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Empowering students through learning environment design.

Are our spaces smart enough?

Associate Professor Wesley Imms

Learning Environments Applied Research Network (LEaRN)

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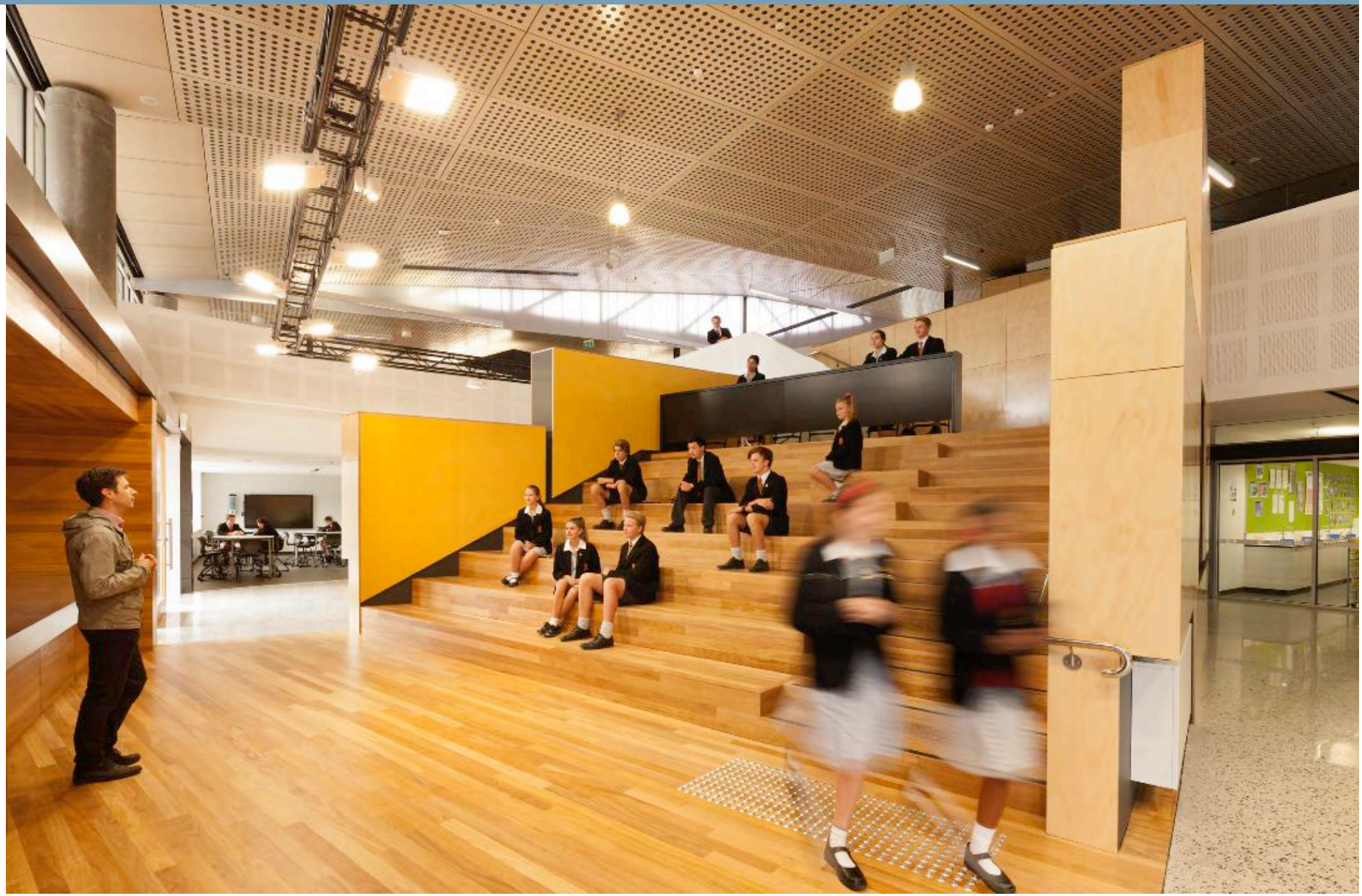

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The evidence: what do we know?

Empowerment?

- Student social and emotional well-being
- Student engagement (social, emotional, cognitive)
- Students' learning outcomes
- Student inclusivity, equity
- Students' 'future skills' development

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The evidence: what do we know?

"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."

The evidence: what do we know?

"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."

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Banyon School, USA, 1975.

Did they fail?

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

FINANCIAL REVIEW

search the AFR

NEWS ▾ BUSINESS ▾ MARKETS ▾ STREET TALK REAL ESTATE ▾ OPINION ▾ TECHNOLOGY ▾ PERSONAL FINANCE ▾ LEADERSHIP ▾ LIFESTYLE ▾

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

The evidence: what do we know?

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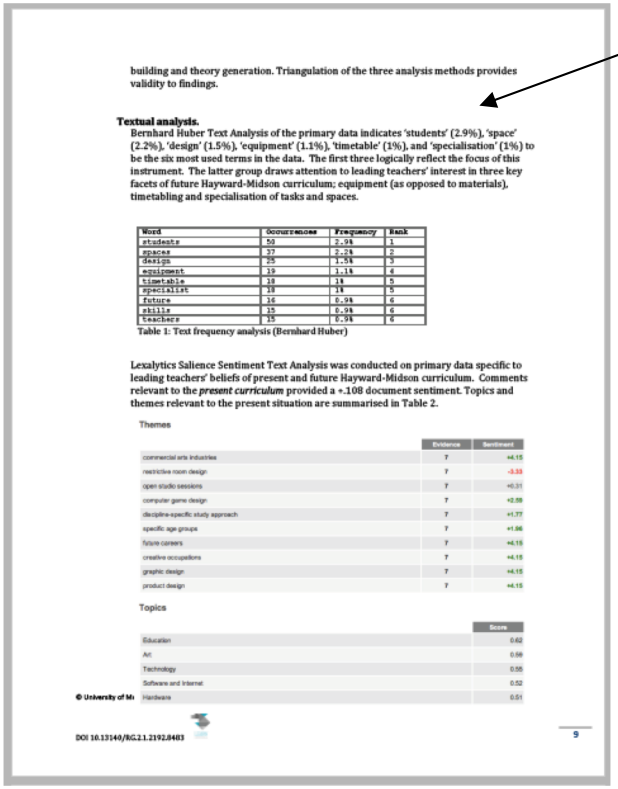
Research report…

Statement of outcomes



building and theory generation. Triangulation of the three analysis methods provides validity to findings.

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

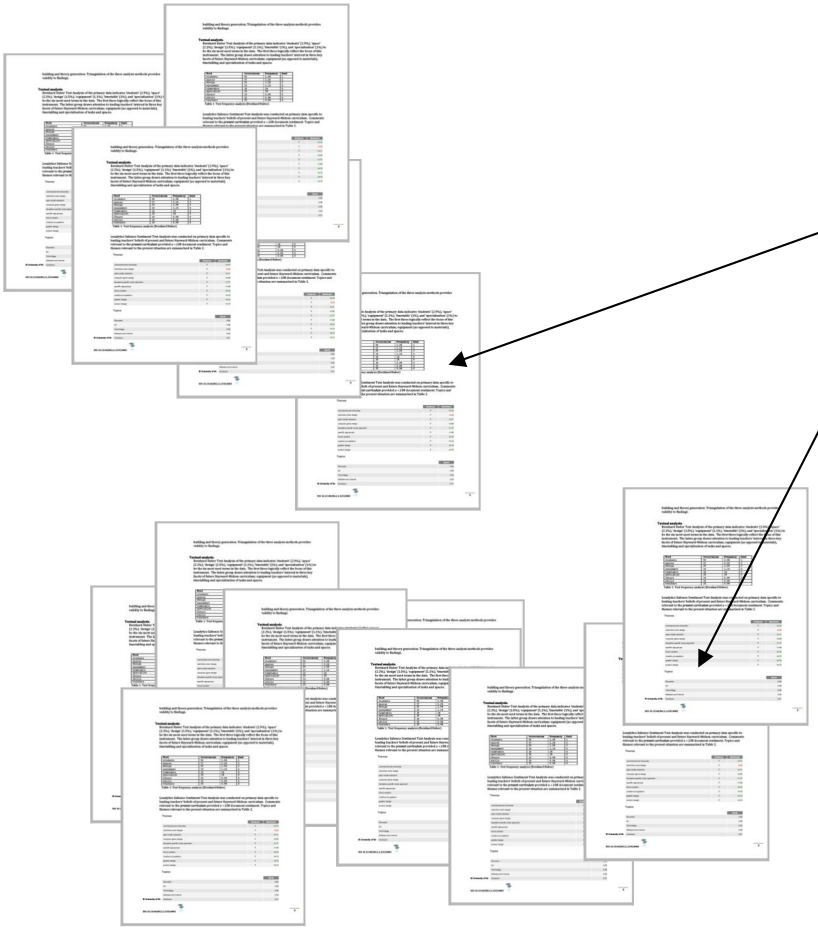
	Evidence	Sentiment
commercial arts industries	7	+4.15
restrictive room design	7	-3.33
open studio sessions	7	+0.31
computer game design	7	+2.58
discipline-specific study approach	7	+1.77
specific age groups	7	+1.96
future careers	7	+4.15
creative occupations	7	+4.15
graphic design	7	+4.15
product design	7	+4.15

Topics

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

DOI 10.13140/RG.2.1.2192.8483

Research reports…

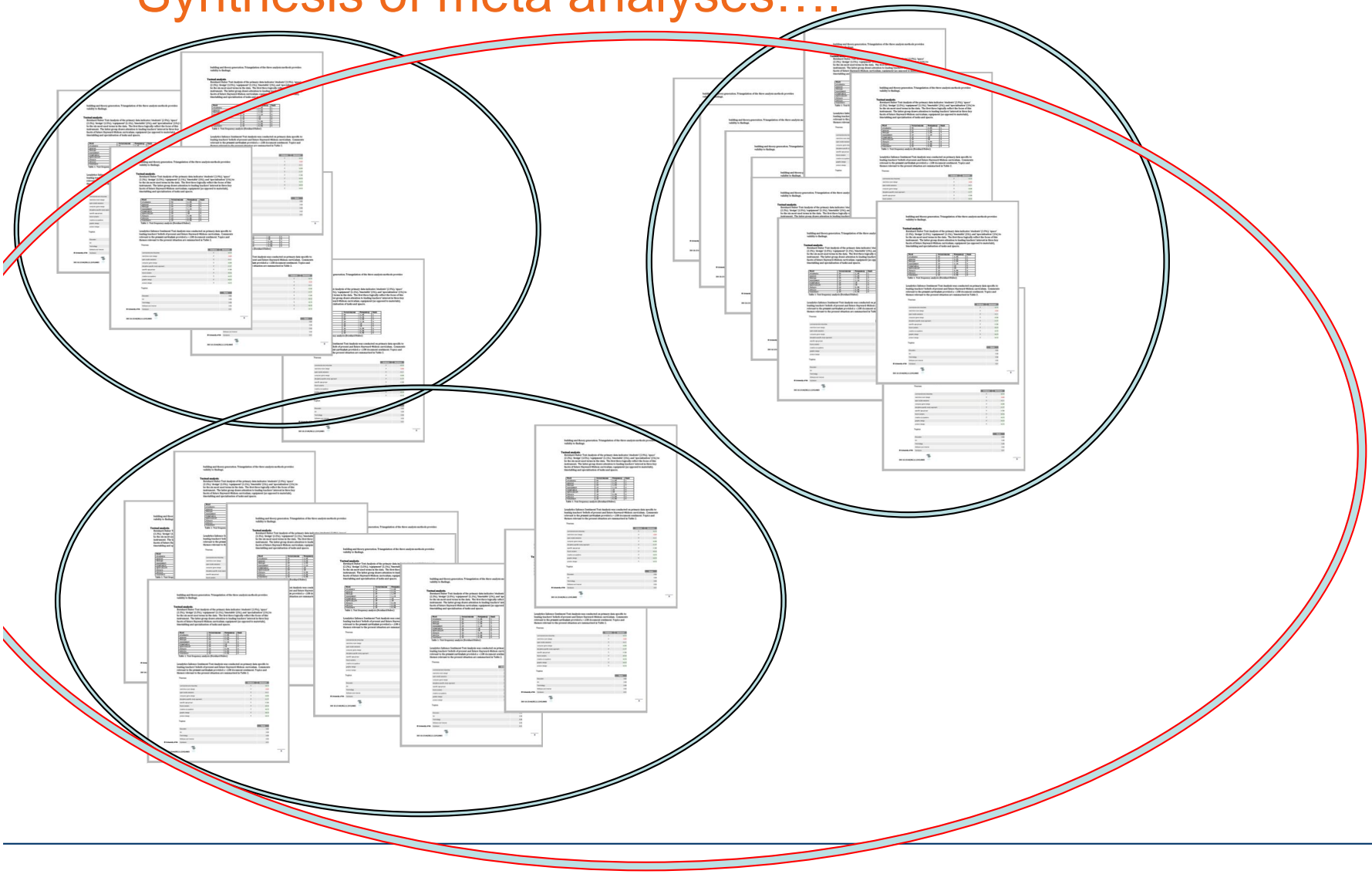


Multiple reports on research across similar topics

The evidence: what do we know?

Meta analyses….

Synthesis of meta analyses….



Hierarchy of what has most impact on student learning

1. *The teacher (collective efficacy)*
2. *Self-reported grades*
3. *Teachers' estimates of achievement*
4. *Cognitive task analysis*

Etc.

Etc.

Etc.

230. *Inquiry learning*

Effect size
d .0+ = negligible
d 1.0 = large

d <0.4 = hinge point – 'just turning up'

Aim is for 'growth'. What variables assist *d* >0.4 outcomes?

Hattie's Mind Frames

(Teaching characteristics common within high-effect outcomes)

1. I am an evaluator
2. I am an agent of change
3. I think of learning, not teaching
4. Assessment is about judging my impact
5. I engage in dialogue, not monologue
6. I do not retreat from doing my best
7. I build positive relationships
8. I teach the language of learning
9. I accept that learning is hard work
10. I collaborate

Hattie, J. (2017) Ten mindframes for visible learning. Routledge..

Hierarchy of what has most impact on student learning

Hierarchy of what has most impact on student learning

← Open versus traditional learning programs (≅ 220, *d=0.1)*

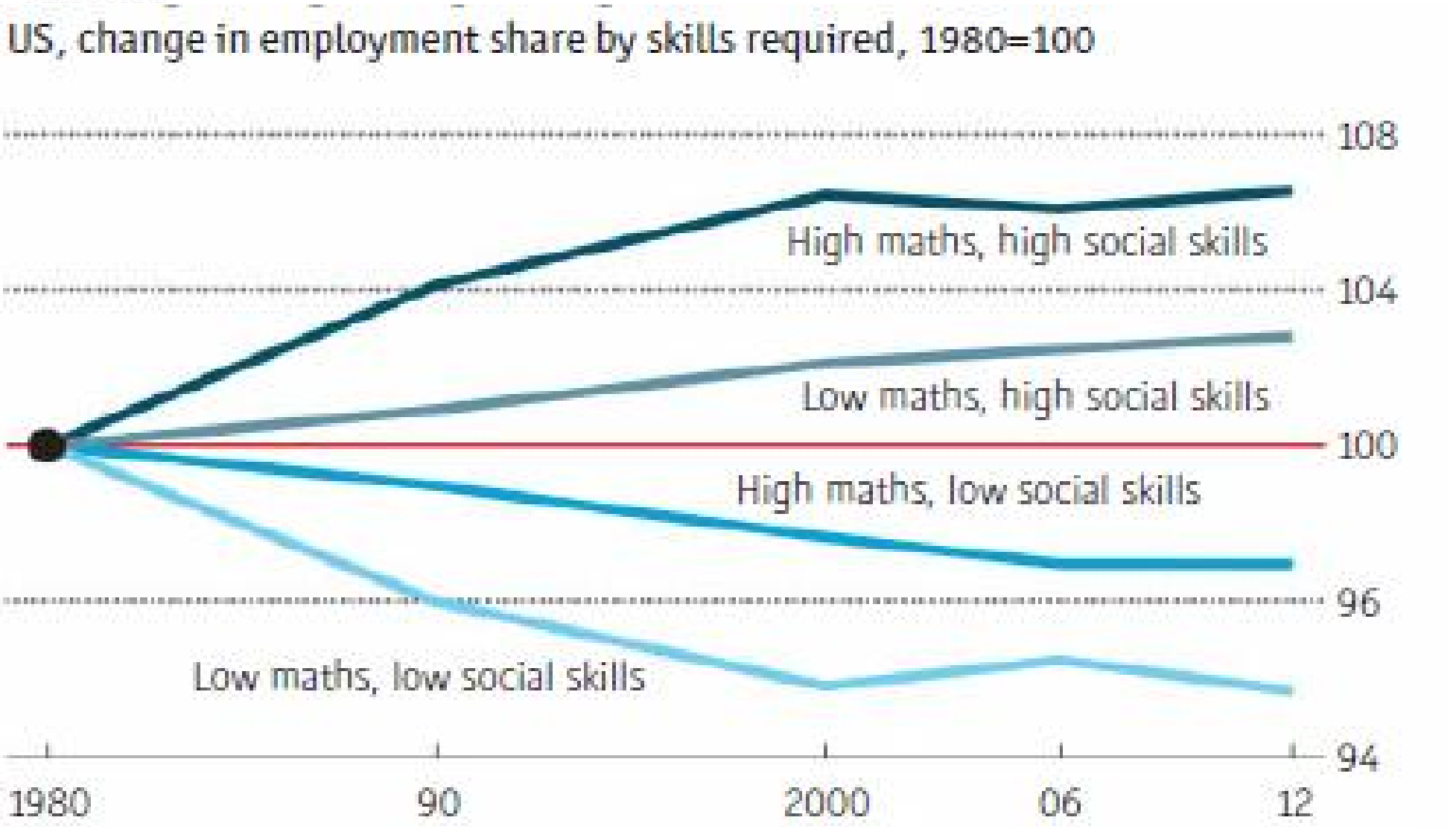
Hierarchy of what has most impact on student learning

- Chess instruction (≅140)
- Using Powerpoint (≅ 175)
- Summer Schools (≅ 180)
- Breastfeeding (≅ 210)
- Open versus traditional learning programs (≅ 220, *d=0.1)*

The Hattie Edict…

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

The evidence: what do we know?

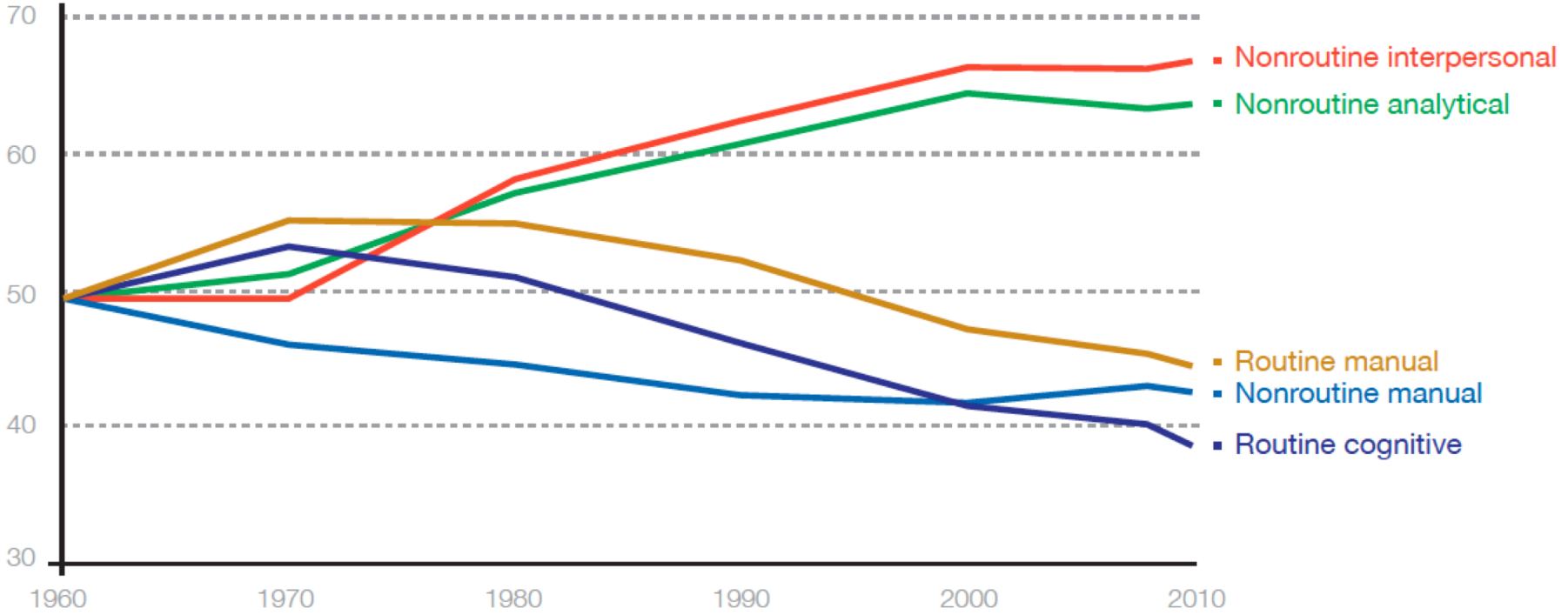


Source: Deming, D. (2016). *Growing importance of social skills in the labour market.*

The evidence: what do we know?

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*.

Student empowerment (+ learning environments)

- Creative thinking
- Critical thinking
- Communication skills
- Collaborative skills

The evidence: what do we know?

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.

The evidence: what do we know?

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Innovative Learning Environments and Teacher Change

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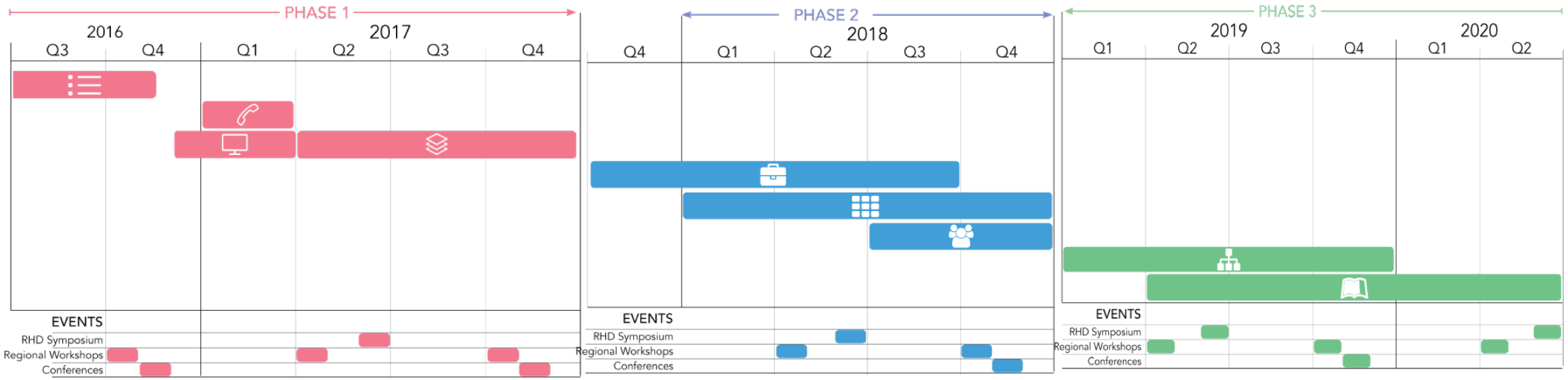

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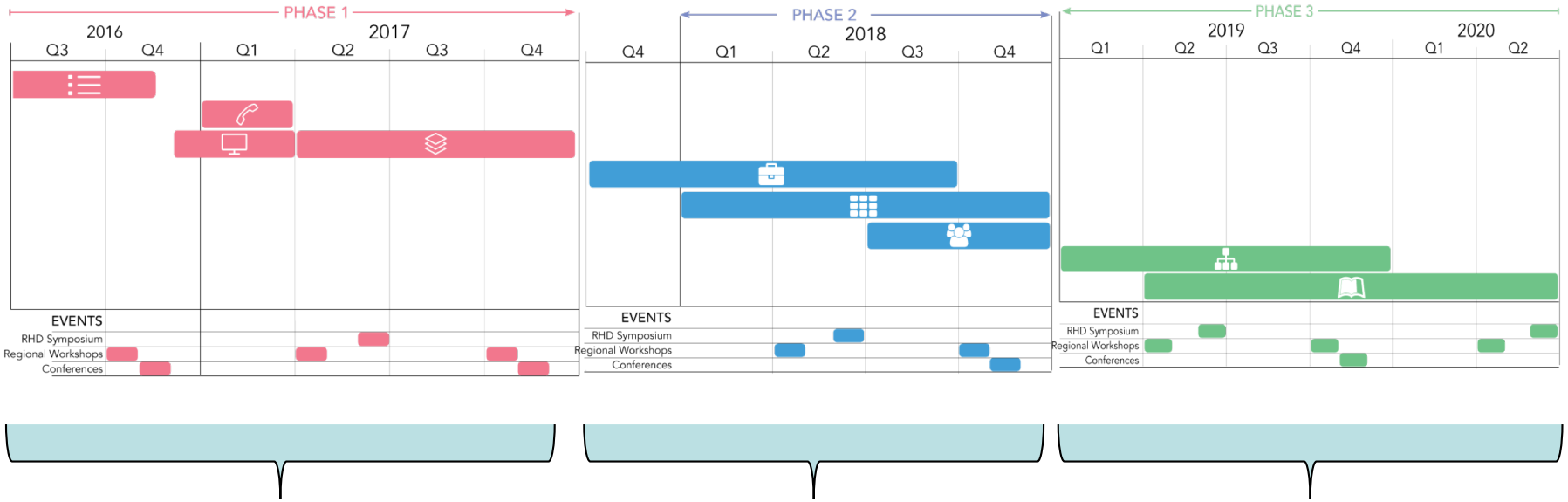


Baseline data

'Toolkit' development

Evaluation of impact

Systematic (Prisma) review for quality evidence

Search for ‘student learning outcomes + learning/classroom + space/environment.’

- 5,521 articles located
- 4,481 after duplicates omitted
- 72 after review of abstracts
- 21 after full text review

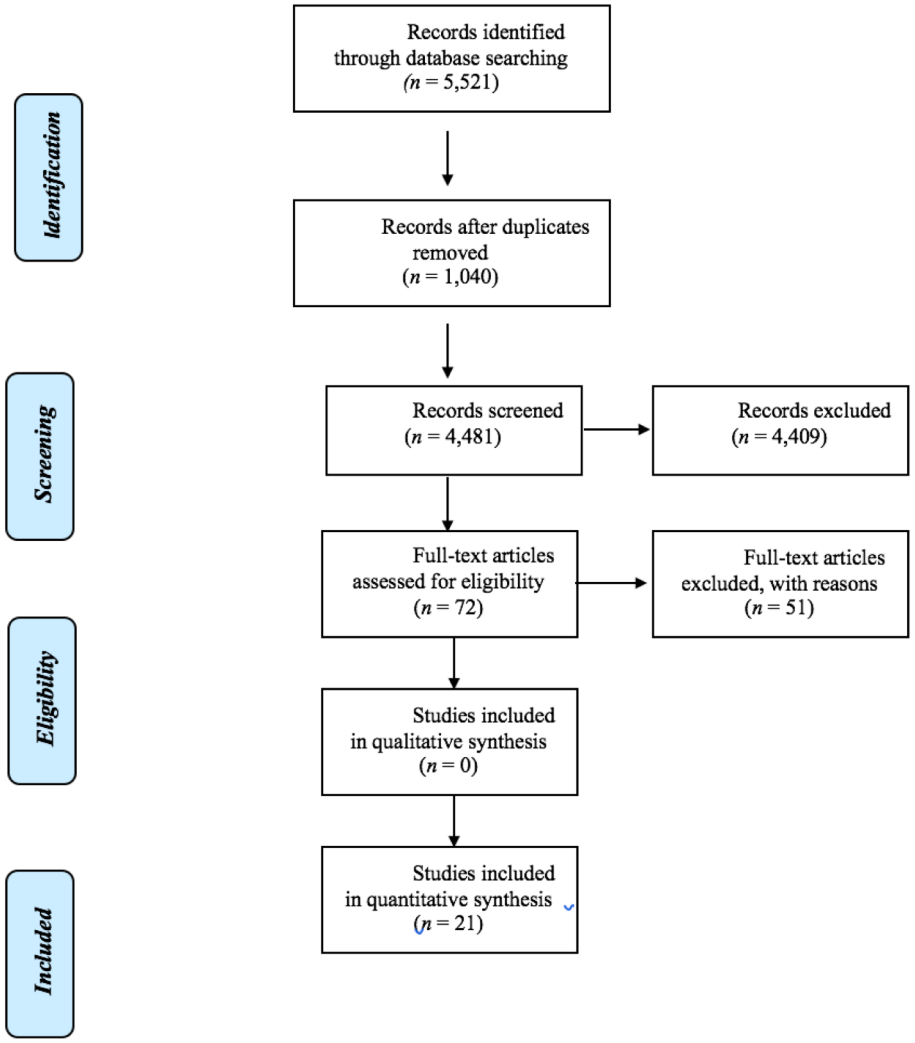


Figure 1. PRISMA flow diagram of the articles yielded during systematic review process

Systematic review of quality evidence

Tanner et al (2008)	Found improving quality of design correlated with an increase in student academic scores.
Tanner et al (2000)	Identified seven design factors that positively correlated to improved student academic scores.
Bartlett et al (2017)	Identified that the built environment accounted for 8% (reading) and 12% (maths) improvement in student academic scores.
Chandra & Lloyd (2008)	A blended environment (ILE + technology) positively impacted student academic scores.
Cicek & Taspinar (2016)	Found that student achievement, retention and positive attitudes were positively impacted by innovative spaces.
Fößl et al (2016)	Elementary/Primary students in an ILE engaged in video learning outperformed students in a traditional setting.

Systematic review of quality evidence

Barrett (2015)	Environmental design factors account for 16% of variance in student academic outcomes.
Byers et al. (2014)	Students in ILEs showed up to 17% improvement in academic scores compared to like-ability peers in traditional spaces.
Chang et al (2006)	Could not differentiate academic scores between students in ILEs and traditional spaces.
Reiss et al (1975)	Limited correlation between open learning environments and student persistence on difficult tasks.
Solomon et al (1976)	Found open classrooms performed worse than traditional spaces in terms of academic achievement on standardized tests.
Kazua et al (2014)	Students in blended (technology + ILE) spaces outperformed students in traditional spaces.

ILETC Stage 1, Phase 1 Survey

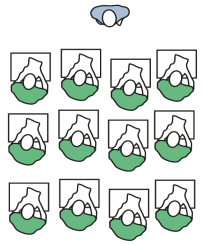
- Three clusters of questions;
  - What types of ILEs and what % of the total school infrastructure?
  - Principal perceptions of the type of teaching that is happening in most predominant classroom type?
  - Principal perceptions of degree of student ‘deep learning’ happening in most predominant classroom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

The evidence: what do we know?

Type A	Type B	Type C	Type D	Type E
57%	14%	13%	4%	12%

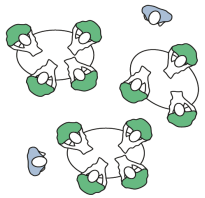
The evidence: what do we know?

Typology 1:
Teacher facilitated presentation, direct instruction or large group discussion.



Typology 2:
Teacher facilitated small group discussion or instruction.

Typology 3:
Team teacher facilitated presentation, direct instruction or large group discussion.



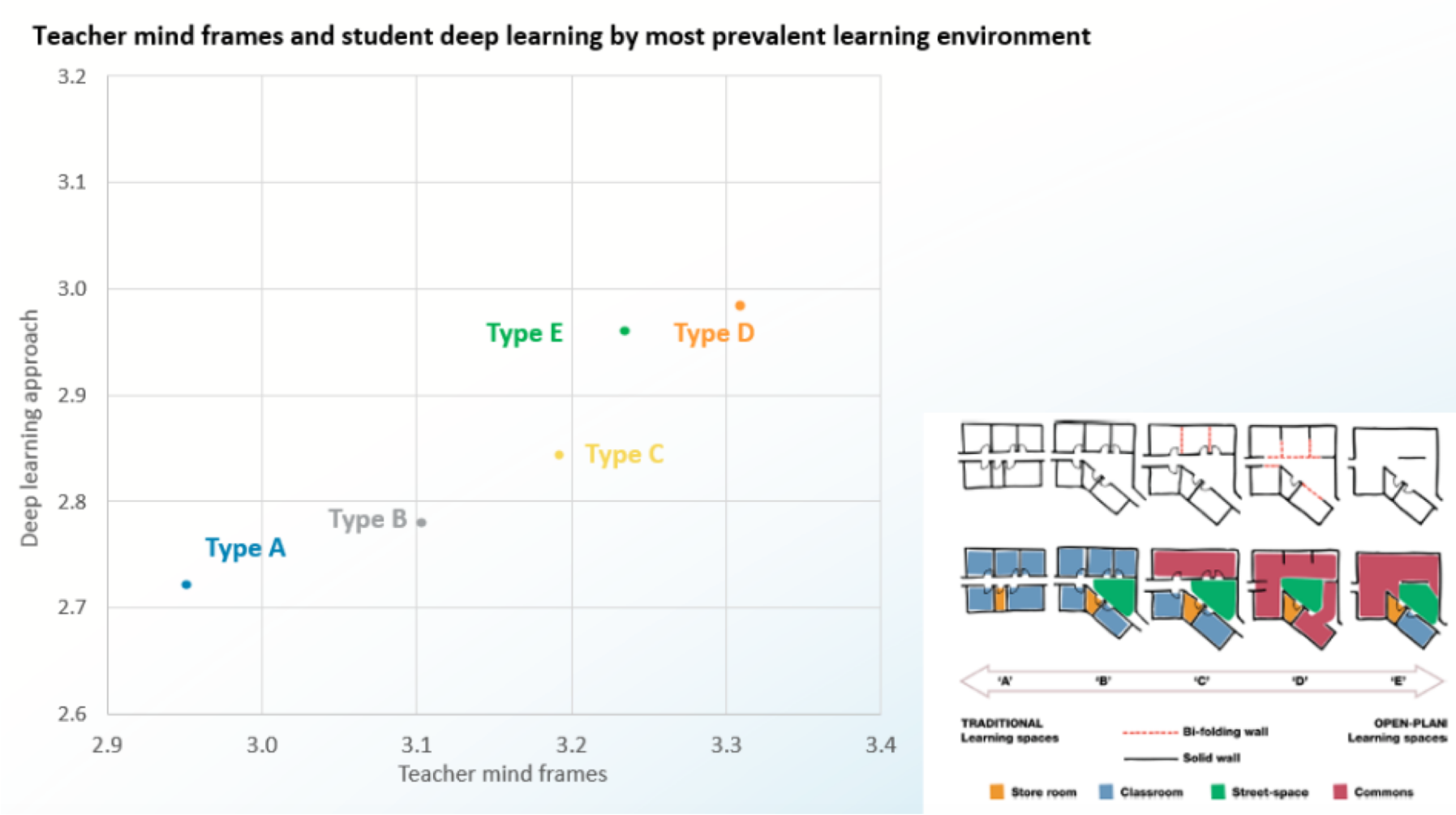
Typology 4:
Collaborative/shared learning, supported by teachers as needed.

Typology 5:
One-on-one instruction.

Typology 6:
Individual learning.

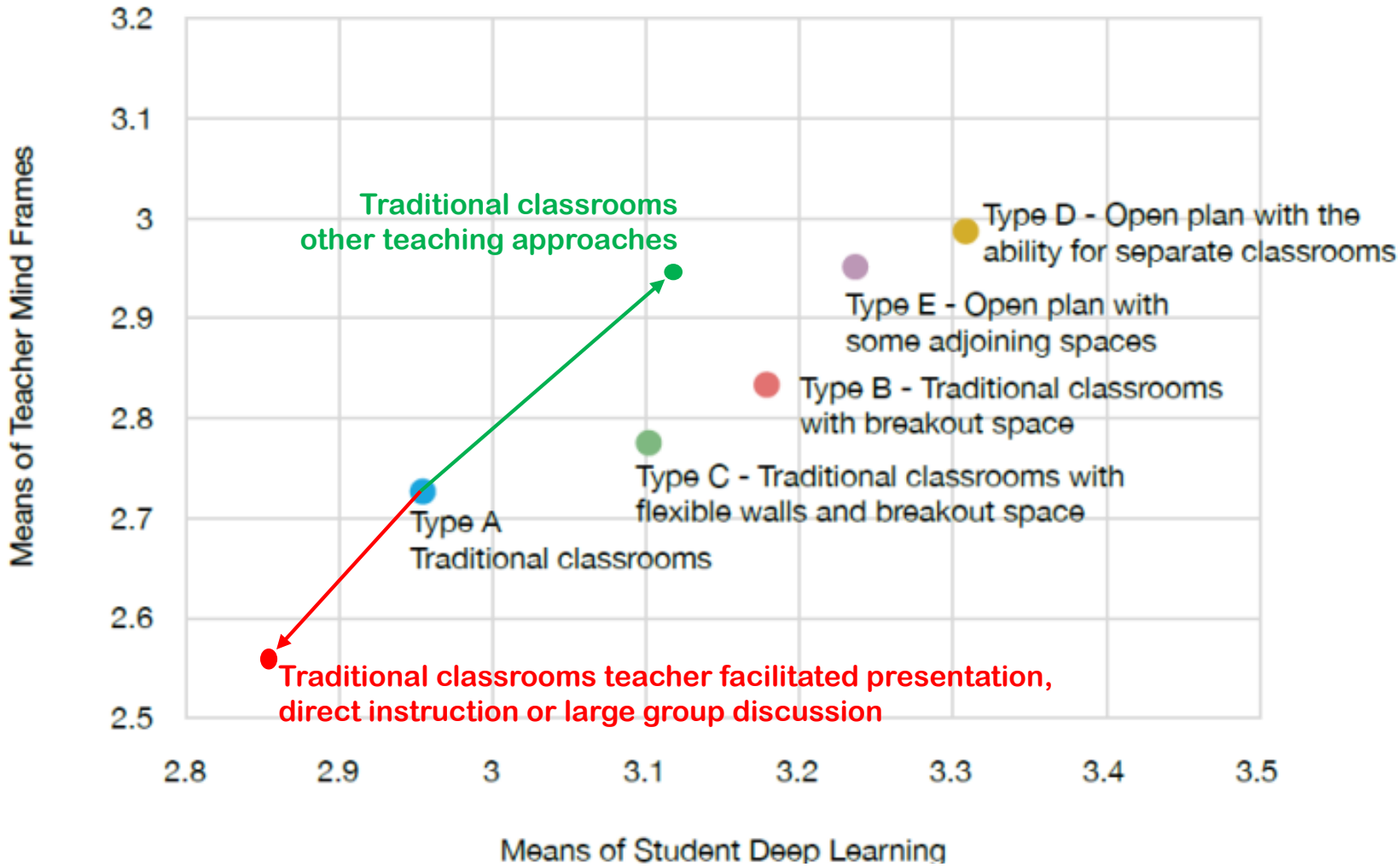
Typology 1	53%
Typology 2	22%
Typology 3	7%
Typology 4	9%
Typology 5	5%
Typology 6	4%

ILETC Stage 1 Survey



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 evidence: what do we know?



Summary

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- Teachers are hungry for support on how to use ILEs better.
- Many teachers are developing effective strategies for using ILEs well, but these lack structure, and are hard to disseminate.
- Given our massive investment in school infrastructure, we have little evidence to show its impact.

Innovative learning environments

Schools hit a wall with open-plan classrooms

November 23, 2015

Henrietta Cook

Education Reporter at The Age

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.

Innovative learning environments

Catalysts, or agents of change?

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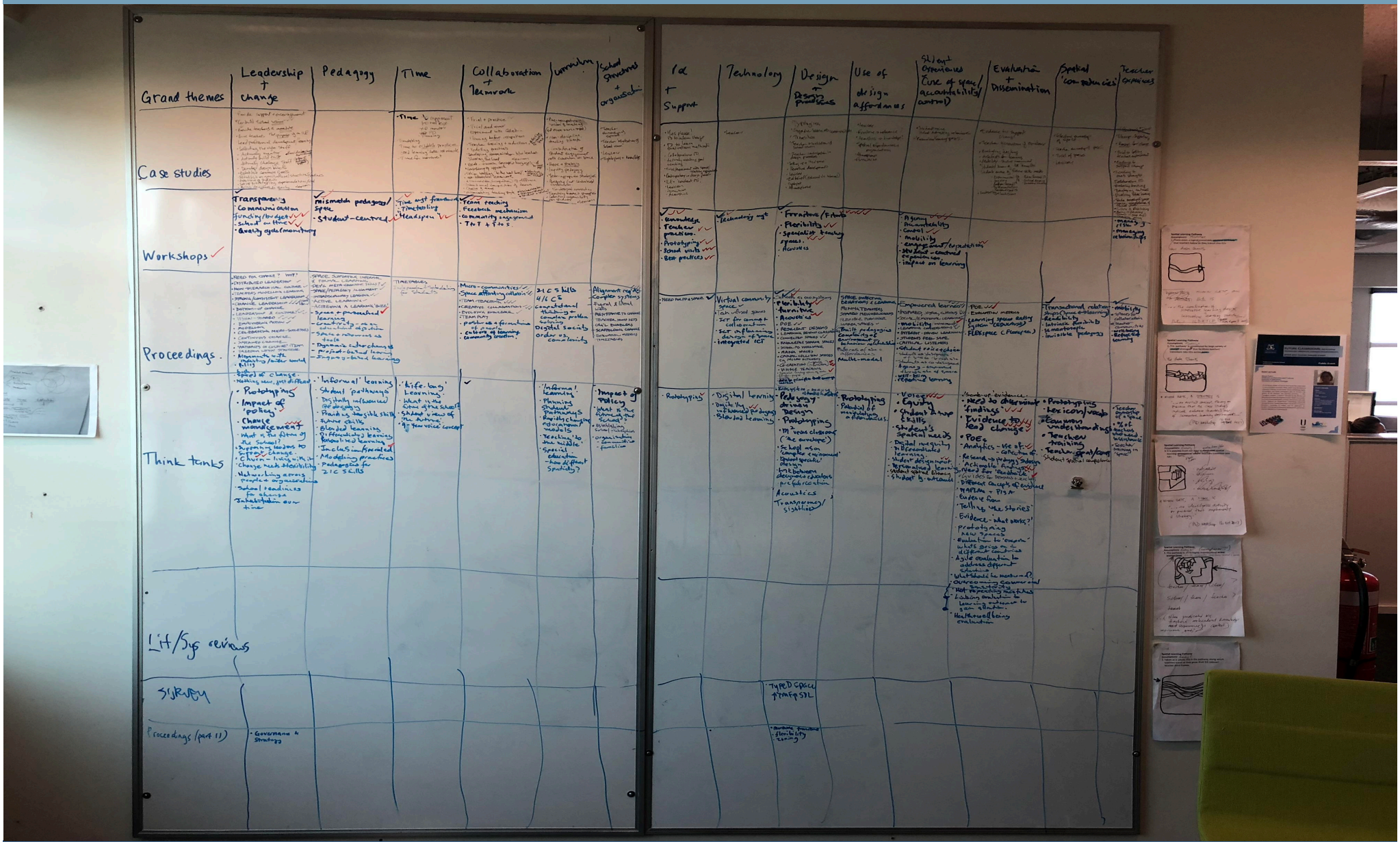

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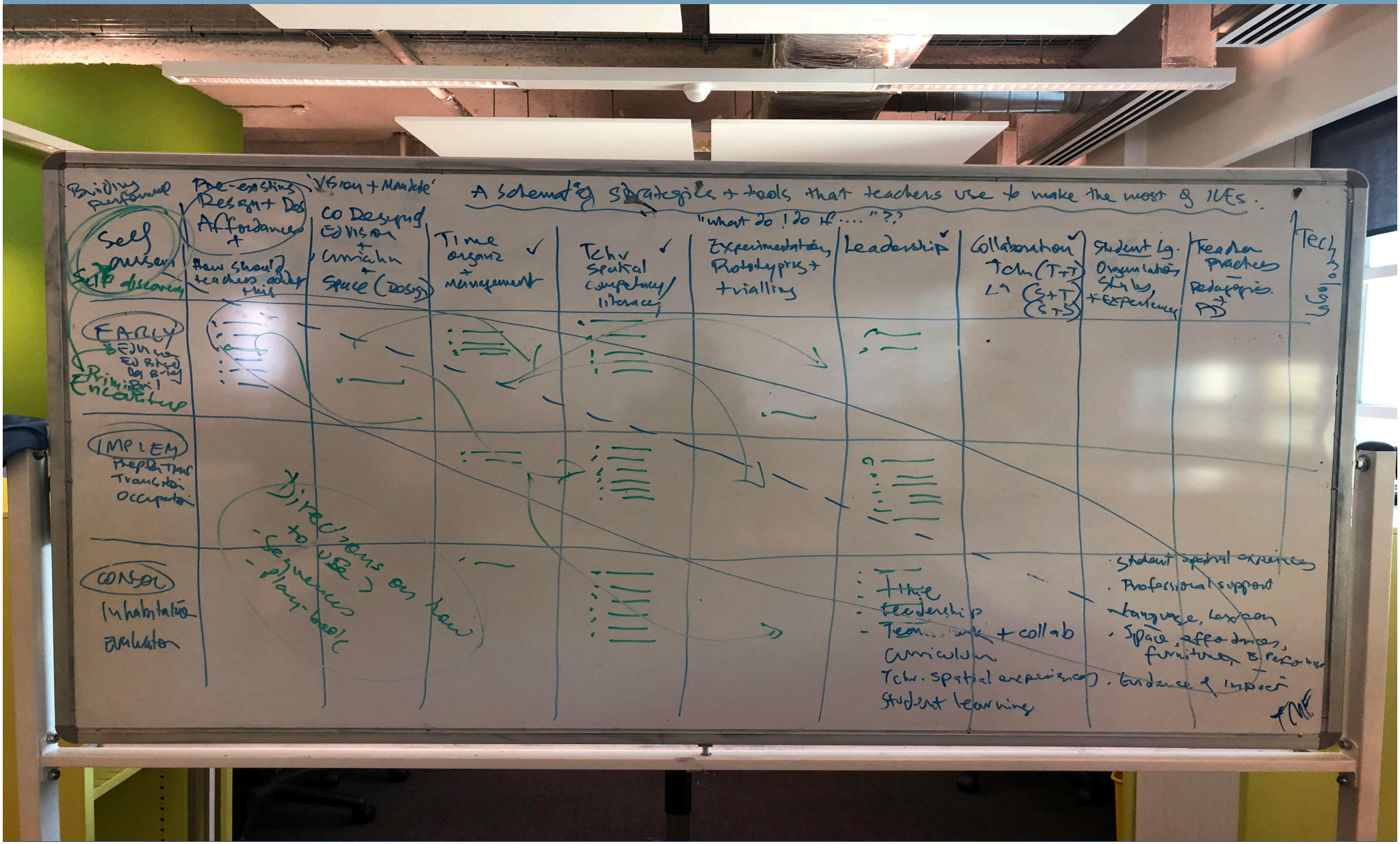
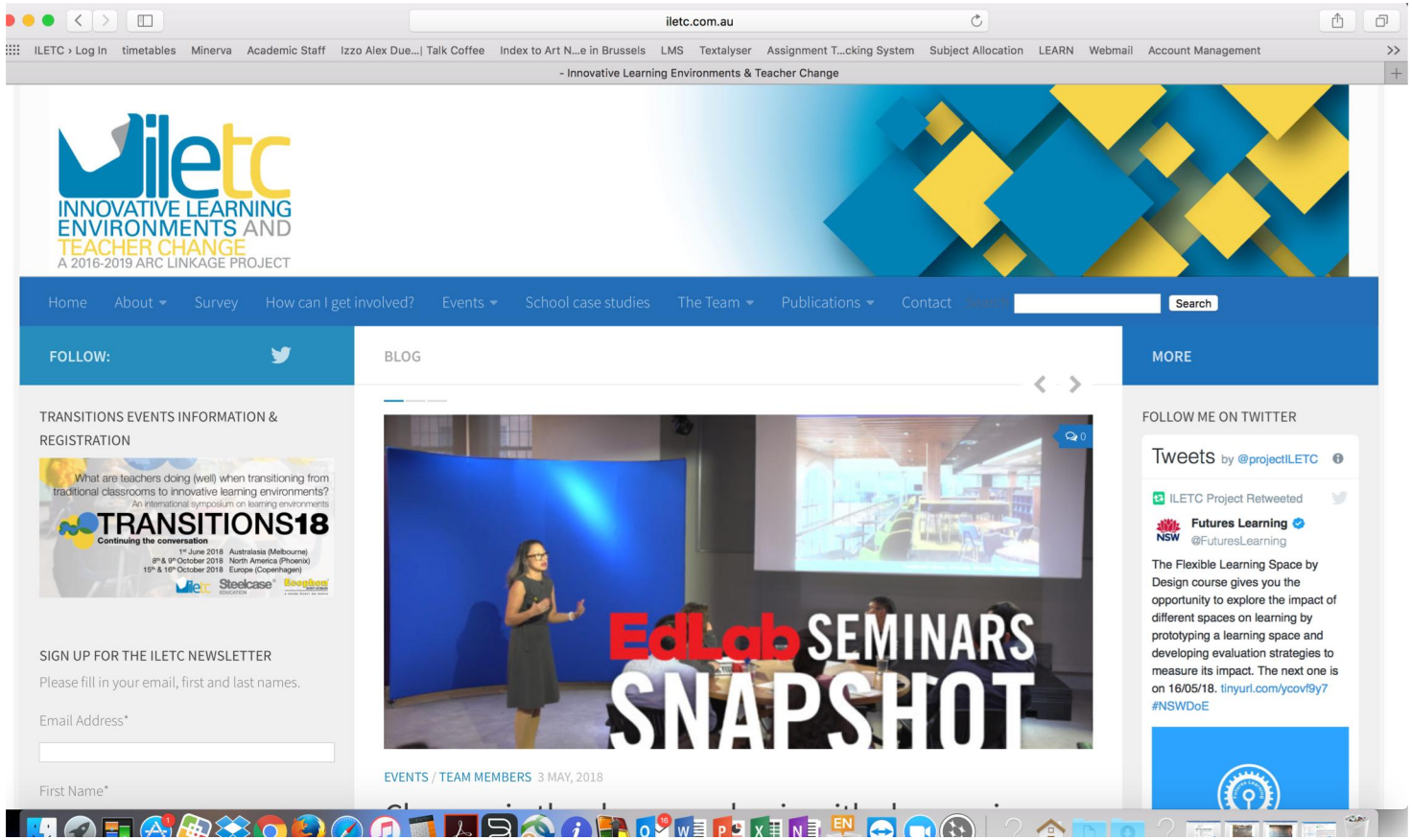


The evidence: what do we know?

http://www.iletc.com.au



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