What were the results?

Teachers reflected on the positive impacts associated with other teachers around them trialling new ideas and practices. These findings were important to how we recognise the importance of how 'visible' this research is across the school, leading to wider engagement and sharing of experiences. This research surfaced more than conversations about ILEs. The collaborative and discursive nature of the research process was revealing for the participant-researchers. We demystified many of the preconceptions surrounding the uses and challenges of ILEs through creative discussions about lived experiences and how we connect with our practice.

What are the implications for future practice?

The structure of PAR paired with the methods of codesign positioned teachers as researchers of their own practice and gave them agency to investigate the use of space, empowering them in the process of change. The creative collaboration with teachers generated a discursive exploration of practice, revealing and recognising the potential of space as a teaching and learning resource.

Curated learning: A pedagogical approach to maximise learning environments for students' deep learning

Ethel D. Villafranca

What was the problem?

The value of museums on student learning has been clearly established by numerous research studies that have been used to inform how museums design their exhibitions and develop education programs. Although great strides have been made in understanding the nature of teaching and learning in museums, translating this knowledge into practical application by museum professionals and educators beyond the museum field have not been given much attention. As Evans (1995) pointed out, although museum settings present a valuable resource in investigating the intersection between the learning environment and learning, this opportunity is underutilised and largely ignored. Based on reviews of literature, there is insufficient studies that examine the relationship between museum education, learning environment, and deep learning, a gap that this research intended to address.

This research also aimed to contribute to the growing body of evidence-based research on the valuable contribution of museums to school teachers' practice, specifically, how museum educators use elements of the learning environment to support students' deep learning and ways in which these may be applied by school teachers in their classrooms practice.

Further, by examining the interrelationship between different aspects of the learning environment and deep learning strategies, this research intended to make more visible the following:

- the role of educators in setting up conditions that support students in enhancing their deep learning competencies;
- the role of the learning environment in enabling educators in setting up these conditions; and
- the kinds of teaching that maximise the learning environment in setting up these conditions.

What methods did I choose?

Due to the complex nature of student learning in museums, a case study approach was selected to enable collection of rich data providing opportunity to view situations captured from multiple angles in order to build a full picture as possible. Additionally, applying the Contextual Model of Learning (Falk & Dierking, 2000, 2005) as a conceptual framework was apropos for investigating museum educators' relevant practices around the use of the learning environment for students' deep learning.

Two cases studies were conducted, which allowed investigation of the same research question in different settings while applying similar data collection and analysis in each setting. Case study 1 involved excursions into museums whilst case study 2 involved incursions into schools, both were led by museum educators. Participants of the study were 28 educators from eight museums and one privately-owned centre that provided incursions in schools. Although official titles of participants may vary, they were all paid staff members who delivered education programs for their respective institutions. For this study, the term 'museum' encompasses public museum, public gallery, or historic shrine in Australia or New Zealand and include art, history, as well as cultural history museums or science centres.

Three primary data collection methods were utilised: (a) program observations; (b) semi-structured interviews with participants; and (c) research journals. Other sources of data include audio recordings of the programs observed, teaching artefacts (worksheets and handouts), and photographs of the learning environment, which were then used to triangulate the primary data. A three-step approach to describe, compare, and relate, was used to analyse the data.

What were the results?

This study produced empirical evidence leading to a new pedagogical approach, Curated learning, that maximises the use of the learning environment to facilitate students' deep learning by leveraging the interdependence between pedagogy and the built environment. Through purposeful selection, manipulation, and use of elements within a learning environment, educators can set-up conditions for students' deep learning. Six principles, called 6Cs of Curated learning, have been identified and mapped against seven deep learning competencies (see Figure 1). These principles will assist educators in using elements within their own learning environments in ways that empower students in developing competencies that will help them succeed in their academic, professional, and civic lives.

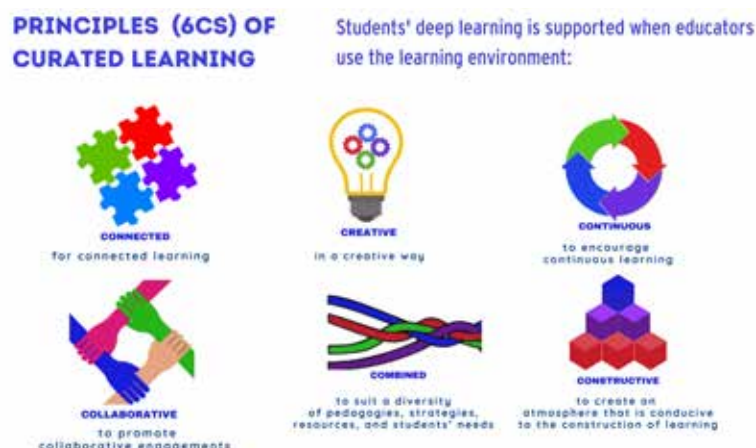


Figure 1: Principles of Curated learning.

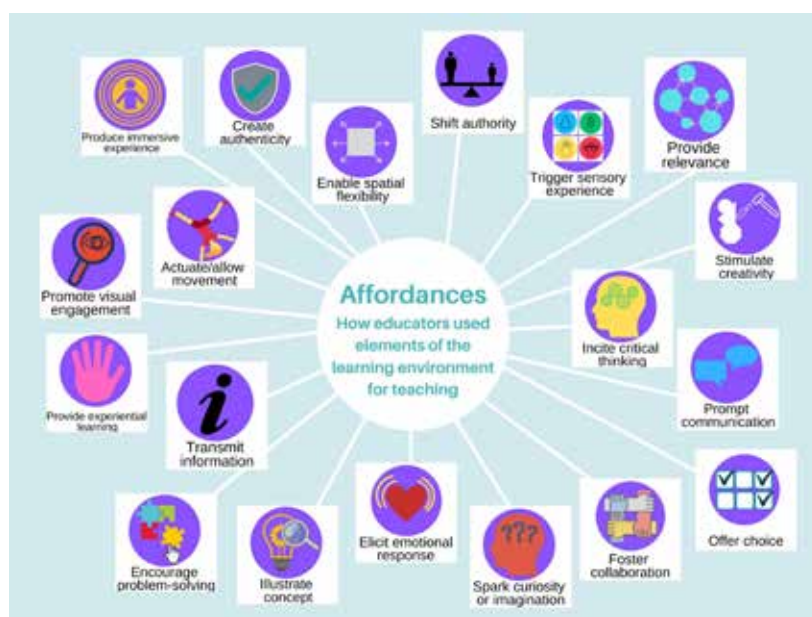


Figure 2: Taxonomy of pedagogical affordances.

Pedagogical affordances (see Figure 2), defined as possible uses of an element of the learning environment to facilitate the learning of another individual, that educators can utilise to support student's learning were also identified.

Additionally, 11 strategies educators employed that used at least one element of the learning environment to encourage students' deep learning were also established, such as creating a positive atmosphere that allows students to make and learn from their mistakes.

Finally, four factors that influence educators' capacity in using the learning environment were discovered. These factors include their agency to curate the learning environment, their spatial competency to understand and effectively use the learning environment, and the organisational culture as an enabler to build agency and competency.

What are the implications for future practice?

This research contributes to future practice by bringing in the perspective of museum educators in helping school teachers understand how they might use the learning environment to support students' deep learning. The list of elements and taxonomy of pedagogical affordances have implications in the school context because school teachers are not generally trained to perceive the relationship between the learning environment and effective teaching. School teachers may refer to this list and taxonomy in exploring other types of elements that they may not have considered using in their classrooms. Additionally, to successfully support school teachers in maximising the learning environment for deep learning, schools should consider how to elevate the different factors influencing school teachers' use of the learning environment.

Learning environment affordances: Bridging the gap between design and use

Fiona Young

What was the problem?

Traditionally, school buildings have been designed around the module of a classroom. However, in Australia and New Zealand since the early 2000's, innovative learning environments (ILEs) designed with the intent to enable a wider range of pedagogies have emerged. In response to the 2007 Global Financial Crisis, as well as ongoing population growth and demographic demand, billions of dollars have been invested into new school buildings at federal and state level. Much of this investment has been based on ILEs, yet little is known about the design and use of these spaces. This study sought to understand the affordances of ILEs which supported deep learning activities and strategies that may enable teachers to take advantage of the possibilities of innovative school designs.

Affordance theory, bridging environment and use, was the theoretical frame for this study. Learning environment affordances are qualities of the environment (space, objects and people) which enable perceived teaching and learning activities and behaviours. People's perceptions, influenced by their abilities, intentions and socio-cultural contexts are a core enabler for the recognition and use of affordances.

What methods did I choose?

The research was conducted in two phases. Study 1 comprised a multiple case study which included two primary schools, two secondary schools and a dedicated museum learning space. A range of learning space typologies from traditional to ILE were represented. At each site, four teachers and two architects were interviewed to gauge how the space they were in enabled or constrained learning activities. Data was also collected via auto-photography, where each participant was provided with an iPad to capture images of the affordances they perceived around them. Follow-up semi-structured interviews enabled more detailed questioning in relation to the affordances perceived for collaborative, interdisciplinary and deep learning activities.

The second study was an interdisciplinary participatory action research (PAR)/codesign study. The sites for this study were two girls' secondary schools, both in the process of designing and building new ILE facilities. The study took part in two stages following a typical PAR spiral. The first stage comprised four workshops, in which teacher participants as researchers explored their current contexts, discussed their felt concerns, developed initiatives to address these, trialled them, reflected on their

experiences, and then adapted their trials to once again re-test and reflect. Codesign methods were employed to help teachers reflect on and share their experiences. A range of strategies were identified which directed the second stage of the study. In Stage Two, a series of tools were developed and trialled with a broader group of teachers over two consecutive workshops.

What were the results?

Forty-three different affordances were identified within categories of general, zones, finishes and fixtures, furniture, digital technology and people. Of these, eighteen specifically related to team teaching and collaborative, interdisciplinary and deep learning pedagogies.

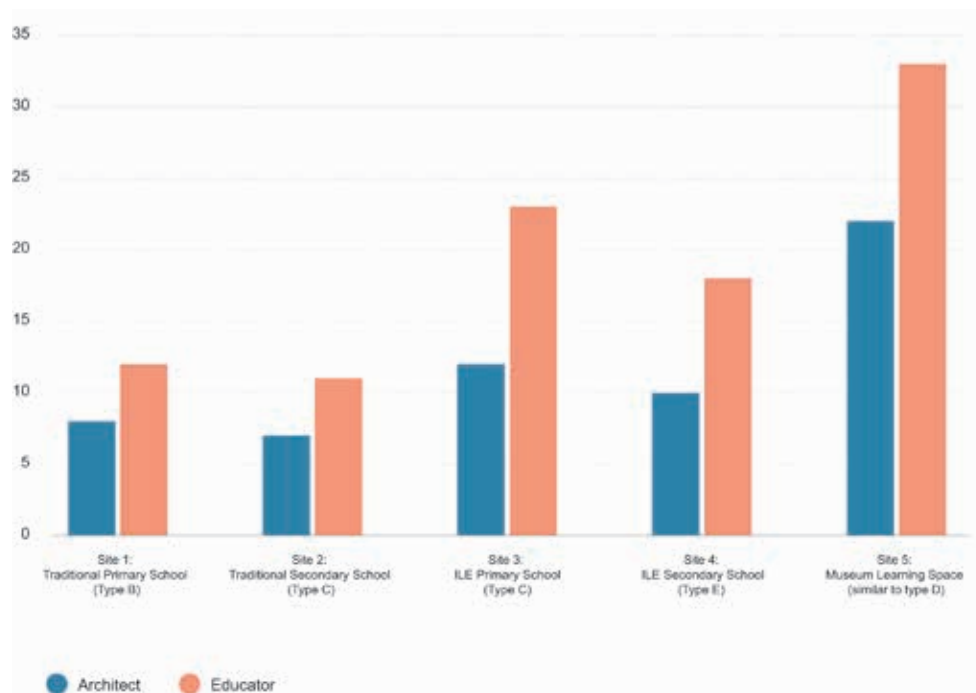


Figure 1: Number of affordances perceived by architects and educators at the case study sites.

A key finding was the difference in affordance perception between the professions of architecture and education (see Figure 1). Educators identified more affordances than architects in both traditional and innovative learning spaces and opinions on spatial qualities that enabled and constrained deep learning activities also varied across the professions.

Strategies identified to support teachers actualise (perceive and use) the affordances of ILEs related to areas of school organization, teacher practice and the built environment. A series of tools were developed and tested based on these strategies.

What are the implications for future practice?

Findings from this study give insights into the range of action possibilities for deep learning offered by the differing spatial qualities of ILEs. Differences in perceptions between the professions of architecture and education highlight the need for collaborative approaches to the design of new learning spaces. It also indicates the value of a common language to ensure alignment in understanding between the range of parties involved in the design of new learning spaces. To successfully support teachers in the transition to new learning spaces, a multi-faceted approach (see Figure 2) involving organisational structure, teacher practice and infrastructure needs to be considered in the development of ILEs.



Figure 2: Strategies to support affordance actualisation.



5. Curriculum Vitae

Innovative Learning Environments and Teacher Change

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Innovative Learning Environments and Teacher Change Project

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Research output summary

Major Surveys	2
Publications, overall	169
Workshops	11
International Conferences	5
Keynotes and Invited Presentations	47
PhDs	9

Publications (summary)

Summary (all publications)			
Edited books	1	Major research reports	8
Book chapters	32	Conference proceedings	78
Edited Conference Proceedings	5	Non-peer reviewed pubs	35
Journal articles	10		

1. Publications (edited books)

Imms, W. & Kvan, T. (2021). Transition of teachers into innovative learning environments: A global perspective. Springer. <http://doi.org/10.1007/978-981-15-7497-9>

2. Publications (chapters in books)

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5. Publications (peer-reviewed conference proceedings)

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7. Research Higher Degree Projects

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Murphy, D. (2020). *Relationships between innovative learning environments, teacher mind frames and deep learning*. [Doctoral dissertation, University of Melbourne].

Young, F. (2020). *Learning environment affordances: Bridging the gap between potential, perception and practice*. [Doctoral dissertation, University of Melbourne]. <http://hdl.handle.net/11343/271824>

Bradbeer, C. (2020). *Teaching together, working together, and being together: Teacher collaboration in Innovative Learning Environments*. [Doctoral dissertation, University of Melbourne]. <http://hdl.handle.net/11343/253903>

Osbourne, M. (2020). *Changing leadership when implementing learning environments*. [Doctoral dissertation, University of Melbourne]. <http://hdl.handle.net/11343/253863>

Villafranca, E. (2020). *Curated learning: A pedagogic approach to maximise learning environments for students' deep learning*. [Doctoral dissertation, University of Melbourne]. <http://hdl.handle.net/11343/237474>

Healy, S. (2019). *Cracking open pedagogy: Learning 'in' intense environments*. [Doctoral dissertation, University of Melbourne]. <http://hdl.handle.net/11343/230614>

8. Presentations (Keynotes and Invited Addresses)

Table 1

Summary of keynotes and invited addresses, as of March 2021.

Types	Countries	Fora
Keynotes	Australia, Canada, Italy, New Zealand, United Kingdom, USA.	Academic conferences, Educational conferences, Educational summits, Education thinktanks, Industry conferences (eg. furniture, ICT, architecture),
Invited Addresses	Australia, Denmark, New Zealand, France, United Kingdom, USA, China, Singapore, Hong Kong.	Infrastructure conferences, Bank finance strategy summits.

- Imms, W. (2021) Learning environments and new challenges between pedagogy and architecture. DIDACTA, Italy. March 17th
- Imms, W. (2020). *ILEs as a development, not a revolution*. Pre-recorded opening address for the Innovative Learning Environments micro certification course, University of Melbourne.
- Young, F. & Imms, W. (2020). *Designing 'innovative' learning spaces that positively impact teaching and student learning*. Invited address, The 5th International Symposium on Planning and Design of Contemporary K-12 Education Buildings. Shenzhen, China. 27-28th November 2020
- Imms, W. (2020). *Moving beyond Innovative Learning Environments to an 'abilities design' concept: Findings from ILET*. Invited speaker at EduTECH2020 Virtual International Congress and Expo, 9th-10th November, 2020 <https://doi.org/10.26188/13220666>
- Imms, W. (2020). *Development of the ILET furniture typology*. Invited speaker at EduTECH2020 Virtual International Congress and Expo, 9th-10th November, 2020 <https://doi.org/10.26188/13220480.v1>
- Imms, W. (2020): *Where to now? Future directions from the Innovative Learning Environments and Teacher Change project*. Invited address presented at Education Estates conference, United Kingdom, Oct 13, 2020. University of Melbourne. Presentation.
- Mahat, M. (2020). *Navigating the mind set shift: Unlocking the potential of innovative spaces to develop students' 21st century learning skills*. NSW Department of Education, Queanbeyan, Australia.
- Mahat, M. (2020). *Navigating the mind set shift: Using physical spaces to develop students' 21st century learning skills*. National Institute of Education, Nanyang Technological University, Singapore.
- Imms, W. (2019). Fourteen things that assist teachers transition into innovative learning environments. EduEstates, Scotland, November 2019
- Imms, W. (2019). Building buildings for future learning: *Evaluation of a whole school campus*. Ghenzoiv, China, March 2020
- Imms, W. (2019). Fourteen things that assist teachers transition into innovative learning environments. EduEstates, Scotland, November 2019
- Imms, W. (2019). *Inhabiting new learning environments: Evidence and developments around pedagogy and space*. Keynote, Learning Spaces Future Learning Symposium, New South Wales Department of Education, Sydney. November 7th.
- Imms, W. (2019). Evidence for the improvement of schools using innovative learning environments. Invited address, Dipartimento di Scienze dell'Educazione. University of Bologna, Italy. 16th September 2019.
- Imms, W. (2019). Helping teachers transition to innovative learning environments: A report on findings from the ILET project. Invited address, INDIRE, Florence Italy. September 18th.
- Imms, W. (2019). Ireland Ed Dept Video presentation April 2019
- Imms, W. (2019). *Developments in researching use of innovative learning environments*. Invited address, EduTech Sydney, November 7th 2019.
- Imms, W. (2019). *Extraordinary spaces for excellent teaching? How are teachers using innovative learning environments?* Invited paper, Learning Environments (Australasia) national conference. Perth, WA, May 28-31st.
- Imms, W. & Bradbeer, C. (2019). *Innovative learning environments and teacher change: Assisting teacher practices*. Invited address, Knowledge Seminar Series. New Zealand Ministry of education, Wellington, NZ. April 30.
- Imms, W. (2019). *L'influenza dello spazio sull'apprendimento secondo la ricerca Australiana* (The influence of space on learning according to Australian research). Invited address (pre-recorded video). Spazi; Innovativi, Inclusivi, Partecipati. Dipartimento di Scienze dell'Educazione. Università di Bologna, Italy. 23 Feb 2019.
- Imms, W. (2018). A4LE UK, Invited address, London 18th October.
- Imms, W. (2018). *Developments in school design and use in Australasia*. West Thorton School, Croydon London. 18th October.
- Imms, W. (2018). The proof is in the pudding! What user-research is telling us about value-for-money school space design. Keynote, EduEstates Conference. Manchester, UK. 17th October 2018.
- Imms, W. (2018). *Engaging teachers in classroom design implications*. Invited Address, Luther School, Croydon Victoria. 28th August.
- Imms, W. & Mahat, M. (2018). *Smart spaces? Basic principles and practices in innovative learning environments*. Invited workshop, Saudi Arabian teacher conference. University of Melbourne, 16th August.
- Bradbeer, C., Mahat, M., Byers, T. & Imms, W. (2018). *ILE & Teacher Change (teacher Mindframes, space, and deep learning)*. Keynote presentation at New Pedagogies for Deep Learning NZ Deep Learning Lab 2018, Auckland, 19-20 July 2018.
- Imms, W. (2018). *Teacher transition into innovative learning environments*. Keynote. July 2nd, 2018. STEM Summit, Department of Education, SA.
- Imms, W. (2018). Trends emerging from empirical evaluation of innovative learning spaces. Central European Bank. Paris, April 10th 2018.
- Imms, W. (2018). Keynote presentation. South Australian Department of Education STEM Summit, Adelaide, 2 July 2018.

- Imms, W. (2018). A4LE Perth, Invited address, Curtin University. June 7th 2018.
- Imms, W. (2018). *Methodological strategies that underpin learning environment research*. Invited address. Grand Valley State University, Michigan, USA. 1st May, 2018.
- Imms, W. (2018) *Open Your Umbrella: Empowering Students Through Design*. Keynote presentation. A4LE, Pacific North West Regional Conference. Seattle, USA. May 2-4, 2018.
- Imms, W & Mahat, M. (2018) *International perspectives*. Invited presentation at Talking Spaces 8, 22-23rd February, The University of Melbourne.
- Mahat, M. (2018). *International insights*. Talking Spaces 8: Geographies, Societies, Practices. Learning Environments Applied Research Network, Melbourne, Australia.
- Mahat, M. (2018). *Implementation*. Talking Spaces 8: Geographies, Societies, Practices. Learning Environments Applied Research Network, Melbourne, Australia.
- Mahat, M. (2018). *Learning without boundaries: Helping teachers utilize space as a pedagogic tool*. (Invited speaker). Teachers College, Columbia University, New York.
- Villafranca, E. (2018). *Curated Learning*. Keynote address with museum professionals and teacher/principal PD developers. Lopez Museum and Library, Pasig, Philippines, 10th May 2018
- Villafranca, E. (2018). *Curated Learning*. Keynote address at Habi Education Lab, Quezon City, Philippines, 9th May 2018
- Young, F. & Imms, W. (2018). *Who owns the design process?* Keynote, A4LE Regional Conference, Churchie, Brisbane Nov 9th 2017.
- Imms, W. (2017). *International perspectives on teacher transition to innovative learning environments: An update on the ILETC project*. Invited Keynote at the Learning Environments Infrastructure Forum. Radisson Blu Plaza, Sydney. Nov 27-28th, 2017.
- Imms, W. (2017). *Ensuring sustainable innovative learning space practices: The critical need for quality evidence*. Keynote address, School Learning Space Design conference. Melbourne, 24th and 25th October 2017.
- Imms, W. Mahat, M. & Edwards, A. (2017). *Three strategies for staff engagement in transition processes to new learning environments*. Invited address at the School learning space design conference. Imms, W, Mahat, M & Edwards, E. Melbourne, 24th and 25th October 2017.
- Imms, W. (2017). *Easy come, easy go: The cost of (not) gathering evidence about school learning spaces*. Invited address, 3rd Annual School Planning, Design & Construction Conference. May 24th Novotel on Collins, Melbourne, 2017
- Imms, W. (2017). *Learning in complex environments*. Invited address, Methodist ladies College, Kew. May 11th, 2017.
- Imms, W. (2017). *Great spaces, great learning? Issues concerning the measurement of impact of innovative learning environments*. Invited address, Australian Council for Educational Leaders, May 17th 2017.
- Imms, W. (2017). *Evidence*. Keynote address, Learning Environments One Day Symposium. Auckland University of Technology. Feb 14th 2017.
- Imms, W. (2017). *Researching learning and teaching in complex environments*. Invited address, Talking Spaces 7: Intersections. University of Melbourne, Feb 9th 2017.
- Imms, W. (2017). *Pursing the elusive evidence of 'what works' in learning environments*. Invited address, Talking Spaces 7: Intersections. University of Melbourne, Feb 10th 2017.
- Mahat, M. (2017). Invited chair, opening and closing remarks. School Learning and Space Design Conference, The Australian Events Centre, Melbourne.
- Mahat, M. (2017) *How to transition your staff into new learning environments*. School Learning and Space Design Conference, The Australian Events Centre, Melbourne.
- Mahat, M. (2017) *The Innovative Learning Environment and Teacher Change (ILETC) project: What are we learning?* 17th Annual Conference of the Learning Environments Australasia, Marina Bay Sands, Singapore.
- Imms, W. (2016). *Aligning pedagogy and space: An Australasian evidence-based approach*. Keynote address at the 'From the classroom to the learning environment'. International conference on school design and learning spaces for schools in the Third Millennium' conference, Rome, Italy. Dec 13-14th, 2016.
- Imms, W. (2016). *Aligning pedagogy and space: An Australian evidence-based approach*. Keynote address, in Proceedings of From the Classroom to the Learning Environment: International conference on school design and learning spaces for schools in the Third Millennium. Istituto Nazionale Documentazione Ricerca Educativa, Rome, Italy, December 13-14th, 2016.
- Imms, W. (2016). *Cultural collisions: A multi-disciplinary approach to researching innovative learning environments*. Invited address at the University of Melbourne Research Retreat, Torquay Victoria, November 10th 2016. Presentations (international)

9. Presentations (international)

- Closs, L., Mahat, M., and Imms, W. (2020). *Learning environments' influence on students' learning experience in an Australian Faculty of Business and Economics*. EnANPAD 2020 Associação Nacional de Pós Graduação e Pesquisa em Administração Online conference, Brazil, 14th October 2020.
- Young, F. & Imms, W. (2020). *Designing innovative spaces that positively impact teaching and learning*. Paper presented at The 5th International Symposium on Planning and Design of Contemporary K-12 Education Buildings, Shenzhen, China (online). 27th November 2020
- Bradbeer, C. (2019). *Innovative Learning Environments*. Paper presented at the Auckland Literacy Association, Auckland, NZ.
- Bradbeer, C. (2019). *Together in the space-between: Teacher collaboration and innovative learning environments in New Zealand primary schools* Paper presented at the NZARE, Hamilton, NZ.
- Cattlin, J. (2019). *Research engagement and impact*. Presented at ARMS Conference, Canada & USA, September, 2019
- Mahat, M. & Imms, W. (2019). *Supporting teachers to use learning environments well: ILETC's Teacher Transition Pathway*. Paper presented at the 2019 British Educational Research Association, Manchester.
- Mahat, M. & Imms, W. (2019). *Physical Learning Spaces for Deep(er) Learning*. Paper presented at the 2019 American Association for Research in Education, Toronto.
- Bradbeer, C. (2018). *Enacting teacher collaboration in innovative learning environments: Reifying pedagogical 'ownership'*. Paper presented at the TRANSITIONS18, Phoenix, AZ.
- French, R. (2018). *Enabling Constraints: Designing Less for Pedagogical Change*. Paper presented at EdScapes: Tampa, USA. 2nd November 2018
- French, R. (2018). *A Quick(er) Transition - Research-Based Strategies for Making a Holistic Shift from Traditional to 'Innovative' Facilities*. Paper presented at Learning Scapes Chicago: USA. 2nd October 2018
- French, R, Mahat, M & Imms, W. (2018). *Shifting Teacher Practice in an Innovative Learning Environment* (Poster presentation) at Association for Neuroscience in Architecture (ANFA), La Jolla, California, USA 21-22 September 2018.
- Imms, W. & Mahat, M. (2018). *Innovative learning environments and teacher change: Shifting teacher practices*. Paper presented at Transitions18 Europe: Continuing the conversation. University College Carlsberg: Copenhagen, Denmark.
- Imms, W. & Mahat, M. (2018). *Innovative learning environments and teacher change: Shifting teacher practices*. Paper presented at Transitions18 North America: Continuing the conversation. Canyon View High School, Phoenix, Arizona.
- Mahat, M. & Dollinger, M. (2018). *Co-creating learning spaces in higher education*. Paper presented at Transitions18 North America: Continuing the conversation. Canyon View High School, Phoenix, Arizona.
- Osborne, M; Imms, W; Bradbeer, C. (2018). *ILETC project update*. LEA NZ conference, Hobsonville Point Secondary School, Auckland, NZ, 2nd November 2018
- Villafranca, E. (2018). *Curated Learning: Teaching strategies for collection-based classroom teaching*. Workshop with museum educators and school teachers. Museo De La Salle: Cavite, Philippines, conducted 7th May 2018
- Villafranca, E. (2018). *Using Curated Learning for engaging gallery tours*. Workshop with museum professionals and tour guides. Bahay Tsinoy, Museum of Chinese in Philippine Life, Manila, Philippines, conducted 8th May 2018
- Bradbeer, C. (2017). *Teacher collaboration in innovative learning environments*. Paper presented at the ULearn, Hamilton, NZ.
- Bradbeer, C. (2017). *The 'state of play' concerning New Zealand's transition to innovative learning environments: Preliminary results from Phase one of the Innovative Learning Environments and Teacher Change project*. Paper presented at the ULearn conference, Hamilton, New Zealand, October 2017
- Bradbeer, C. (2017). *Teaching and learning in innovative learning environments: Reality or rhetoric?* Paper presented at the Hawkes Bay Primary Education Research Symposium, Eastern Institute of Technology, Hawkes Bay.
- Bradbeer, C. (2017). *ILETC The Innovative Learning Environments & Teacher Change Project (ILETC): What are we learning?* Paper presented at Wellington East Girls College, New Zealand, 17th August 2017
- Bradbeer, C. (2017). *ILETC The Innovative Learning Environments & Teacher Change Project (ILETC): What are we learning?* Paper presented at Learning Environments Association conference, Christchurch, New Zealand, 22nd August 2017
- Bradbeer, C., Cleveland, B., Mahat, M. & Imms, W. (2017) *The Innovative Learning Environment and Teacher Change (ILETC) project: What are we learning?* Paper presented at the 17th Annual Conference of the Learning Environments Australasia, Marina Bay Sands, Singapore.
- Bradbeer, C., Mahat, M., Byers, T. Cleveland, B., Kvan, T. & Imms, W. (2017). *Innovative Learning Environments and Teacher Change project update: What are we learning about the New Zealand context through Phase 1?* Paper presented at the ULearn17 Conference, Hamilton, New Zealand.

- Cleveland, B., Leonard, R. & Horton, L. (2017). *Embodying an Educational Vision in School Architecture: Untangling the Messy Business of Collaborative Translational Design*. Paper presented at the 2017 European Educational Research Association (ECER), Copenhagen, Denmark 22 August 2017
- Imms, W. (2017). *Developing spatial literacy through advanced information technology strategies*. Symposium, Industry and Academic Collaboration in Learning Space Design and Use, European Educational Research Association (EERA/ECER), University College UCC, Copenhagen, Denmark, 22 - 25 August 2017.
- Imms, W., Steigler-Peters, S. & Smith, M. (2017). *Developing Spatial Literacy through Advanced Communication Strategies*. Paper accepted at the 2017 European Educational Research Association (ECER), Copenhagen, Denmark.
- Mahat, M., Byers, T., Newton, C. & Imms, W. (2017). *Innovative Learning Environments and their impact on learning and instruction*. Paper presented at the 2017 European Association for Research on Learning and Instruction (EARLI), University of Tampere, Finland.
- Mahat, M. & Campbell, C. (2017). *Making it work: The effective use of acoustics in learning spaces*. Paper presented at the 2017 European Educational Research Association (ECER), Copenhagen, Denmark.
- Mahat, M., Cleveland, B., Leonard, R., Horton, L., Campbell, C., Fisher, K., Kim, A., Newton, C., Strickland-McGee, A., Imms, W., Steigler-Peters, S. & Smith, M. (2017). *Industry and academic collaboration in learning space design and use*. Paper presented at the 2017 European Educational Research Association (ECER), Copenhagen, Denmark.
- Newton, C., Fisher, K., Strickland-McGee, A., Kim, A. (2017). *Facilitating Learning Through Furniture and the Design of Learning Spaces*. Industry and academic collaboration in learning space design and use. Paper presented at the 2017 European Educational Research Association (ECER), Copenhagen, Denmark.
- Byers, T., Imms, W. & Hartnell-Young, E. (2016). Use of empirical evidence to support changes to teachers' pedagogical practice in contemporary and technology-enabled learning environments. (Byers, T., Imms, W. & Hartnell-Young, E.). Second 21st Century Academic Forum Conference, Harvard University, <https://doi.org/10.13140/RG.2.1.4508.0488>

10. Presentations (national)

- Bradbeer, C. (2019). *Ten years in ten minutes: Evolving spatial understandings*. Paper presented at the Talking Spaces 9, University of Melbourne.
- Mahat, M. & Imms, W. (2019). *Teacher Transition Pathway: Building teachers' spatial competency and learning in the 21st century*. Paper accepted at the 2019 Australian Association for Research in Education (AARE) Annual Conference, Brisbane.
- Closs, L., Mahat, M. & Imms, W. (2019). *Learning environments and students experience in higher education*. Paper presented at Transitions19, The University of Melbourne, Australia.
- Osborne, M. (2019). *Creating the conditions and capabilities for an ILE implementation*. Talking Spaces 9. Melbourne: Australia. 21-22nd February 2019.
- Villafranca, E. (2019). *Curated learning: the pedagogical relationship between museums and schools*. Talking Spaces 9. Melbourne: Australia. 21-22nd February 2019.
- Young, F.; Tuckwell, D. (2019). *Affordances as a conversation between designers and educators*. Talking Spaces 9. Melbourne: Australia. 21-22nd February 2019.
- Young, F. (2019) *Does space make a difference?* Independent Education Union of Australia NSW/ACT branch – The Great Debate (on Learning Environments). 5th September 2019.
- Bradbeer, C., Cleveland, B. & Imms, W. (2018). *Key findings for the ILETC project phase 1*. Learning Environments Australia Conference, Sydney 28-30 May 2018.
- Mahat, M., Imms, W., Osborne, M., Young, F. & Murphy, D. (2018). *Making space work: Linking pedagogy and space*. Symposium presented at the 2018 Australian Association for Research in Education (AARE) Annual Conference, University of Sydney, Sydney.
- Mahat, M. & Imms, W. (2018). *The development of a spatial tool to support teachers use of innovative learning environment*. Paper presented at the 2018 Australian Association for Research in Education (AARE) Annual Conference, University of Sydney, Sydney.
- Murphy, D. (2018). *The relationship between teacher mind frames and student learning approaches in innovative and traditional learning environments*. Presented as part of Symposium at Australian Association for Research in Education (AARE) Annual Conference, University of Sydney.
- Osborne, M. (2018). *Change leadership and the transition to innovative learning environments*. Presented as part of Symposium at the 2018 Australian Association for Research in Education (AARE) Annual Conference, University of Sydney.
- Villafranca, E. (2018). *Temporalities and spatialities of Becoming a Filipino scholar*. Panel presentation at Annual International Research Forum on the Philippines, La Trobe University, Melbourne, Australia, 27th November 2018.

- Villafranca, E. (2018). *Understanding affordances in museum education context*. Paper presented at the Museum Galleries Australia National Conference, Brisbane, Australia, 16th May 2018.
- Villafranca, E. (2018). *Beyond these museum walls: Educators as curators of learning*. Paper presented at the Transitions18 conference, The University of Melbourne, Australia, 1st June 2018.
- Villafranca, E. (2018). *Museum educators as curators of student learning*. Paper presented at the Museum Educators, Evaluators and Technologists MEETDAY 2018 held in conjunction with the Museums Galleries Australia National Conference, Melbourne, 4th June 2018.
- Young, F. (2018). Affordances of innovative learning environments: A participatory action research process to engage educators in developing and utilising tools to support transition to ILEs. Presented as part of Symposium at the 2018 Australian Association for Research in Education (AARE) Annual Conference, University of Sydney.
- Bradbeer, C. (2017). Into the great wide open: Navigating teacher opportunity, autonomy and structure in a collaborative Innovative Learning Environment. Paper presented at the Transitions 2017 Research Symposium, University of Melbourne.
- Mahat, M. & Imms, W. (2017). *What is needed to help teachers better utilize space as one of their pedagogic tools?* Proceedings of Transitions: Inhabiting Innovative Learning Environments. Melbourne Graduate School of Education: Melbourne.
- Mahat, M. & Imms, W. (2017). The development of a sampling frame to investigate teacher practices and student learning in 'traditional' and 'non-traditional' learning spaces. Paper presented at 2017 Australian Association for Research in Education, Canberra.
- Imms, W. (2017). *Learning in complex environments*. Paper presented at 2017 Talking Spaces, The University of Melbourne, Melbourne.
- Imms, W. (2017). *The 'crafted home': Inhabiting special places, and implications for school design*. Paper presented at the Australian Association for Research in Education, Canberra November 2017.
- Mahat, M. & Imms, W. (2017). Are we measuring what we are measuring? A measurement tool to measure teacher mind frames and student deep learning in the context of innovative learning environments. Paper presented at the 2017 Australian Association for Research in Education, Canberra, Australia.
- Tuckwell, D., Edwards, A., Grocott, L., Mahat, M. & Imms, W. (2017). Designing stakeholder engagement: How experiential workshops create space for teachers to question, propose and share narratives around innovative learning environments. Paper presented at 2017 Australian Association for Research in Education, Canberra.
- Bradbeer, C. (2016). I can see clearly now the wall is gone: Situated professional learning in a collaborative Innovative Learning Environment. Paper presented at the 2016 LEARN International Graduate Research Symposium, Melbourne, Australia.
- Bradbeer, C. (2016). Understanding and fostering collaboration to ensure innovative learning environments thrive. Paper presented at the New Generation Learning Spaces, Melbourne.
- Byers, T. & Imms, W. (2016). Empirical Evidence that supports changes to pedagogical practice and tracks learning gains in contemporary and technology-enabled learning environments. Excellence in Professional Practice Conference 2015. ACER, Sydney May 21-23rd. <https://www.doi.org/10.13140/RG.2.1.3328.4007>
- Mahat, M. & Imms, W. (2016). *Innovative Learning Environments: A critical review of its effects on teacher mind frames and student deep learning*. Paper presented at the 2016 Australian Association for Research in Education, Melbourne Cricket Ground, Melbourne.
- Imms, W. (2016). *How new are 'new generation learning environments'? Emerging research on space and quality teaching*. Paper presented at the 2016 Australian Association for Research in Education, Melbourne Cricket Ground, Melbourne.

11. Engagement (Visiting Scholars)

Residence

Year	Organisation*	Country	Duration
2017	DLR	USA (Fullbright)	1 year
2018	Independent	Canada	3 weeks
2018	Uni Lisbon	Portugal	4 weeks
2018	Ford	Denmark	2 weeks
2018	Fed Uni Rio Grande do Sul	Brazil	1 year
2018	University of Jyväskylä	Finland	4 weeks
2018	Bologna Uni	Italy	6 weeks

Visit < 3 days

Organisation*	Country
Ecophon	South Africa
Uni Gavle	Sweden
Grand Valley Uni	USA
A4LE (Europe)	UK
Fed Uni Rio Grande do Sul	Brazil
Hanzehogeschool Groningen	Netherlands
Aarhus Uni	Denmark
Singapore Institute	Singapore
Bartlett Institute	UK
Lodz University	Poland

*Names omitted due to privacy requirements

12. Engagement (media, selected)

- 2021 'Coffee Chat'. EIW Architects, Western Australia. <https://www.eiwarch.com.au/articles/enrichment/interview-coffee-break-with-dr-wesley-imms>
- 2019 Earp, J. (2019, August 5). Traditional classrooms and Innovative Learning Environments. Teacher Magazine. https://www.teachermagazine.com/au_en/articles/traditional-classrooms-and-innovative-learning-environments
- 2018 Davies, E. (2018, August 1). Calm spaces. The Educational Reporter. <http://edureporter.com.au/latest/#page=34>
- 2018 Henebery, B. (2018, November 14). Are open learning environments the answer? The Educator. https://www.teachermagazine.com/au_en/articles/traditional-classrooms-and-innovative-learning-environments
- 2018 Stephenson, M. (2018). Future directions for classroom designs. Community News.
- 2018 Designing classrooms to match 21st century learning. Projects that make a Difference: Australian Research Council. <https://www.arc.gov.au/news-publications/media/feature-articles/designing-classroom-match-21st-century-teaching>
- 2017 Edgar, R. (2017, July 3). Smart school design offers a lesson in better learning. Sydney Morning Herald. <https://www.smh.com.au/entertainment/art-and-design/smart-school-design-offers-a-lesson-in-better-learning-20170630-gx2fz5.html>
- 2017 Figgis, J. (2017, June 6). Commissioned report of 'future schooling'. ACER Research.

- 2017 Hore, M. (2017, April 23). Technology and flexible space will be the classrooms of the future. Herald Sun. <https://www.kidsnews.com.au/green/technology-and-flexible-space-will-be-the-classrooms-of-the-future/news-story/75a053c9c27d0dc0acd2322a0aaca9d1>
- 2017 Are flexible learning environments working in NZ schools? (November 13th 2017). Radio National New Zealand. <http://www.radionz.co.nz/national/programmes/ninetoonoon/audio/2018621406/are-flexible-learning-environments-working-in-nz-schools>
- 2017 Australian expert gives thumbs up to Wakatipu High School classrooms. (December 5th, 2017). New Zealand South TV. <http://www.channel39.co.nz/news/australian-expert-gives-thumbs-wakatipu-high-school-classrooms>
- 2016 Chandler, J. (2016, October 31). Innovative learning environments changing the shape of teaching. School News. <https://www.school-news.com.au/property/innovative-learning-environments-changing-shape-of-teaching/>

13. Engagement (research workshops, selection)

- 2020 Sharing Stories of Success - Stonefields 19 Feb 2020
- 2020 Sharing Stories of Success - Queanbeyan 24 Feb 2020
- 2020 Sharing Stories of Success - West Pymble, Sydney 25 Feb 2020
- 2020 Sharing Stories of Success - Bella Vista, Sydney 26 Feb 2020
- 2018 Research strategies to develop career pathways. Invited ECR workshop, Grand Valley State University, Michigan USA. 1 May 2018
- 2017 Changing teacher practices in ILEs, Department of Education, Brisbane, 2017
- 2017 Transitioning into ILEs; Journey maps, Charles Weston Primary School, Canberra, 2017
- 2017 Tool development trial workshop. Melbourne, April 2017, Methodist Ladies College
- 2017 Tool development trial workshop. Brisbane, May 2017, Anglican Church Grammar School.
- 2017 Tool development trial workshop. Sydney, May 2017, Northern Beaches College.
- 2016 Deep Learning and ILEs: Learning from deep learning experiences, Avonside Girls High School, Christchurch, 2016.
- 2016 Mind Frames and belief systems: Learning from ideals and teaching practices, Stonefields School, Auckland, 2016.
- 2016 ILEs in the classroom: Learning from practice and potential, Department of Education, Sydney, 2016.
- 2016 Tool development trial workshop. Melbourne, November 2016, Woodleigh School.
- 2016 Tool development trial workshop. Adelaide, December 2016, Australian Science and Mathematics School.



Nordagerskolen. Ecophon Saint-Gobain. Teddy Strandqvist/Studio-e.se photography.

ILETC partners

