Smart spaces?

Wesley Imms

Twilight Lecture, Edith Cowan University, 5th April 2018

Learning Environments Applied Research Network (LEaRN)

Smart spaces?

The Sydney Morning Herald
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Noisier but not distracting . . . Zac Gerheard (from left), Christian Stathopoulos and Bessie Phillips work on their laptops in the mega classroom at St Monica's Primary. *Photo: Brendan Esposito*

THE blackboard has already gone from most NSW classrooms. Now, the head of a big school system is determined that the classroom itself joins it in the scrapbook of history.

"It's dead," said Greg Whitby, the executive director of 78 schools in the Catholic diocese of Parramatta, which 42,000 students attend.

He is not alone. The Sydney diocese has embarked on the same path for primary schools. Forty of the 112 primary schools already use large-form learning areas instead of classrooms and the diocese is keen to expand their use.

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Traffic Conditions

Schools hit a wall with open-plan classrooms

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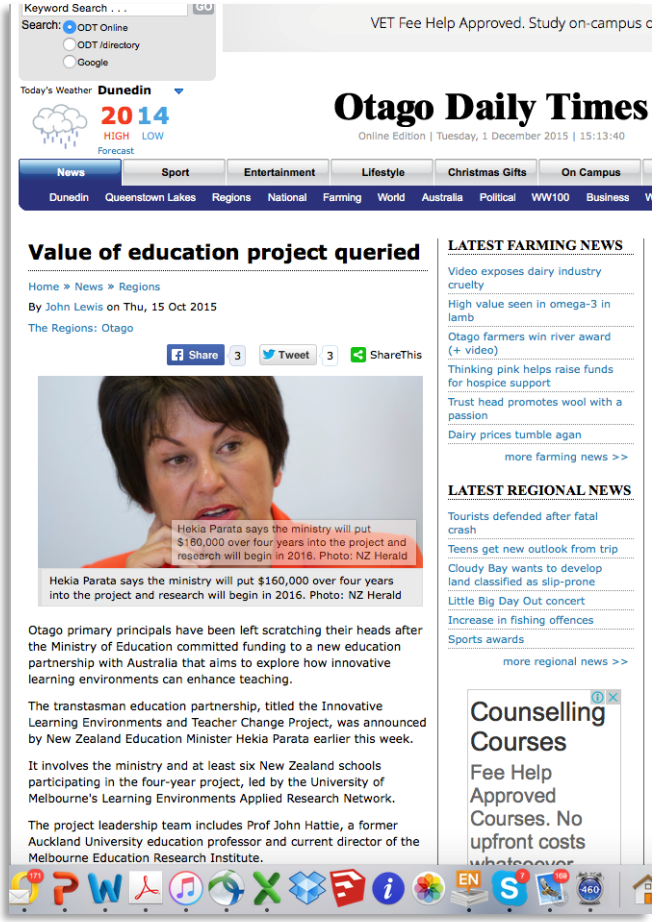
New dividing walls separate classes in open-space rooms at Laverton P-12 College. *Photo: Jason South*

They knocked down walls to revolutionise learning and now they are putting them up again.

Open-plan classrooms have caused nothing but trouble for many schools, which are putting up partitions and walls to counter the deafening noise created in the barn-like spaces.



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Value of education project queried

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By John Lewis on Thu, 15 Oct 2015

The Regions: Otago

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Hekia Parata says the ministry will put $160,000 over four years into the project and research will begin in 2016. Photo: NZ Herald

Hekia Parata says the ministry will put $160,000 over four years into the project and research will begin in 2016. Photo: NZ Herald

Otago primary principals have been left scratching their heads after the Ministry of Education committed funding to a new education partnership with Australia that aims to explore how innovative learning environments can enhance teaching.

The transtasman education partnership, titled the Innovative Learning Environments and Teacher Change Project, was announced by New Zealand Education Minister Hekia Parata earlier this week.

It involves the ministry and at least six New Zealand schools participating in the four-year project, led by the University of Melbourne's Learning Environments Applied Research Network.

The project leadership team includes Prof John Hattie, a former Auckland University education professor and current director of the Melbourne Education Research Institute.

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Smart spaces…

- What *are* they…
- And are they actually ‘smart’?

Smart spaces?

Marshland School, Christchurch. Stephenson & Turner/Hayball © Paul McCredie

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Smart spaces?

Ravenswood School for Girls, Sydney, BVN © John Gollings

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Macgregor Primary School, ACT © DET, ACT

Yarra Valley Grammar, Hayball © Dianna Snape

Marist College, Bendigo, Y2 © Bill Conroy

St Francis Xavier College, Hayball © Diana Snape

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Harboard Primary School, NSW © DoE, NSW

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Our Lady of the Assumption Primary School, BVN © John Gollings

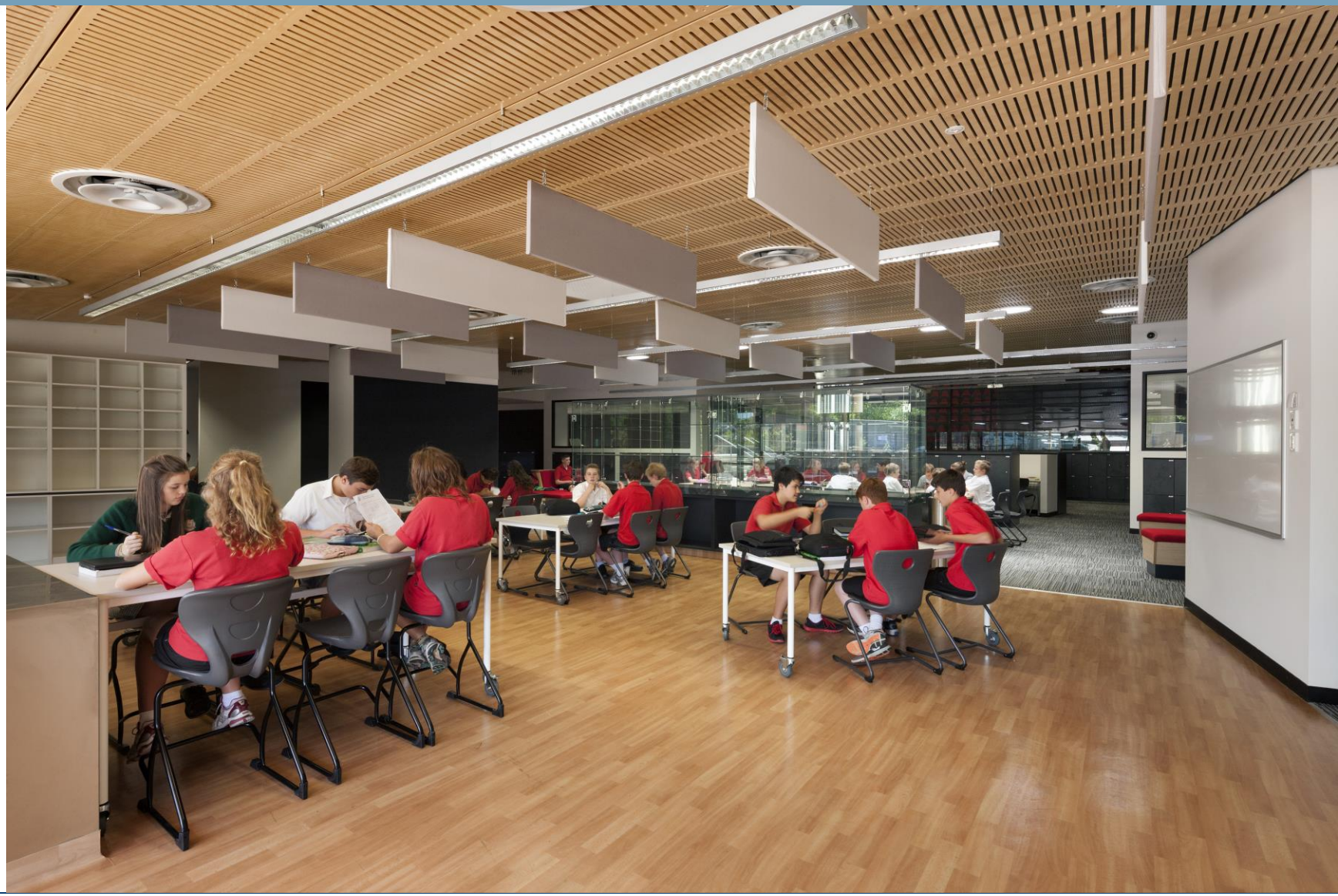
Centenary Library, Churchie, Brisbane. Brand Slater ©

Smart spaces?

Bellevue Hill Priumary Schoo, NSW © DoE, NSW

StudioFive, PTID, University of Melbourne © PTID

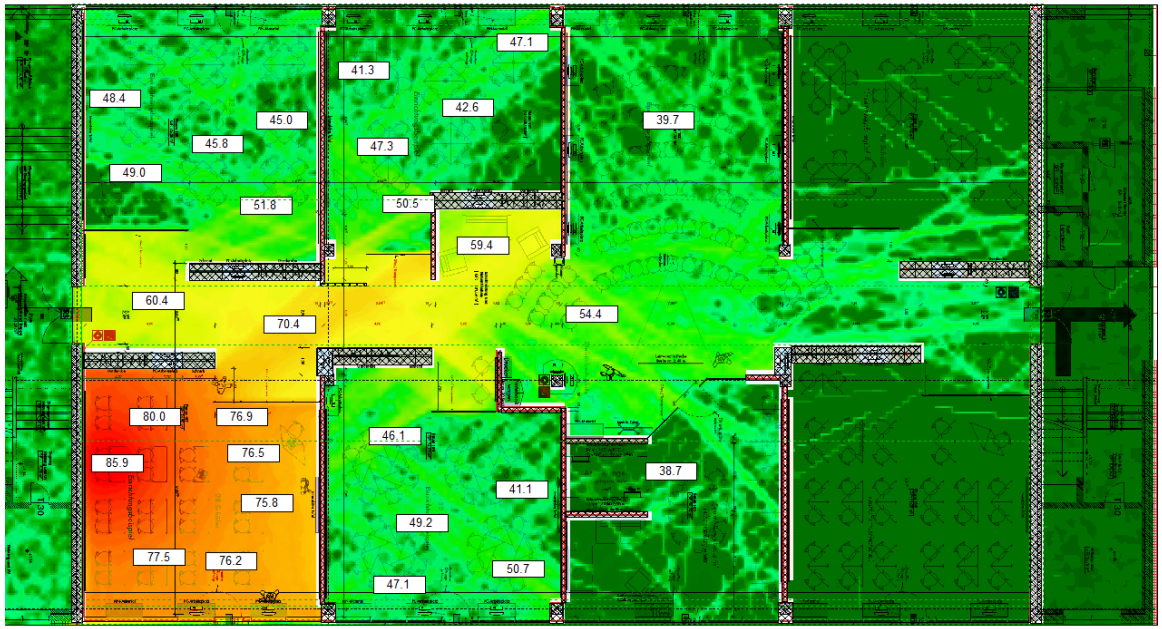
St Francis Xavier, Hayball © Dianna Snape

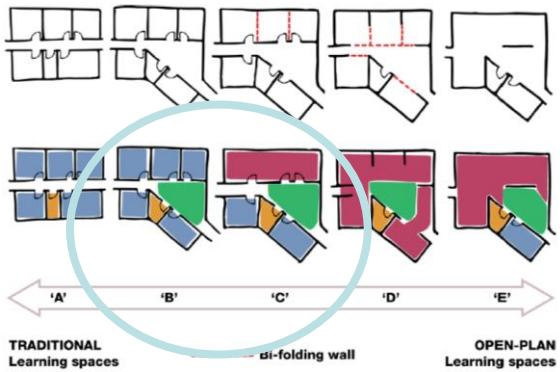


Camberwell High School, Hayball © Dianna Snape

St Columba's College, Hayball © Dianna Snape

Witzenhausen – sound reduction mapping & speech perception





Educationally open & transparent but acoustically closed

Ecophon
SAINT-GOBAIN
A SOUND EFFECT ON PEOPLE

Innovative Learning Environments (ILEs)

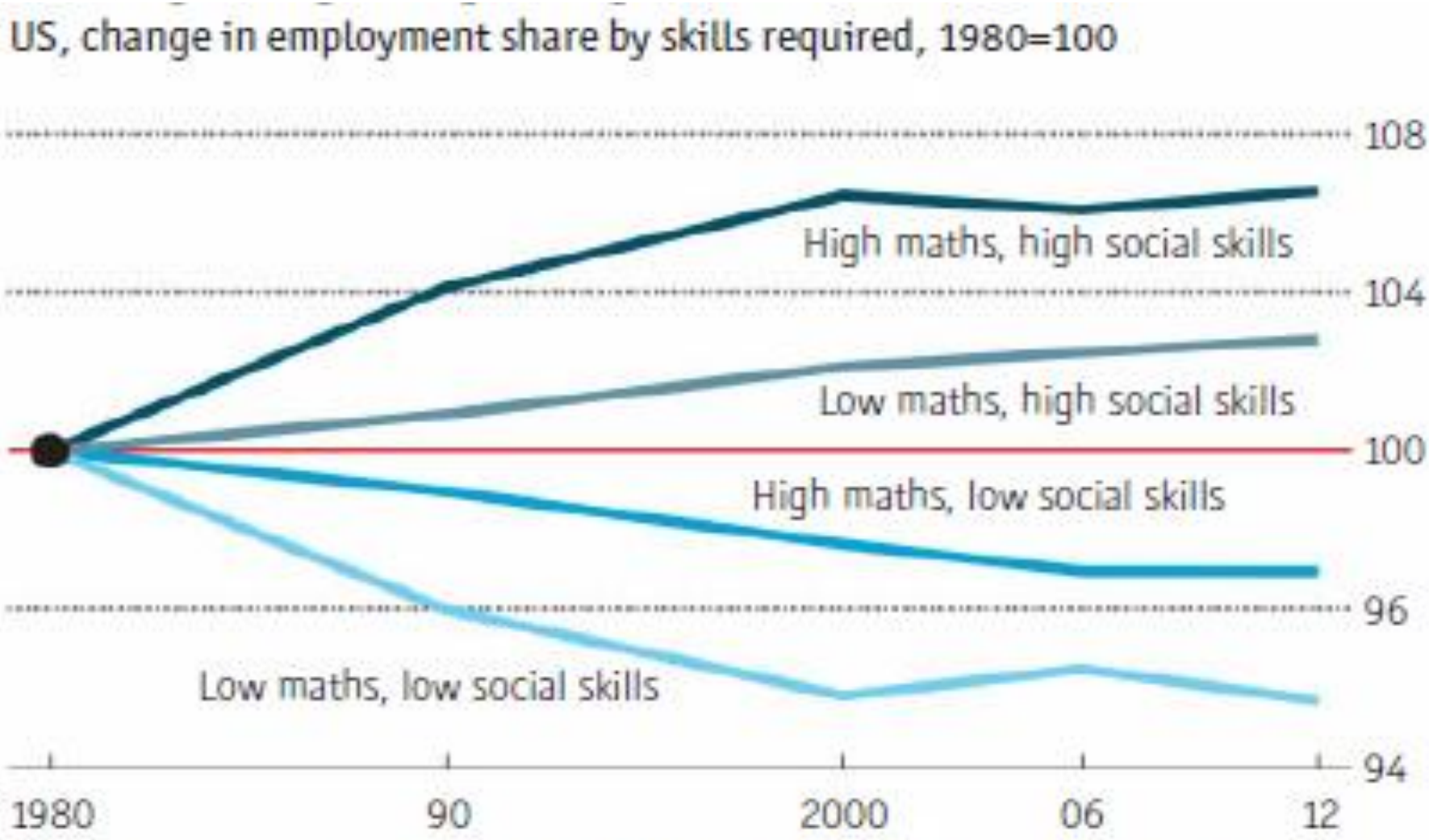
ILEs = Innovative designs

Innovative Learning Environments (ILEs)

ILEs = Innovative designs + innovative teaching/learning practices

"A design may be deemed 'innovative', but it only becomes an ILE once its inhabitants (teachers and students) teach and learn innovatively within them" (Mahatt et al., p.9).

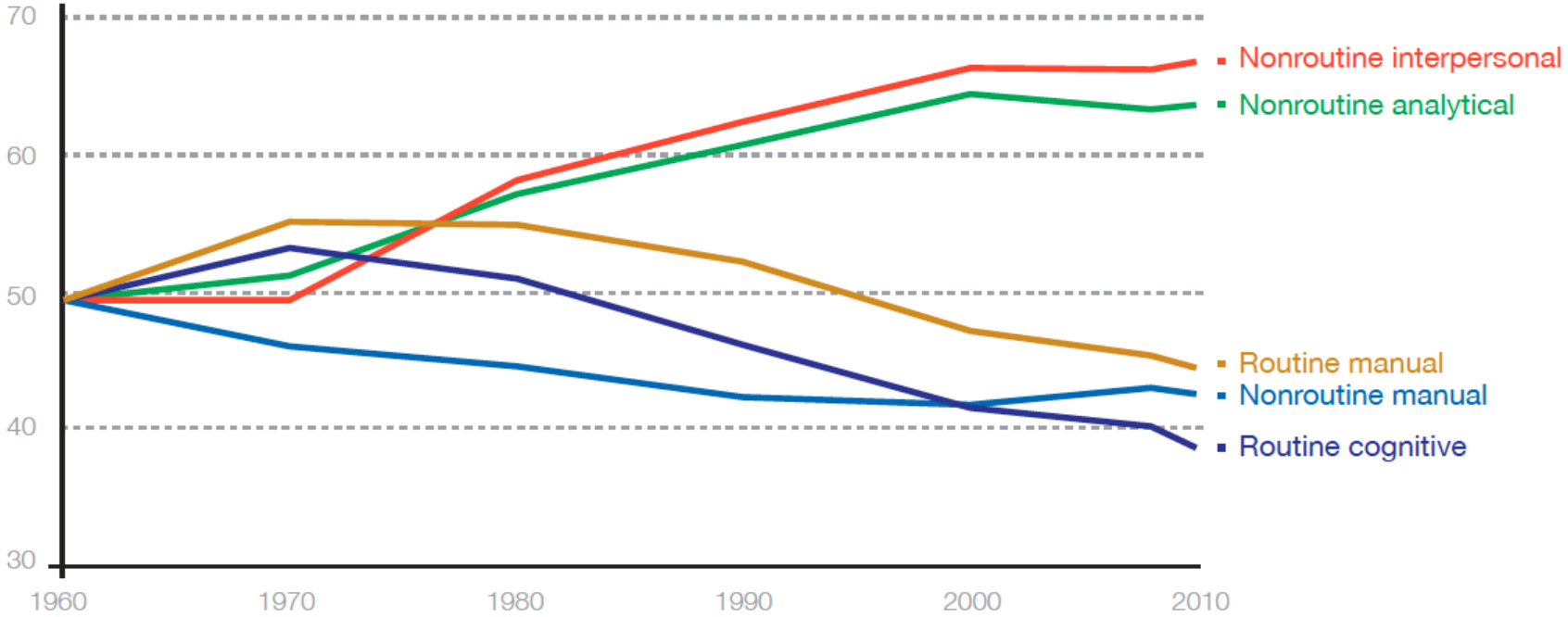
Mahat, M., Imms, W., Bradbeer, C. & Byers, T. (2017). Innovative learning environments and teacher change: Defining key concepts. Technical Report 3/2018. ILETC Project: Melbourne.



Source: Deming, D. (2016). *Growing importance of social skills in the labour market.*

Exhibit 1: The labour market increasingly demands higher-order skills

Tasks by percentile for the US economy, 1960-2009



Note: The starting point of the chart has been indexed to 1960.
Adapted from Levy, Frank and Richard J. Murnane. "Dancing with robots: Human skills for computerized work." Third Way NEXT. 2013. (http://content.thirdway.org/publications/714/Dancing-With-Robots.pdf) Data provided by David Autor at MIT and updated from the original 2003 study by Autor, Levy and Murnane.

Cited in World Economic Forum (2017), *New Vision for Education*.

21st Century Learning Skills

- Collaboration
- Communication
- Creativity
- Critical thinking

Innovative Learning Environments (ILEs)

ILEs = Innovative designs + innovative teaching/learning practices

"A design may be deemed 'innovative', but it only becomes an ILE once its inhabitants (teachers and students) teach and learn innovatively within them" (Mahatt et al., p.9).

Houghton's (citing Biggs, Entwistle, Ramsden) characteristics of deep learning

- New facts into existing beliefs
- Finding links between beliefs
- Looking for meaning
- Linking learning to real life
- Intrinsic curiosity
- Determination to learn well
- Personal interest in content
- Personal interest in content
- Allowing time for construct understanding
- Confronting misconceptions
- Facilitating active learning
- Using assessment well
- Relating new knowledge to old

	Deep learning	Surface learning
Definition	Examining new facts and ideas critically, and tying them into existing cognitive structures and making numerous links between ideas.	Accepting new facts and ideas uncritically and attempting to store them as isolated, unconnected, items.
Characteristics	Looking for meaning. Focusing on the central argument or concepts needed to solve a problem. Interacting actively. Distinguishing between argument and evidence. Making connections between different modules. Relating new and previous knowledge. Linking course content to real life.	Relying on rote learning. Focussing on outwards signs and the formulae needed to solve a problem. Receiving information passively. Failing to distinguish principles from examples. Treating parts of modules and programmes as separate. Not recognising new material as building on previous work. Seeing course content simply as material to be learnt for the exam.
Encouraged by students	Being intrinsically curious about the subject. Being determined to do well and mentally engaging when doing academic work. Having the appropriate background knowledge for a sound foundation. Having time to pursue interests, through good time management. Positive experience of education leading to confidence in ability to understand and succeed.	Studying a degree for the qualification and not being interested in the subject. Not focussing on academic areas, but emphasising others (e.g. social, sport). Lacking background knowledge and understanding necessary to understand material. Not enough time / too high a workload. Cynical view of education, believing that factual recall is what is required. High anxiety.
Encouraged by teachers	Showing personal interest in the subject. Bringing out the structure of the subject. Concentrating on and ensuring plenty of time for key concepts. Confronting students' misconceptions. Engaging students in active learning. Using assessments that require thought, and requires ideas to be used together. Relating new material to what students already know and understand. Allowing students to make mistakes without penalty and rewarding effort. Being consistent and fair in assessing declared intended learning outcomes, and hence establishing trust (see Constructive Alignment).	Conveying disinterest or even a negative attitude to the material. Presenting material so that it can be perceived as a series of unrelated facts and ideas. Allowing students to be passive. Assessing for independent facts (short answer questions). Rushing to cover too much material. Emphasizing coverage at the expense of depth. Creating undue anxiety or low expectations of success by discouraging statements or excessive workload. Having a short assessment cycle.

Houghton, W. (2004) Engineering Subject Centre Guide: Learning and Teaching Theory for Engineering Academics. Loughborough: HEA Engineering Subject Centre.

FINANCIAL REVIEW

John Hattie tops Australia's most powerful in education in 20

The AFR Magazine's hotly anticipated annual Power issue includes lists of the key players across five different industry sectors. Here, the top five from education.

John Hattie's research as an education professor at the University of Melbourne brings big data to the problem of deciding which are the best, most cost-effective ways of improving schools.

Power is in flux in education, which is waiting for the next big idea after the failure of the last two attempts at sweeping reform. Labor's Gonski school funding reform was halted by the Abbott

Smart spaces?

NEWS ▾ BUSINESS ▾ MARKETS ▾ STREET TALK R

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Hattie's Mind Frames

1. I must evaluate my teaching effectiveness
2. I am a change agent
3. I must talk more about learning than teaching
4. I accept assessment is about my impact
5. My teaching is dialogue, not monologue
6. I do not retreat from doing my best
7. I must build positive relationships
8. I teach the language of learning
9. I accept that learning is hard work
10. I collaborate

What are our challenges?

- Engaging students in deeper learning practices.
- Teachers ‘mind frames’ are the key…

What are our challenges?

- (Arguable) teacher resistance to ILEs, scepticism, poor spatial awareness.
- Poor teacher involvement in conceptualisation of designs.
- Vision + design of spaces outstripping teachers' capacity to use them.
- Need for good evidence to support change.

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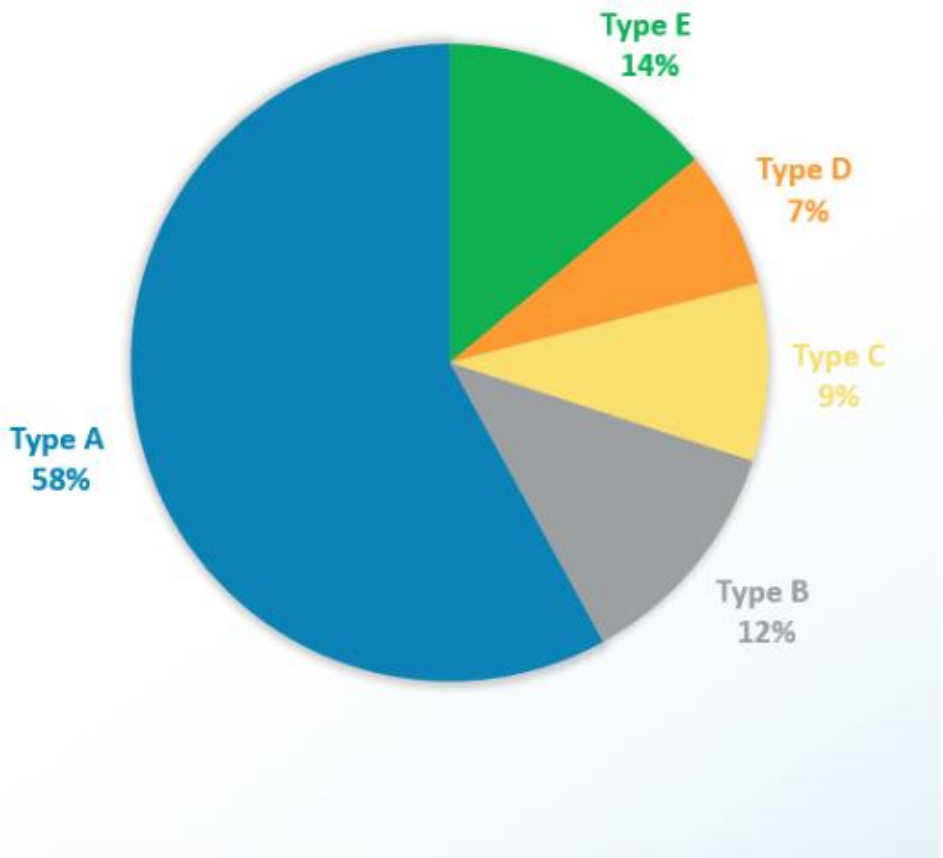
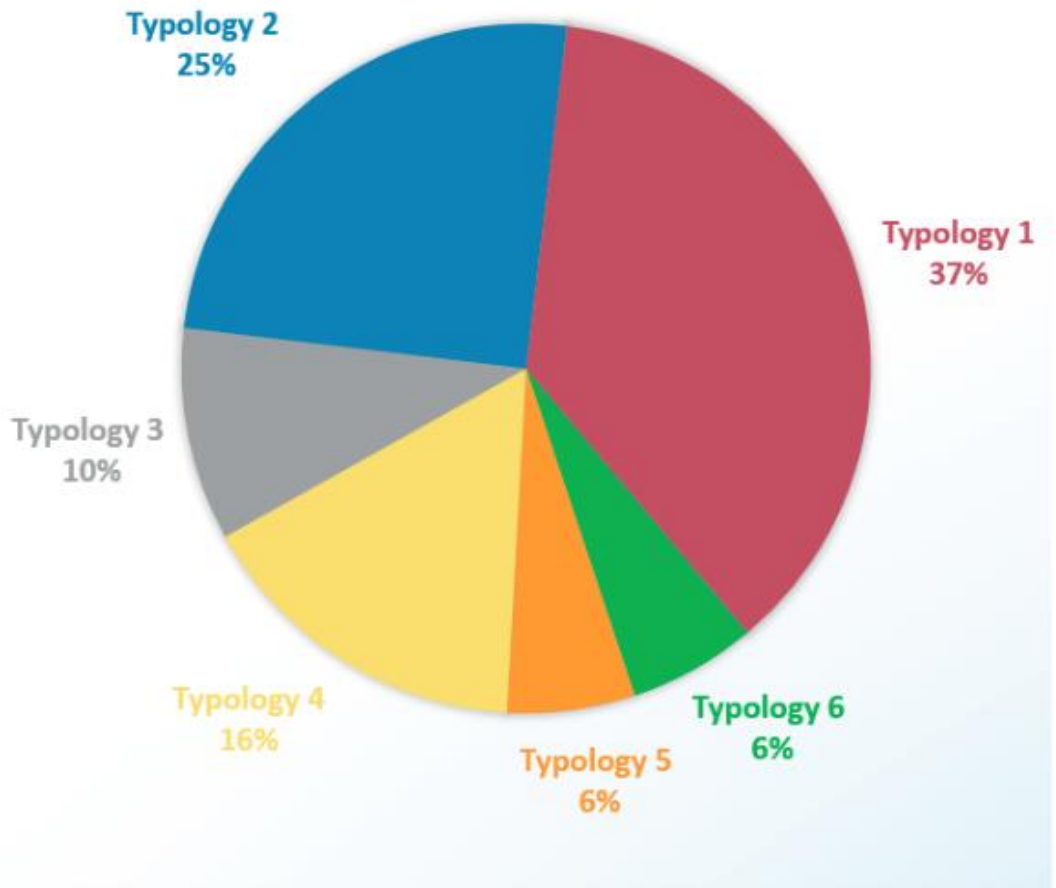
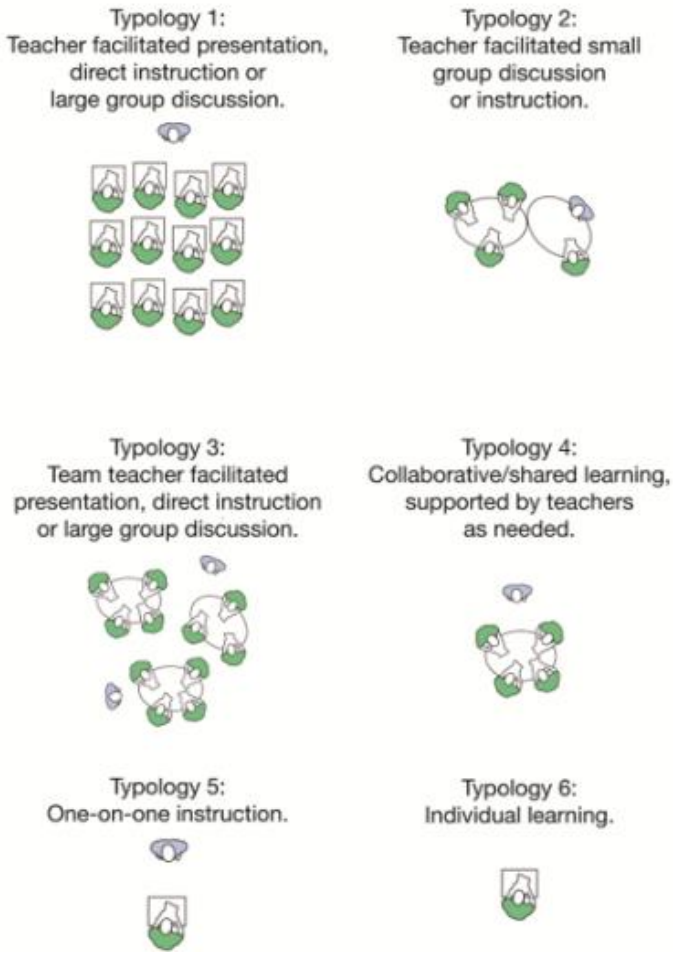
ILETC Stage 1 Survey (n=822)



Imms, W., Mahat, M., Murphy, D. & Byers, T. (2017). Type and Use of Innovative Learning Environments in Australasian Schools – ILETC Survey. Technical Report 1/2017. ILETC Project: Melbourne.

ILETC Stage 1 Survey





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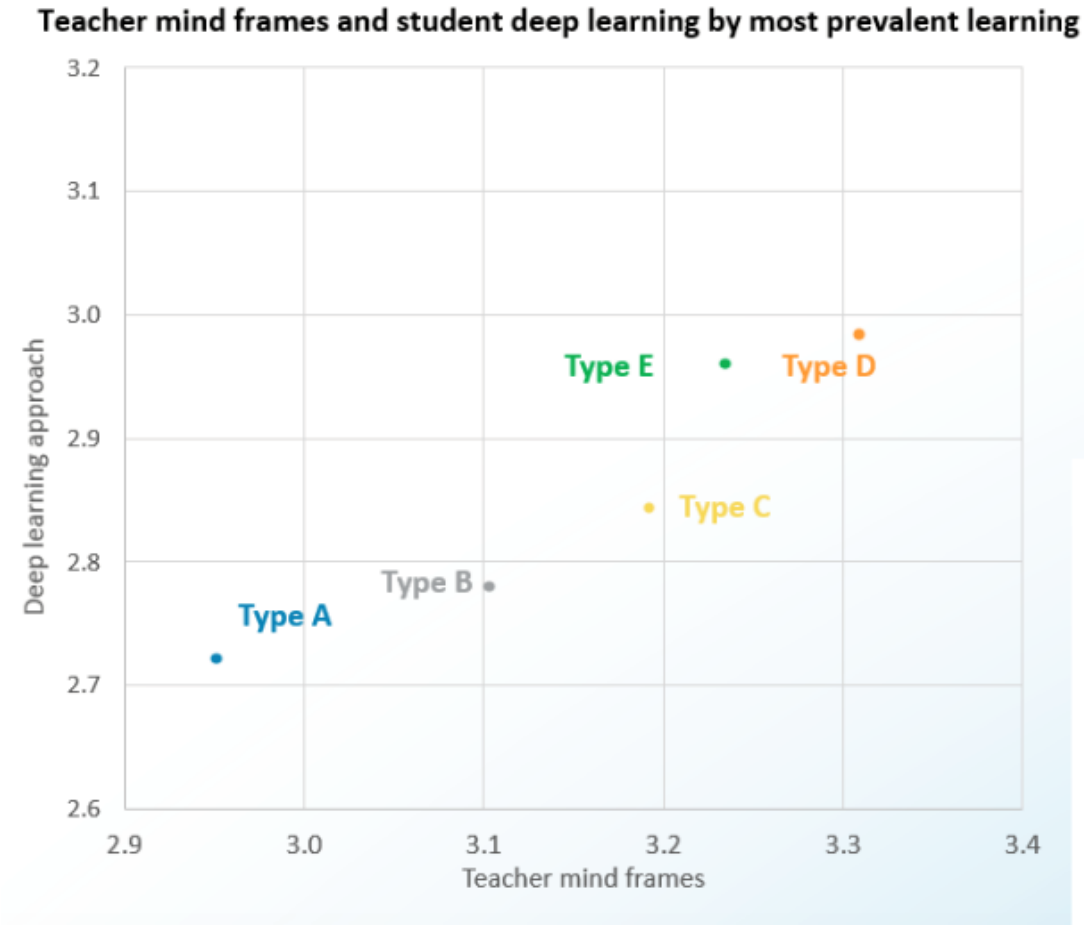


Imms, W., Mahat, M., Murphy, D. & Byers, T. (2017). Type and Use of Innovative Learning Environments in Australasian Schools – ILETC Survey. Technical Report 1/2017. ILETC Project: Melbourne.

The Finished Beginning

Empirical retrospective of the impact of different learning environments on teaching and learning from the 2010 to 2018 New Generation Learning Spaces Project.

Churchie.

Anglican Church Grammar School
The University of Melbourne LEaRN group
Evaluating 21st Century Learning Environments
Brand + Slater architects
Innovative Learning Environments and Teacher Change

Stage 1 *study*

YEAR
2012

BUILDINGS
Arnott, Fisher and Lanskey

SUBJECT
English and Mathematics

SAMPLE
6 classes, 164 students
(94% participation) and 17 teachers

RESEARCH DESIGN
Quasi-experimental + single-subject research design

METHODS
Repeated Measures LPTS Survey + Learning Outcomes

STUDY SUMMARY
This exploratory study focused on refining a design and method to measure the empirical impact of different classroom layouts on student perceptions of their learning and academic outcomes. The design removed the key barriers to the empirical evaluation of educational spaces, through the control of those complex confounding variables inherent in schools.

The study produced evidence that advanced the knowledge of learning spaces in a school setting, finding that space does matter and served to validate a robust method for exploring this topic.

Making the case for space: the impact on students

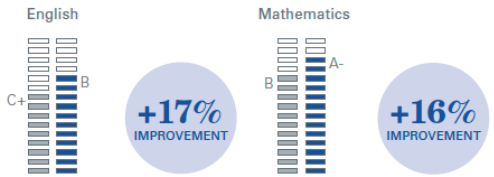
Macro effects

Summary of changes in student attitudes to their learning

Use of technology	Learning experiences	Engagement in learning
Consistent statistical improvement in: • Effectiveness • Efficiency	**Significant increase in opportunities for:** • Self-regulation • Collaboration	**Statistically significant change:** • Behavioural engagement • Cognitive engagement

Summary of impact on academic results

Conventional classroom — NGLS



Stage 2 *study*

YEAR
2013

BUILDINGS
Arnott, Fisher and Lanskey

SUBJECT
English, Humanities and Mathematics

SAMPLE
22 classes, 385 students (68% participation) and 21 teachers

RESEARCH DESIGN
Quasi-experimental + single-subject research design

METHODS
Repeated measures LPTS survey + learning analytics

STUDY SUMMARY
This confirmatory study focused on the longitudinal pedagogic impact of space on teaching and learning. The design incorporated the use of control groups, to conduct a comprehensive and robust evaluation to determine if, and to what extent, different learning spaces affected the nuances of teaching and learning.

It was found that the affordances of the NGLS design acted as a conduit to better support teachers in facilitating a wider array of pedagogical practices and active and collaborative learning modalities than those experienced in a conventional layout.

Evaluating the longer term impact of space on students

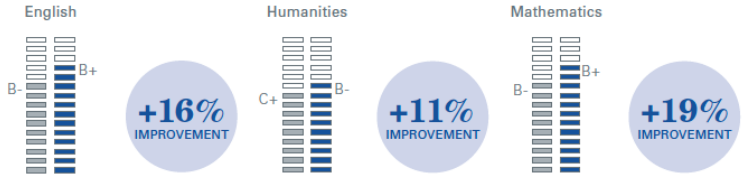
Macro Effects

Compared to students in a conventional space, NGLS classes

Use of technology	Learning experiences	Engagement in learning
• Preferred using technology • Learning was more interactive • Added value to their learning	• Greater differentiation • More active and collaborative • More creative and interesting	• More engaged in their learning • More positive about their effort • Increased enjoyment

Summary of impact on academic results

Conventional classroom — NGLS



Byers, T. & Imms, W. *The finished beginning.* (2018). *Anglican Church Grammar School*.

Stage 4 *study*

YEAR
2017 to present

BUILDINGS
The Centenary Library

SUBJECT
All subjects

SAMPLE
18 days of hourly observations and n = 249 Year 7, 9 and 12 students (participation rate of 37.1%)

RESEARCH DESIGN
Quasi-experimental + repeated measures design

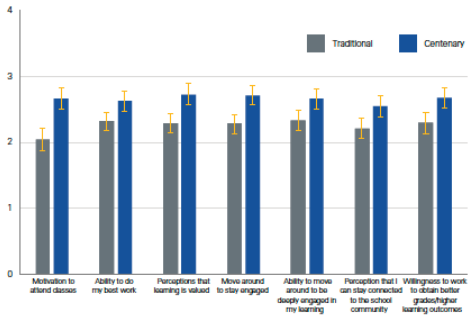
METHODS
LPTS spatial syntax metric + Student Engagement Index© survey

STUDY SUMMARY
The Centenary Library brings together a range of key academic and pastoral services into a single space: student services (careers, chaplain, school psychologist and community service), information services and ICT services and along with gifted education and learning support. Modelling the function of a tertiary library environment, the collation of services seeks to nurture aspects of Churchie's four tenets. The synergy of expertise seeks to permeate a service orientation throughout the building, with the potential to become the central space of a boy's daily life at Churchie. Boys are able to learn and work in the building, through the responsive provision of academic and information services that extend beyond the standard school day.

The post-occupancy evaluation determined if, and to what extent, The Centenary Library facilitated a more active, responsive and personalised approach to learning. The LPTS spatial syntax metric was used to analyse the longitudinal occupation and use of the Library to ascertain how learning stretched beyond the walls of the conventional school space and, with the proliferation of mobile technologies, beyond the school day. It evaluated the nature of the occupation and learning and how the blend of formal and informal spaces shaped both activity and communities of learning. The corroboration of student voice, ascertained through the Student Engagement Index© (SEI) survey (developed by the DLR Group and INSYNC: Education Research + Design), highlighted how the design and function of The Centenary Library impacted their engagement in learning.

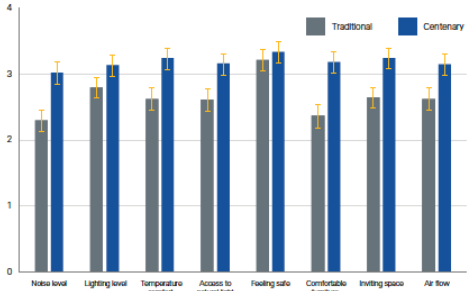
The analysis from the post-occupancy evaluation suggested that the occupation and pedagogical use of The Centenary Library exceeded the expectations. The array of spaces promoted creativity, effective approaches to thinking and flexibility by allowing for multiple purposes concurrently, with student able to undertake a range of activities and that extends from an individual through to mixed class and age. At the same time, these bespoke and responsive learning spaces provided teachers from all subject areas with greater pedagogical freedom. Collectively, this translated to a relatively high (maximum of 78%) and consistent (average of 59%) student occupation of the library that extended well beyond the typical school day. A correlation between the design and nature of utilisation showed how learning was more active, collaborative and engaged higher-order cognitions, challenging the prevailing view of the subjects that libraries support.

Impact on student attitudes to their learning



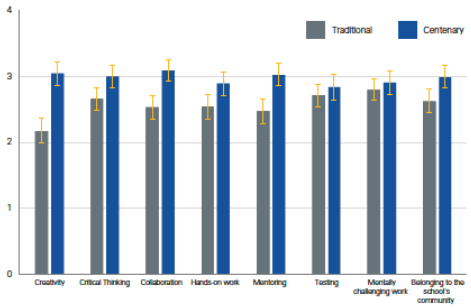
Likert Scale Student Response (0 - No impact at all; 1 - Small impact; 2 - Moderate impact; 3 - Makes a noticeable difference; 4 - Makes a big difference)

Impact of bespoke design, layout and furniture



Likert Scale Student Response (0 - Poor; 1 - Fair; 2 - Good; 3 - Very good; 4 - Excellent)

Effect on learning outcomes



Likert Scale Student Response (0 - Not valued; 1 - Valued a little; 2 - Valued; 3 - Valued a lot ; 4 -Considered critical)

Byers, T. & Imms, W. *The finished beginning.* (2018). *Anglican Church Grammar School*.

Stage 4 *study*

YEAR
2017 to present

BUILDINGS
The Centenary Library

SUBJECT
All subjects

SAMPLE
18 days of hourly observations and n = 249 Year 7, 9 and 12 students (participation rate of 37.1%)

RESEARCH DESIGN
Quasi-experimental + repeated measures design

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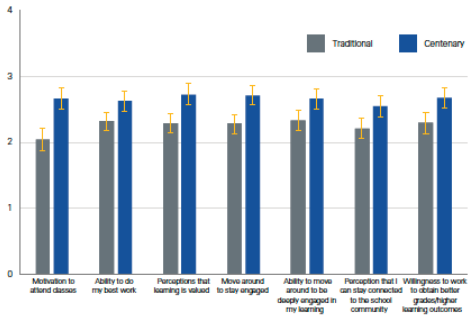

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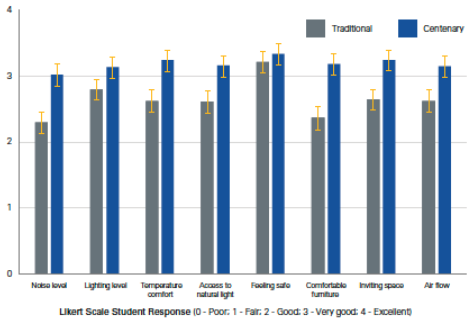
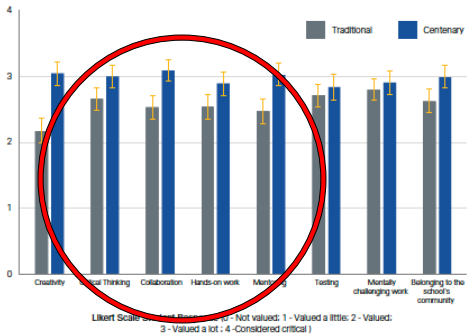


Likert Scale Student Response (0 - Poor; 1 - Fair; 2 - Good; 3 - Very good; 4 - Excellent)

Effect on learning outcomes



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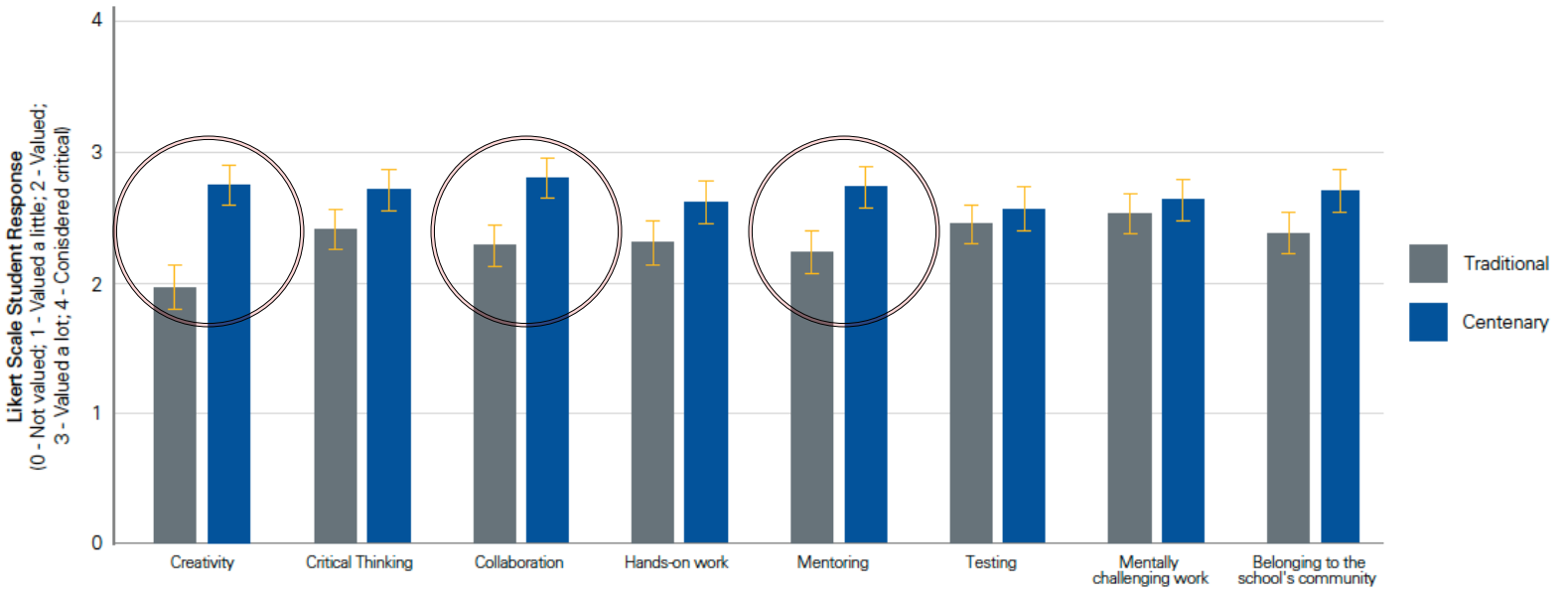

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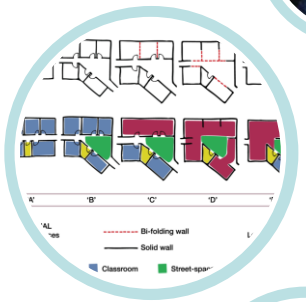
INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE
A 2016-2019 ARC LINKAGE PROJECT

3 x Systematic Reviews

3 x International industry think-tanks (Aust, Europe, Nth America)

Survey, (Aust + NZ)

3 x international research symposia (Melb, London, Michigan)

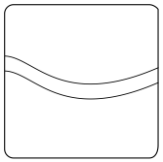


30 x case studies (Aust + NZ)

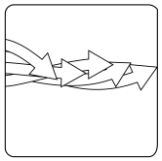
6 x Teacher Workshops (Aust + NZ)

Smart spaces?

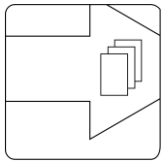
INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE
A 2016-2019 ARC LINKAGE PROJECT



1. Common pathway

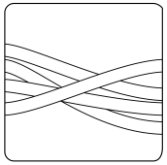


2. Individualised ‘journeys’



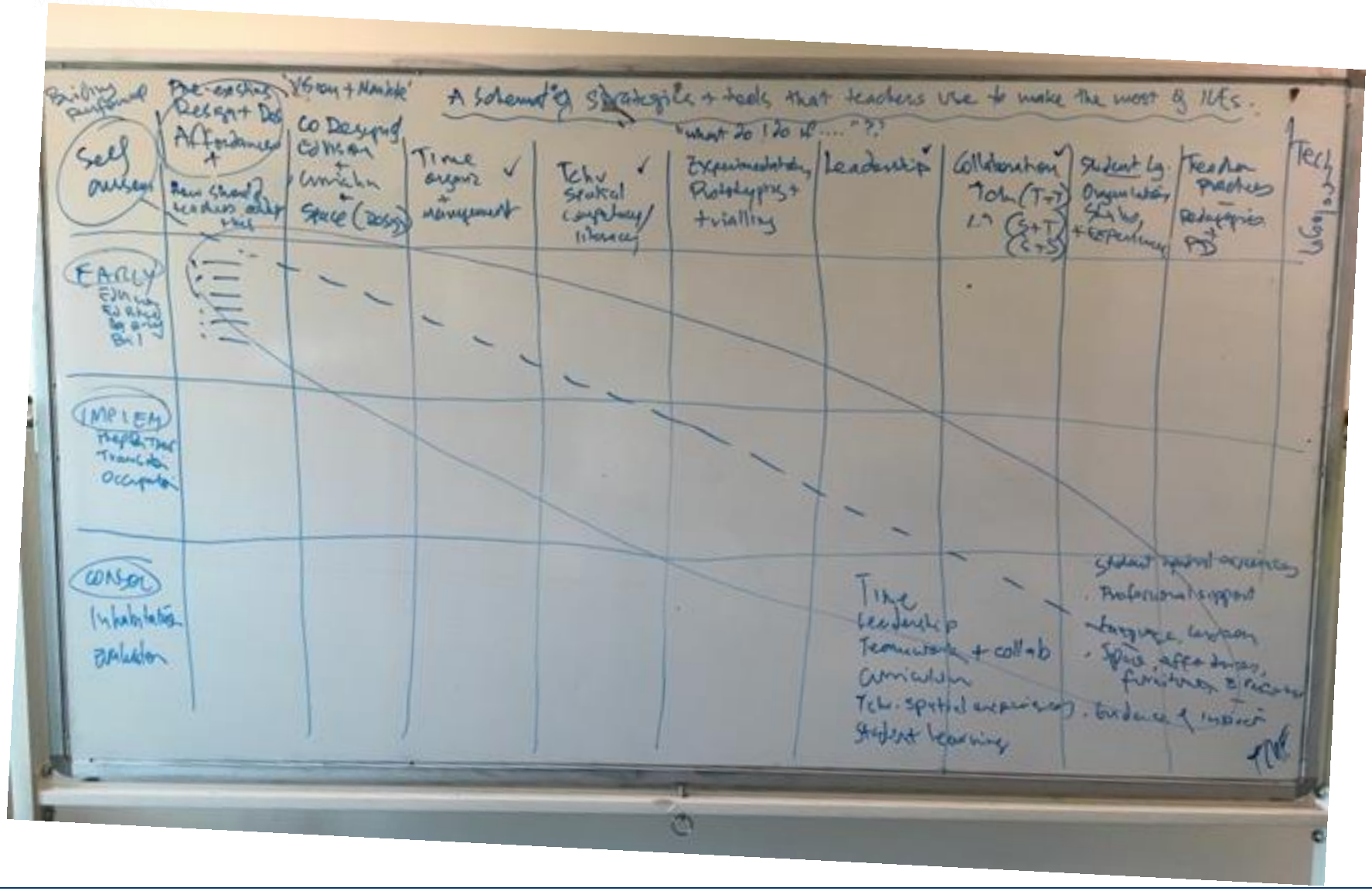
3. Suite of strategies being used

4. These strategies sponsor individual spatial learning skills



5. These skills develop growth in mind frames

Smart spaces?



Smart spaces…

- What *are* they…
- And are they actually ‘smart’?

Summary

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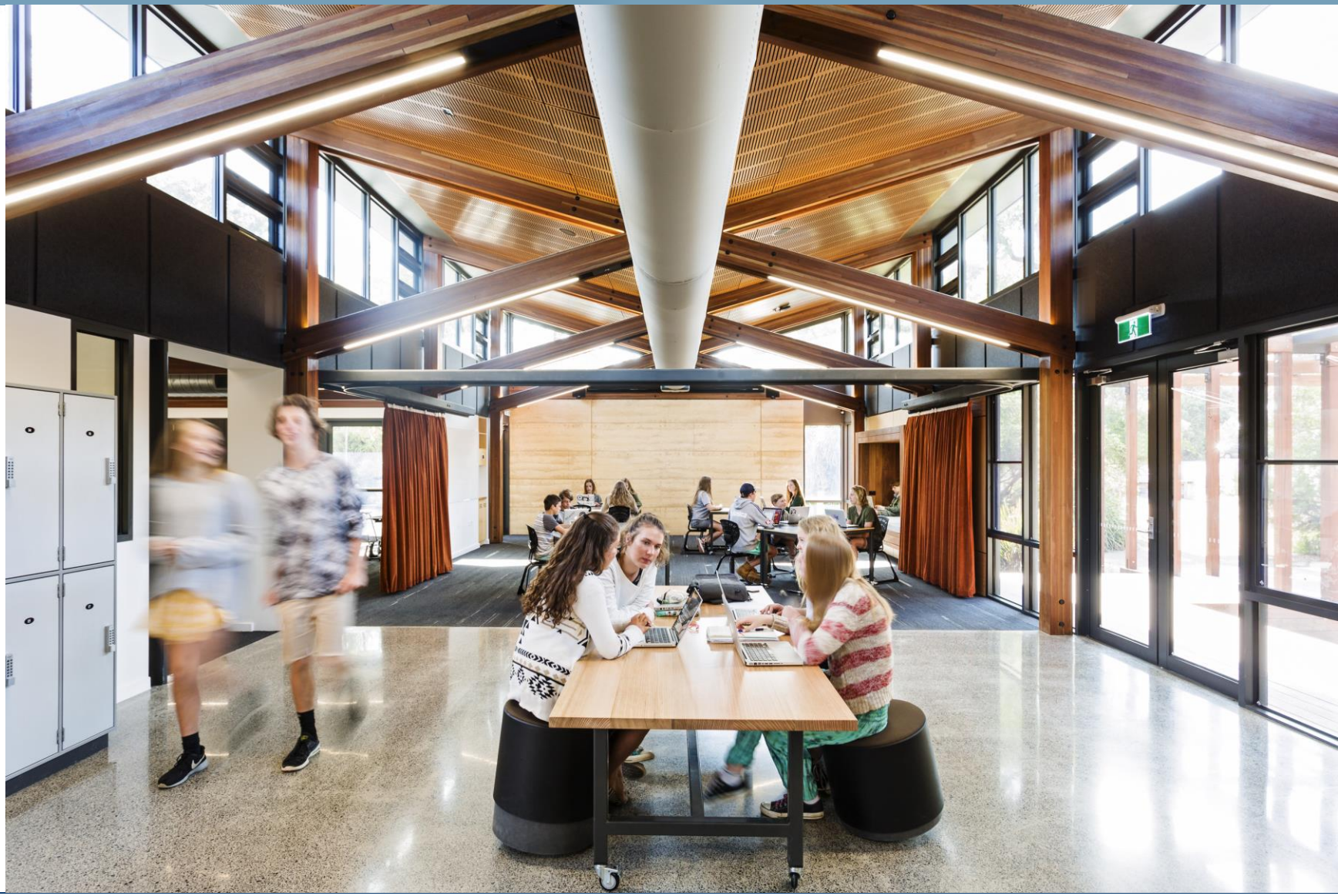
- ILEs; a catalyst or an agent of change?

wesleyi@unimelb.edu.au

https://research.unimelb.edu.au/learnetwork

Smart spaces?



Woodleigh School, Law Architects © Drew Echberg

LEaRN Australian Research Council Linkage Grants

- 2008 – 2010 ***Smart Green Schools*** (Newton, Hes, Wilks, Dovey & Fisher)
- 2010 – 2013 ***Future Proofing Schools*** (Newton, Kvan, Hes, Grose & Fisher)
- 2014 – 2016 ***Evaluating 21st Century Learning Environments*** (Imms, Kvan, Dinham, Fisher & Newton)
- 2016 -2019 ***Innovative Learning Environments and Teacher Change*** (Imms, Hattie, Clarke, Kvan, Fisher, Newton & Cleveland)

Smart spaces?

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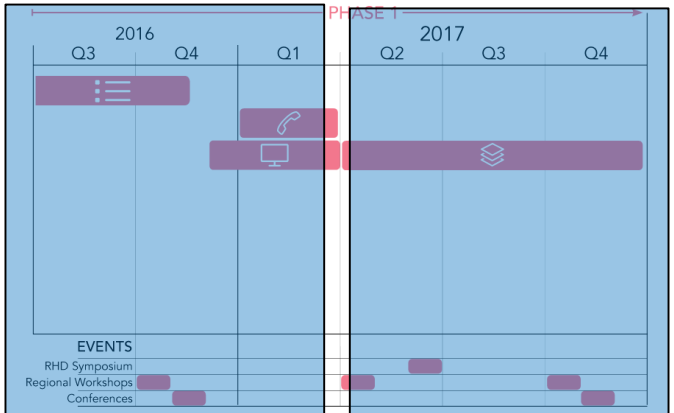
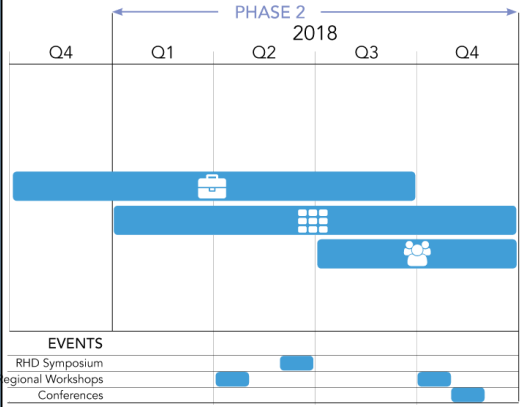
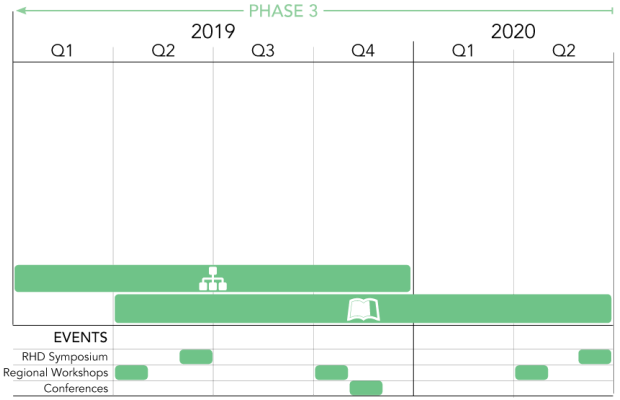
Smart spaces?



1. Defining key concepts
2. Survey 1
3. Regional workshops
4. Systematic Reviews
5. Research symposia
6. 'Think Tanks'

1. Phone survey
2. Case studies





Phase	Year	Key task
1	2016-7	Data collection: Assumption testing & baseline on core variables
2	2018	Development of resources
3	2019-20	Trialing & testing

Smart spaces?

Techincal report 1, 2, 3

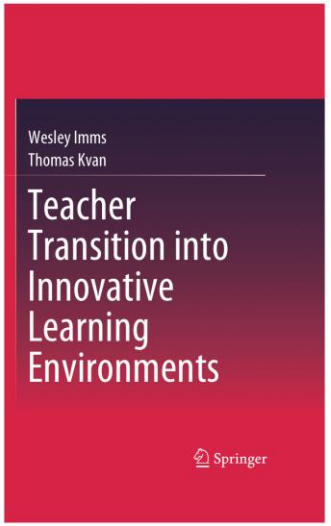
Fact sheets 1, 2, 3, 4, 5, 6

Proceedings 1, 2, 3

Talking spaces 7

Systematic review 1, 2, 3

Technical, Technical, Technical



Smart spaces?

*The **Plans to Pedagogy (P2P)** Project*

A Learning Environments Applied Research Network (University of Melbourne) strategy for assisting schools to use new spaces well.

Context

A need exists in Australian and New Zealand schools for assistance as staff and students transit from traditional to 'innovative' learning environments (ILEs).

This includes:

- Building school capacity to participate effectively in the conceptualisation and design of new builds;
- Developing strategies that help prepare teachers to adapt their pedagogies to maximize the potential of ILEs;