THE UNIVERSITY OF MELBOURNE

Evidence

Wesley Imms

Learning Environments Applied Research Network (LEaRN)

Evidence

"Students are experiencing an explosion in information… Its better to teach them to access and process information, than to get them to commit a small percentage to memory"

"Teachers must be freely accessible to all, not stay at the front of the room…"

"Students learn well, even better, from each other."

"Spaces must allow students to use peers as fellow learners and teachers, and facilitate teachers as resources to help that learning."

Evidence

"Classrooms with flexible furniture and moveable walls are needed to allow freedom of movement, access to resources…"

"Students need individualised learning plans, individualised assessment strategies… spaces that provide the capacity to match a student's knowledge needs to a team of teachers, not just one."

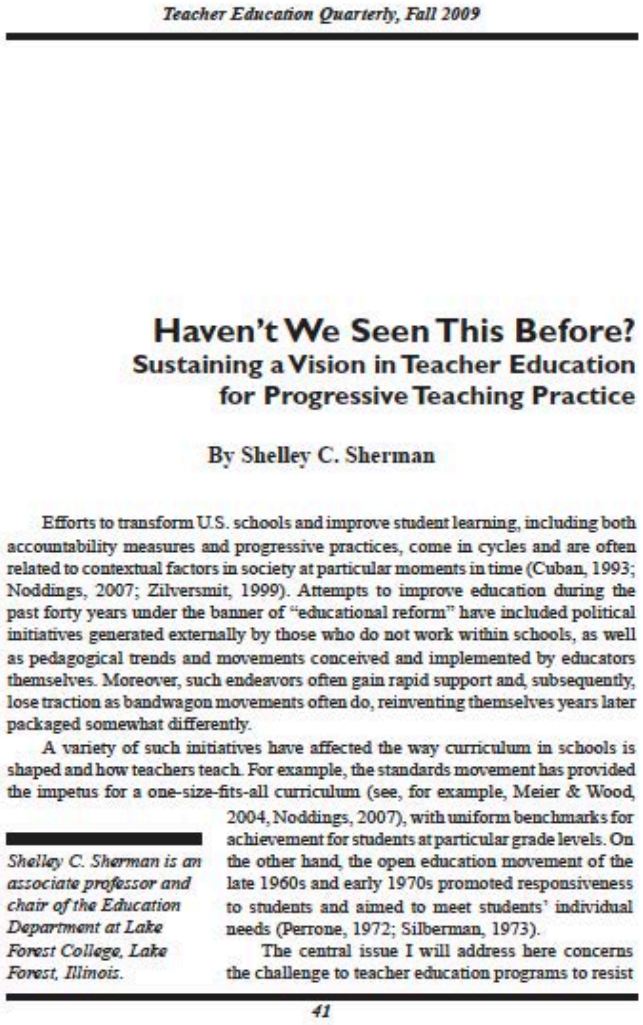
"Spaces must reflect that no two students are the same, learn the same."

“Classrooms with flexible furniture and moveable walls are needed to allow freedom of movement, access to resources…”

“Students need individualised learning plans, individualised assessment strategies… spaces that provide the capacity to match a student’s knowledge needs to a team of teachers, not just one.”

“Spaces must reflect that no two students are the same, learn the same.”

Banyon School, USA, 1975.



Teacher Education Quarterly, Fall 2009

Haven't We Seen This Before?
Sustaining a Vision in Teacher Education for Progressive Teaching Practice

By Shelley C. Sherman

Efforts to transform U.S. schools and improve student learning, including both accountability measures and progressive practices, come in cycles and are often related to contextual factors in society at particular moments in time (Cuban, 1993; Noddings, 2007; Zilversmit, 1999). Attempts to improve education during the past forty years under the banner of "educational reform" have included political initiatives generated externally by those who do not work within schools, as well as pedagogical trends and movements conceived and implemented by educators themselves. Moreover, such endeavors often gain rapid support and, subsequently, lose traction as bandwagon movements often do, reinventing themselves years later packaged somewhat differently.

A variety of such initiatives have affected the way curriculum in schools is shaped and how teachers teach. For example, the standards movement has provided the impetus for a one-size-fits-all curriculum (see, for example, Meier & Wood, 2004, Noddings, 2007), with uniform benchmarks for achievement for students at particular grade levels. On the other hand, the open education movement of the late 1960s and early 1970s promoted responsiveness to students and aimed to meet students' individual needs (Perrone, 1972; Silberman, 1973).

The central issue I will address here concerns the challenge to teacher education programs to resist

Shelley C. Sherman is an associate professor and chair of the Education Department at Lake Forest College, Lake Forest, Illinois.

41

- Popular but poorly conceived or implemented innovations, are rarely sustained.
- Bandwagons and fads.
- The key to effective *sustainable* innovation is evidence of success.

Sherman, S. (2009). Haven't we seen this before? *Teacher Education Quarterly* 36(4), 41-60.

Did they fail?

- Social resistance
- Political resistance
- No evidence supporting open learning successes

FINANCIAL REVIEW

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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

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Power is in flux in educati
idea after the failure of the
Labor's Gonski school fun

The Hattie Edict…

“Open classrooms make little difference to student learning outcomes”. (p. 88)

Unpacking the Hattie Edict…

1. Quality of the data was questionable.
   - Failed to define key concepts.
   - Avoided longitudinal studies.
   - Frequently used inadequate sample sizes (Gray, 1978).
   - Measurement instruments favoured traditional classrooms (Doob, 1974).
   - '…not all studies can be considered [methodologically] equal' (Marshall, 1981, p. 82).

Unpacking the Hattie Edict…

1. Quality of the data was questionable.
2. Age of the data is an issue.
   - All four meta analyses conducted between 1980 and 1982 on studies conducted in the 1970s.
   - "…a finding of 'no effect' in the 1970s cannot be used to plausibly claim a similar trend exists in the 2010s' (Imms, Cleveland & Fisher, 2016, p. 28).

Unpacking the Hattie Edict…

1. Quality of the data was questionable.
2. Age of the data is an issue.
3. Inconsistent stipulative definitions.
   - Open programs versus open classrooms?
   - ‘Open versus traditional’ programs ranged widely in actual practice (McPartland & Epstein, 1978).
   - Many ‘open programs’ frequently were taught in traditional classrooms.

Unpacking the Hattie Edict…

1. Quality of the data was questionable.
2. Age of the data is an issue.
3. Inconsistent stipulative definitions.
4. Omitted all qualitative data.

Factor	Studies	Findings
Student achievement	7	Two significant findings favourable of open programs in primary schools, one statistically insignificant finding. High school studies found one favourable of open programs, two statistically insignificant. Researchers cautioned that the measurement tools favoured students in 'traditional' settings.
Student self-concept	3	One study found students in open programs had higher measures of self-esteem. Two studies produced statistically insignificant findings. Boys' self-esteem was significantly higher in open programs.
Student behaviour	3	Open programs produced higher levels of student academic confidence, greater intellectual independence, better use of time, fewer incidents of disruptive behaviour.
Student attitude	5	Four studies found statistically significant findings on student attitude favourable to open programs, one study the reverse. Boys' attitudes to learning were improved in open programs.
Transition (OP to traditional)	1	Students from a primary school open program found transition to high school easier that traditional program peers.
Teacher opinion and morale	6	Of two high school studies of teacher opinion and morale, one was in favour of open programs, one the opposite. Of primary teachers, one found morale lower in open programs. A study of inexperienced teachers was favourable tom open programs. Teachers in small, informal open program 'teaching teams' were more satisfied than colleagues in large teams. No one personality 'type' suited open program teaching.
Parent and community reaction	4	Three studies were favourable to open programs, one showed no significant result. A 'community and police opinion' study was in favour of open programs.
Administration roles	2	One study found a need to free Principals from administration in order to focus on in-service training and leadership.
School costs	1	Open program schools allowed for increased enrolment capacity, a more diversified program, and increased floor space for instructional use.

From Educational Research Services (1974). *Research on open education.*

The Hattie Edict…

"Open classrooms make little difference to student learning outcomes". (p. 88)

Five most misused words in research…

"There is no evidence that..."

"There's no existing evidence that space impacts student learning...but it must, surely? So lets find that evidence."

(Hattie 2011, personal correspondence).

The Sydney Morning Herald
National

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Andrew Stevenson

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4 Girls from Catholic schools in Sydney most

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.

THE AGE
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Traffic Conditions

Schools hit a wall with open-plan classrooms

November 23, 2015

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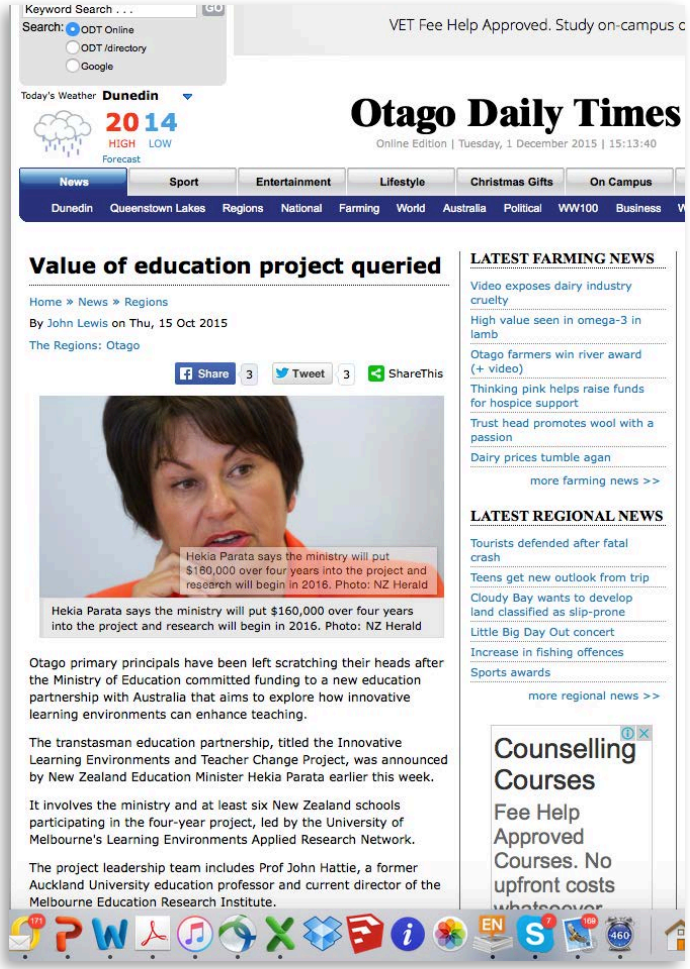
New dividing walls separate classes in open-space rooms at Laverton P-12 College. *Photo: Jason South*

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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Learning Environments Applied Research Network (LEaRN)

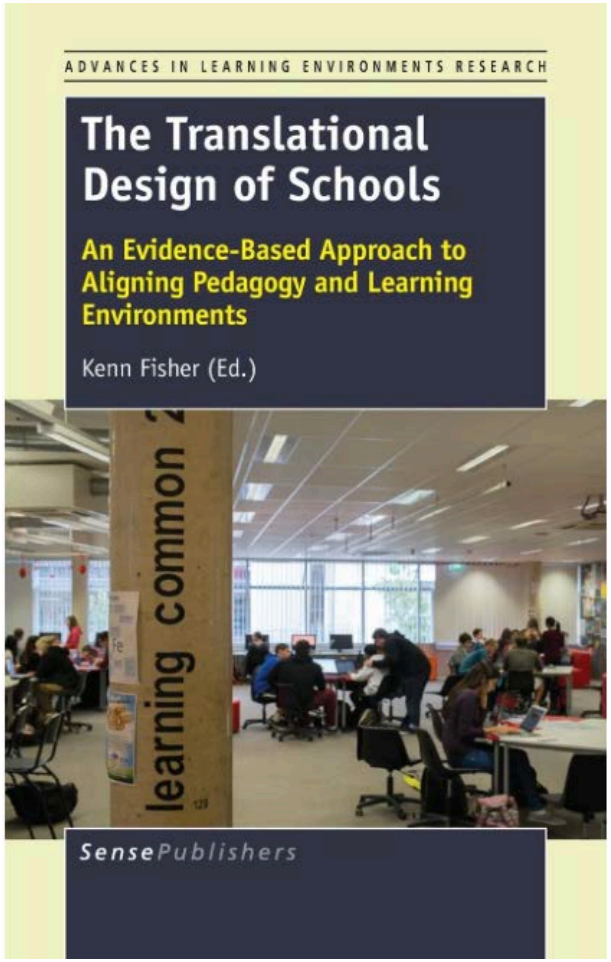
A multi-disciplinary centre for researching the development of effective learning environments across all educational sectors.

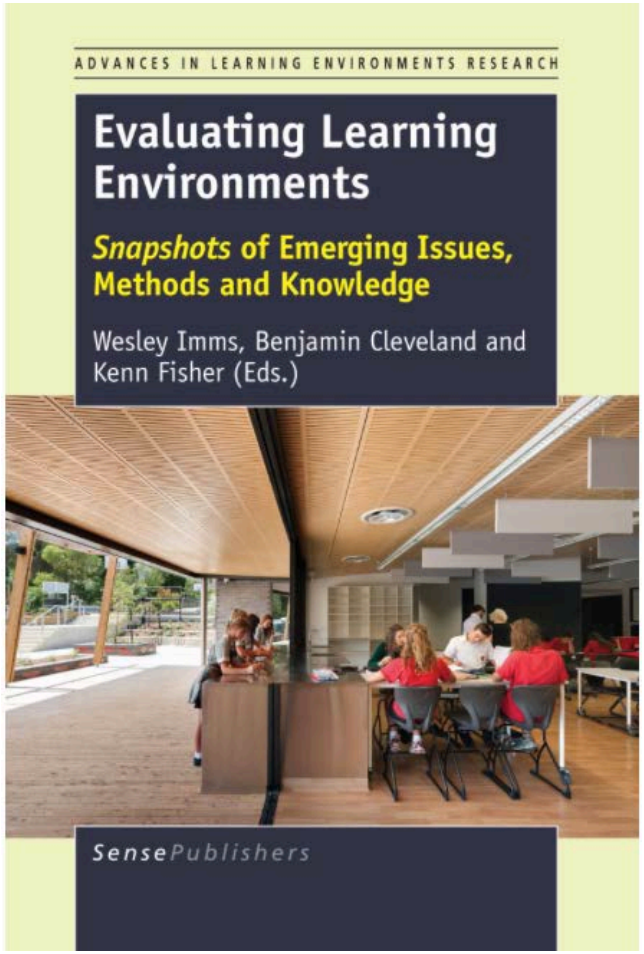
- Faculties of Architecture, Education and Medicine
- Multiple (>30) national and international industry partners
- Vibrant
  - Teaching program (Masters subjects)
  - PhD program (currently >20 theses in progress)
- Consultancies, Research Partnerships, Federal Research Grants (currently >Euro4M)

Australian Research Council Grants (Category 1)

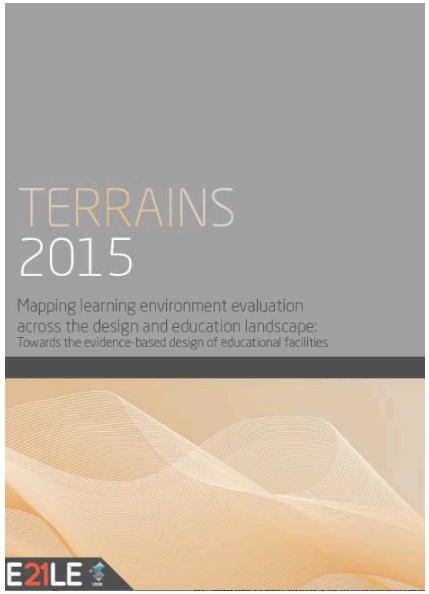
- 2008 – 2010 ***Smart Green Schools*** (Newton, Hes, Wilks, Dovey & Fisher)
- 2010 – 2013 ***Future Proofing Schools*** (Newton, Kvan, Hes, Grose & Fisher)
- 2014 – 2016 ***Evaluating 21st Century Learning Environments*** (Imms, Kvan, Dinham, Fisher & Newton)
- 2016 -2019 ***Innovative Learning Environments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

LEaRN recently released books





LEaRN annual PhD Symposia



Upcoming - *Transitions:*
Melbourne June 3rd & 4th, 2017
Europe (London), September 7th & 8th, 2017
USA (Michigan), 14th & 15th September 2017

Woodleigh School, Sandy Law Architects © Drew Echberg

Woodleigh School, Sandy Law Architects © Drew Eshberg

Caulfield Grammar, Hayball © Diana Snape

What are our problems?

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

E21LE
EVALUATING 21ST CENTURY LEARNING ENVIRONMENTS 2013–2016 ARC Linkage Project

Evaluating 21st Century Learning Environments (Australian Research Council)

- 3 years
- 5 Partner Organisations (Research-oriented schools, industry partners)
- 3 PhDs

E21LE
EVALUATING 21ST CENTURY LEARNING ENVIRONMENTS 2013–2016 ARC Linkage Project

Evaluation issues.

Architect as an 'agent of change'	Educator-relevant POE data	Meeting future curriculum needs	'Alternative' learning environments (Museums, etc.)
Evaluating blended learning environments	'The 'Educational Space Planner' as an evaluator	Systemic models of evaluation (innovative spaces, innovative pedagogies)	'Whole project' & longitudinal evaluations
Measuring impact (Learning outcomes Engagement Use of ICT Pedagogy)	Inclusivity	Leadership and 'change'	Changing pedagogy and learning spaces
Defining and measuring designed affordances	Defining and measuring spatial competencies	Applying big data approaches to learning environment research	ICT, blended learning, and space
Collaborative teaching in ILEs	Personalised learning and space	Building performance and student learning	Subject-specific approaches to utilising space
Affective learning spaces	Identifying factors defining innovative learning and innovative space		

E21LE
EVALUATING 21ST CENTURY LEARNING ENVIRONMENTS
2013—2016 ARC Linkage Project

A profile of future curricular needs

Subject, teacher, date: Design & Technology, Max, May 7th 2013.

School educational philosophy, underpinning future practices (from SSEI Survey)

- **Aim:** Facilitate individual students' potential through developing personal skills and knowledge, independence, capacity for personalised learning, producing skills/capacities that society requires.
- **Strategy:** Creative and technological skills development; developing cognitive capacity (higher order thinking, meta-cognitive skills)
- **Method:** Specialised instruction; flexible curriculum; personalised learning approach; collaborative teaching; collaborative learning.
- **Particular foci:** Active learning; practice-based pedagogies; flexible, creative, non-prescriptive pedagogies.

Logistics	Now	15 Years
How many students do your subject?	About 800 - 850	This number is unsustainable in the current and planned facilities. But increased advances and widespread access to specialist Computer aided IT in our teaching will allow for less centralised instruction, thus less demand on physical learning spaces based around full-sized classes.
Why do students do your subject?	It does not feel like school. Getting success through creating something.	Same as currently, but 'doing' D/T will not look like it does now, spatially. D/T facilities will look more like a Technological library, open spaces, with specialised 'nooks'. The subject will appeal to students who can imagine a solution (and then act on making that solution happen), rather than seek to follow prescribed patterns of working. Discovery learning rather than repetition of previous skills.
What are the career implications for students doing your subject?	Vocational.	D/T students will be those who seek careers where they use imagination to create solutions. The graduate will be one who is a creator/manufacturer, rather than a consumer of existing ideas and practices. He will be working in industries that seek to create something that is not yet imagined, produce, market and reap the rewards of being producers.
What are the social implications of students doing your subject?	At the moment, there is a tendency towards social interactions not always work related. There is in the current set up of the spaces, quite a bit of interaction between boys (and vertically between year groups as well) as boys move from room to room seeking specialised equipment.	In the future, D/T will be more 'cognitive'. With the subject more focused on imagination and idea generation, quieter spaces (the 'library' effect) will be more common, thus less movement and socialisation. But group work/brainstorming will be prevalent. Group master classes, breaking out into homogeneous projects with students from all age groups represented in project teams.

Groupings	Now	15 Years
What natural 'groupings' (teacher) occur as part of using this space?	Teachers tend to work independently due to space restrictions/organisation of equipment. There is collaboration in planning, assessment etc., but little in the way of teaching.	Groups of students will be taught by groups of teachers. Each teacher will teach to their speciality, and not organised around classes of boys, but to a group off students. Teachers will

Textual analysis.

Bernhard Huber Text Analysis of the primary data indicates 'students' (2.9%), 'space' (2.2%), 'design' (1.5%), 'equipment' (1.1%), 'timetable' (1%), and 'specialisation' (1%) to be the six most used terms in the data. The first three logically reflect the focus of this instrument. The latter group draws attention to leading teachers' interest in three key facets of future Hayward-Midson curriculum; equipment (as opposed to materials), timetabling and specialisation of tasks and spaces.

Word	Occurrences	Frequency	Rank
students	50	2.9%	1
spaces	37	2.2%	2
design	25	1.5%	3
equipment	19	1.1%	4
timetable	18	1%	5
specialist	18	1%	5
future	16	0.9%	6
skills	15	0.9%	6
teachers	15	0.9%	6

Table 1: Text frequency analysis (Bernhard Huber)

Lexalytics Salience Sentiment Text Analysis was conducted on primary data specific to leading teachers' beliefs of present and future Hayward-Midson curriculum. Comments relevant to the *present curriculum* provided a +.108 document sentiment. Topics and themes relevant to the present situation are summarised in Table 2.

Themes

	Evidence	Sentiment
commercial arts industries	7	+4.15
restrictive room design	7	-3.33
open studio sessions	7	+0.31
computer game design	7	+2.59
discipline-specific study approach	7	+1.77
specific age groups	7	+1.96
future careers	7	+4.15
creative occupations	7	+4.15
graphic design	7	+4.15
product design	7	+4.15

Topics

	Score
Education	0.62
Art	0.59
Technology	0.55
Software and Internet	0.52
Hardware	0.51

Table 2: Lexalytics salience and sentiment analysis (present curriculum)

© University of Melbourne 2013

Future Curriculum Profile analysis, LEaRN, 2013

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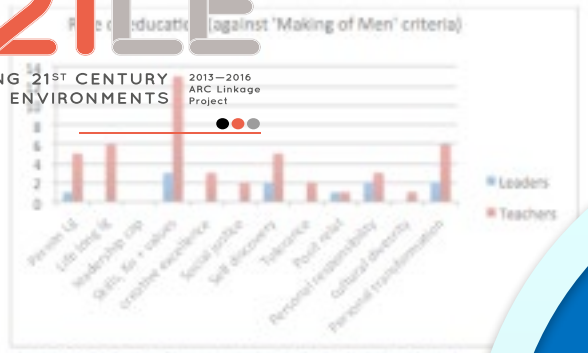
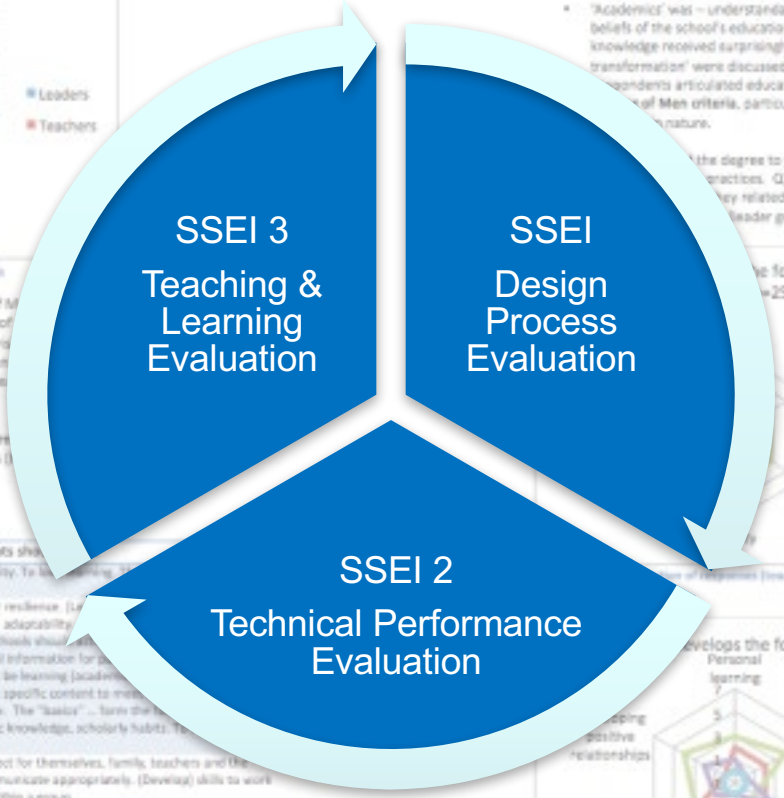
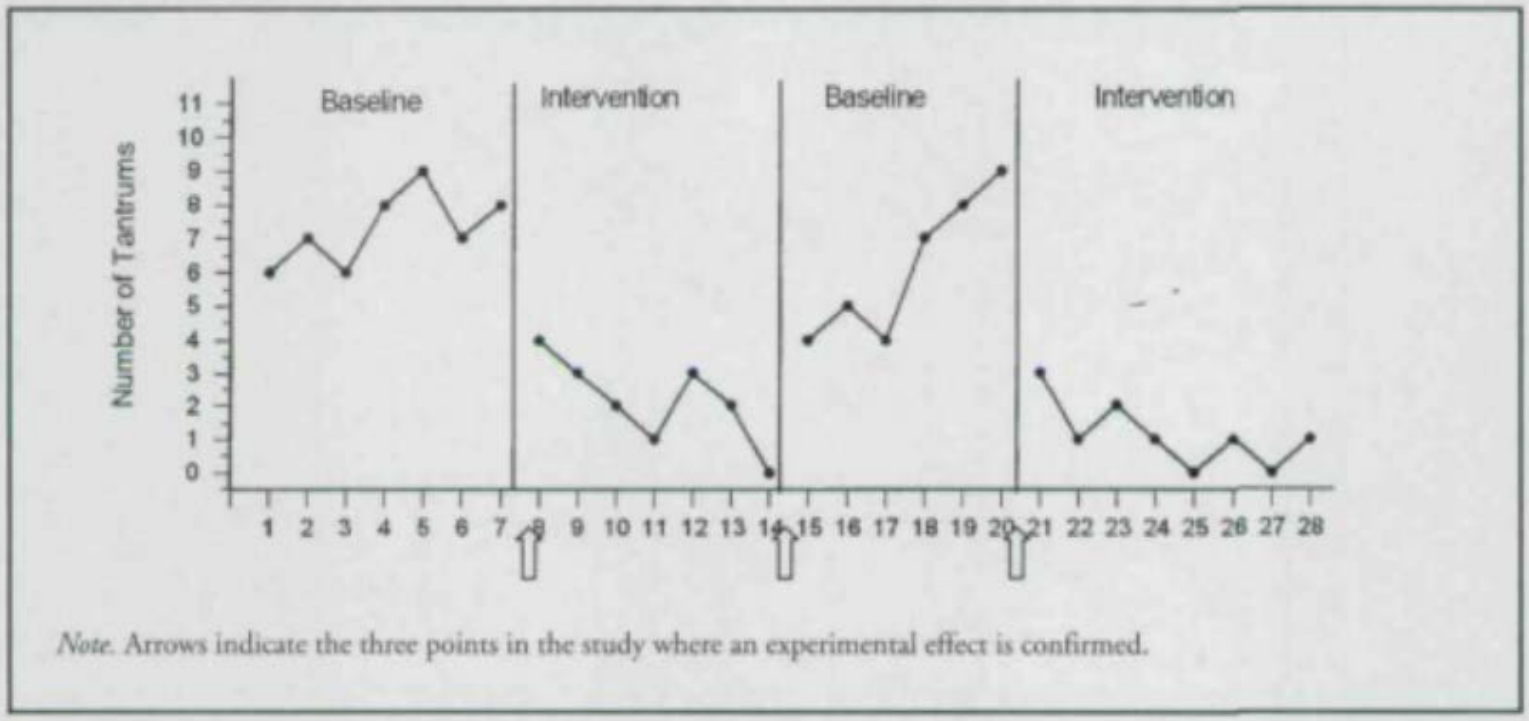




School Spaces Evaluation Instrument (SSEI), LEaRN, 2014

FIGURE 1

Example of a Single-Subject Reversal Design Demonstrating Experimental Control



Note. Arrows indicate the three points in the study where an experimental effect is confirmed.

Single-subject Research Design, Horner, et al. (2005)

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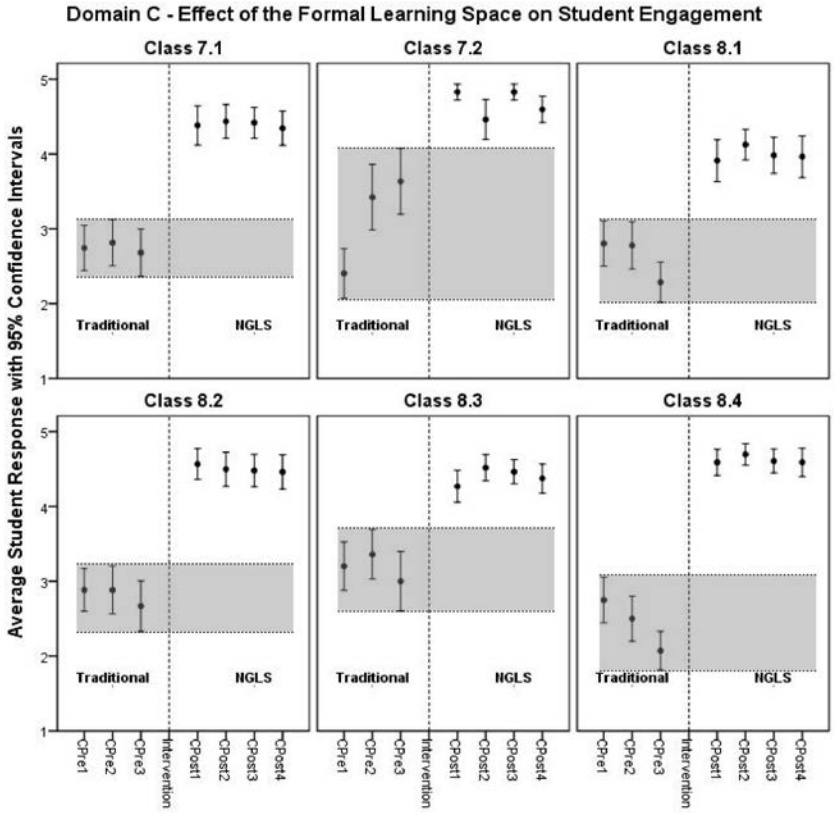
Class means & 95% CI



Cohen's *d* effect size

Student learning experiences

Class	Visual analysis	Cohen's *d* effect size
7.1	Significant	1.50 (very large)
7.2	Non-significant	1.04 (large)
8.1	Significant	1.01 (large)
8.2	Significant	1.31 (very large)
8.3	Significant	1.35 (very large)
8.4	Significant	2.01 (very large)

Date	Teacher	Observer	School	Subject	Year	Observation No

TECHNOLOGIES	TEACHER	STUDENTS	Teach total	Student total
Pen and Paper	Teacher ☐	Student ☐	0:00:00	0:00:00
Tablet	Teacher ☐	Student ☐	0:00:00	0:00:00
Diagnostic Testing Tool	Teacher ☐	Student ☐	0:00:00	0:00:00
Hands-on/Virtual	Teacher ☐	Student ☐	0:00:00	0:00:00
TOW	Teacher ☐	Student ☐	0:00:00	0:00:00
Front Data Projector	Teacher ☐	Student ☐	0:00:00	0:00:00
Whiteboard on Walls	Teacher ☐	Student ☐	0:00:00	0:00:00
Mode 1 - Teacher-ctr	Teacher ☐	Student ☐	0:00:00	0:00:00
Mode 2 - Student-ctr	Teacher ☐	Student ☐	0:00:00	0:00:00
Mode 3 - Informal	Teacher ☐	Student ☐	0:00:00	0:00:00
Outside Classroom	Teacher ☐	Student ☐	0:00:00	0:00:00
OneNote	Teacher ☐	Student ☐	0:00:00	0:00:00
DyKnow	Teacher ☐	Student ☐	0:00:00	0:00:00
Word	Teacher ☐	Student ☐	0:00:00	0:00:00
PowerPoint	Teacher ☐	Student ☐	0:00:00	0:00:00
Excel	Teacher ☐	Student ☐	0:00:00	0:00:00
Camera or image capture	Teacher ☐	Student ☐	0:00:00	0:00:00
Multimedia	Teacher ☐	Student ☐	0:00:00	0:00:00
CAD/Design	Teacher ☐	Student ☐	0:00:00	0:00:00
Email	Teacher ☐	Student ☐	0:00:00	0:00:00
Internet	Teacher ☐	Student ☐	0:00:00	0:00:00
LMS	Teacher ☐	Student ☐	0:00:00	0:00:00

Total		
0:00:00	START/STOP OBSERVATION	☐

Totals	TEACHING	
0:00:00	Direct instruction	☐
0:00:00	Interactive Instruction	☐
0:00:00	Facilitating	☐
0:00:00	Providing Feedback	☐
0:00:00	Class Discussion	☐
0:00:00	Questioning	☐

Totals	ARRANGEMENT	
0:00:00	Individual	☐
0:00:00	Small groups (same no.)	☐
0:00:00	Whole class	☐
0:00:00	Mixed groups (diff no.)	☐
0:00:00	Mixed class/year-levels	☐

Totals	LEARNING ACTIVITY	
0:00:00	Receive Instruction	☐
0:00:00	Concieve-Research	☐
0:00:00	Design	☐
0:00:00	Create	☐
0:00:00	Appraise	☐
0:00:00	Refine	☐
0:00:00	Writing Notes	☐
0:00:00	Testing	☐
0:00:00	Drill & Practice or Repitition	☐
0:00:00	Hands-on/Practical Activity	☐
0:00:00	Students Disengaged (>25% students off-task)	☐

Instructions

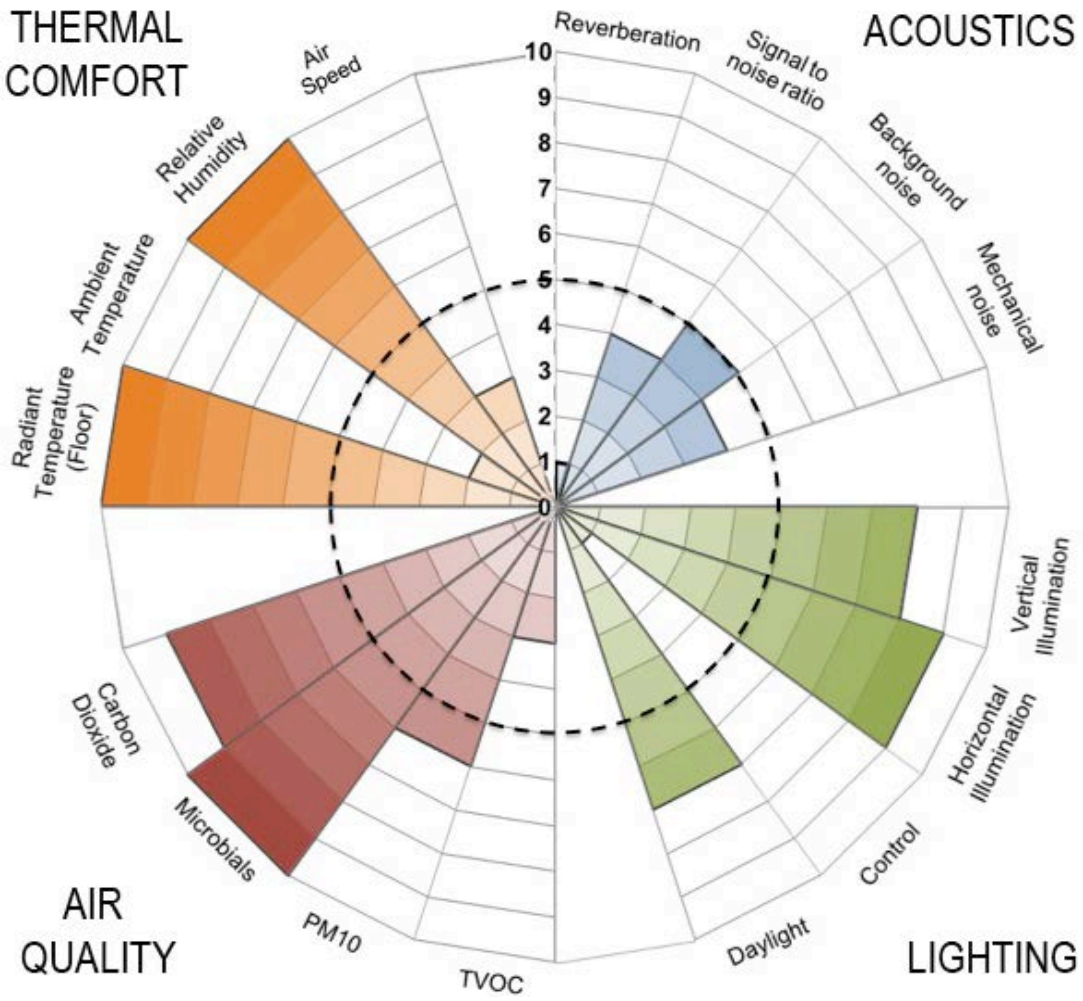
Step 1: Check box to Start
Step 2: Click Date enter descriptors
Step 3: Uncheck all activity boxes to save times
Step 4: Check box to finish
Step 5: Click to Save

Save Data

Step 6: Click to clear all data

Clear All Data

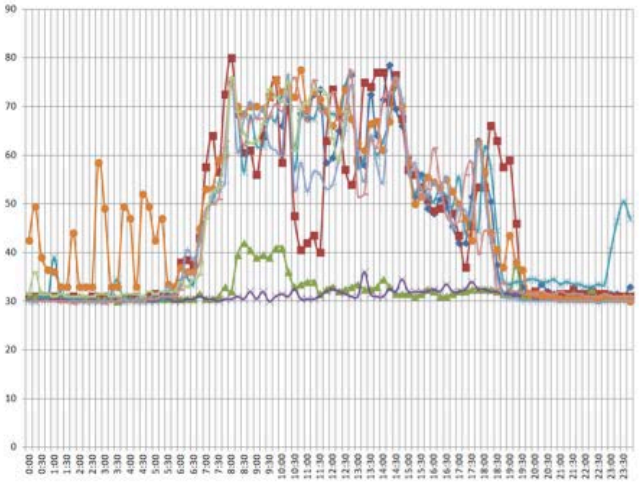
Observation metric, Byers, 2015



EduTool:IEQ (Soccio), 2015.

Noise level descriptors

Each 'dot' represents the L_{eq} over a 15 minute period.

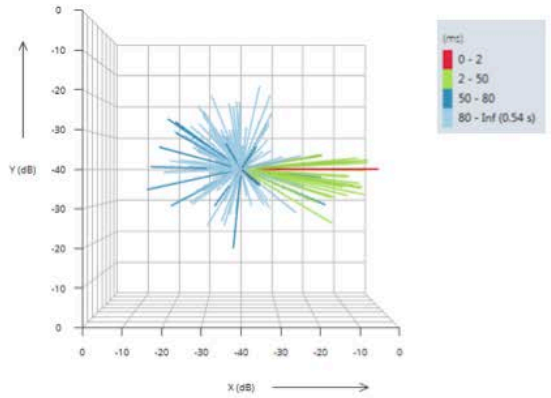


The L_{eq} is defined as where the graph area is the same above the line as below the line, and is often referred to as the Average.

L_{A90}	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period. [in the context of a school, this could be a loud squeal near the microphone, or someone dropping something – it is unlikely to be teacher voice]
$L_{Aeq\ (t)}$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the "average" noise level.
	The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
	Sound varies over time. The L_{eq} is effectively defined as a notional steady sound level, which over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (in our case 15 mins).

Table 5: Learning 4 Receiver 3

Acoustic test results summary		Receiver 3 (Shared area 2 approx 9m from source)					
T_{mf}, s	1.1s						
L_{A90}, dB (unoccupied)	25dB						
	Octave Band Centre Frequency (Hz)						
Parameter	63	125	250	500	1k	2k	4k
G %							
T20 [s]:	1.1	0.7	0.4	0.8	0.5	0.5	0.4
T30 [s]:	0.9	0.9	1.0	1.1	1.1	0.9	0.6
C50 [dB]:	-	0.9	1.1	1.2	1.1	1.0	0.7
D50 [-]:	0.0	5.1	8.2	4.9	6.3	6.8	7.7



SPECIAL PROJECTS 2

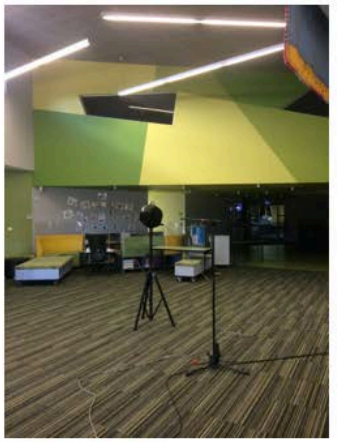


Figure 5: Special Resources 2

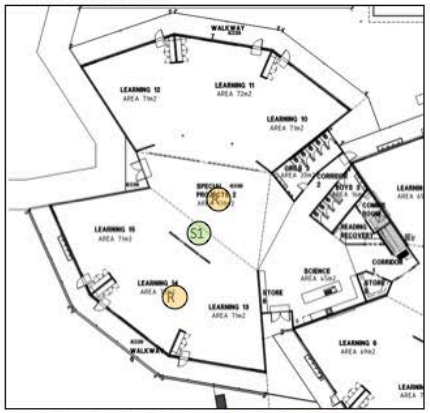


Figure 6: Floor plan showing source and receiver locations

		Meeting the *needs* of those who wish...			
		To describe	To classify	To identify causality	To determine value
	(Aim) (Through)				
The *purpose* of evaluation research is...	To improve — Formative analysis (judgment)				
	To audit — Summative analysis (appraisal)				
	To generate theory — Predictive analysis (analysis)				

Matrix of Learning Environment Evaluations, Imms 2014 (after Mark, Henry and Julnes, 1999)

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

https://youtu.be/inzssGYi6MM

Innovative Learning Environments and Teacher Change (Australian Research Council)

- 4 years
- Australia and New Zealand
- 15 Partner Organisations (State Education Departments, research-oriented schools, industry partners)
- 6 PhDs, 3 Research Fellows
- Sample pool of 6100 schools

INNOVATIVE LEARNING ENVIRONMENTS AND TEACHER CHANGE
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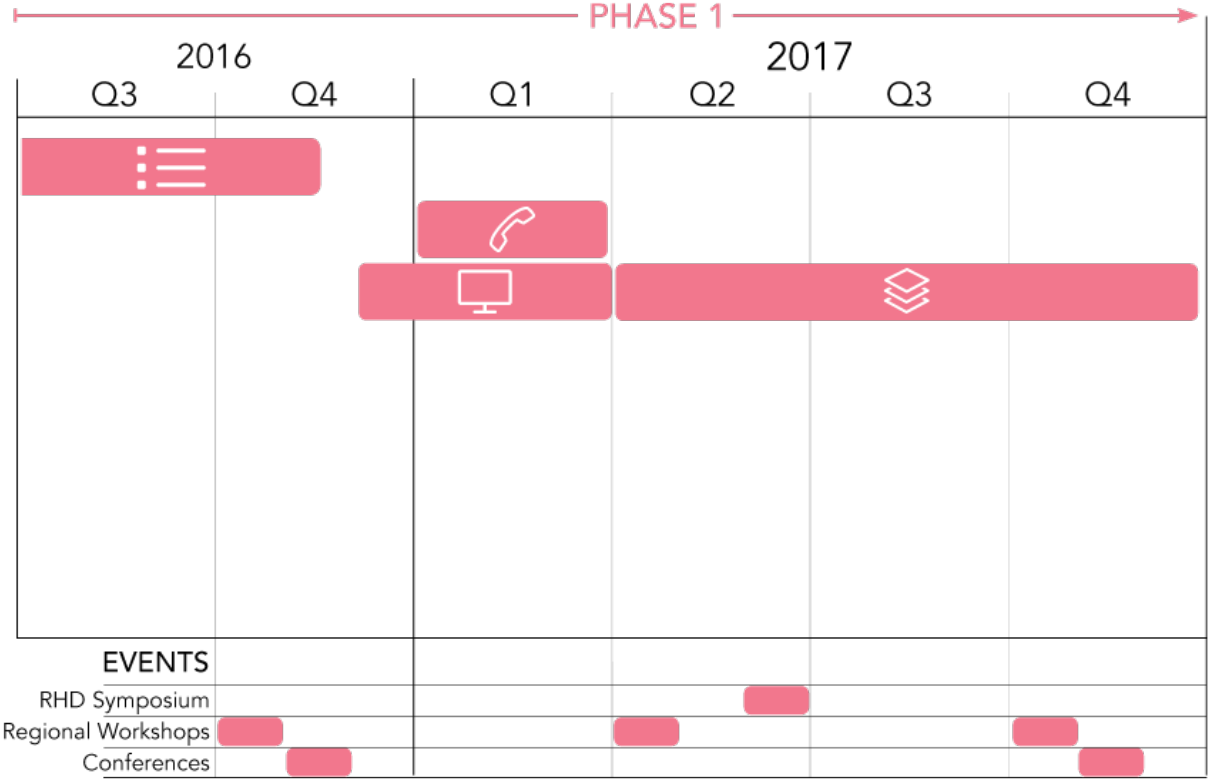
Phase 1

Are teachers using ILEs? What is being done well, what needs addressing?



- Assumption testing
- Baseline data on core variables
- Measurement tool development and trial

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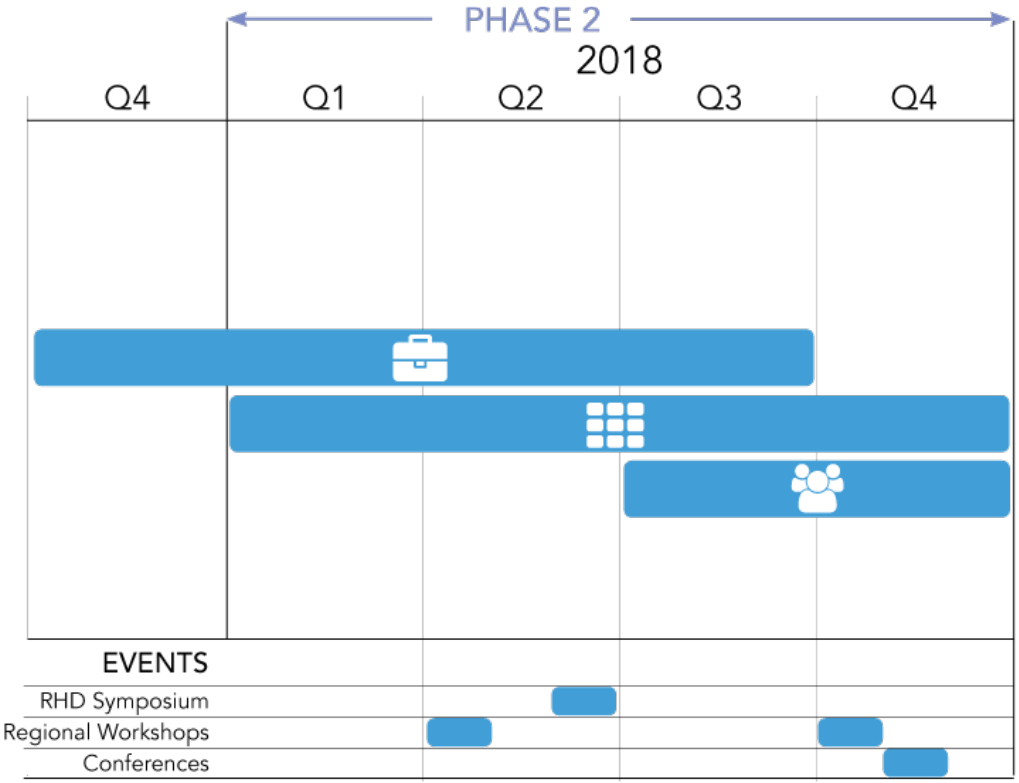
Phase 2

What strategies are needed? Are they 'workable'?



- Development of strategies to assist teachers utilise ILEs
- Trial of strategies

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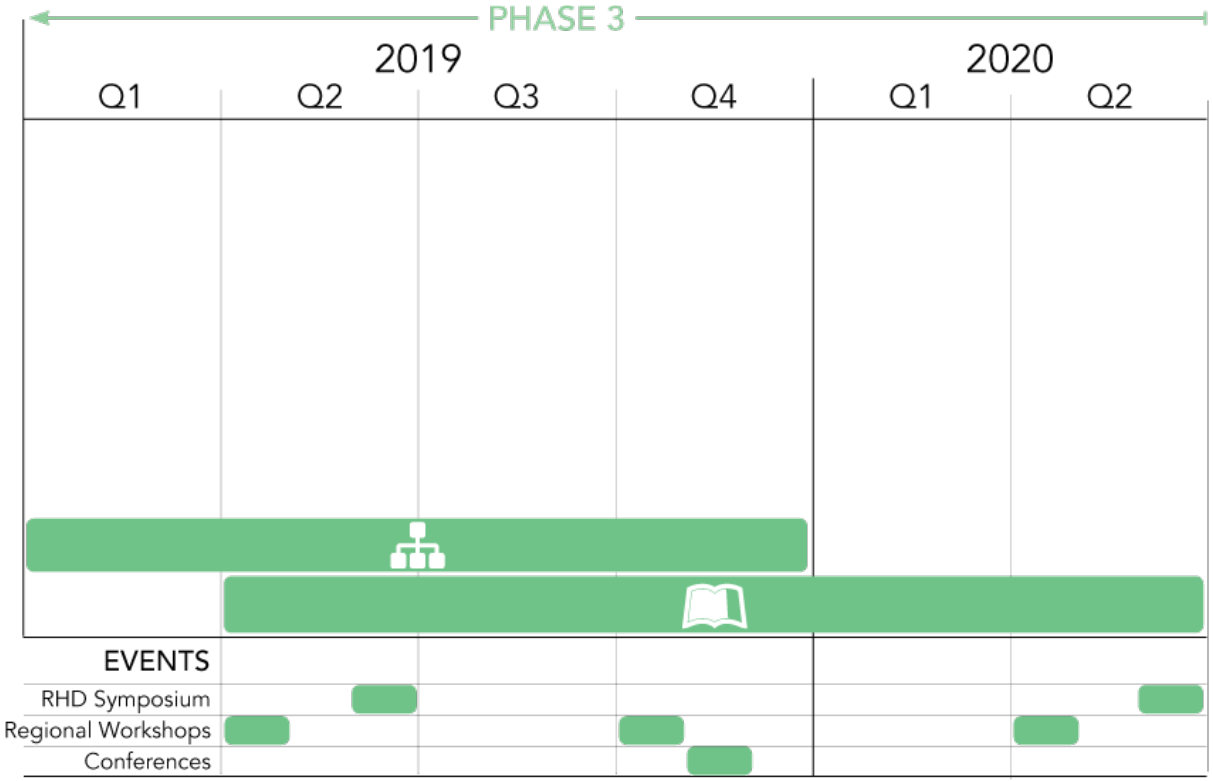
Phase 3

Do these strategies work? Is student deep learning improved?

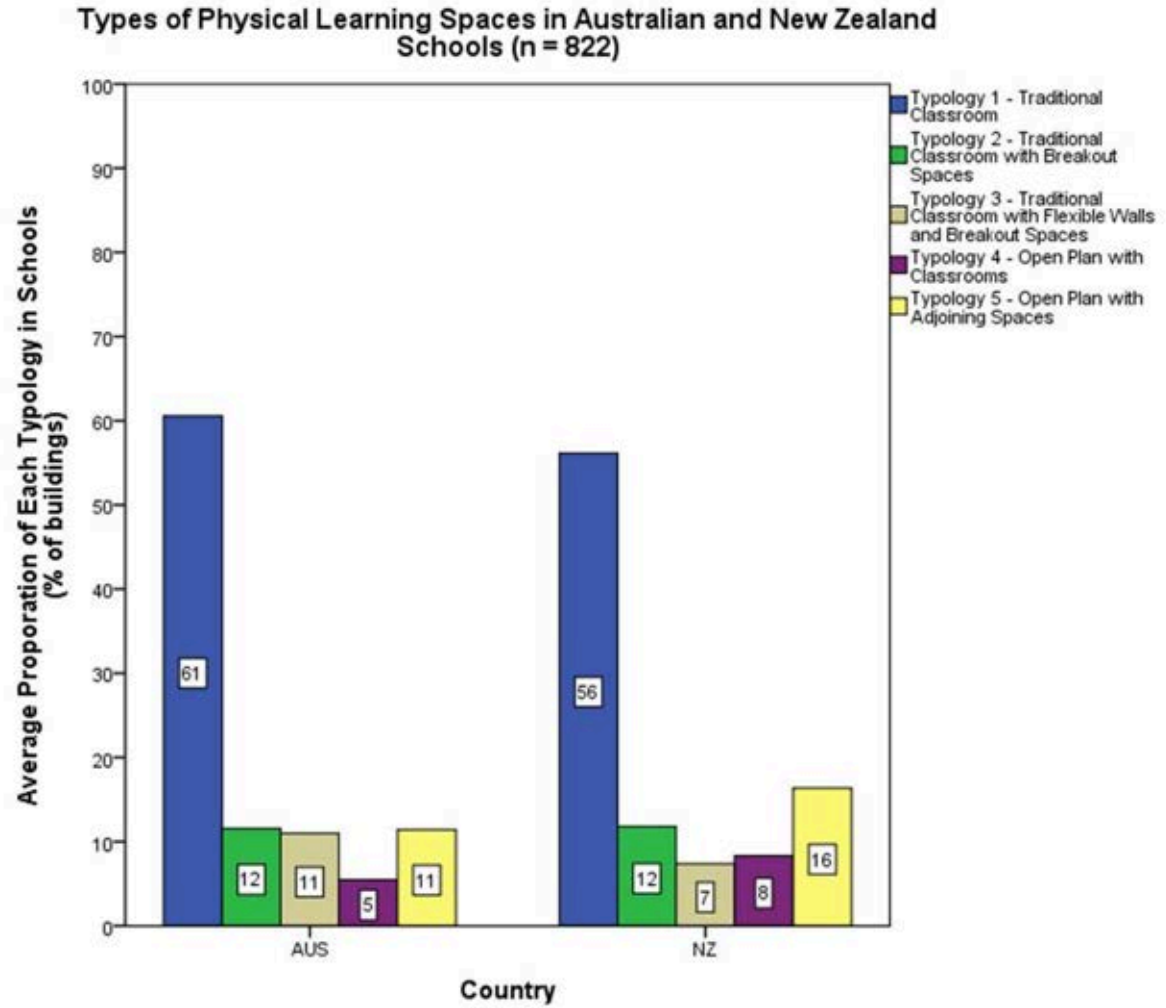


- Quasi-experimental testing of strategies across 1000 schools

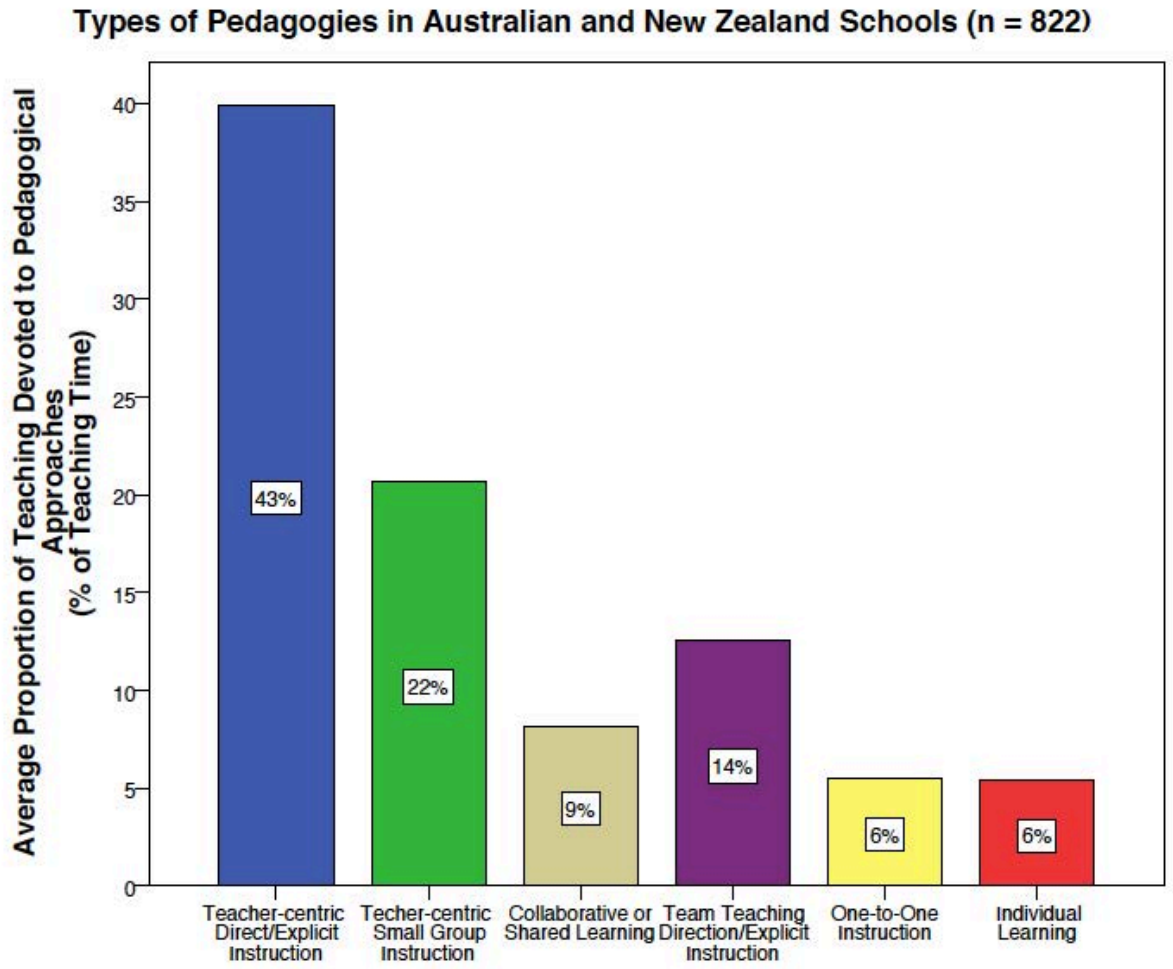
ILETC Stage 1, Phase 1 Survey

- Three clusters of questions;
  - What types of ILEs and what % of the total school infrastructure?
  - Principal perceptions of the type of teaching that is happening in most predominant classroom type?
  - Principal perceptions of degree of student ‘deep learning’ happening in most predominant classroom type?
- 14% response rate (822 schools)*

ILETC Stage 1, Phase 1 Survey



ILETC Stage 1, Phase 1 Survey



Summary

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Summary

- In Australia and New Zealand, school design is arguably outstripping teachers' capacity to use them well.
- Teachers are resisting change – mind frames.
- In this field there is a history of poor collection and use of evidence.
- The critical focus must be gathering and using evidence to assist teachers align pedagogies with innovative learning space design.

THE UNIVERSITY OF MELBOURNE

Evidence

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E21LE EVALUATING 21ST CENTURY LEARNING ENVIRONMENTS 2013–2016 ARC Linkage Project

www.e21le.com

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