

# **Teacher-led Inquiry in School Learning Environments Leading by Example**



**Linking Theory  
and Practice  
in Learning  
Environments**

**Edited by  
Marian Mahat  
Chris Bradbeer**

TEACHER-LED INQUIRY IN  
SCHOOL LEARNING  
ENVIRONMENTS

This page intentionally left blank

*This book provides a deep dive into teacher-led inquiries related to design, pedagogy, and collaborative practice in flexible learning environments. Mahat and Bradbeer skilfully weave together research, theory, and contextualised evidence with practical examples and insights from a range of school settings. Perhaps most importantly it is written by educators for educators in a practical and easy to understand manner. This will certainly be a “go to” book for those seeking to move into more responsive and innovative schooling design and approaches.*

—Tony Grey

*Principal, Te Ao Mārama School, Hamilton, New Zealand*

*A thorough yet practical lens on the impact of teacher-led inquiry, Teacher-led inquiry in School Learning Environments: Leading by Example echoes what I have observed in my work supporting schools in implementing inquiry-based learning throughout my career, that if we want agency, ownership, and curiosity for our students, then we need schools and systems that provide agency, ownership, and curiosity for teachers. A welcome addition to any inquiry practitioner’s bookshelf!*

—Trevor MacKenzie

*Educator, Author of Dive into Inquiry and the Inquiry Mindset series, Consultant*

# LINKING THEORY AND PRACTICE IN LEARNING ENVIRONMENTS

**Series Editor: Marian Mahat**

This innovative series closes the gap between the theory and practice of learning environments by bringing together new research focused on the various aspects of learning environments, defined as the physical, pedagogical, and psychosocial contexts in which learning occurs.

# TEACHER-LED INQUIRY IN SCHOOL LEARNING ENVIRONMENTS

Leading by Example

EDITED BY

**MARIAN MAHAT**

*The University of Melbourne, Australia*

And

**CHRIS BRADBEER**

*The University of Melbourne, Australia*



United Kingdom – North America – Japan – India  
Malaysia – China

Emerald Publishing Limited  
Emerald Publishing, Floor 5, Northspring, 21-23 Wellington Street, Leeds LS1 4DL

First edition 2024

Editorial matter and selection © 2024 Marian Mahat and Chris Bradbeer.  
Individual chapters © 2024 The authors.  
Published under exclusive licence by Emerald Publishing Limited.

**Reprints and permissions service**

Contact: [www.copyright.com](http://www.copyright.com)

No part of this book may be reproduced, stored in a retrieval system, transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without either the prior written permission of the publisher or a licence permitting restricted copying issued in the UK by The Copyright Licensing Agency and in the USA by The Copyright Clearance Center. Any opinions expressed in the chapters are those of the authors. Whilst Emerald makes every effort to ensure the quality and accuracy of its content, Emerald makes no representation implied or otherwise, as to the chapters' suitability and application and disclaims any warranties, express or implied, to their use.

**British Library Cataloguing in Publication Data**

A catalogue record for this book is available from the British Library

ISBN: 978-1-83797-217-3 (Print)  
ISBN: 978-1-83797-216-6 (Online)  
ISBN: 978-1-83797-218-0 (Epub)



INVESTOR IN PEOPLE

# CONTENTS

<i>About the Editors</i>	ix
<i>About the Contributors</i>	xi
<i>Foreword I</i>	xiii
<i>Foreword II</i>	xvii
<i>Acknowledgments</i>	xxi
1. Teacher-Led Inquiry in School Learning Environments: Setting the Context <i>Marian Mahat and Chris Bradbeer</i>	1
2. Leveraging Student Voice to Inform Learning Environment Design: A Case Study of the Middle School at Singapore American School <i>Chris Beingessner and Chris Raymakers</i>	11
3. Developing Teacher Capacity for Teaching and Learning in Innovative Learning Environments <i>Suzanne Bennett</i>	25
4. Plan–Act–Observe–Review: A Case Study of Claremont College <i>Janelle Ford</i>	41
5. Harnessing Teacher Collaboration in Learning Environments to Notice, Recognize and Respond <i>Hope Griffin and Anita Unka</i>	57
6. Constructing Education Into Innovative Learning Environments at Viscontini School: A Case Study of an Italian Primary School <i>Cristina Colombo and Raffaele Mercuri</i>	75
7. Reimagining Learning Environments in Orang Asli Schools: A Lived Experience in SK RPS Banun, Perak, Malaysia <i>Shawn Stanly Anthony Dass, Siti Noor Shafiqah Badrolhisham and Febryani Fallensia Lusiana Wadipalapa</i>	89

8. Future Directions for Teacher-Led Inquiry in School Learning Environments <i>Chris Bradbeer and Marian Mahat</i>	105
<i>Index</i>	117

## ABOUT THE EDITORS

**Marian Mahat** is an Associate Professor of Learning Environments at the Faculty of Education in the University of Melbourne. She leads a sustained and impactful research on learning environments, with an emphasis on spatial competency, codesigning curriculum and pedagogy, teacher-led inquiry, and professional learning and development of teachers.

**Chris Bradbeer** has been a Primary School Teacher and a School Leader in New Zealand for over 20 years. His professional and research interest in learning environments focuses on teacher professional learning, teacher-led inquiry, student engagement, and design. He completed his PhD, looking at teacher collaboration in innovative learning environments, in 2020 at the University of Melbourne.

This page intentionally left blank

## ABOUT THE CONTRIBUTORS

**Shawn Stanly Anthony Dass** is a Teaching Fellow who is part of Teach for Malaysia's Fellowship program currently serving in an all Indigenous rural school in the state of Perak. Shawn holds a Bachelor's of Social Sciences majoring in International Relations from University Malaysia Sabah and has been involved in education the last seven years.

**Siti Noor Shafiqah Badrolhisham** is a Teach for Malaysia 2022 Fellow who teaches Mathematics at the primary level in SK RPS Banun. She holds a Bachelor's degree and a Master's degree in Petroleum Geoscience from Universiti Teknologi PETRONAS. She had published two research papers on her studies related to earthquakes before she started teaching.

**Chris Beingessner** is the Middle School Principal at Singapore American School (SAS). He has collaborated with colleagues to transform learning spaces in Canada and Singapore. As a parent of two children who have experienced the SAS Middle School, he has witnessed the positive impact of prioritizing student voices in shaping a school.

**Suzanne Bennett**, Principal, Bellevue Hill Public School, has held many leadership positions throughout her extensive career. She is passionate about developing the creativity and thinking of students to improve outcomes. She leads professional learning for the *Community of Schools in the Eastern Suburbs*, with 15 schools and 300 teachers.

**Cristina Colombo** is a Teacher of Italian at Viscontini Primary School in Milan where she's also a Project Coordinator for curricular and extracurricular activities. She coordinates the innovative learning spaces project and is a member of the assessment board for the drafting of the RAV. She graduated in Pedagogy at Sacred Heart Catholic University of Milan.

**Janelle Ford** has been the Deputy Principal at Claremont College over 15 years, where she has been part of the leadership team facilitating the change to collaborative teaching. She is the primary researcher and the author of 'Co-Teaching Improves Student Outcomes' (2016), a research partnership

with AISNSW, and she is currently researching ‘Successful and Sustainable Collaborative Teaching’ through the UNSW EdD program.

**Hope Griffin** has been a Teacher at Stonefields School in Auckland, New Zealand, since 2019. She is an Associate Principal and Leader of Learning for Year 5–6. Working in a collaborative environment means that problem-solving with others and coming together in the pursuit of supporting learners to make good progress is at the heart of what we do.

**Febryani Fallensia Lusiana Wadipalapa** is a Teach for Malaysia Fellow from the 2022 batch. She earned a Bachelor’s degree in Education with Honors (Economics) from Universiti Pendidikan Sultan Idris. She is now leading the Boomerang Literacy Project with Shafiqah to address literacy difficulties at SK RPS Banun.

**Raffaele Mercuri** is a Teacher of English at Viscontini Primary School in Milan where he’s also a member of the board for the innovative learning spaces project. He graduated in Foreign Languages at the University of Messina with a thesis in Cultural Anthropology focusing on the migration from his hometown in southern Italy to Western Australia.

**Chris Raymaakers** is the Director of Admissions at Singapore American School (SAS). He has held various teaching and leadership roles in education and leverages these experiences when designing learning spaces. Chris also volunteers on school accreditation teams globally where he focuses on advancing school improvement, with an emphasis on enhancing student learning.

**Anita Unka** has been at Stonefields School in Auckland, New Zealand, since 2014. As an Associate Principal and Leader of Learning for Year 0–2, she focused on student achievement, well-being, and effective collaboration. Anita is also an Across School Lead for Te Rōpū Pourewa community of learning, developing pedagogical practice to support equity outcomes.

# FOREWORD I

Imagine starting to build schools today instead of 150 years ago. Would we build self-contained schools and furnish the classes with bench desks, slate boards, straight rows, a piano, and one teacher (and some adult helpers) with 20–40 students? Would we insist on massed practice on one topic, then move to another, with bells and demarcation, and then insist more work is done at home? Would we insist that all students focus on one task or topic at a time, and assessments would ask each student to ‘strut their stuff’? Would we insist that the teacher dominate the talking (about 90% of the time), ask the questions (typically requiring less than three-word responses), dictate the time on each task, prepare the lessons, and mark the work?

No.

If we were starting to build schools today, they would focus on learning much more than on teaching; students would be appropriately challenged to engage in problem-solving activities and taught the needed skills and confidence, and there would be close attention to the multiple paths and differences in timing necessary to attain success. Students would be taught to work alone as well as work with others; there would be rapid release of teacher responsibility, students would learn to seek and use feedback, ask probative questions, engage in assessing the credibility of information, evaluate the worthwhileness of solutions, collaboratively critique their and others learning, and know how to learn, when to learn, and evaluate their learning. Note, the space issues are not yet mentioned, as learning can occur in multiple places. However, a premise would be teams of educators engaging in the same activities relating to their successes at diagnosing problems, critiquing implementation, and evaluating their impact, hence the need for innovative learning environments (ILE).

Every chapter in this book shows the opportunities and powers of ILE and why this is the critical advantage of innovative learning environments. Students are then the beneficiaries.

This book focuses on teacher inquiry with specific reference to the use of school learning environments, thus continuing the long series of deep engagement these authors have had in this space. How do teachers approach

inquiry, problem-solving, data collection and interpretation, action planning, and impact evaluation? This requires readiness, confidence and capability among the educators, feeding back the feedback to students and educators, developing a shared narrative of impact, implementation and evaluation, and high prominence of collective efficacy about impact. It is noted that ‘putting old practice into new spaces leads only to a waste investment in new environments’.

As I updated the 2008 version of Visible Learning into the 2023 Sequel, one profound difference was the importance of school leaders knowing, defending, evaluating, and enhancing the climate and culture within every classroom and across the school. Note, the leaders’ role includes *within* the classroom – however, it is configured as we cannot leave climate to the dictates and whims of each teacher. We are quite explicit about what the core elements of this climate and culture need to be, specifying 10 ways of thinking focused on whether the students feel they belong and are invited to learn, whether they believe their identities are recognized and esteemed, and whether the learning spaces are fair, equitable, and just for learning. Note, this sense of climate and culture is known from the student’s perspective not the teacher’s belief, in the same way that the culture and climate in the staff room and professional development sessions start from the teachers’ (not leaders) perspectives.

When the learning environment is flexible, there is more focus on the language of learning regardless – and this seems the case across the many countries evident throughout this book (the remote communities in Malaysia, the outskirts of Milan, the quarries of Auckland, and from the beautiful views of Sydney). Yes, all education is local, but there is far more commonality than difference as to what struggles, dilemmas, and conundrums educators face when you focus on successful learning than on successful teaching. All students want to know the secret of how to learn, how to work alone and with others, how to know you are successful in learning, and how to maximize the opportunities within schools to achieve meaningful learning progress. Students are generally improvement machines; they do not want to comply and listen to endless hours of talking and performance by the teacher, and they fundamentally want to be challenged and not bored. In every chapter, educators also have a profound sense of curiosity to explore the opportunities of space to make this learning more successful. Curiosity wins over content every day.

A powerful message is that innovative learning environments create the most opportunities for educators to enhance their impact. Students can and do learn anywhere – straight rows, circle groups, beside a tree, and in a bean bag. However, when teachers do not have barriers or walls to isolate them, they can critique each other collaboratively to increase the impact on all their students.

They work together to optimize strengths, share observations and noticing, to make meaning and dig deeper, to triangulate across many forms of evidence, to engage in courageous open-to-learning conversations, and to emote, cognate, and appreciate the love and impact of their teaching. This comes through within each chapter.

Enjoy the chapters, hear the learning by teachers and students, and not be burdened by the fixed walls of solo practices where we ‘hope’ learning might occur.

Melbourne Laureate Professor Emeritus John Hattie

This page intentionally left blank

## FOREWORD II

Change is happening all around us, whether we are fully conscious of it or not. The very experience of schooling is undergoing transformation in various contexts and countries though, admittedly, not uniformly across the globe. This inconsistency in educational evolution underscores the relevance of this collection of articles. When contemplating the transformation of learning experiences, a great deal hinges on the capacity of educators to adopt different perspectives regarding their roles. And in many contexts, this change in mindset and practice might be supported by working in more innovative learning environments. This transition, however, is easier said than done, especially considering that the majority of teacher education programs still evaluate educators based on their effectiveness as solitary figures, operating in and managing their classrooms and students largely in isolation from their peers.

My own path toward educational transformation has been enriched by observing or reading about many communities, schools, and individuals. It was enhanced by a deeper appreciation of the role of teacher inquiry combined with the opportunities of more innovative learning environments. These newer learning environments, where the design intentionally creates communities of learners far bigger than just one classroom, create the ability for collaboration and shared practice in ways that can radically transform the experience of learning. The narratives within this anthology provide clear examples of these two intertwined components: space and inquiry.

There is tremendous power in making the journey of transformation a collective envisioning process. It is through shared experiences and mutual learning that educators can cultivate a vision robust enough to unite communities and create opportunities for enhanced learner agency. Embarking on this journey is not merely an option; it is a necessity. The urgency of educational transformation is becoming increasingly visible against the backdrop of rapid technological advancements, particularly in artificial intelligence, and the emergence of new learning opportunities.

The demands of employers are evolving accordingly. Over the past decade, numerous reports have been commissioned and published, highlighting the

shift in skill requirements for the workforce. The option to remain unchanged is quickly disappearing, and educators who neglect to explore and understand the nuances of learning autonomy are doing their students a significant disservice. By fostering collaborative communities of practice that champion self-direction, self-determination, and autonomy, educators can ensure that their students are well-equipped to thrive in the ever-changing landscape of the future, just as they are thriving as younger learners in the changed cultural context of a more innovative learning environment.

The diverse chapters within this anthology offer insightful glimpses into the ongoing processes of educational transformation across a variety of nations. Given the distinct cultural and contextual differences that exist, it is vital that we explore narratives from a broad spectrum of systems and cultures. This exploration is crucial if we are to identify and forge effective strategies for instigating and maintaining change in the educational landscape.

How might educators' proficiency in self-directed learning within more open and collaborative learning environments influence and transform the learning experience for their students? Mahat and Bradbeer astutely highlight the critical role of continual teacher inquiry as the cornerstone of educational transformation. If educators are to guide students toward acquiring the skills necessary for self-directed learning, they themselves must first embody the principles of self-directed learners. Teacher inquiry emerges as a natural and effective avenue for this endeavor – encouraging educators to reflect upon and refine their approaches to meet the evolving needs of their students, thus fostering a culture of curious, lifelong learners who take ownership of their educational journey, under the guidance of teachers who are continually reassessing and adapting to the learning requirements of their students.

The ensuing chapters shed light on exemplary and collaborative learning environments from around the world. Whether it is a government-run school in New Zealand, a private institution in Australia, a remote and disadvantaged educational setting in Malaysia, or a purpose-built educational facility in Italy, educators are raising remarkably similar questions and needing to address similar challenges.

There are many questions that need to be asked. How can they most effectively assess and respond to their students' needs? What modifications or adaptations could be made to enhance student agency? What strategies are effective for collaborating with colleagues to bring about change? What constitutes self-directed learning? What insights do curriculum developers need to gain from the realities of the classroom? How do contemporary learning environments differ fundamentally from the open-plan classrooms of previous

decades? What elements are essential for the flourishing of learning communities?

The articles in this anthology should not only motivate readers toward change but also an understanding that every context is different and will require a specific focus. This conversation is critical, especially in light of the tendency of government and educational bureaucracies to pursue short-term goals due to a fear of failure. Yet, it is precisely this capability to fail forward – to critically appraise and modify learning experiences – that stands out as an essential skill for the future. As we draw together the threads of inquiry, exploration, and collaboration detailed in these chapters, we are reminded that the journey toward educational transformation is both a collective and an individual endeavor. It challenges us to rethink, reimagine, and reinvigorate the educational landscape for the benefit of all learners, preparing them for a world that is continually evolving.

*Dr Stephen Harris*  
Learnlife, Sydney and Barcelona

This page intentionally left blank

## ACKNOWLEDGMENTS

Writing and editing a book is no easy feat. We couldn't have done it without the support of many.

To our esteemed authors, we express our heartfelt gratitude for the dedication and commitment you've demonstrated in crafting your chapters. We understand that this endeavor has required considerable time and effort, often amid the demands of your primary roles in education – teaching, leading, and continual learning within school settings. Your willingness to share your expertise and insights, despite the myriad challenges inherent in your daily responsibilities, is truly commendable.

To our early readers and critical friends, we have valued your thinking and critique and know the book is all the better for it.

To John Hattie and Stephen Harris, the impact of your work in schools and school systems around the world are incredible. We are humbled by your generosity and kind words in providing a prelude to this manuscript.

To Kirsty Woods, Lydia Cutmore and the team at Emerald, thank you for your diligent approach, for supporting us through the process, and for the opportunity to see this idea through to fruition.

Finally, but definitely not the least, to all the educators in the teaching profession. Your passion for teaching and dedication to professional inquiry is second to none. Thank you for making learning fun and engaging in whatever environments you are in.

*Chris and Marian*

This page intentionally left blank

# TEACHER-LED INQUIRY IN SCHOOL LEARNING ENVIRONMENTS: SETTING THE CONTEXT

MARIAN MAHAT AND CHRIS BRADBEER

The University of Melbourne, Australia

## ABSTRACT

*Teacher-led inquiry in school learning environments is the critical and systematic analysis of pedagogical practice in flexible and agile learning environments that teachers undertake as researchers of their own practice. It is an iterative approach, combining theory and practice, operates over reasonably short time spans and involves substantial collaboration and participation amongst peers. Akin to action research, it works most effectively when it is combined with evidence on what works (and what works well) and what does not, specifically as it relates to student learning outcomes. In this introductory chapter, the authors synthesize scholarly research to set the context for teacher-led inquiry in school learning environments. The authors discuss the challenges and opportunities for schools and educators embarking on evidence-based teacher-led inquiry as a powerful form of professional learning for contemporary teachers.*

**Keywords:** Teacher-led inquiry; practitioner inquiry; school learning environments; flexible and agile spaces; spatial competencies

## INTRODUCTION

Teacher-led inquiry or practitioner inquiry is a systematic, intentional study of one's professional practice (Dana, 2015). It provides a framework to examine the complexities of teaching and learning whilst also ensuring that the voices and practices of educators are central (Dana & Yendol-Hoppey, 2020). Akin to the process of action research (Carr & Kemmis, 1986; Dana & Yendol-Hoppey, 2014), it ensures that problem identification, action planning, trialling of alternative approaches, data collection and evaluation of impact are based on everyday teaching practice and unique school contexts. Through teacher-led inquiry, teachers' tacit knowledge is made explicit and localized knowledge and personal beliefs are developed, questioned and re-shaped. While teacher inquiry has a focus on enhancing pedagogy in ongoing ways, it also deepens understandings of complex cultural, political and social-emotional factors that influence what teachers and students do and believe (Cochran-Smith & Lytle, 2009).

Teacher-led inquiry is characterized by the teacher as researcher, community building, collaboration, school contexts as sites of inquiry and professional practice as the focus of study (Cochran-Smith & Lytle, 2009). A cyclical process, teacher-led inquiry involves developing questions (predominantly because of an identified issue or challenge), collecting and analysing data to gain evidence and insights, making changes to practice and sharing and reflecting on findings (Dana, 2013, 2015; Dana & Yendol-Hoppey, 2020). Rather than a focus on reproduction or simple application, teacher-led inquiry encourages teachers to value problem-finding, risk-taking and failure as opportunities for learning. Consequently, teacher-led inquiry is not static and linear – it is a process that can sometimes produce more questions than answers and often with surprising results.

Teacher-led inquiry empowers teachers through an active, ongoing examination of practice in context. Importantly, it positions students and their learning as central to decision-making in teachers' practice. As questions and new insights emerge, teachers respond through carefully constructed action plans, collaboration, a preparedness to address tensions and a desire to take risks and activate thinking dispositions. When teachers embrace this cyclical reflective process as a way of being, inquiry becomes a stance (Cochran-Smith, 2003). Inquiry as a stance can enable teachers to ground their teaching practices that optimize learning and meet students' needs (Dana, 2015). It is a powerful form of evidence-based, job-embedded professional learning for teachers.

## WHAT THIS MEANS IN THE CONTEXT OF SCHOOL LEARNING ENVIRONMENTS

Contemporary schools' learning environments are being transformed to incorporate innovative designs and pedagogies, digital technology and new ergonomic furniture – often 'un-classroom-like' in their form but can more readily accommodate the needs of 21st century learners (Bradbeer et al., 2019). Rather than the egg-crate model of teaching, flexible and agile learning environments help students connect to the real world by providing authentic learning experiences, enabling them to become lifelong learners who contribute to society and the wider world as active and discerning citizens.

This is a global phenomenon, not restricted to only some school systems (Mahat & Imms, 2021). Following the Organisation for Economic Co-operation and Development's (OECD) advice that schools today 'need to prepare students for more rapid economic and social change than ever before, for jobs that have not yet been created, to use technologies that have not yet been invented, and to solve problems that we do not yet know will arise' (2015, p. 3), schools and schools systems around the world including in Finland, Ireland, Italy, New Zealand, Singapore, Spain, Uruguay and many others are investing in school building infrastructure that are more flexible and agile to meet this need (Bradbeer et al., 2017).

Flexible and agile learning environments need to be distinguished from open plan learning environments of the 1960s. The open-space school concept first emerged as an experimental school design where the physical walls separating classrooms were removed to promote movement across class areas by teachers. The idea of the open classroom was that a large group of students of varying skill levels would be in a single, large classroom with several teachers overseeing them. Rather than having one teacher lecture to the entire group at once, students were typically divided into different groups for each subject according to their skill level for that subject. The students then worked in small groups to achieve their assigned goal.

Flexible and agile learning environments are more than just an open canvas for teaching and learning. They are planned and designed for their intended use and purpose to meet a variety of pedagogical practices that cater to the needs of a diverse cohort of students. Rather than a one size fits all approach, these environments provide opportunities for teachers to differentiate and tailor their pedagogical practice to meet students' individual needs. Consequently, these flexible and agile learning environments are much more than just innovative design features; they also require innovative and varied pedagogical approaches (Mahat et al., 2018) – including direct instruction,

collaborative group activities, and independent learning (Mahat & Imms, 2021) – to work most effectively.

Working and teaching in these environments require teachers to continuously reflect on their practices – not least because the cohort of students changes each year. This involves an iterative process of inquiry on what works, what works well and what does not, specifically as it relates to student learning and outcomes. Teacher-led inquiry is highly contextual – what works well in one context might be unsuccessful in another. However, evidence-based, job-embedded professional learning in any contexts provide critical knowledge and insights on the experiences of educators that have been found to be useful for the practice of teacher inquiry as a stance (Cochran-Smith, 2003). Inquiry as a stance offers opportunities for educators to question, understand and reflect on challenges of designing, using and inhabiting their school learning environments, ensuring a cycle of improvements over time.

#### IMPLICATIONS FOR TEACHING AND LEARNING

The case studies in this monograph synthesize examples of teacher-led inquiry from varied contexts – in Australia, Malaysia, New Zealand, Singapore and Italy – with the aim of providing a compilation of strategies that other educators might consider. The case studies provide inquiries in three main foci: design, pedagogy and collaborative practice. The case studies involved the collection of data from myriad sources, including surveys from both teachers and students, teachers' observations and reflections, focus group discussions and leadership feedback. Outcomes include increased agency and engagement of students, efficacy of teachers, improved teaching and pedagogical practices and the development of strategies for improvements. In several of the case study examples, data were also fed back to inform master planning, the design of learning spaces in schools or furniture purchase.

*Design* relates specifically to aspects of the built environment, involving design of learning spaces, furniture selection and usage, planning and using of indoor and outdoor spaces, etc. Inquiry is conducted typically using enduring prototypes (Osborne, 2021), i.e. involving the use of existing spaces that allow teachers to trial some of the approaches and furniture believed to be useful or more effective in flexible and agile spaces. This form of inquiry, as is described in chapters 2 and 3, leads to cost efficiencies as it informs decision-making of significant infrastructure expenditure. In these case studies, it is an opportunity to utilize change champions to test and trial new and innovative approaches

and to scale up both in quantitative, such as number of teachers adopting new practices, and qualitative, such as in responsibilities, norms and practices, changes (Blannin et al., 2020; Roesken-Winter et al., 2015) that is critical for sustainable improvements.

*Pedagogy* relates to the teaching approaches used in the learning space, from project-based learning to inquiry-based learning to co-teaching. The design of new learning spaces should be based on specific pedagogical principles whilst considering theories of learning, subject matter and pedagogical practice, including the use of technology (Cuban et al., 2001; Scardamalia & Bereiter, 2014), all of which must be integrated effectively in the space (Ellis & Goodyear, 2016). In Chapter 7, this pedagogical inquiry occurred in traditional classroom spaces with quite different contexts than the typical school. Physical modifications to the classroom space, even small ones, such as changes in seating arrangements, classroom organisation and visual stimulation affect teaching and learning behaviours and outcomes (Ariani & Mirdad, 2016; Duthilleul, 2018; Tanner, 2009), including in achievement tests, increased on-task behaviours, improvements in mood and motivation and greater student engagement (Guardino & Antia, 2012; Guardino & Fullerton, 2010; Woolner et al., 2007), as can be seen in some of the case studies.

*Collaborative practice* refers to ways of working within the learning environments and more broadly within the school. Such collaborative inquiry involves a group of teachers, or whole-school community, working together to systematically examine focused aspects of their teaching and pedagogical practices. Having a shared focus, feeling accountability to the group, large group sharing and debriefing, sustained cycles of collaborative inquiry, affective support, valuing diversity and drawing from expert others as resources are some of the supports that are useful in collaborative practice (Schnellert & Butler, 2021). In particular, the ‘collaborative enactment of practices’ (p. 106) is critical in teacher-led inquiry in school learning environments, as can be seen in Chapter 3. Throughout this process, teams of teachers test presuppositions about what they think will work against the evidence of what actually works (City et al., 2009) and to utilize individual strengths and opportunities to determine how the facets of learning, time and space are organized (Bradbeer, 2021). By closely examining and reflecting on the results of their actions, teachers begin to question long-standing beliefs and consider implications for their professional practices. Typically, such collaborative practices also involve a culture of trust that embraces change, as can be seen in Chapter 4.

The case studies as described in the subsequent chapters provide examples of teacher-led inquiry in school learning environments that focus on three

critical areas of design, pedagogy and collaborative practice. Their contributions are further synthesized in the concluding chapter, highlighting some of the key strategies that have been found to be useful in different school contexts. Written by educators themselves, this book provides the voices, perspectives and reflections of educators as they traverse into their new learning environments whether a refurbishment, a prototype or as part of a built masterplan. The book is a powerful form of evidence-based, job-embedded professional learning *from* educators *for* educators. It contributes to the ongoing development of the education profession not only by using research findings to inform teachers' practices and professional learning but also by sharing these findings with peers, policymakers and the broader community, for long-term sustainable improvements.

## CHALLENGES AND OPPORTUNITIES

Teacher-led inquiry as a form of professional learning poses several challenges and opportunities for teachers, schools and school systems. Teachers require time and resources if they are to make sense of data, explore research designs and develop findings from their work, which is critical for success (Blannin et al., 2020). In a world of 'crowded curriculum, massive administrative load and everchanging educational trends, technology and environments' (Mahat, 2023b, p. 41), school leaders need to be persuaded that teacher-led inquiry is an important investment. In the context of school learning environments with millions of dollars being spent on school infrastructure, the opportunity cost of not doing any type of inquiry can be detrimental, not only in terms of financial resources but also on student learning and outcomes.

Teacher-led inquiry in school learning environments can be categorized by 'false-starts', 'failures' and 'messy-sidesteps', with change being slow to gain momentum across the school. Teachers' enthusiasm may diminish before significant changes can take place. In the context of school learning environments, steady momentum can be gained through maintaining a core group of educators as change champions, the continuous collection of data (even amidst other changes within the school) and ongoing commitment of the schools' leadership (Blannin et al., 2020). Incorporating flexibility and agility into any programme of teacher-led inquiry also means that research could be integrated into the teaching practices of teachers on a sustainable basis (Elliot, 2009).

Kemmis et al. (2014, 2017) consider learning as being 'stirred in' to practice. In this case, the dynamics of entering and becoming a teacher involves

being initiated into the discourses (sayings), the workings (doings) and relationships (relatings) of teaching. As a teacher learns more of the teaching and pedagogical practices, they make their way from the boundary towards the nucleus of the community they are engaging in. This changes their professional competence identity from novice to expert, respectively. In the same way and in the context of school learning environments, being ‘stirred in’ practice is an iterative process of becoming and being, which is critical for the development of teachers’ spatial competency and identity (Mahat, 2023b).

Teacher-led inquiry reflects one of the core tenets of Wenger’s (1998) social learning theory in communities of practice: Mutual engagement. Wenger described engagement as a three-fold process which includes the ongoing negotiation of meaning, the formation of trajectories and the unfolding of histories of practice (Wenger, 1998, p. 174). While ideas develop in solitude, they grow exponentially in intellectual exchanges that is critical in teacher-led inquiry. Such exchanges provide the inter-connections between people, places and activities that support the acquisition of spatial skills for teachers to use the school learning environments as a pedagogical tool to support better student learning and outcomes (Mahat & Loh, 2023). It brings together individuals with varying experiences, which enable different pedagogical approaches to emerge from the collective knowledge of educators and from multiple perspectives (Mahat, 2023a). This form of intellectual engagement goes a long way to transforming teachers’ professionalism.

## CONCLUSION

Documenting the case studies of teacher-led inquiry, specifically in school learning environments, is one way of counteracting the naysayers of flexible and agile learning environments that are pervasive in the media. It provides contextualized evidence that, with proper planning and inquiry, school learning environments with flexible and agile design features support the development of student learning and outcomes that are not possible in conventional classroom layouts. Additionally, showcasing these case studies provides an opportunity to celebrate teachers’ professionalism that typically goes un-noticed and un-recognized. It is critical that such important work is highlighted and brought to the forefront – both in theory and in practice.

## REFERENCES

- Ariani, M. G., & Mirdad, F. (2016). The effect of school design on student performance. *International Education Studies*, 9(1), 175–181.
- Blannin, J., Mahat, M., Cleveland, B., Morris, J. E., & Imms, W. (2020). Teachers as embedded practitioner-researchers in innovative learning environments. *Center for Educational Policy Studies Journal*, 10(3), 99–166. <https://doi.org/10.26529/cepsj.10.3>
- Bradbeer, C. (2021). The enactment of teacher collaboration in innovative learning environments: A case study of spatial and pedagogical structuration. In W. Imms & T. Kvan (Eds.), *Teacher transition into innovative learning environments: A global perspective* (pp. 47–60). Springer.
- Bradbeer, C., Mahat, M., Byers, T., & Imms, W. (2019). *A systematic review of the effects of innovative learning environments on teacher mind frames*. The University of Melbourne. <http://hdl.handle.net/11343/233535>
- Bradbeer, C., Mahat, M., Marian, T., Cleveland, B., Kvan, T., & Imms, W. (2017). The “state of play” concerning New Zealand’s transition to innovative learning environments: Preliminary results from phase one of the ILETC project. *Journal of Educational Leadership, Policy and Practice*, 32(1), 22–38.
- Carr, W., & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research*. Falmer Press.
- City, E. A., Elmore, R. F., Fiarman, S. E., & Teitel, L. (2009). *Instructional rounds in education* (Vol. 30). Harvard Education Press.
- Cochran-Smith, M. (2003). Learning and unlearning: The education of teacher educators. *Teaching and Teacher Education*, 19(1), 5–28.
- Cochran-Smith, M., & Lytle, S. L. (2009). Practitioner inquiry: Versions and variance. In M. Cochran-Smith & S. L. Lytle (Eds.), *Inquiry as Stance Practitioner: Research for the next generation* (pp. 37–59). Teachers College Press.
- Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, 38(4), 813–834.
- Dana, N. F. (2013). *Digging deeper into action research: A teacher inquirer’s field guide*. Corwin Press.