

Does the space make a difference?

Empirical retrospective of the impact of the physical learning environment on teaching and learning evaluated by the New Generation Learning Spaces Project.



Churchie.

Anglican Church Grammar School
The University of Melbourne LEaRN group
Evaluating 21st Century Learning Environments



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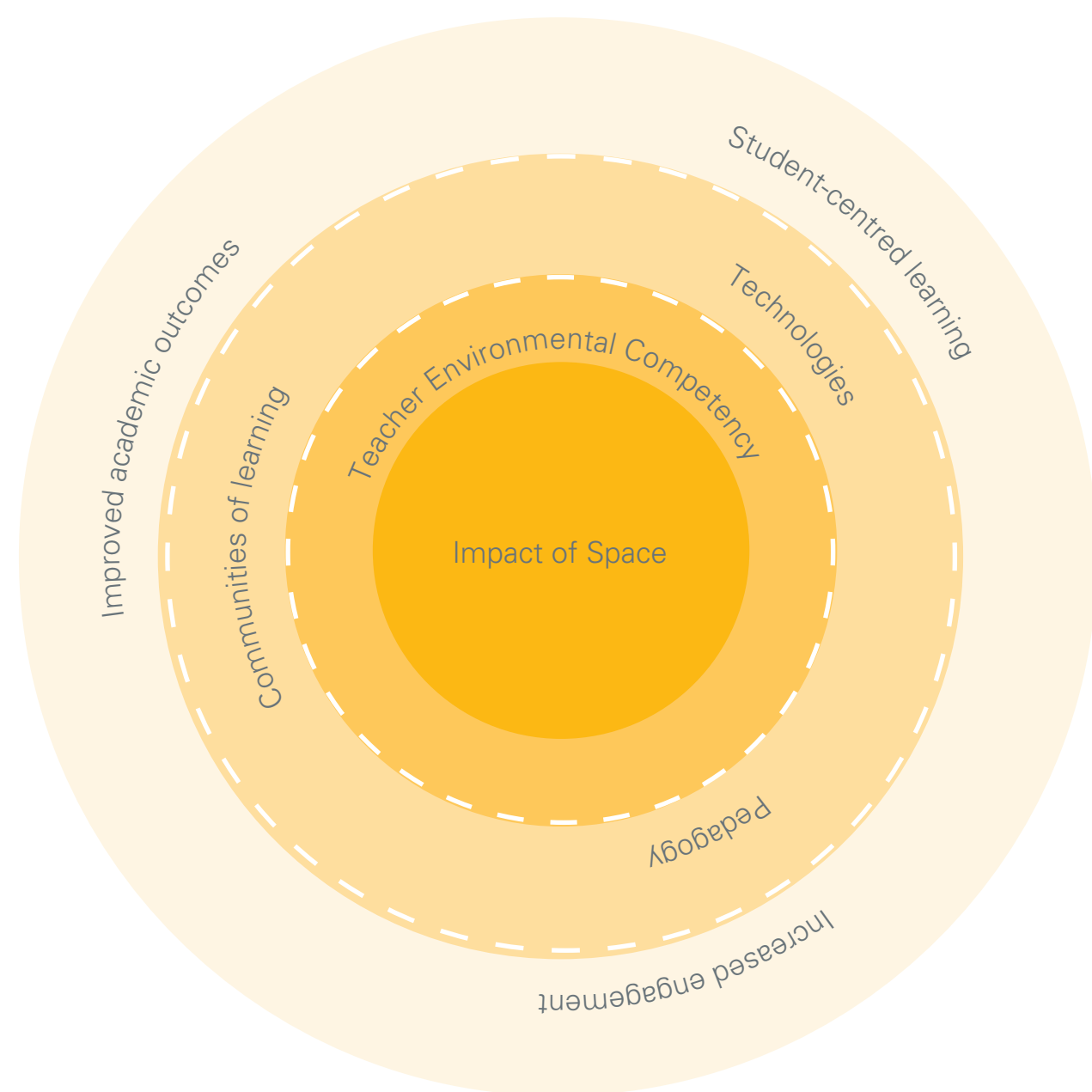
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Executive Summary

A resurgence in the interest in classroom and school design has highlighted how little we know about its impact on teaching and learning.

New Approach Needed

Historically, the literature has focused on the design of the building and not its actual use. Furthermore, there has been a lack of research methods capable of controlling those complex variables inherent to both education and space.

The longitudinal New Generation Learning Spaces (NGLS) project focused on providing an approach, and suite of tools to measure the pedagogical impact of different learning environments.

This novel approach isolated the impact of different learning environments to then examine how they influence student and teacher activity and behaviour.

The evidence suggests that when considering the impact of the physical learning environment on learning, how it is inhabited, is at least as important as its design.

Across the four studies, it is clear that the environmental competency of the teacher, is a clear predictor on any spatial design to facilitate its intended pedagogical function.

What We Found

Keeping this in mind the empirical evidence does suggest that the learning environment can:

- Significantly influence how technologies (both digital and physical) are used, and therefore, are perceived by students.

- Increase the instance of active, collaborative, and multiplicitious nature of student-centred learning experiences.
- Affect a statistically significant enhancement of student engagement in their learning.
- On average, different classroom layout explains 7 per cent of the variation in academic outcomes in each study.
- On average, when students transition from a conventional classroom to a NGLS, their academic achievement increases by 15 per cent.



Introduction

Anglican Church Grammar School, in partnership with the University of Melbourne's 'Learning Environments Applied Research Network' (LEaRN) and the Australian Research Council 'Evaluating 21st Century Learning Environments' (E21LE) project evaluated the impact of the physical learning environment on teaching and learning.

This partnership has devised new approaches, methods, and tools to measure how different learning spaces influence the activity and behaviour of students and teachers.

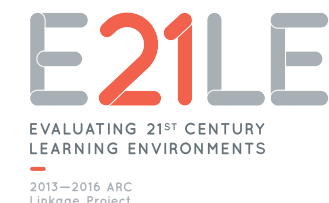
At the beginning of the partnership, the very nature of what constitutes an 'effective' learning environment was undergoing substantial re-imagination. Underpinning this process was the growing influence of digital technologies within education. At the time, its hypothesized potential could revolutionize how, where and with whom students learn.

As a consequence, what was considered as quality teaching and learning was challenged by shifts in pedagogies and practices to support better the multiplicitous nature of student-centred learning. However, given these significant drivers, there was scant attention in the literature regarding if, and to what extent, these re-imagined learning environments could facilitate this transformation in teaching and learning to occur.

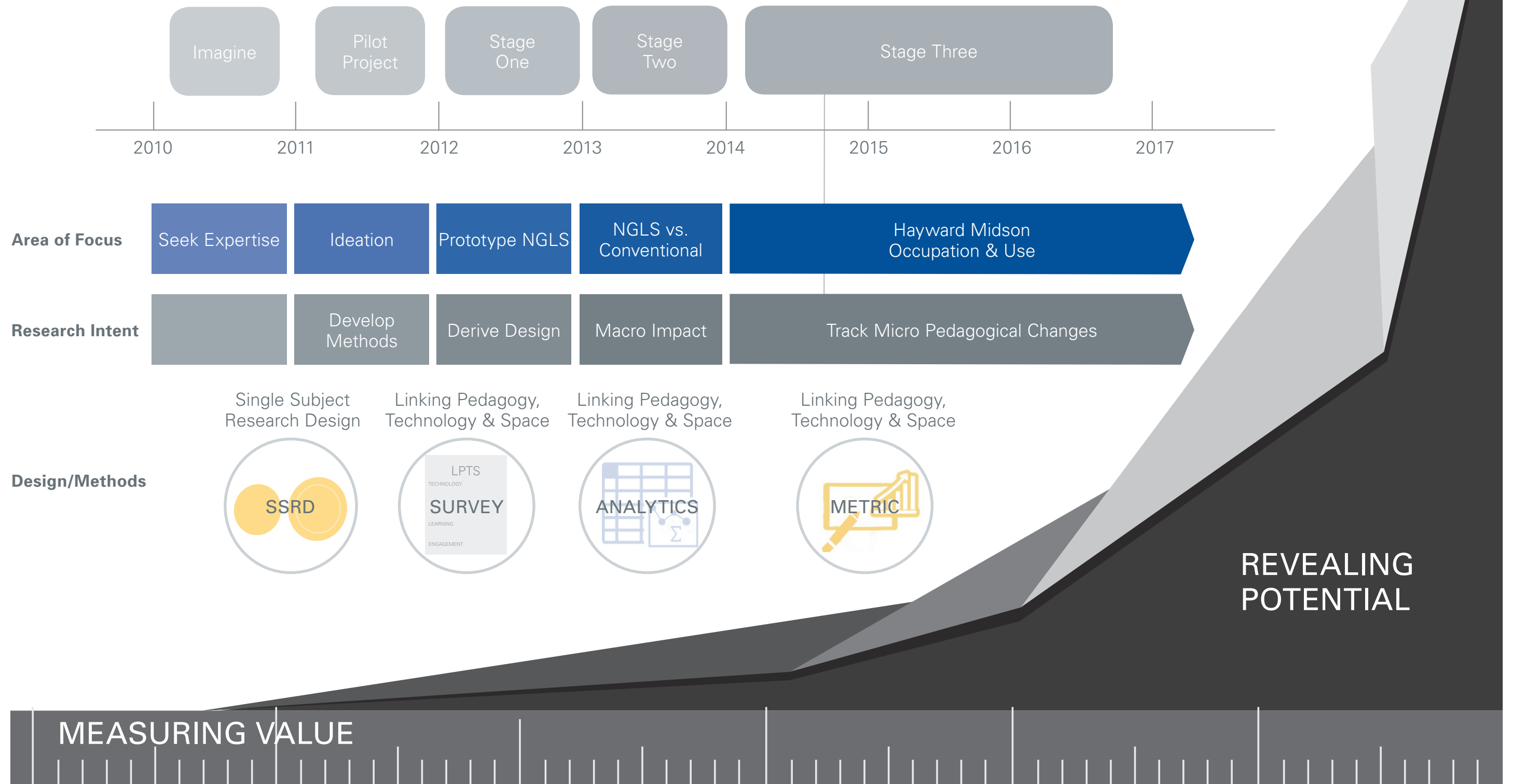
The partnership focused on providing empirical evidence to determine if the interest and investment in contemporary or innovative learning environments actually had a positive and measurable impact on teaching and learning.



Churchie.



Process and Timeline





Research *Question*

*“What are the macro and micro **effects** of different learning spaces on student perceptions of their usage of technology and learning experiences, and **how** does this affect their engagement and academic outcomes?”*

Pilot Study

YEAR

2011

BUILDING

Lanskey

SUBJECT/S

Mathematics

SAMPLE

3 classes, 52 students
(65% participation) and 3 teachers

RESEARCH DESIGN

Single-Subject Research Design

METHODS

Repeated Measures Survey + Learning Outcomes

STUDY SUMMARY

A unique study that overcame the methodological issue of controlling the complex variables inherent to space and education. Borrowing an approach from the applied health sciences, the study focused on devising a design that moderated a number of confounding variables to focus on a spatial intervention.

The intervention consisted of the retrofit of existing classrooms spaces to pilot a cost-effective NGLS layout.

A NGLS combines furniture design and the integration of digital and visual technologies to create a polycentric or 360° learning environment within a singular space.

Can you Evaluate the Impact of Different Spaces?

Macro Effects

Summary of changes in student attitudes to their learning



Summary of impact on academic results

Results in Mathematics improved by



Stage 1 Study

YEAR

2012

BUILDINGS

Arnott, Fisher and Lanskey

SUBJECT/S

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

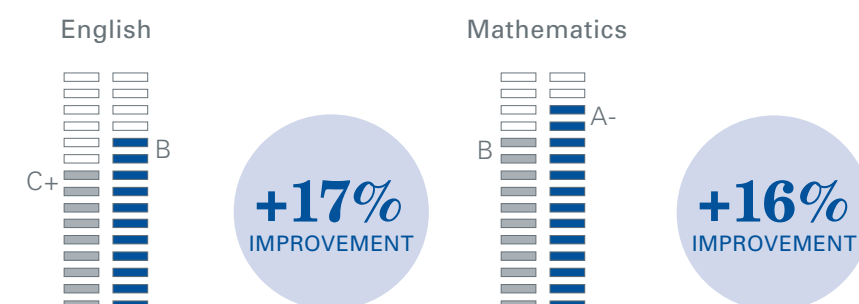
Macro Effects

Summary of changes in student attitudes to their learning



Summary of impact on academic results

Conventional classroom NGLS



Stage 2 Study

YEAR

2013

BUILDINGS

Arnott, Fisher and Lanskey

SUBJECT/S

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.

Stage 3 Study

YEAR

2014 - 2016

BUILDINGS

Hayward Midson Creative Precinct

SUBJECT/S

Film and Television, Design and Technology, Drama, Engineering Technology, Technology Studies, and Visual Art

SAMPLE

126 observations of 11 teachers and 14 classes

RESEARCH DESIGN

Quasi-experimental + Single-Subject Research Design

METHODS

LPTS Observational Metric + Learning Analytics

STUDY SUMMARY

The literature has previously focused on the design and the impact of physical characteristics of learning spaces.

What exactly happens once these new spaces are in use has been largely overlooked.

Furthermore, there is little known of the best way to support teachers, and students, as they navigate the spatial transition. In response to this gap, this study assessed the micro changes by students and teachers as they transitioned from their conventional studios/workshops (baseline) to a new Creative Precinct (inhabitation) as well as a year beyond the move (occupation).

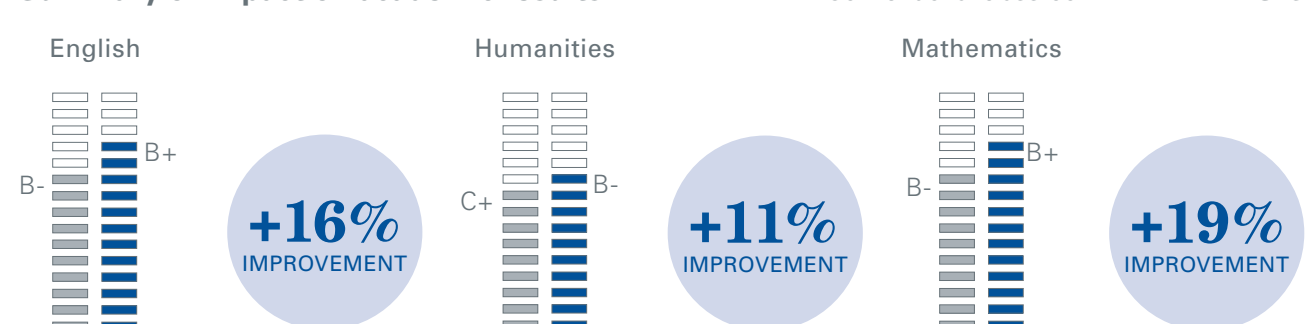
Evaluating the Longer Term Impact of Space on Students

Macro Effects

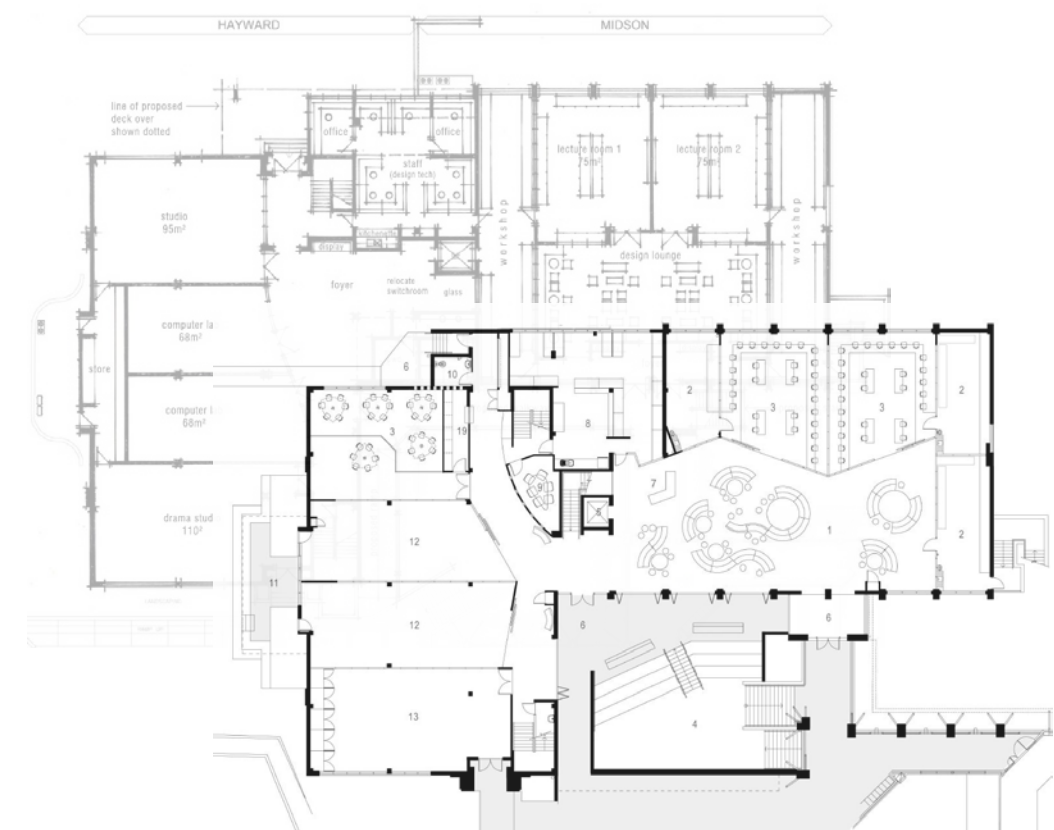
Compared to students in a conventional space, NGLS classes



Summary of impact on academic results

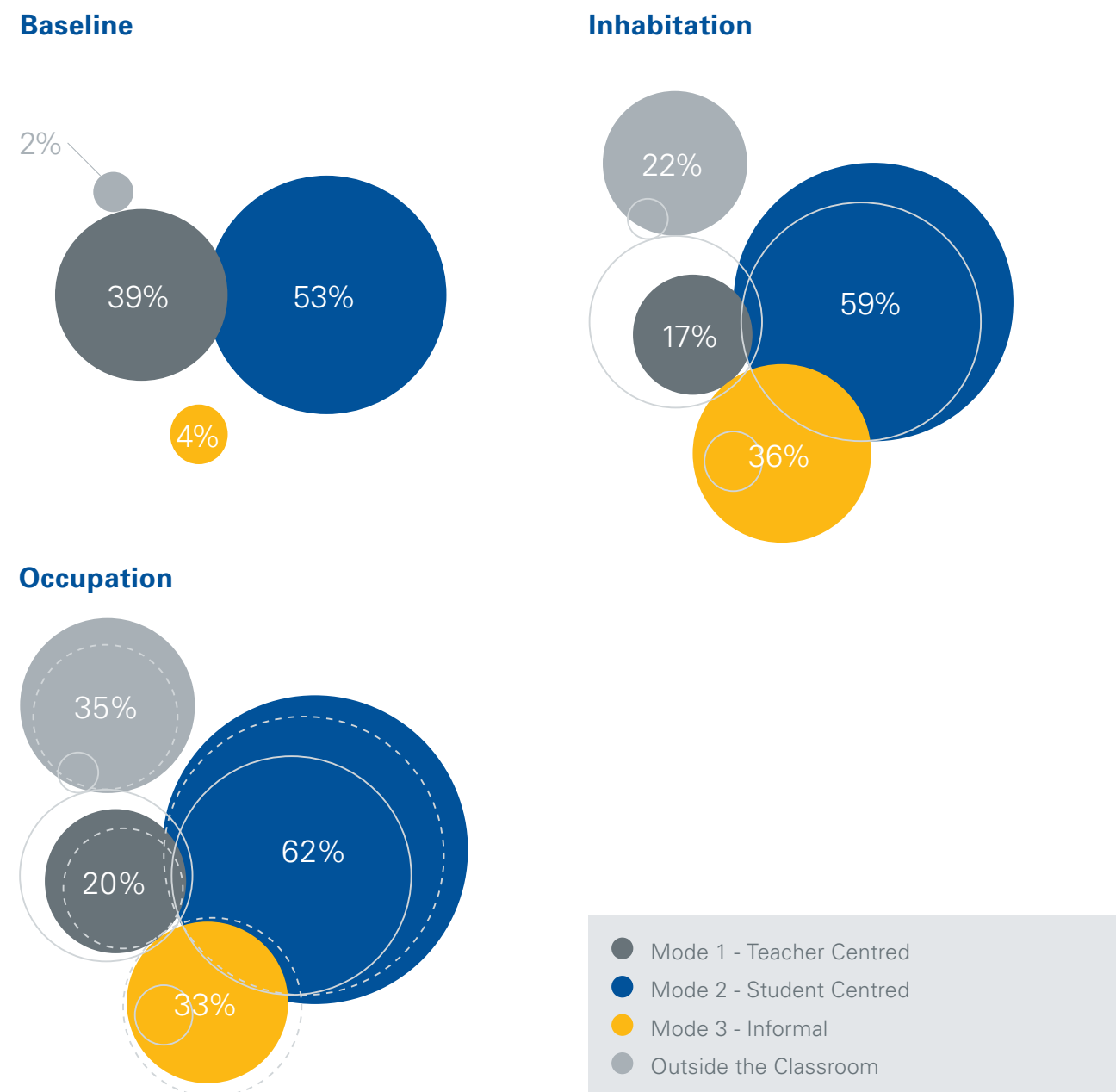


Evaluating the Micro Pedagogical Changes in the Spatial Transition



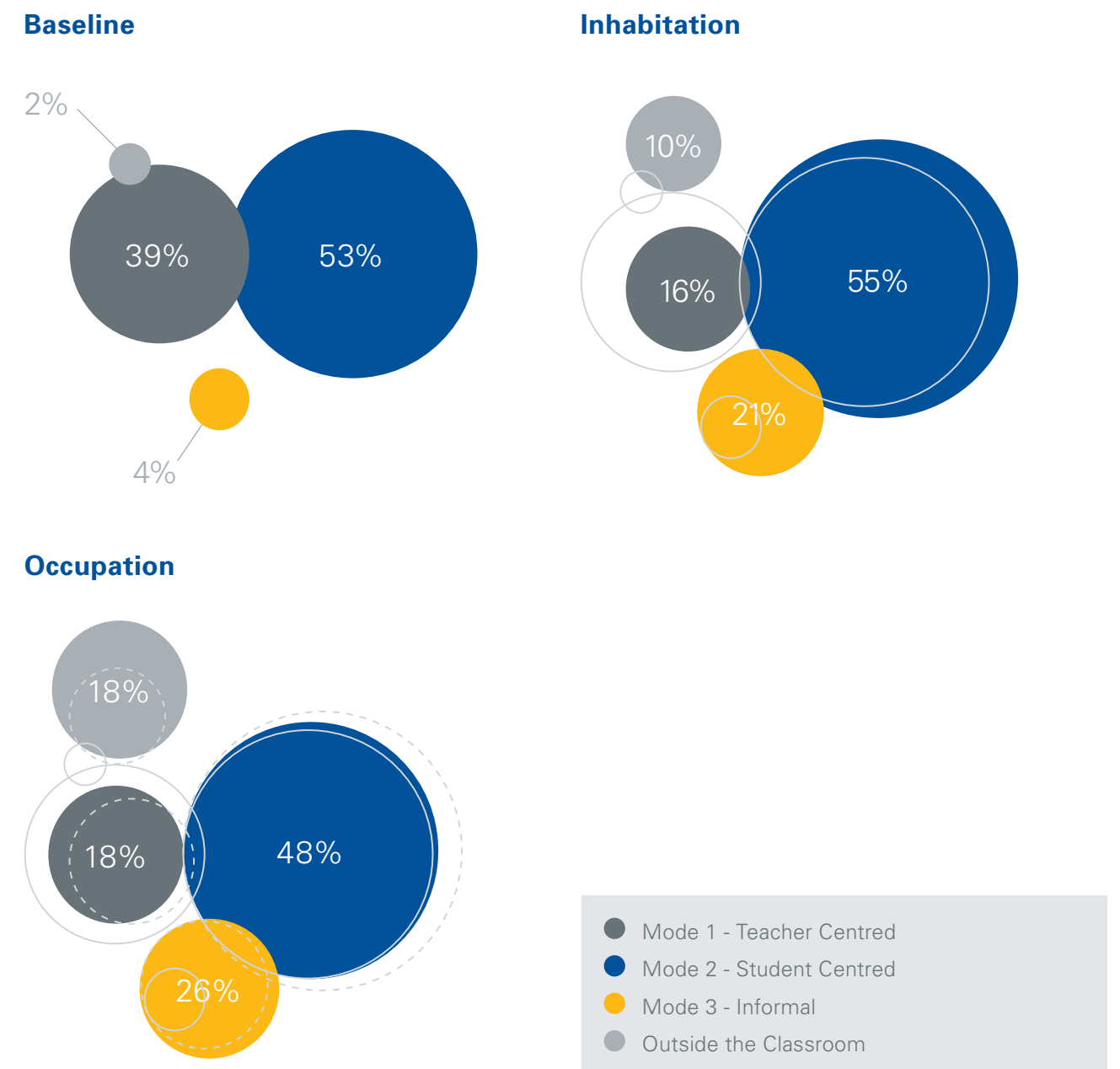
Stage 3 Study

Change in how Students Occupied Modalities



Stage 3 Study

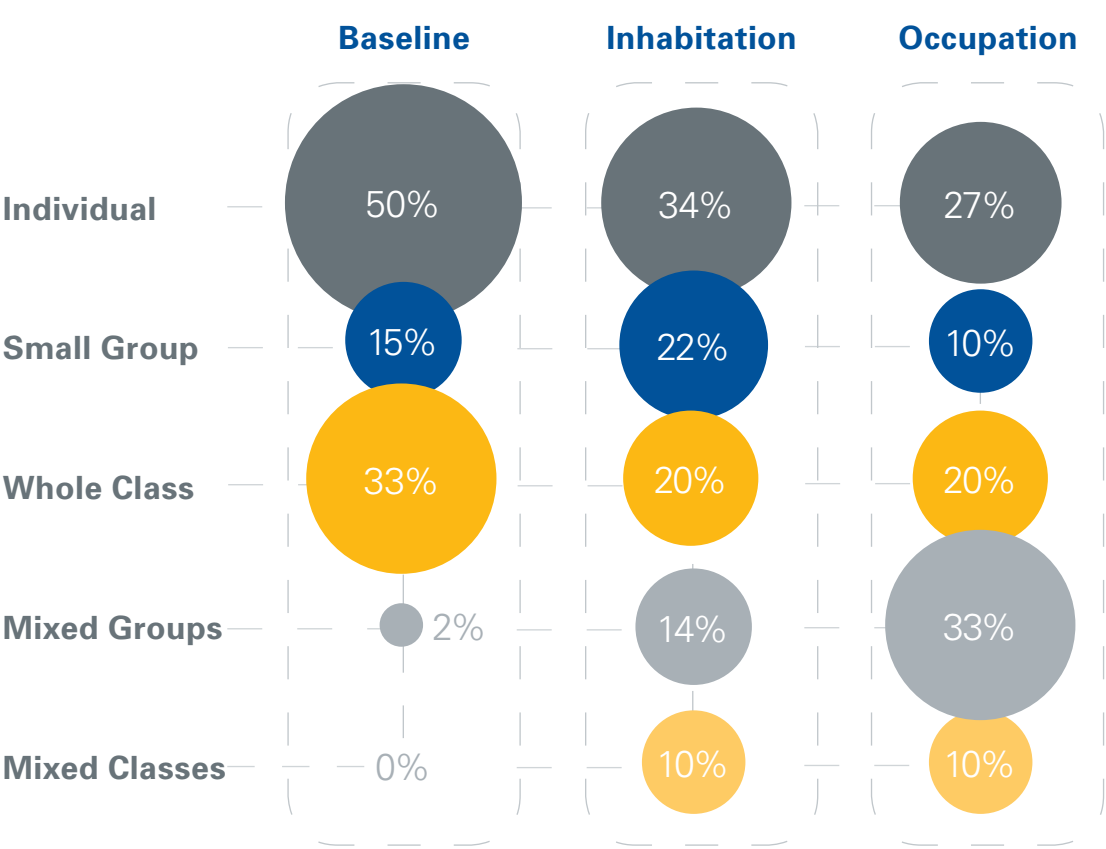
Change in how Teachers Utilised Modalities





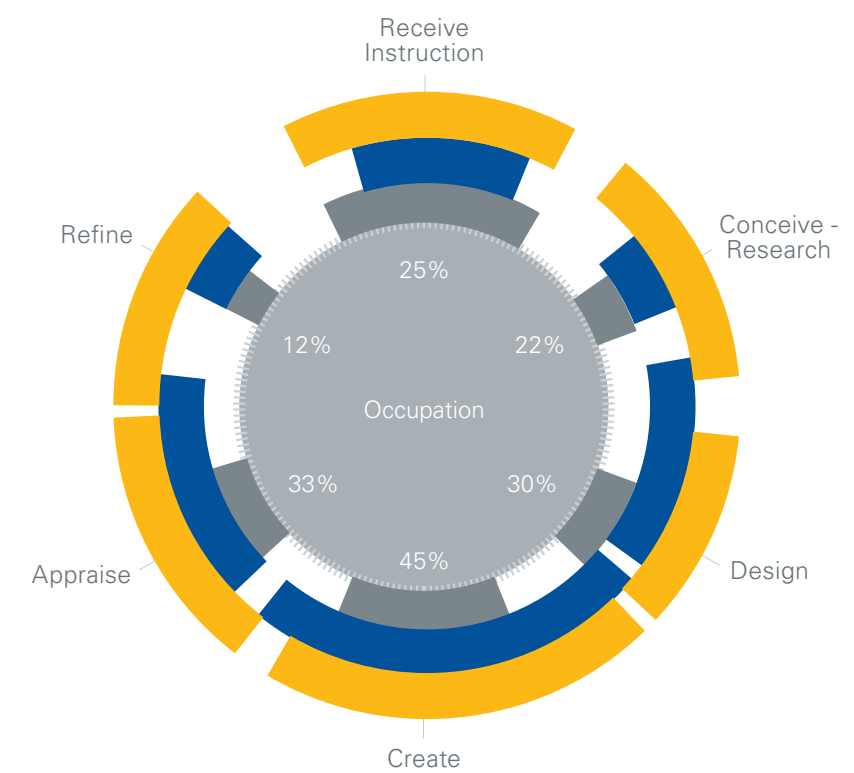
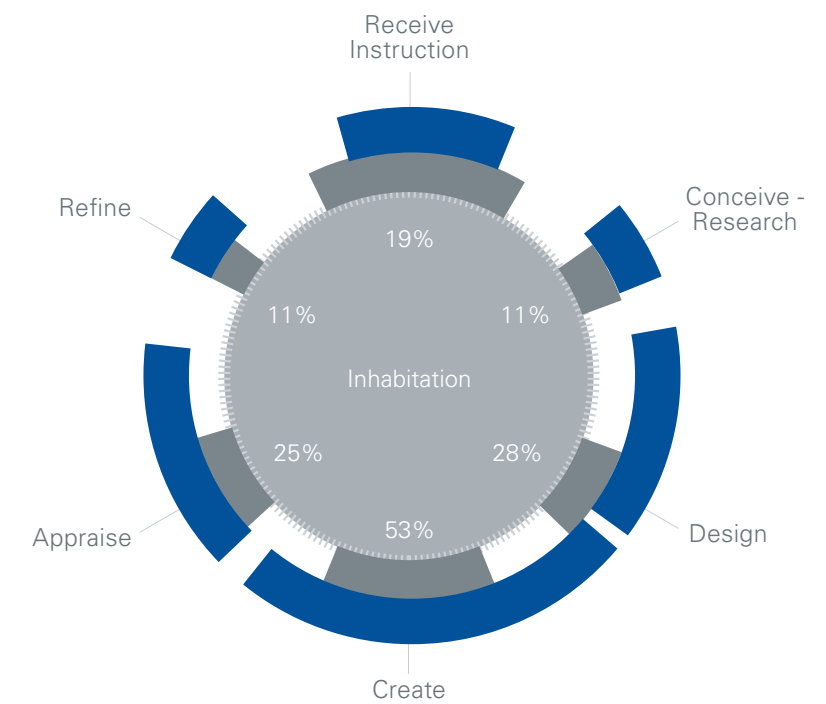
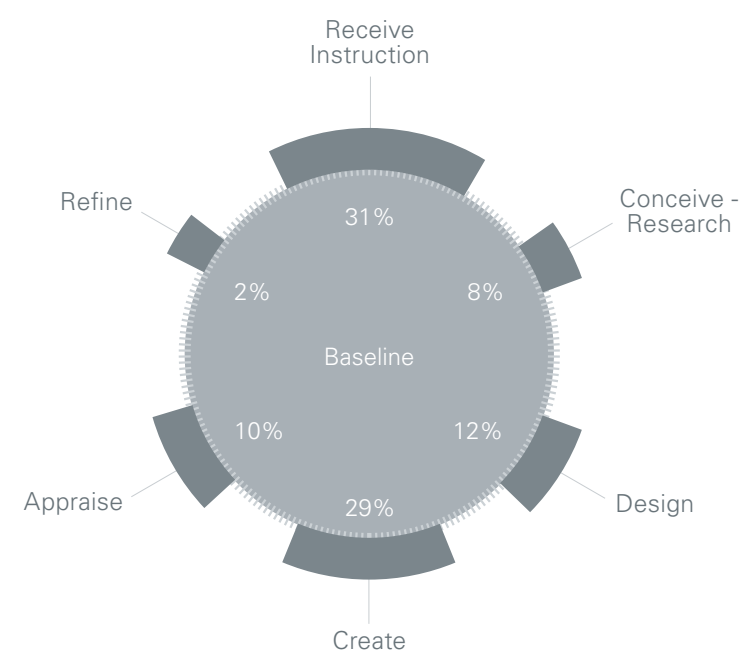
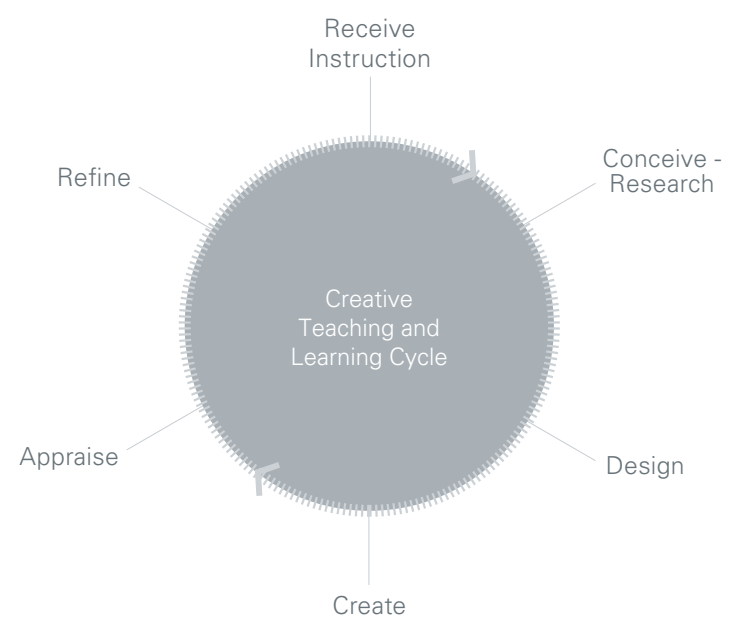
Stage 3 Study

How the Communities of Learning Changed

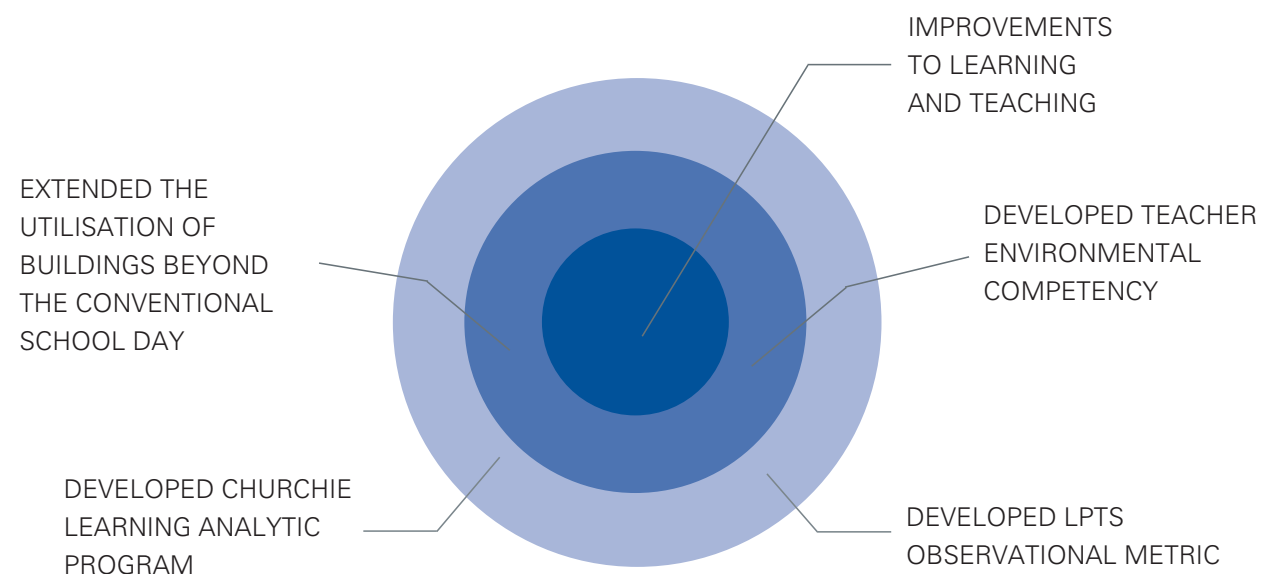


Stage 3 Study

Creative Teaching and Learning Cycle



Additional Benefits



Conclusion

The aim of the NGLS project study was to derive empirical evidence to test the assumption that different spaces can have different effects on teaching and learning. It sought to test, refine and validate a novel methodology approach through its extended replication. This study has presented a set of empirical methods that can evaluate the impact of different learning spaces on teaching and learning. In this process, this study has provided empirical evidence that goes some way to reinforce the broad set of assumptions underlying the relationship between the physical space and its potential impact on teaching and learning.

The synthesized quasi-experimental and single-subject research design isolated the link between different learning spaces and student perceptions related to key aspects of their learning. The positive, and at times, statistically significant effects suggest that the teachers did alter their pedagogies in different spatial layouts. While in an NGLS, many teachers were able to facilitate a wider array of active pedagogical practices and collaborative learning modalities. This often correlated to significant improvements in both student engagement and academic outcomes.

However, it is clear that the NGLS by themselves are not the agents of change. The long-term success of the learning spaces movement lies in the hands of the classroom teacher. It is clear that a teacher's environmental competency is a clear predictor of any spaces impact to facilitate its intended pedagogical function.

About the Authors

Terry Byers is the Director of Innovation in Learning at Anglican Church Grammar School.

Mr Terry Byers is interested in the effective integration of technology to best increase students' engagement and academic outcomes. At the same time, he is uncovering ground breaking insights into the critical role that the classroom environment plays in this equation. Together, these developments have led to the creation of dynamic and responsive tools that provide teachers with data-rich visualisations. These visualisations enable teachers to better understand their pedagogical practice in technology-enabled, contemporary learning environments and how this affects student learning outcomes and gains.

Mr Byers is soon to receive his PhD through his involvement in the 2013-2016 Australian Research Council (ARC) Linkage project 'Evaluating 21st Century Learning Environments' (E21LE). E21LE is a research project developing multidisciplinary evaluation strategies for the new generation of learning environments. In addition, to his current work in the E21LE project, Terry is a Research Fellow in the 2016-2019 ARC Linkage Project 'Innovative Learning Environments and Teacher Change' (ILE+TC).

Wes Imms is an Associate Professor at the University of Melbourne Graduate School of Education.

Associate Professor Imms is currently the school's Head of Visual Art and Design Education and its Research Higher Degree Coordinator for Curriculum and Teaching.

He is the lead Chief Investigator in the E21LE ARC Linkage Project, which is being run from 2013 to 2016. Further to this, Associate Professor Imms is

also the lead Chief Investigator in the ILE+TC ARC Linkage Project. The nature of this project is such that it will bring together the expertise from industry and leading schools, with the University of Melbourne's School of Design and Graduate School of Education. It will be run in six Australian states and New Zealand from 2016 to 2019.

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