Personalised learning as a pedagogical approach at Trinity Grammar School: Impact on the use of space

Faculty of Education

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Dr Marian Mahat is an Associate Professor in the Faculty of Education at the University of Melbourne. Her research focuses on the connections and alignment of the physical and pedagogical learning environments, with an emphasis on spatial literacy and competency, evidence-based teacher-led inquiry, and professional learning and development of teachers across different educational and learning environment contexts. Working across multiple fields of inquiry, utilising innovative quantitative and qualitative methodologies and interdisciplinary collaboration with other universities, industry and schools, she has co-authored over 70 peer-reviewed journal articles, book chapters and reports, and recipient or co-recipient of over AUD$2.3M in external research funding. Her core research program is recognised nationally and internationally, exemplified by several research excellence awards.

Dr Chris Bradbeer is a learning environments researcher and educational consultant based in New Zealand. His work looks at developing connections between pedagogy and space, growing teachers' collaborative capacity and skills, and harnessing student voice to inform decision-making. For twenty-five years he has taught and led in schools in the United Kingdom and New Zealand, most recently as Associate Principal at Stonefields School in Auckland. His PhD research, at the University of Melbourne, explored teacher collaboration in innovative learning environments. He is currently an Honorary Research Fellow with the Faculty of Education and part of the team working on the Innovative Learning Environment and Students Experience project (ILESE).

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Acknowledgment of Traditional Owners

The University of Melbourne acknowledges the Aboriginal and Torres Strait Islander traditional owners of the unceded land on which we work and learn. We pay respect to the Elders, past and present, and the place of Indigenous knowledge in the academy.

Disclaimer

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Executive Summary

Rationale

It is widely recognised that a school's pedagogical vision should guide the design and construction of its learning environments. When a school has a well-defined pedagogical approach that is deeply understood by the entire school community, the learning spaces, including the use of technology and furniture, can be designed to align with this vision. Empowering teachers (Bøjer, 2021) to take control of their physical environment and actively work on aligning space with practice (Mahat et al., 2018) 'activates' the learning environment, leading to deeper student learning (Imms et al., 2017).

Aim

The overarching objective of the study was to support teacher-led inquiry in using and evaluating pedagogical practices in the prototype learning spaces, otherwise known as the Robertson Corridor, at Trinity Grammar School. This study was conducted in the first half of 2024.

Method

The study utilised a mixed method approach involving video observations, teacher and student surveys, as well as artefacts produced from three co-design workshops. Triangulating the findings from various data sources, this report describes an in-depth case study of the pedagogical and spatial practices of four teachers in the prototype learning spaces. Additionally, all teachers who were teaching in the Robertson Corridor, were invited to respond to a survey that asked them about their perceptions of the prototype spaces.

Results

In summary, the following results were found:

- Measures of student learning, engagement, and agency increased after the post-intervention lesson for two of the case studies (Alex and Bailey). There was some variability with the other two case studies, with learning and agency improving for Year 11 Politics students and engagement improving for Year 8 Geography students.
- Measure of teacher efficacy increased for Bailey and Dani. However, the means of teacher efficacy increased after the post-workshop but decreased after the post-lesson for Alex and Charlie.
- Teachers' confidence and knowledge about teaching in a more flexible and agile teaching space increased for all case study teachers.
- Video analysis of lessons showed a change in their teaching practices, most noticeably, resulting in a reduced amount of time spent in didactic instruction and increased time facilitating learning.
- Case study teachers responded positively to the opportunity to trial different teaching practices in the prototype spaces. However, they acknowledged several challenges, including the additional planning time required and the need to adapt previous practice.
- Survey responses in the larger cohort of teachers were split fairly evenly between positive and negative responses. Positive comments suggested that teachers found the spaces well-lit and with good acoustics, and for some, the opportunity for students to collaborate in groups was a positive feature. On the other hand, many of the negative comments referred to difficulties with the furniture and its layout, and the need for spatial arrangements that reduced distraction. They also cited a need for knowledge-building and professional learning on how best to use the spaces in their teaching.

Implications

The findings of the study provide several important implications and next steps, critically involving the school pedagogy, school design and professional learning. Taken together, this will enable Trinity Grammar School to transition into their new learning environments with confidence:

- **School pedagogy.** The concept of personalised learning is interpreted in several ways between the participating teachers. To ensure consistency and sustainability across the school, it is critical to ensure that there is a shared agreement within the whole school community. A critical piece of work, therefore, would be to co-develop with teachers a set of key beliefs and underlying principles pertaining to personalised learning, as well as articulating aligned practices, shared expectations, and ways of evaluating their effectiveness.
- **School design and master-planning.** The prototype spaces in the Robertson Corridor have been set up with the intention of providing teachers with a context in which to trial new ways of teaching. It would be beneficial to establish a methodology for how this current work will inform future design conversations—how will findings from the use of these spaces inform the shape, size, layout, and adjacencies of learning spaces and the selection of furniture within them? How will teachers (and students) be further consulted about the design of future learning spaces?
- **Professional learning.** Teachers involved in the study valued the professional learning opportunity to trial the new spatial and furniture settings. This is also reiterated by the feedback from the broader teaching staff. Professional learning can occur in several ways:
    - Scaling up the professional learning workshops to include a larger cohort of teachers and/or the whole school community.
    - Providing ongoing support as well as a forum for professional conversations through the establishment of professional learning communities (PLCs).
    - In tandem with the PLCs, engaging teachers in teacher-led inquiry, one that enables teachers to focus on and evaluate a specific part of their practice.

Introduction

Trinity Grammar School is an independent Anglican day and boarding school for boys, located in Kew, Melbourne, Australia. Opened in 1903, Trinity is looking at infrastructure developments of new and refurbished spaces. To inform their school infrastructure developments, and master-planning, Trinity has refurbished several learning spaces, including the Robertson Corridor, which will be used for trialling new and innovative pedagogical practices.

It is increasingly understood that the pedagogical vision of a school should underpin the design and build of their learning environments. When a school's pedagogical approach is clearly defined with a deep understanding across the school's community, learning space, including the use of technology and furniture, can be designed to align with this intended vision. When teachers are empowered to take control of their physical environment (Bøjer, 2021) and actively work on aligning space and practice (Mahat et al., 2018), the learning environment is 'activated' and students achieve deeper learning (Imms et al., 2017).

Trinity's strategic plan promotes personalised learning as a pedagogical approach that underpins their teaching and learning.

> *Individuality has always mattered at Trinity, and the ability to personalise learning, leadership and wellbeing will continue to be a point of difference for our school. Knowing our people deeply and personally, will be the centre of our focus as we venture towards Trinity 2030* (Trinity 2030 Strategic Plan, p. 12).

There is, however, no one definition of personalised learning. As a result of the definitional vagueness, there are various overlapping accounts of the pedagogies, environments and components required to optimise personalised learning as a pedagogical approach (Prain et al., 2013). This vagueness has also necessitated schools and teachers to define and conceptualise what personalised learning means to them as individuals and as a whole school community.

Consequently, the overarching objective of the study was to support teacher-led inquiry in using and evaluating pedagogical practices in the prototype learning spaces, based on a personalised learning pedagogical approach. This study was conducted in the first half of 2024. The aims of the study were two-fold: (1) To co-design pedagogical practices with a group of teachers for use in Trinity's prototype spaces; and (2) To support evidence-based practice through data collection to inform learning space and pedagogical design.

Study Design

Spatial context

The Robertson Corridor refurbishment contains four explicit classrooms, R1, R2, R3 and R4 (see **Figure 1**). These learning spaces were designed with breakout spaces such as breakout rooms and theatrette, an array of audio and video tools, and diverse types of furniture such as cushioned seating and booth seats, round and rectangular tables, and whiteboard tables. The case studies involved the use of R1, R3 and R4.

Figure 1. Spatial layout of Robertson Corridor, R1 – R4

R1 is approximately 89.6 metres square, with a breakout meeting room attached to it. There are several round and rectangular tables that could be reconfigured as needed. There is a cushioned seat on one wall of the classroom, with typically three round tables set up alongside it. The classroom has two screens (one interactive touch screen), two cameras for hybrid or online teaching, and microphone array. The classroom can comfortably sit 30 students including in the breakout seating area.

R2 is approximately 65.3 metres square and is connected to R1 via a door. Tables and chairs are organised around four screens (non-touch) located on the walls. Teachers can control all the screens at the same time or students can control individual screens. There is a microphone array in the space but no cameras. The classroom can comfortably sit 26 students.

R3 is approximately 65.3 metres square in size with additional access to a breakout room and theatrette. The classroom contains two round and three rectangular tables that could be reconfigured as needed. The classroom has one interactive touch screen. There are no cameras or microphones set up. The classroom can comfortably sit 26 students. The adjacent breakout space contains a rectangular table and seating for six students. The theatrette, accessed via the breakout space comfortably sits 14 students on tiered L-shaped soft seating. The theatrette has one large (non-touch) screen fixed to the wall on a movable arm. In addition, there are breakout seats in the corridor with whiteboard tables that can comfortably seat 10 students.

R4, also known as 'the huddle room', is approximately 63.5 metres square, and notable for its curved walls. There are five large circular whiteboard tables in the centre of the room. There are three smaller whiteboard tables in the corners, each positioned next to an L-shaped soft seating area. The classroom has one large, curved screen, two cameras for hybrid or online teaching, and a microphone array. The classroom can comfortably sit 26 students.

Sample

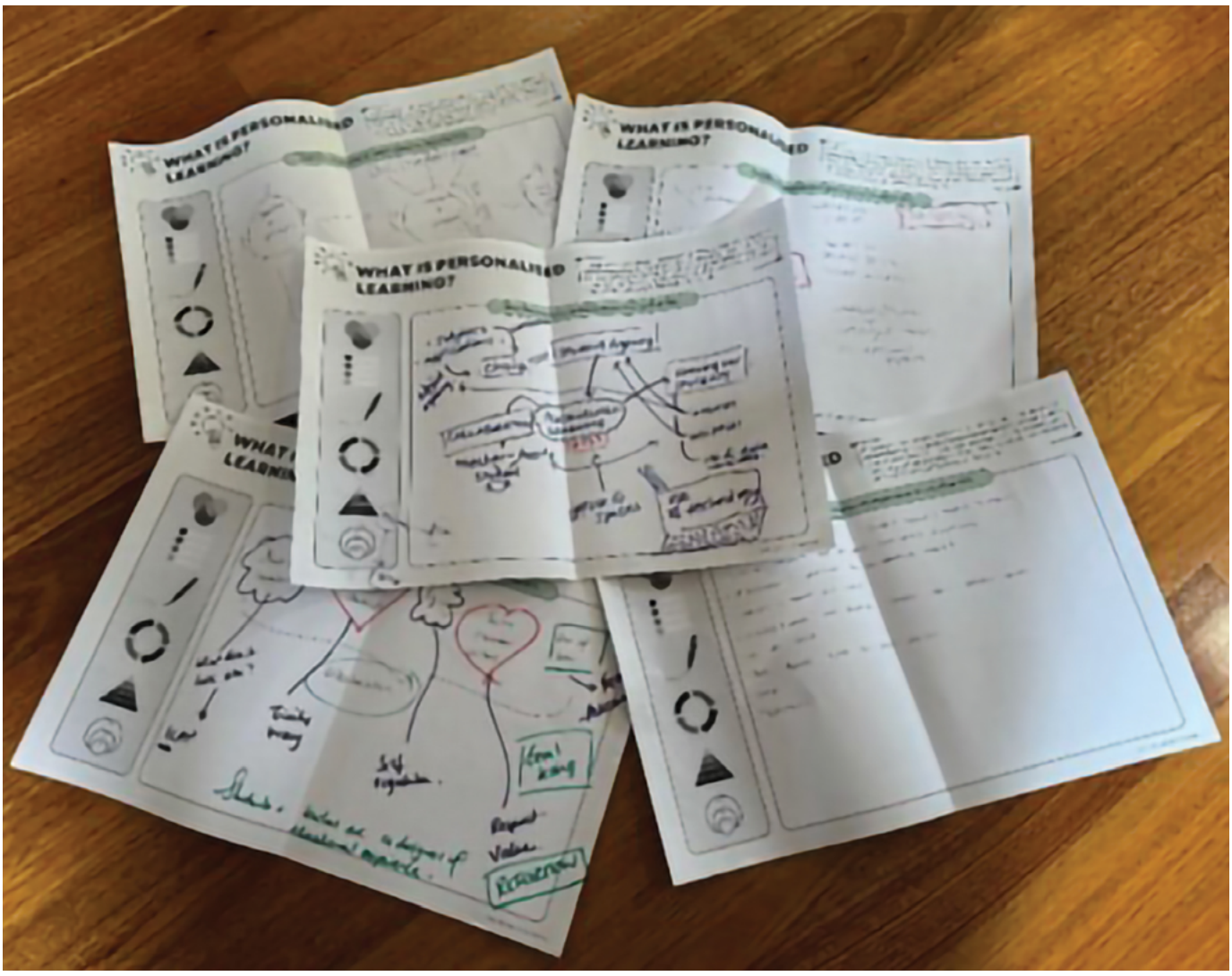
Teachers were recruited based on an expression of interests of all teachers scheduled to teach in the Robertson Corridor in 2024. The study involved four teachers—two teaching Mathematics, one teaching Humanities and one teaching Politics, with 72 of their students—who responded to the expression of interest.

Co-design workshops

Three face-to-face interactive workshops were held with the four teachers and two senior educators to co-design pedagogical practices that aligned with Trinity's strategic and pedagogical vision of personalised learning. The co-design workshops also provided teachers with a deeper understanding of how physical space could be leveraged and optimised to support different pedagogical practices and enhance student learning outcomes.

Workshop 1 focussed on what it means for teachers to deliver personalised learning in their classrooms. It created a shared understanding amongst teachers about personalised learning as a pedagogical approach and how teachers' practice can support it (see **Figure 2**). Workshop 2 explored design and spatial settings to ensure that teachers can implement their pedagogical and teacher practice. And finally, Workshop 3 explored teachers' mindsets as they considered what was most important for a successful practice. The final workshop also explored several spatial strategies with case study examples to support the development of their spatial competency. As part of the final workshop, teachers also reflected on their learnings from the workshops and were asked to write a letter to their future self who was about to embark on the transition to more innovative learning environments. The outcome from these workshops was a set of action plans for teachers to trial and implement a pedagogical intervention based on personalised learning in the prototype spaces. The action plans and reflections were also used as data sources.

Figure 2. Workshop artefacts on creating a shared understanding of personalised learning



Video observations

Classroom observations were undertaken via video recordings of lessons before and after the co-design workshops. One researcher analysed the video recordings employing an observation protocol tailored to examine teacher practices, adapted from the Linking Pedagogy, Technology, and Space (LPTS) observational metric (Byers, 2016). During the analysis, videos were observed specifically for the teacher practice employed by the teacher, and coded and time stamped accordingly. Categories of teacher practice as recommended by the LPTS observational metric include didactic instruction, interactive instruction, facilitating, providing feedback, class discussion, and questioning (See **Table 1** for definitions each category). Total time spent in each category was calculated as a percentage of the whole lesson. The second researcher reviewed the analyses to ensure agreement with the categories and time spent in each category. Both researchers also added qualitative observations of what was happening during the lessons.

Table 1. Definitions of teacher practice categories

Teacher practice categories	Definitions
Didactic instruction	Delivery of factual information without any input from students.
Interactive instruction	Delivery of factual information with systematic interaction from students.
Facilitating	Guiding and assisting student in learning for themselves.
Providing feedback	Any response regarding a student's performance, behaviour, or questions.
Class discussion	A sustained exchange between and among teachers and students with the purpose of developing students' capabilities and/or expanding students' understanding of a specific concept. Can be whole class, large and small groups discussion.
Questioning	Instructional cues or stimuli that convey to students the content elements to be learned and directions for what they are to do and how they are to do it.

Teacher and student surveys

Student Learning, Engagement and Agency Survey

The Student Learning, Engagement and Agency survey was administered to students at two moments in time, before and after the delivery of the intervention lesson. Student learning in this context focuses on student's deep learning and is characterised by critically applying new facts to existing knowledge and accepting that learning as part of their personal development (Mahat at al., 2018). Eleven items were derived from the Space Design and Use Survey (Imms et al., 2017; Mahat & Imms, 2021) adapted from Kember et al. (2004). An example of an item is "I try to relate what I have learned in one subject to what I learn in other subjects."

Student engagement in learning is defined as a balance between student's capability for learning and expectations of learning in a particular learning environment context (Cavanagh et al., 2008). Twenty-four items were derived from Survey of Student Engagement in Classroom Learning (Cavanagh, 2015). An example of an item is "I am confident about my ability to perform well."

Student agency can be defined as having ownership, making responsible choices, and taking meaningful action in the student's learning process (Benson, 2022). Thirty-six items from the Agency Self-perception Tool (ASpT, Benson, 2022) were used for the study. A number of items were revised as they were relevant to the original study's context (New Zealand). An example of an item is "I know where I learn best." The student survey used a 4-point Likert scale of Strongly Agree, Agree, Disagree, Strongly Disagree.

The final student survey also included a photo elicitation section where students could take a photo of their favourite space and respond to two open-ended questions about how the space or furniture helped them learn.

Teacher Efficacy Survey

The Teacher Efficacy Survey was administered to teachers at three moments in time—prior to the workshops as baseline data, after the workshop and after the lesson intervention. Teacher's self-efficacy is defined as teacher's belief in their capacity to positively influence students, and is strongly associated with student achievement (Hattie, 2015). Twenty items were adapted from the Classroom and School Context Model of Teacher Efficacy (Friedman & Kass, 2002). For instance, one item reads: "I know how to improvise in response to changing circumstances when I teach." Two additional items were included: "Q19. I know how to adapt my pedagogical practice when teaching in a more flexible and agile learning space" and "Q20. I feel confident teaching in a more flexible and agile learning space". This survey employed a 6-point Likert scale of Always, Very often, Often, Sometimes, Rarely, and Never.

Similar to the student survey, the final survey also included a photo elicitation section where teachers could take a photo of their favourite space and respond to two open-ended questions about how the space or furniture helped them teach. For the teacher survey, this section also included additional open-ended questions about the use of breakout spaces, as well as the benefit, challenges and support they needed to teach in the prototype spaces. This component of the survey was also distributed to the broader school community who were teaching in the Robertson Corridor.

Results

The findings in this study were obtained through descriptive analysis, employing visual graphic analysis via histograms, and summarised in table formats. Inferential statistical analysis was not conducted due to small sample sizes. Additionally, the results incorporated images supplied by teachers and students, qualitative analysis of data gathered from open-ended questions, as well as lesson plans and reflective texts from teachers. Data triangulation from various sources provided a thorough understanding of the change in pedagogical practice from teacher and student perspectives.

Table 2 summarises the number of student responses. **Table 3** summarises the means for student learning, engagement, and agency, whilst **Table 4** summarises the means of teacher efficacy before and after intervention. Green indicates an increase in the means whilst amber indicates a decrease in the means. The subsequent subsections discuss in detail the findings from the four case studies. The final subsection provides the findings from the broader teacher feedback survey.

Table 2. Number of student responses

Phase	Pre1			Post2		
Survey	**Learning**	**Engagement**	**Agency**	**Learning**	**Engagement**	**Agency**
Year 10 Maths (Alex)	17	17	17	18	17	17
Year 11 Maths Methods (Bailey)	20	19	19	13	13	13
Year 11 Politics (Charlie)	15	14	14	10	10	10
Year 8 Geography (Dani)	20	18	18	18	18	18
Total sample (*n*)	72	68	68	59	58	58

Table 3. Student learning, engagement, and agency

Means	Student learning		Student engagement		Student agency	
	Pre	Post-l	Pre	Post-l	Pre	Post-l
Year 10 Maths (Alex)	2.68	2.96	3.01	3.11	3.01	3.19
Year 11 Maths Methods (Bailey)	3.01	3.22	3.16	3.41	3.17	3.31
Year 11 Politics (Charlie)	2.86	2.87	3.09	3.03	3.01	3.18
Year 8 Geography (Dani)	2.80	2.65	3.03	3.05	3.04	3.02
All students	2.81	2.91	3.08	3.14	3.06	3.16

Table 4. Teacher efficacy

Means	Teacher efficacy			Adapting practice (Q19)			Confidence (Q20)		
	Pre	Post-w	Post-l	Pre	Post-w	Post-l	Pre	Post-w	Post-l
Alex	4.50	4.56	4.33	4.00	3.00	5.00	4.00	3.00	5.00
Bailey	4.28	4.22	4.72	2.00	2.00	4.00	2.00	3.00	4.00
Charlie	4.17	4.61	4.44	3.00	4.00	5.00	2.00	4.00	5.00
Dani	4.67	4.67	4.72	3.00	4.00	5.00	4.00	5.00	5.00

Case study 1 – Year 10 Maths (Alex)

Alex is a beginning Mathematics teacher, with less than five years of teaching experience. The case study involved a Year 10 Mathematics class consisting of 19 students, using R1.

Pre and post-workshop lessons

The pre-workshop lesson focussed on bivariate data. Alex spent the majority of class time on teacher-led instruction standing in front of the classroom. Alex spent the remainder of the class time on facilitation, where students were asked to complete example tasks individually or in groups. Alex stayed in the front of the classroom initially during the facilitation time, where students would come up to the front to ask questions, and then moved around the classroom to assist and support students as required.

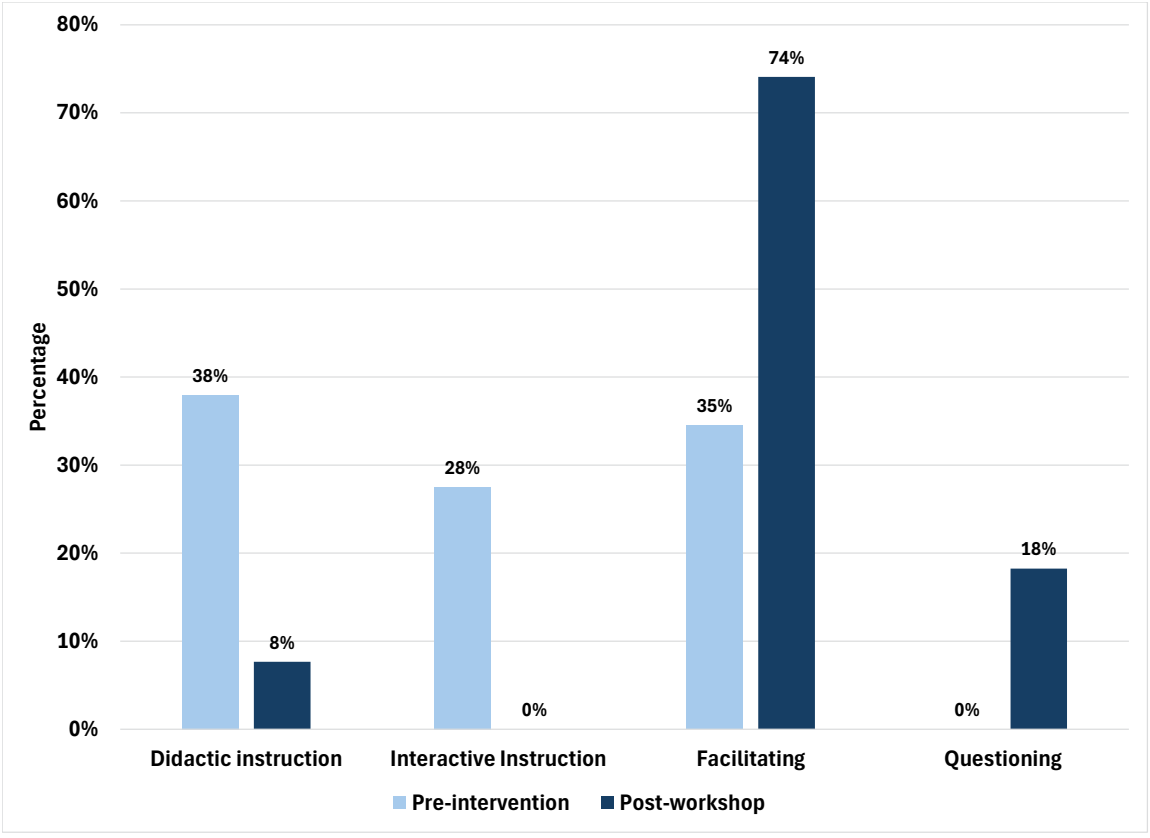
Following the co-design professional learning workshops, Alex designed a lesson that would offer more personalised learning. The post-intervention was designed for students to spend more time in group work rather than lecture.

> *Instead of giving a lecture about how to classify data, as an introduction to the statistics topic in mathematics (Y10), [students] do activities where they are guided to generate a decision tree and use their decision tree to classify data.* Alex

Alex spent the initial few minutes on explicit instructions about working on the tasks set out during the lesson. Students spent the rest of class time working on tasks in pairs with the teacher facilitating them. Each task was followed by question and answer time, where Alex elicits answers to the tasks from students. The video observation indicated a greater buzz during class time, that there was significantly more student talk during the lesson.

Pre and post-video observations (see **Figure 3**) showed that Alex's teaching practice shifted from being predominantly instruction-focused to facilitation-focused. Instruction time, whether didactic or interactive, reduced from 66% to 8% of class time. In contrast, facilitation increased from 35% to 74% of class time. In the post-lesson, Alex spent almost a fifth of class time (18%) on questioning, eliciting responses and clarifying concepts with students. It was noted that Alex did not reconfigure the spatial layout in the pre and post-intervention lesson, i.e. the classroom layout for both lessons remained as they were from previous lessons taught by other teachers.

Figure 3. Pre and post video observations, Year 10 Maths, Alex



When asked about how the space and furniture enabled better teaching, Alex commented:

> *I have different areas where I can write: smartboard and whiteboard. I have enough whiteboards to have some students writing and participating as well… I can arrange the tables to get students to work in different group sizes depending on the exercise. I have enough space to move around and interact with the students.* Alex

However, Alex found the round tables challenging because *"I can't have all the students facing the same direction. It is particularly challenging when doing exercises on the board".*

The means of teacher efficacy increased slightly from 4.50 to 4.56 after the co-design workshop, however, decreased after the post-lesson intervention to 4.33 (see **Figure 4**). The two additional efficacy items related to space use were analysed separately and showed a dip after the post-workshop (from 4.00 to 3.00) and then an increase to 5.00 post-lesson (see **Figure 5**). The increase in confidence after the post-lesson is mirrored in Alex's letter to self:

> *Embrace the flexibility that a more innovative environment brings…Understand that transitions take time, for you and for the students…Try new things, if something new doesn't work the first time, don't automatically discard it, students might need a few lessons to adapt to it… Seek feedback from the students and make them also reflect on how the environment and the teaching techniques are affecting their engagement in class and their learning.* Alex

Figure 4. Pre and post teacher efficacy, Alex

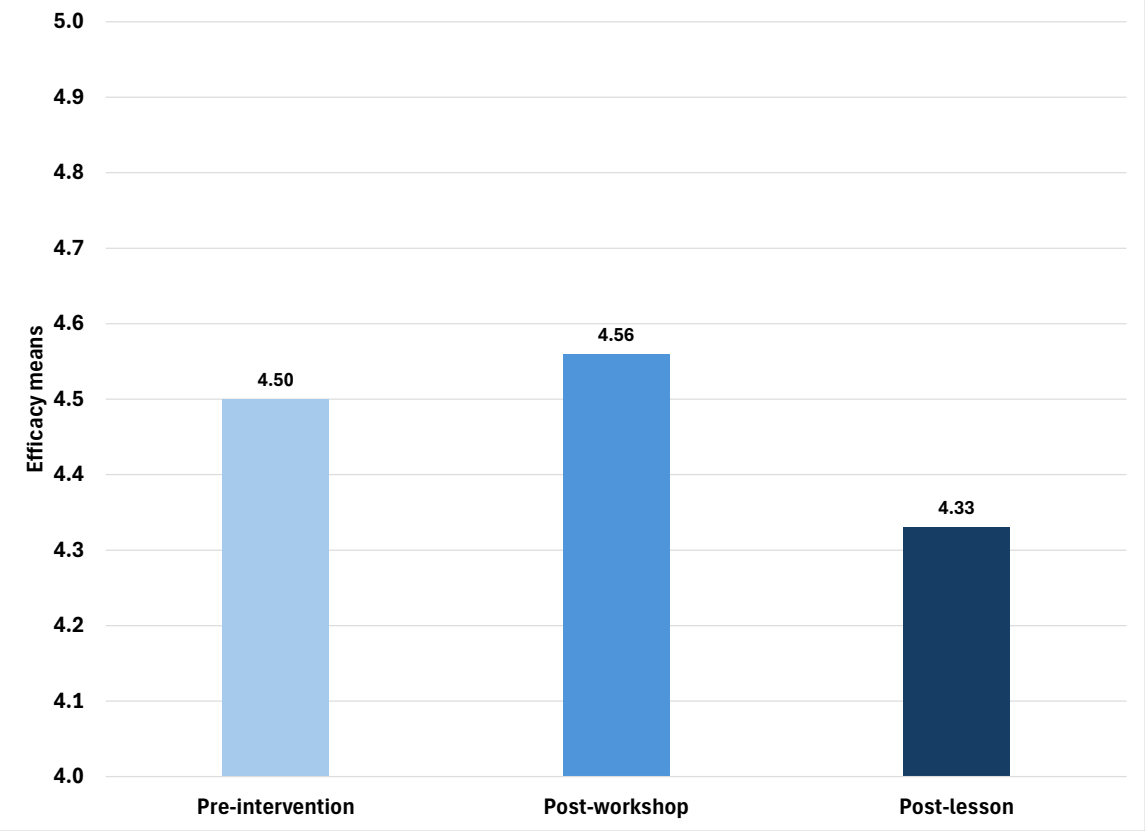
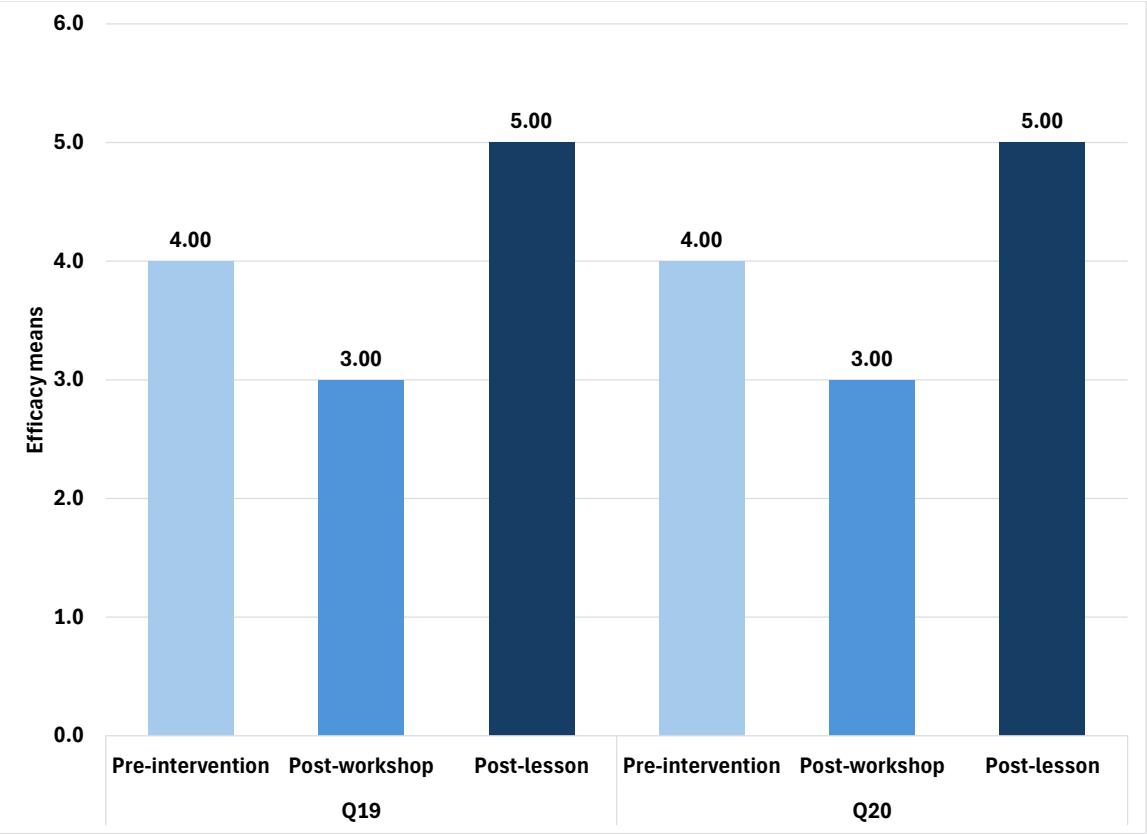


Figure 5. Pre and post teacher efficacy, Q19 and Q20, Alex



Student learning, engagement and agency improved in the post-intervention lesson. The means for each student variable increased: student learning from 2.68 to 2.96, student engagement from 3.01 to 3.11, student agency from 3.01 to 3.19 (see **Figure 6**).

Figure 6. Pre and post student learning, engagement and agency, Year 10 Maths

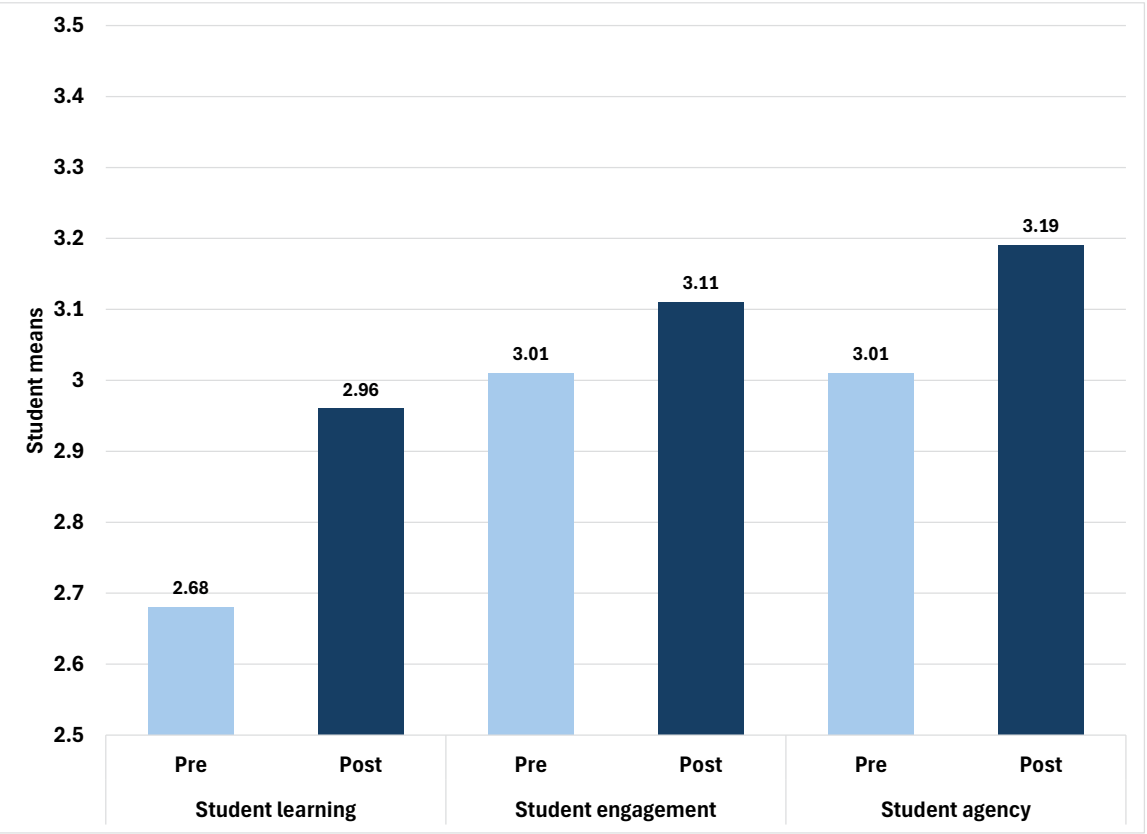


Figure 7 illustrates sample images provided by students. Despite Alex finding the round tables challenging, students enjoyed the ability to collaborate with their peers.

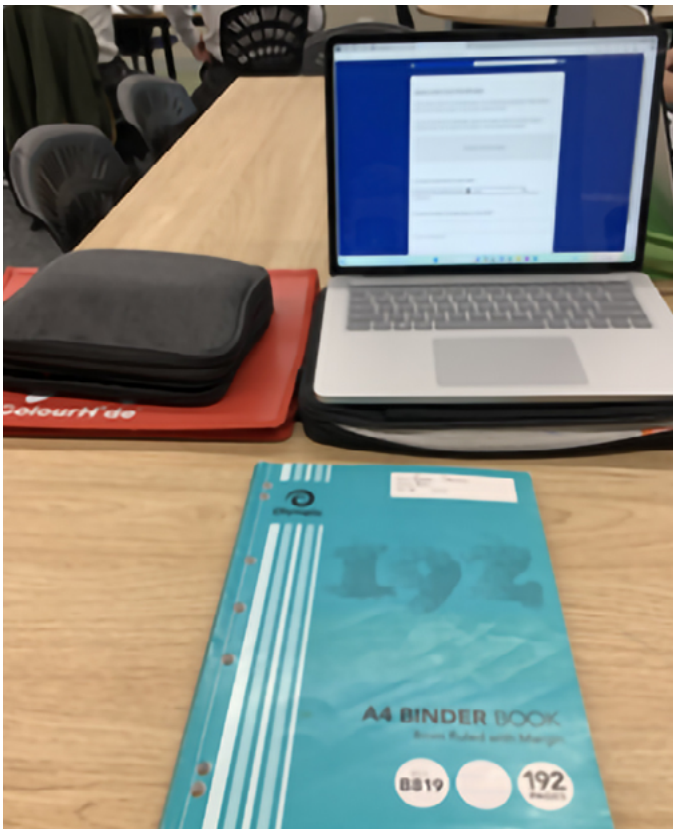
> *Learning is easier in this room as it allows for more collaboration between myself and my peers. I am very happy to learn in this environment, with collaboration with peers providing for understanding.* Student 2

> *Learning on a round table makes for better conversation and working together in groups. The usual rectangle tables are not as good for group work.* Student 4

> *It helps with everyone having the ability to collaborate more easily as people are sitting facing each other.* Student 5

Figure 7. Sample images provided by students, Year 10 Maths

Student 2



Student 14

However, students also recognised the need for and importance of the ability to work independently and reflectively without distractions.

> *This space enables me to learn better, as it provides me with the ability to ask others around me for help, whilst also not distracting myself.* Student 14

> *This space at the back of the classroom allows me to think and work independently while having lots of space to be able to put my things.* Student 15

Case study 2 – Year 11 Maths Methods (Bailey)

Bailey has nearly ten years of teaching experience. The case study involved a Year 11 VCE Maths Methods subject consisting of 19 students, using R1.

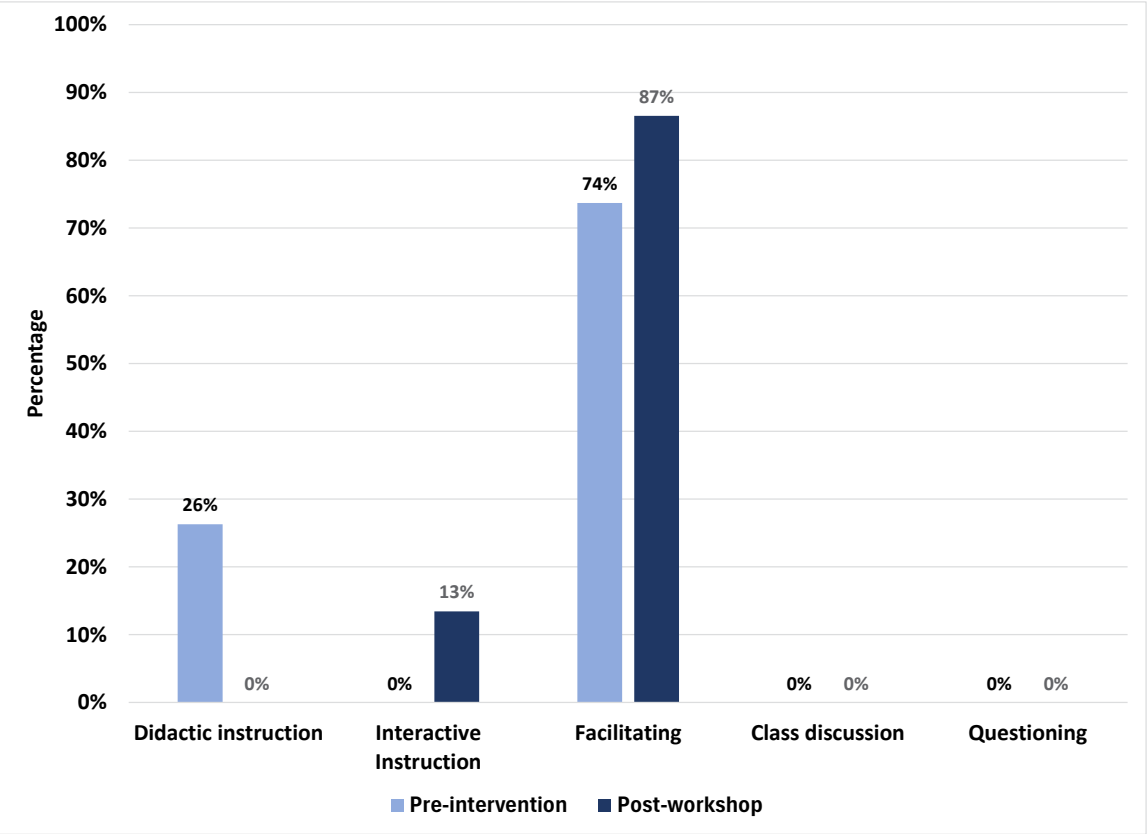
Pre- and post-workshop lessons

The pre-intervention lesson began with a warmup task with students working in groups either at tables or one of the four wall-mounted whiteboards to solve a set of equations. Bailey moved around the classroom facilitating discussion and problem-solving. Bailey then spent a short time at the podium in front of the classroom explaining the next part of the lesson. This involved three groups of students either working on the whiteboards, on tables in the main part of the classroom, or on the side tables. Bailey moved between groups checking understanding and supporting students where required. After about ten minutes, Bailey paused the lesson, asking students to photograph and clean whiteboards before rotating to the next task.

Following the co-design professional learning workshops, Bailey designed a lesson that would enhance opportunities for students to work either individually or collaboratively, and to be able to use technology to support their learning. Students spent the warm-up part of the lesson working in small groups at the whiteboards stationed around the walls, to solve a set of questions displayed on the screen. During the main part of the lesson, students worked individually or collaboratively to solve problems accessed through a set of QR codes. There was considerable engagement in both tasks, with students discussing questions, problem-solving strategies, and where necessary, asking for clarification or support from Bailey. During the lesson, Bailey constantly moved from one group to another, checking for understanding, providing prompts for consideration, and offering feedback on approaches to problem-solving.

Pre and post-video observations (see **Figure 8**) showed that Bailey's teaching practice emphasised a facilitatory approach during the post-intervention lesson. Didactic instruction reduced from 26% to none in the post-intervention lesson. However, interactive instruction increased to 13%. Time spent facilitating increased from 74% to 87%. This included time for questioning, providing feedback and clarifying understanding. Spatially, the layout of the classroom remained the same in both pre and post-intervention lessons.

Figure 8. Pre and post video observations, Year 11 Maths Methods, Bailey



When asked about how the space and furniture enabled better teaching, Bailey commented:

> *I appreciate the freedom to move around the classroom, work with different groups of students, see the room from different perspectives… Whiteboards on walls - students can be completing group work without the fear of making mistakes.* Bailey

However, Bailey noted that teaching in the prototype spaces required more planning—development, checking, printing of resources, and set up took about 30 minutes. Despite the additional planning time, Bailey commented about the benefit of using the prototype space.

> *Students do appreciate the different activities and engage proactively with what's on offer. This engagement hopefully has a knock on effect to their learning. Students are getting used to the space and are very patient and willing to try new things. With greater instruction on how to best use these spaces, I can certainly see the benefit and think they can too.* Bailey

Bailey also commented on how best to leverage the opportunities in the prototype spaces through collaboration with other teachers:

> *I actually really appreciated trying something different in a new space. I think that to continue to improve I'd like to speak more widely with my colleagues about 'activities' that can be done in these spaces. Whilst it's great to be given a bunch of [infrastructure] resources – we are so lucky to have this – they don't serve their purpose if we don't know how to use them properly. With greater time in planning, I'd love to continue to experiment with technology within these innovative spaces too. The students were engrossed in the lesson, and I think there is more that can be done with this. It'll be exciting to see where things go next.* Bailey

The means of teacher efficacy dropped slightly from 4.28 to 4.22 after the co-design workshop, and then rose to 4.72 after the post-lesson intervention (see **Figure 9**). The two additional efficacy items, analysed separately, showed an increase in confidence and knowledge of how to adapt pedagogical approaches in the new learning environment. Illustrated in **Figure 10**, they showed an increase from 2.00 (baseline) to 4.00 after the post-intervention lesson.

Student learning, engagement, and agency each improved in the post-intervention lesson. The means increased for student learning from 3.01 to 3.22, student engagement from 3.16 to 3.41, and student agency from 3.17 to 3.31 (see **Figure 11**).

Figure 9. Pre and post teacher efficacy, Bailey

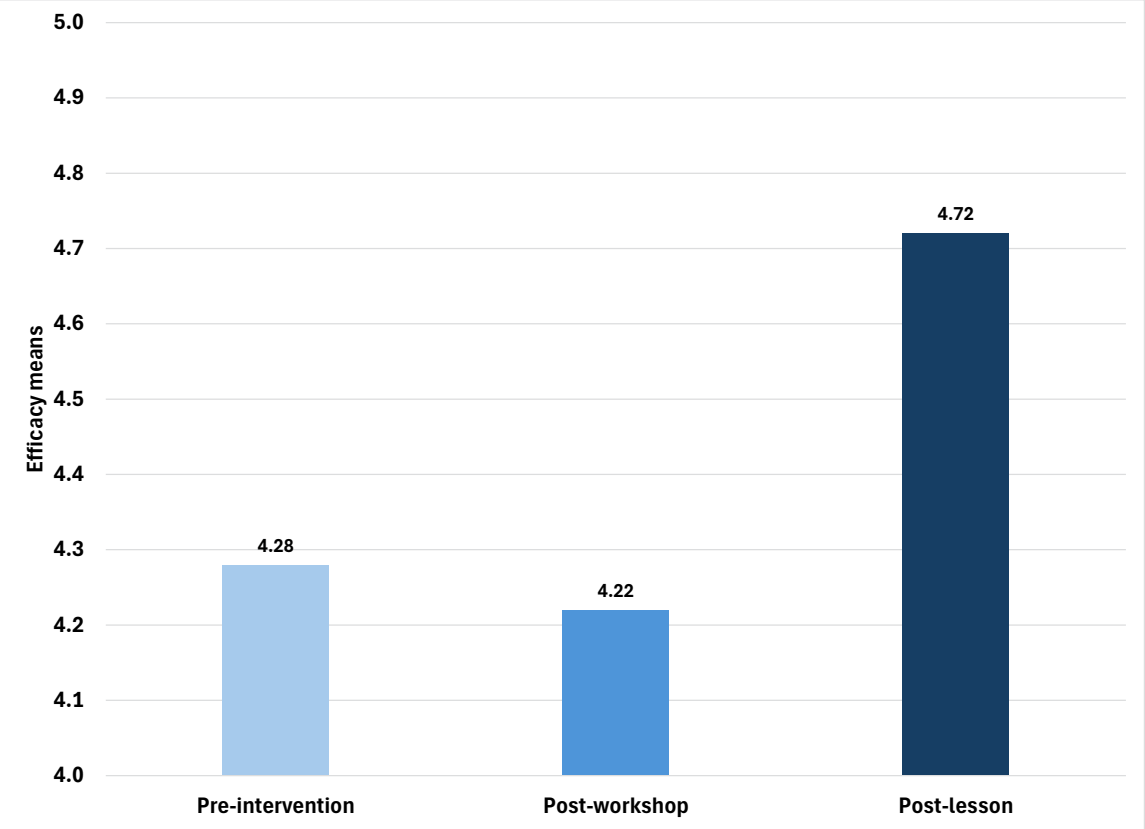


Figure 10. Pre and post teacher efficacy, Q19 and Q20, Bailey

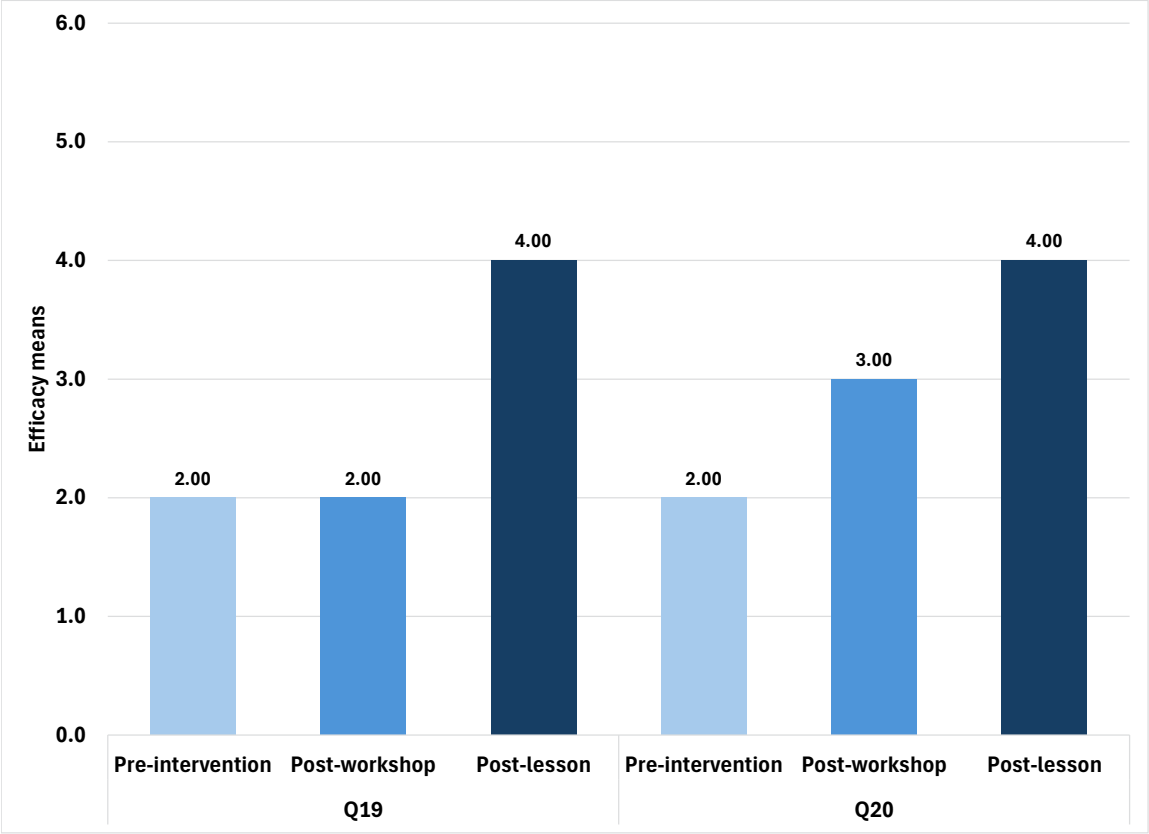
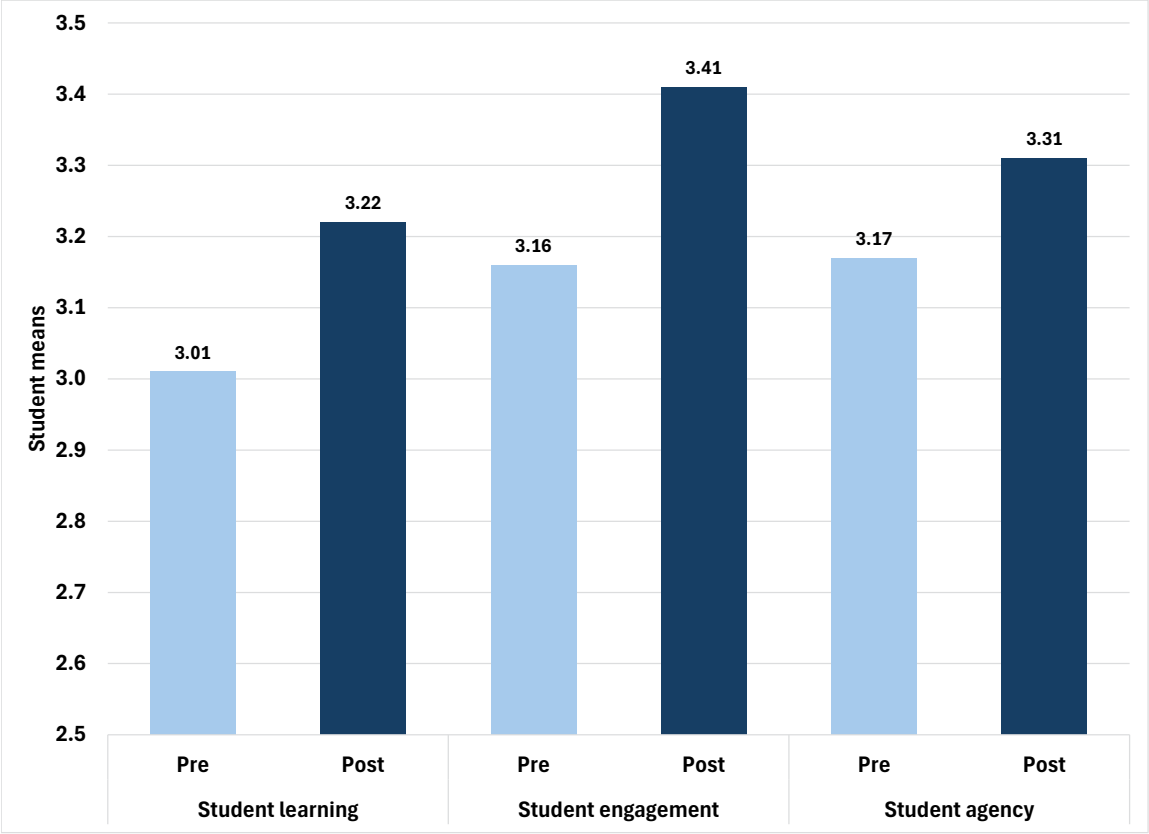


Figure 11. Pre and post student learning, engagement and agency, Year 11 Maths Methods

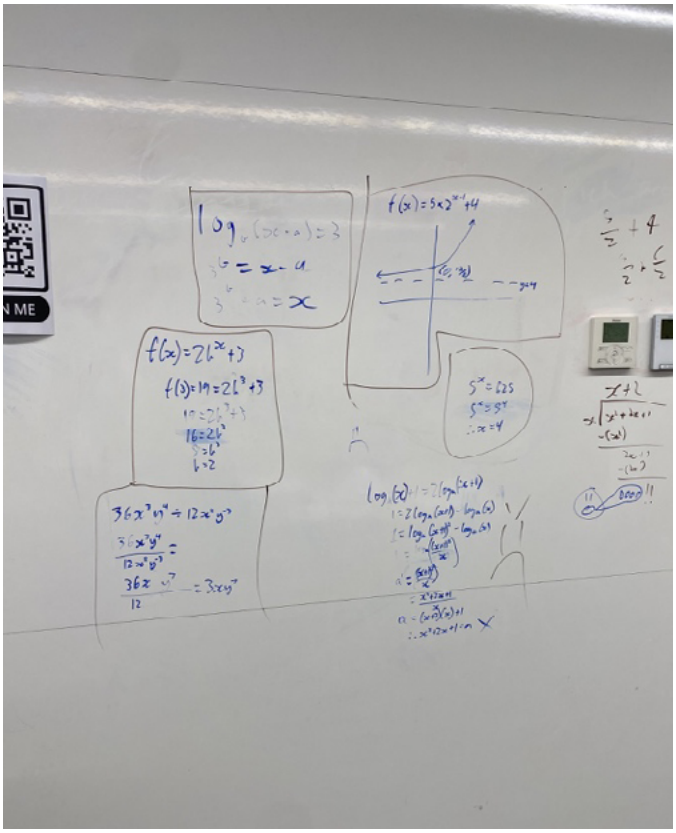


Sample images provided by students are illustrated in **Figure 12**. Consistent with Bailey's comment regarding whiteboards, students also enjoyed the use of whiteboards for making their learning visible and for collaborating with peers.

> *More whiteboards allow for students to express their answers and show their solutions to peers.* Student 38

> *Allows me to collaborate with peers and express our ideas visually.* Student 45

Figure 12. Sample images provided by students, Year 11 Maths Methods



Student 38

Student 39

Similarly, the table layout helped with students' collaboration.

> *The fact that all people are sitting in a sort of circle orientation means we can all work and talk together.* Student 42

Students also recognised the need for concentration in their learning, and commented that the furniture and space helped them do so:

> *It helps me to be more concentrated into my study process. The cozy chair and warm lights really provide a good environment, and I love it.* Student 39

> *It feels comfortable and relaxing to sit here, so I suppose it helps me focus better.* Student 44

Additionally, students referenced the choice of furniture and how it could be used to reconfigure the room according to the type of learning that was going on.

> *Movable tables allow the classroom to be setup more modular.* Student 45

> *The tables are nice as they are light and easily moved to make bigger tables for group projects.* Student 49

Case study 3 – Year 11 Politics (Charlie)

Charlie has five years of teaching experience. This case study involved a Year 11 Politics class consisting of 17 students, using R4 or the 'huddle room'.

Pre and post-intervention lessons

The pre-workshop lesson focused on federalism in Australia and the division of power between Federal, state and local levels, including potential changes to improve the federation and how decisions made are when altering electorate boundaries. Charlie spent most of the time in teacher-led instruction, either didactic or interactive. Students were initially asked to read an article before responding to a series of questions (individually). The class was noticeably quiet during this period. The last part of the lesson involved students in pair/group work discussing and recording ideas. Some chose to use the whiteboard tables to do so.

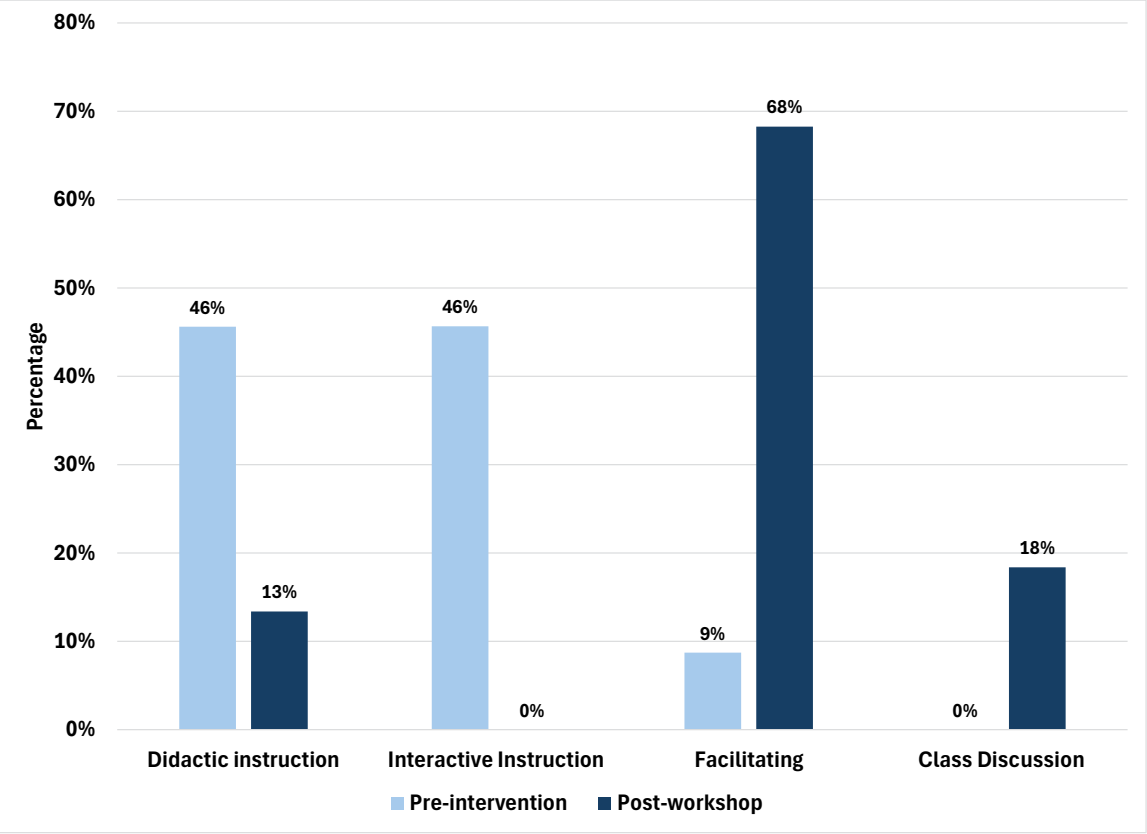
After the professional learning, Charlie designed a lesson that would involve students in more student-student discussion and collaborative group learning.

> *I plan to use desk whiteboards to encourage active collaboration in my classroom. Students will brainstorm and visualise their ideas directly on their desks, making it easy to share and refine concepts in real-time. This approach will foster creativity, critical thinking, and immediate feedback, creating a dynamic and interactive learning environment.* Charlie

The post-intervention lesson focused on revision for the School Assessed Coursework (SAC), specifically on application of key concepts to the context of COVID. The lesson began with an explanation of the type of questions students might be asked to respond to (details of which had been previously emailed to them), the key knowledge they would be using, and application to the issue in question e.g. Chief Health Officers as key political actors. The main component of the lesson involved a 'station activity' where students worked in groups at their whiteboard tables, responding to a question posed on an index card. Students were asked to work from what they know rather than referring to laptops/ textbooks. After 4-5 minutes they rotated to the next table, to build on the work of previous groups. Charlie often provided an additional prompt as they changed tables. The activity prompted considerable on-task discussion among groups of students. During this time, Charlie moved between groups responding to questions and checking understanding. Students utilised all the furniture in the room. At the end of the last rotation, Charlie photographed the tables. These images were used on the large screen as part of an interactive plenary session.

Pre and post-video observations (see **Figure 13**) showed that Charlie's practice shifted significantly from being highly teacher-centric (involving lots of teacher-student-teacher questioning), to being more facilitation focused. Comparison between the two lesson observations shows didactic and interactive instruction time reduced from 92% to 13% of class-time. Time spent facilitating groups of students increased from 9% to 68%. In the post-lesson Charlie spent a large proportion of the class on facilitating student learning. It is noted that the spatial configuration of the room remained the same for both lessons.

Figure 13. Pre and post-video observations, Year 11 Politics, Charlie



When asked about how the space and furniture enabled better teaching, Charlie commented,

> *I like the group desks and whiteboard desks…it has whiteboards on it and lends itself to small group discussion.* Charlie

However, Charlie found the size of the room inadequate, noting, *"Too many students in too small a space"*.

Charlie commented that the post-intervention lesson had required substantially more planning than usual, not only in terms of its content and structure, but also in how best to leverage the physical environment.

> *Organising this lesson required significantly more thought and effort than a typical lesson, as it involved not only planning the content but also rethinking the entire classroom dynamic. I had to carefully consider how to integrate desk whiteboards effectively, ensuring that they would enhance collaboration without disrupting the flow of the lesson. This meant designing activities that were flexible enough to allow for spontaneous idea sharing while still achieving the lesson's objectives. Additionally, I needed to anticipate potential challenges, such as managing time and providing clear instructions, to ensure the innovative approach would be successful and beneficial for all students.* Charlie

However, in evaluating the lesson, Charlie recognised a difference in the engagement of the students and their deeper level of understanding as a result of the change in pedagogical approach.

> *Collaboration within groups fostered a deeper understanding of the material, as students were able to pool their knowledge and perspectives, leading to richer discussions and more well-rounded ideas. Sharing these ideas with the broader class further enhanced learning by exposing students to different approaches and solutions, encouraging them to think critically and refine their own thoughts. This process not only solidified their grasp of the concepts but also built a sense of community and shared purpose in the classroom.* Charlie

The means of teacher efficacy increased from 4.17 to 4.61 after the co-design workshop but decreased to 4.44 post-lesson intervention (see **Figure 14**). Responses to the two additional efficacy questions, relating to practice and confidence in the learning space increased more considerably. The mean for item Q19 increased after the co-design workshop (3.00 to 4.00) and again after lesson intervention (4.00 to 5.00). The mean for item Q20 also increased after the co-design workshop (2.00 to 4.00) and then again after the lesson (4.00 to 5.00) (see **Figure 15**). Charlie's reflection post-lesson demonstrated a real willingness to explore the use of collaborative group work as an alternative to more teacher-centric pedagogies:

> *The lesson was fantastic and truly transformative in my pedagogy. By incorporating innovative strategies like collaborative whiteboard activities, I witnessed a marked shift in student engagement and interaction. The energy in the classroom was palpable as students eagerly exchanged ideas and built on each other's insights. This experience has reshaped my approach to teaching, reaffirming the power of creativity and collaboration in driving deeper learning and making the classroom a more dynamic and inclusive space.* Charlie

Figure 14. Pre and post teacher efficacy, Charlie

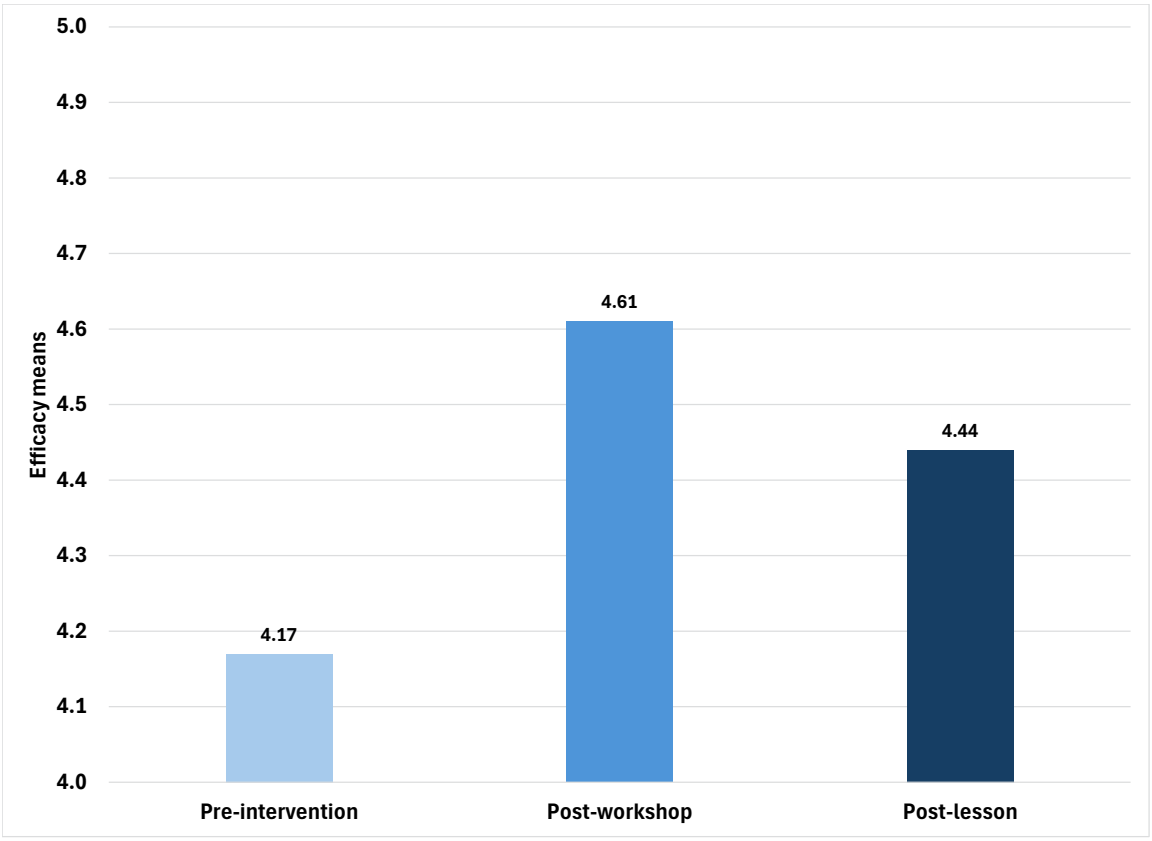


Figure 15. Pre and post teacher efficacy, Q19 and Q20, Charlie

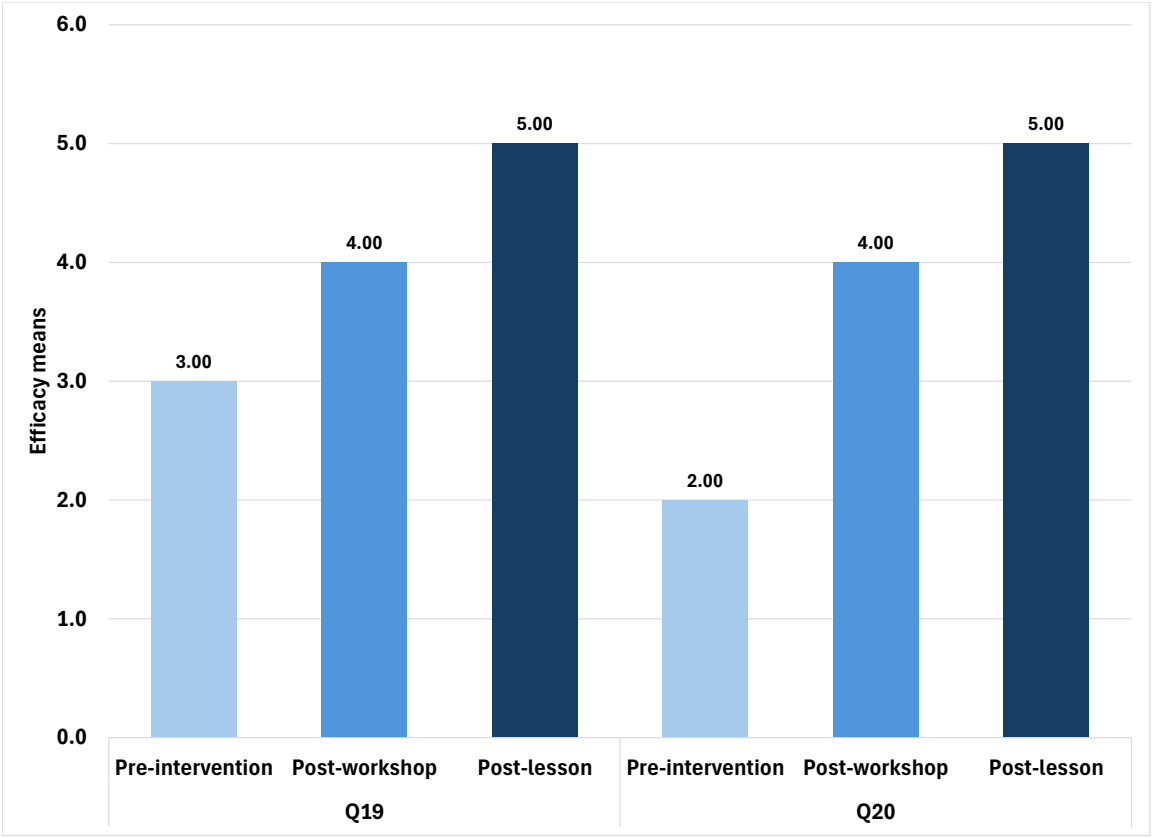
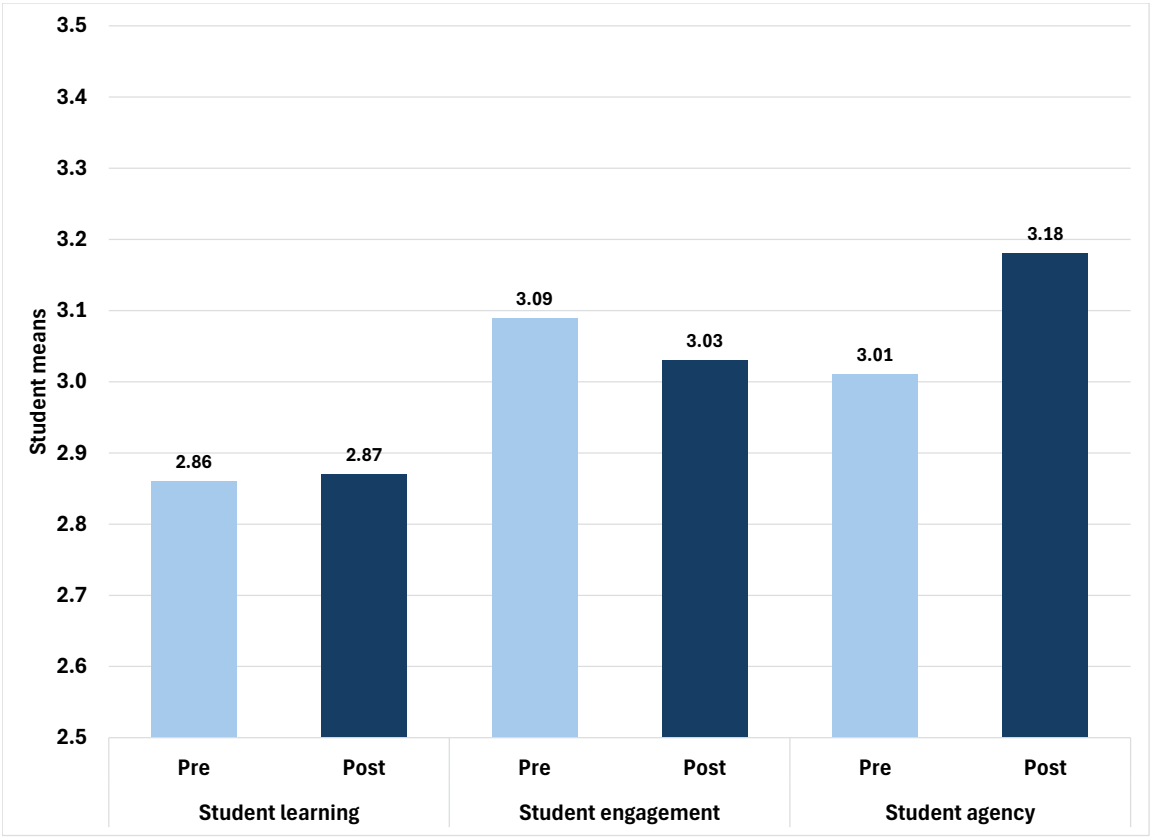


Figure 16. Pre and post student learning, engagement and agency, Year 11 Politics



Student learning, engagement, and agency varied in the post-intervention lesson. Whilst student learning improved slightly from 2.86 to 2.87, and student agency increased from 3.01 to 3.18, student engagement decreased from 3.09 to 3.03 (see **Figure 16**).

Figure 17 show examples of images provided by students. Students shared Charlie's view that the furniture and layout assisted collaboration.

> *The furniture in R4 is very different to other classes and the use of whiteboards makes us share ideas. The use of the spread of tables creates a spacious room that doesn't feel like you are being cram. This space helps me to collaborate with other students in the class as it forces [us to] share with each other as we are in a circle table.* Student 57

Likewise, students responded positively to the inclusion of whiteboard tables, and saw benefits for their learning, particularly in their capacity to share thinking and work together.

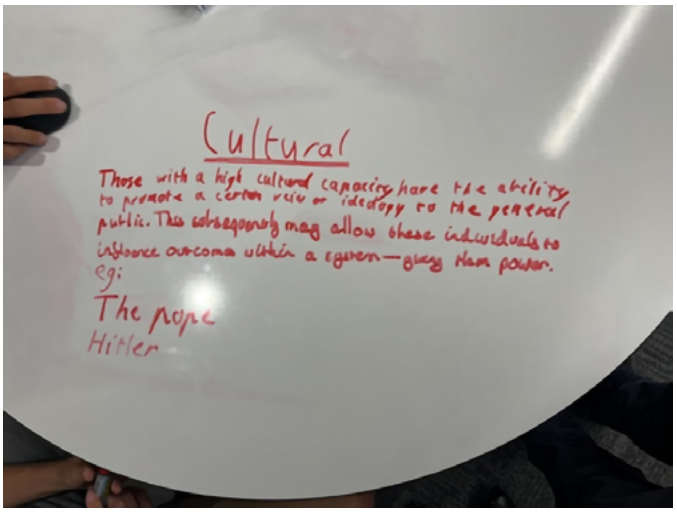
> *The tables that double up as whiteboards allow for an interactive learning environment for me and my peers.* Student 50

> *The whiteboard on the tables allows for a better group collaborative environment where there can be smaller groups but all work together to brainstorm the ideas and be able to physically see the work.* Student 56

> *It allows us to draw on the tables allowing for greater ability to lay out our ideas.* Student 58

However, one student commented on the need to keep them clean, as *"if the whiteboard tables aren't cleaned they get really grotty"* (Student 59).

Figure 17. Sample images provided by students, Year 11 Politics



Student 50

Student 56

Students had mixed responses regarding the learning space (R4) and the furniture in it. Some were positive about the furniture, commenting about the comfort levels, lighting and vibe, and which encourage collaboration and learning:

> *It has nice lighting. The chairs are comfortable, and encourage collaboration.* Student 52

> *The furniture in R4 is very cool and nurtures a better experience for learning as the spread out tables, couches create an ambient vibe within the class, this makes the room feel far better to learn.* Student 56

However, others found the furniture uncomfortable, and also awkwardly positioned:

> *The furniture, excepting the whiteboard tables, is counterproductive; the seats in the corners are broadly unhelpful due to the positions of the wall whiteboards and screen. Student* 53

> *The chairs are uncomfortable and don't let you rock back on them, ruins the functionality.* Student 55

> *The chairs are horrible, the couches are located inconveniently (can't see the screen from one of them).* Student 59

Case study 4 – Year 8 Geography (Dani)

Dani has more than 20 years of teaching experience. This case study involved a Year 8 Geography class consisting of 23 students, using R3.

Pre and post-intervention lessons

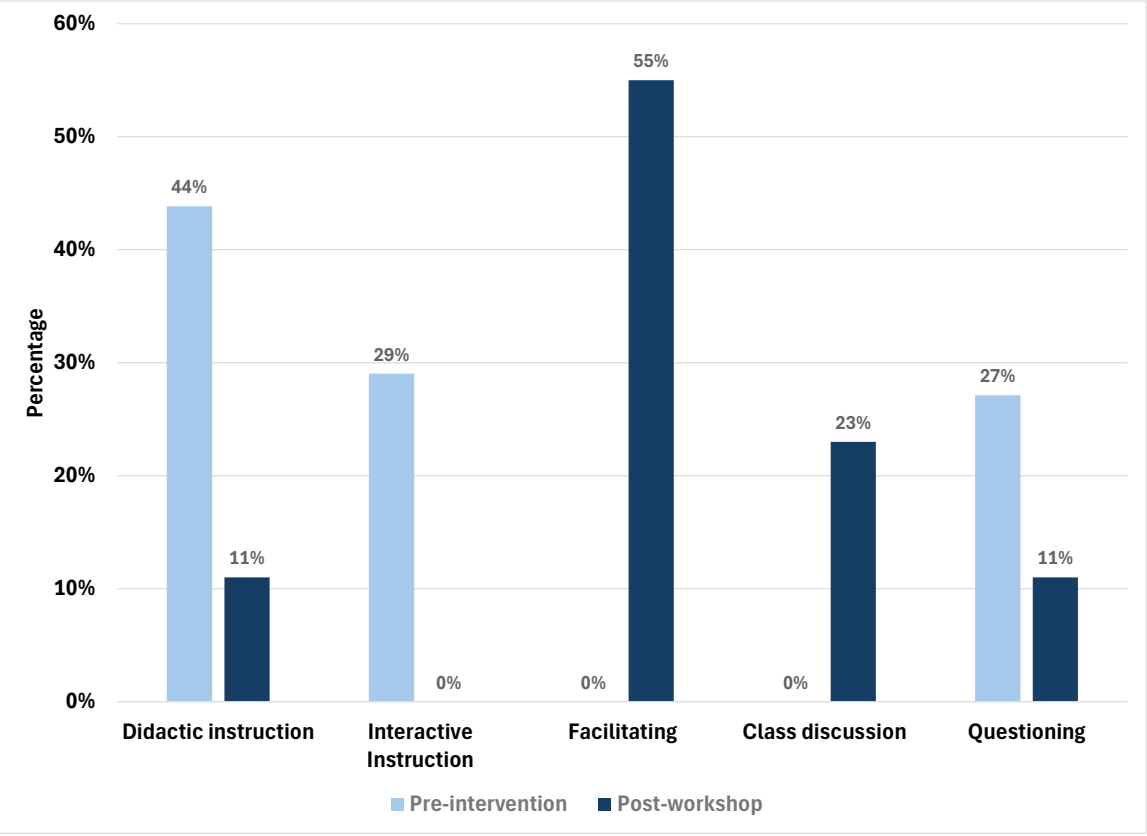
The pre-intervention lesson focused on landscapes and landforms. After taking the student roll, Dani engaged in a teacher-student question session recalling the previous lesson's content about volcanoes. Dani spent a substantive amount of time in questioning previous contents, standing at the front of the classroom by the teacher's podium. This was followed by students completing crossword puzzle of associated terms. During the crossword activity—a quiet, individual activity, Dani moved around the room responding to individual questions before going through the answers with the class. The second half of the lesson related to notetaking on several landform types, including rivers, springs, and channels, with text and images displayed on the screen at the front of the classroom. Students were asked to copy the text from the slides into their books. Dani stood by the teacher's podium at the front of the classroom and often talked while moving around the room. The third part of the lesson involved students using their laptops to find out specific facts about the English Channel, before going through the answers at the end of the lesson.

After the co-design professional learning workshop, Dani designed a lesson that would engage students working in small groups on a practical task. Students were tasked with developing a model city using Lego, as a way of presenting their previous learning on urbanisation. In this lesson, Dani intentionally wanted students to, *"work in groups"* and for the teacher to *"act as a guide rather than pressing their ideas"*. Additionally, the Lego construction task would help students *"show their thinking and how they have applied their theory"*.

Dani spent a short amount of time on explicit instruction and setting the students up with the task, before providing extensive time during which students worked collaboratively on model-making. Students were highly motivated and engaged in task-focused discussions. During the lesson, Dani moved from group to group observing, listening, and facilitating discussion. The latter part of the lesson involved groups of students explaining their models and responding to questions from other students and Dani.

Pre and post-video observations are illustrated in **Figure 18**. It is important to note that not all the second lesson was videotaped. The post-observation data was extrapolated from a combination of video data and the lesson plan. Figure 18 showed that Dani's practice shifted from didactic teaching and a predominance of teacher-student questioning to an approach based on facilitation. Instruction time, whether didactic or interactive, reduced from 73% to 11% of class time. In the post-lesson, Dani spent more than half the class (55%) facilitating group work, and almost a fifth (23%) on class discussion. It was noted Dani did not change the spatial layout of the classroom for the second lesson. However, students were encouraged to work on the floor as well as on tables for the construction task.

Figure 18. Pre and post video observations, Year 8 Geography, Dani



When asked about how the space and furniture improved their teaching, Dani commented they had enjoyed the movable furniture and lectern, and the use of VIVI to roam around the learning space. In particular:

> *I can select to use the groups or not, select certain students to sit next to each other, create a "divide and conquer area" being able to move around evenly... It has been good experiencing this as time goes, teaching will evolve to use space even better.* Dani

Although Dani found the *"acoustics, sense of calm, ownership of new material"* beneficial, they observed that *"R4/5 acoustics was strange, O2 sensors kept kicking in"*.

The means of teacher efficacy showed no shift from 4.67 after the co-design workshop but a small increase to 4.72 post-lesson intervention (see **Figure 19**). Responses to the two additional efficacy questions, relating to practice and confidence in the learning space increased more considerably. The mean for item Q19, "I know how to adapt my pedagogical practice when teaching in a more flexible and agile learning space" increased after the co-design workshop (3.00 to 4.00) and again after lesson intervention (4.00 to 5.00). The mean for item Q20, "I feel confident teaching in a more flexible and agile learning space" increased after the co-design workshop (4.00 to 5.00) and remained the same after lesson intervention (see **Figure 20**). Dani's reflection post-lesson (letter to future self) demonstrated a real willingness to explore the use of collaborative group work as an alternative to more teacher-centric pedagogies:

> *As you continue to shape and influence the lives of your students, I wanted to remind you of the importance of embracing groupwork as a fundamental teaching method. It's easy to get caught up in the comfort of individual instruction and solitary activities, but groupwork offers invaluable benefits that you should be open to incorporating into your classroom practices...As you plan your lessons and reflect on your teaching strategies, remember that groupwork is not just an additional activity, but a powerful tool that can transform the learning experience for your students. Embrace the opportunities it offers and be open to experimenting with different group activities that can enrich your classroom environment.* Dani

Figure 19. Pre and post teacher efficacy, Dani

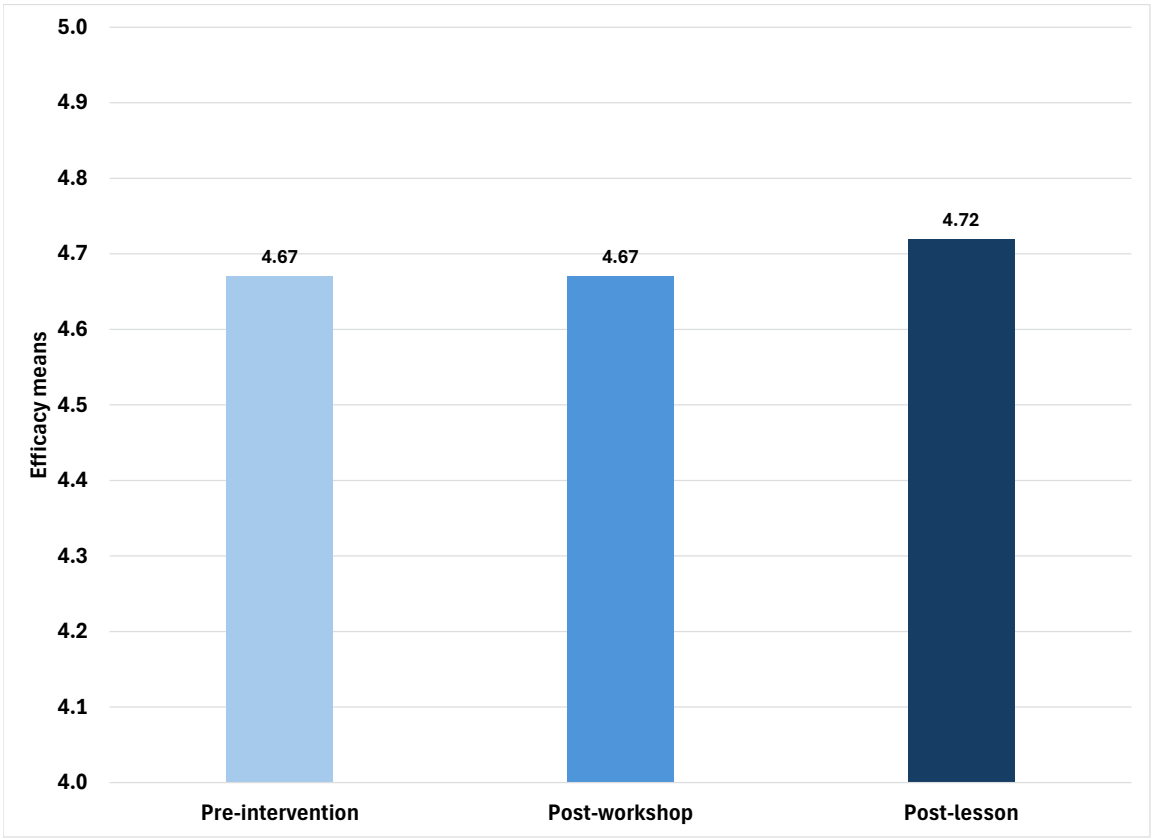


Figure 20. Pre and post teacher efficacy, Q19 and Q20, Dani

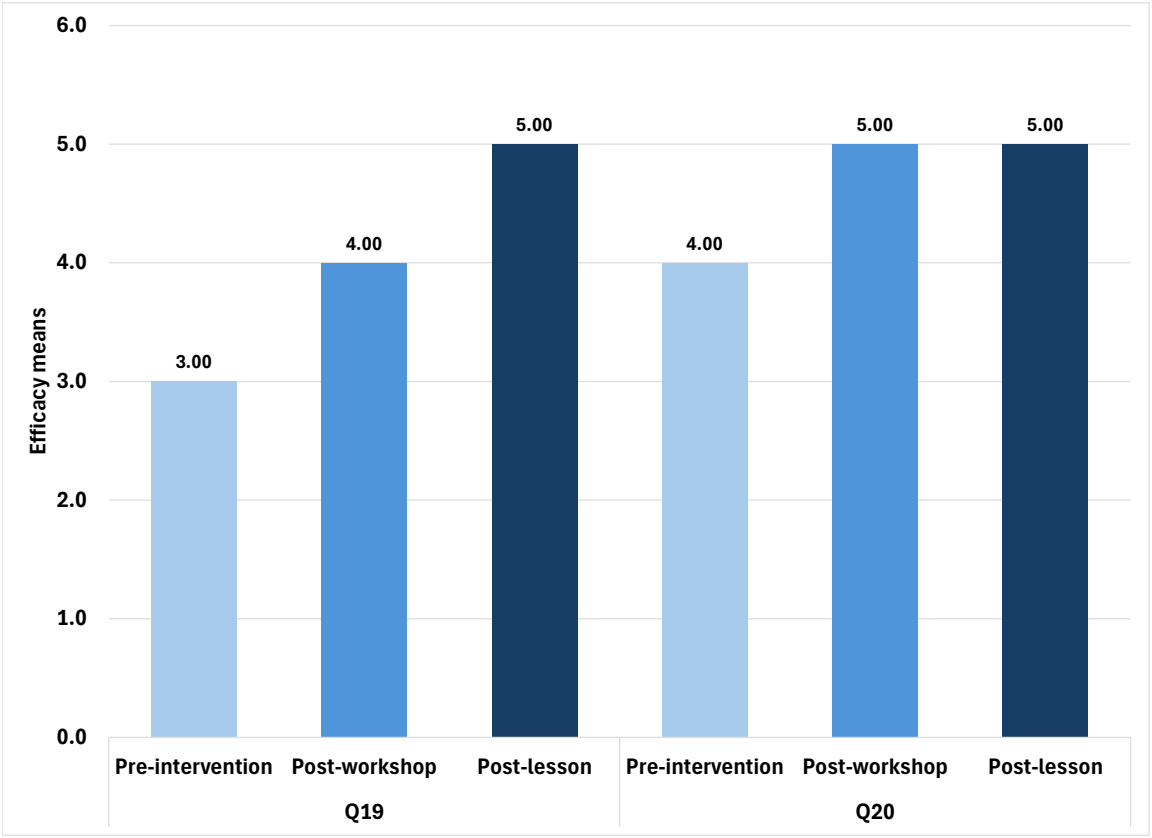
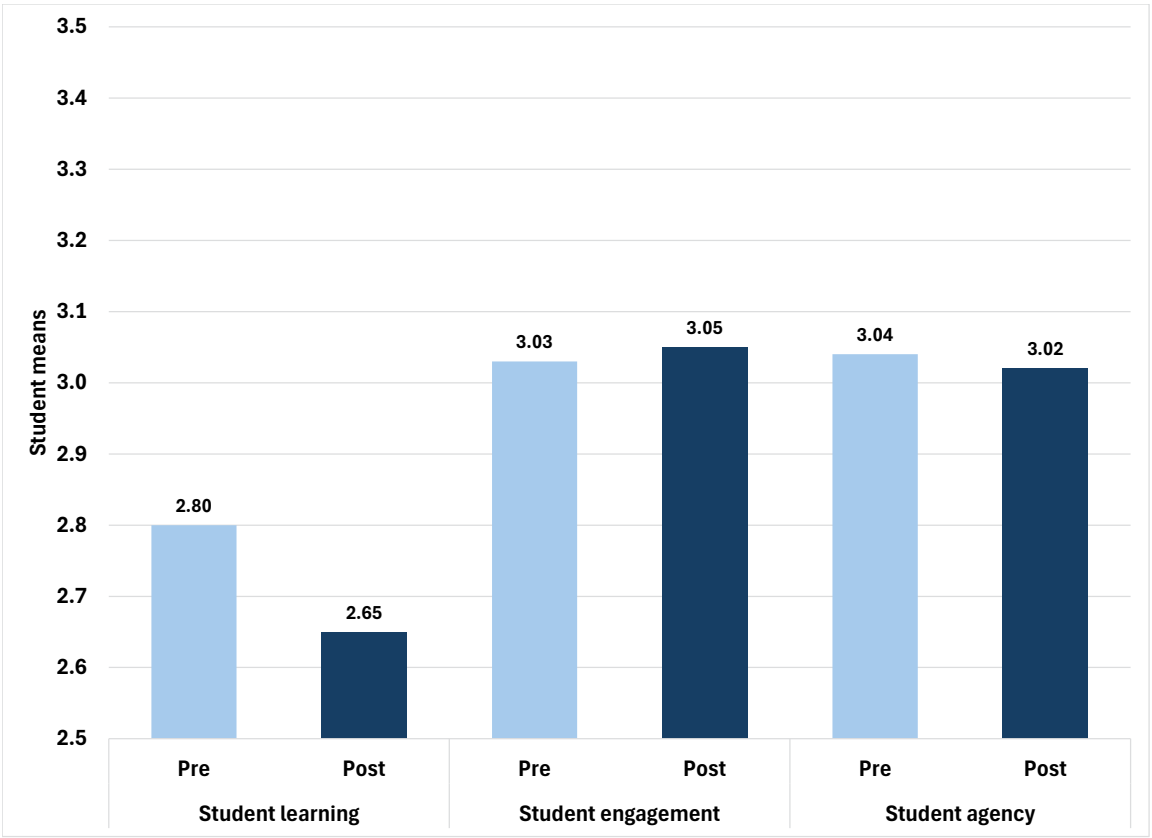


Figure 21. Pre and post student learning, engagement and agency, Year 8 Geography



Student learning, engagement, and agency varied in the post-intervention lesson. Whilst student engagement improved slightly from 3.03 to 3.05, student learning and agency decreased, from 2.80 to 2.65 and 3.04 to 3.02 respectively (see **Figure 21**).

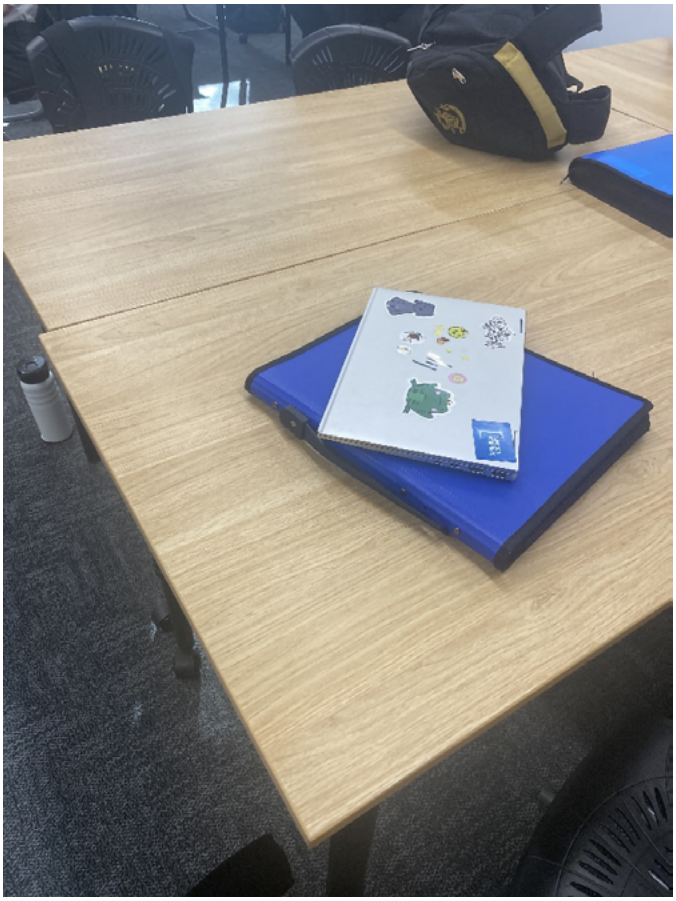
Examples of images of the learning space taken by students are shown in **Figure 22**. Students enjoyed the collaborative nature of the furniture layout, and reflected how this supported their learning:

> *It makes me able to communicate with others better and helps me to learn better.* Student 28
>
> *I can communicate with my fellow classmates as we are all seated around the same table.* Student 31
>
> *It gives me a good view of the board and I can collaborate with my friends better.* Student 34

One student did however comment on the challenges of using circular tables:

> *I like the rectangle tables as I can fit all of my stuff on the table, unlike the round tables where it is like a game of Tetris to fit anything on them.* Student 27

Figure 22. Sample images provided by students, Year 8 Geography



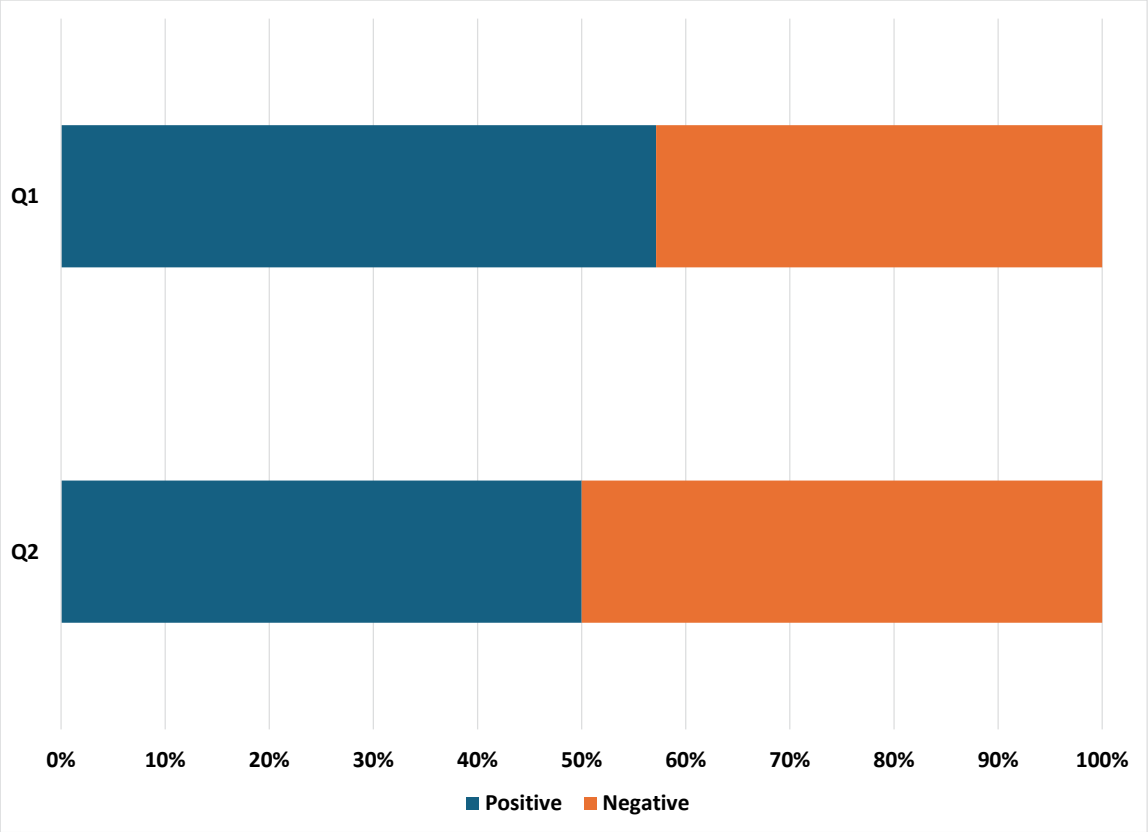
Student 27

Student 34

Teacher feedback survey

Thirty teachers responded to the survey. There were 15 complete responses with seven providing images. Teachers responded to two open-ended questions about how the space (Q1), or furniture (Q2) helped them teach. Comments were categorised as positive or negative. In some cases, an individual teacher's comment could sometimes include both positive and negative statements. **Figure 23** summarises this for both questions.

Figure 23. Positive and negative comments for Q1 and Q2



Slightly more than half of the respondents (8 of 15 teachers) felt that the space helped them teach better. Comments centred around how the space enabled mobility as well as different modalities for them and their students, for example:

> *I love that I can roll around the room and teach from different perspectives. I can interact with students more regularly.* Teacher 9
>
> *Provides options for students to work independently and in small groups.* Teacher 11
>
> *Allowing for space, students are able to move out to areas and work individually, students are less distracted and focused on their learning.* Teacher 12

Teacher also commented on the environmental qualities of the spaces, such as the acoustics and the lighting:

> *I like the sound-proofing and treatment in the rooms. It restricts outside noise but also limits echoes in the classroom.* Teacher 13
>
> *The light, transparent, inclusive aspects initiated by the floor to ceiling glazing are very useful. The casual (by passer) scrutiny can also ensure high performance by students.* Teacher 15

Most teachers who considered that the space did not help them teach better did not provide an explanation about why it does not, simply saying *"It doesn't"* or *"I don't believe it does"*. Some who did, indicated the lack of time to reconfigure the learning space and how the glass windows may distract students:

> *It does not - glass walls allow easy distraction for students.* Teacher 6
>
> *The space itself is not dissimilar to standard classrooms and does not improve my teaching.* Teacher 8
>
> *Not really. As you can see from the photo another teacher had arranged the desks in a traditional format before I arrived, and I don't have time to reorder the classroom.* Teacher 10

There were fewer positive comments about the furniture than there were about the space. Positive comments regarding the furniture in the space centred around the portable nature of the furniture, for example *"the furniture is very easily moveable"* (Teacher 5) and how they afforded comfort (Teacher 11). Teachers also commented about how the furniture can enable collaboration, on one hand, and individual work, on the other.

> *The ways the furniture are arranged enables students to talk together so much more than traditional layouts.* Teacher 3
>
> *Whiteboard tables encourage collaborative thinking.* Teacher 11
>
> *When whole class teaching, all students need their bodies to be facing the board, for focus and attention, then when working individually the desks can be moved.* Teacher 12

Negative comments, on the other hand, described the inflexibility of the furniture, either being too small or too large, for example:

> *The furniture is a real struggle with 24 students and 4 large tables there is not the flexibility required for Maths teaching.* Teacher 7
>
> *It doesn't. The tables are too small to house VCE students comfortably and the chairs are unsupportive. The furniture and layout seem conducive of distraction.* Teacher 13

Teachers also commented about the impact furniture has on classroom and behaviour management.

> *It is harder to get students' attention as half of them always have their back towards you.* Teacher 3
>
> *Most lessons it can make it harder to teach. Not all students can see the screen comfortably and it is harder to view all students at once to ensure they are engaged in the content.* Teacher 4
>
> *No noticeable difference for me. If anything, it makes my job harder. The students are always adjusting the legs on the tables, and they tend to distract one another in table groups.* Teacher 10

About half the respondents reported that they had used the breakout spaces. Breakout spaces were typically used for small group work, individual tasks (including catching up on assessments), oral presentations, videoing films, presentations, and student retreat. On the other hand, teachers who have not used breakout spaces provided several reasons: *"the need had not arisen"* (Teacher 3), and that they were *"too far from R1"* (Teacher 9). Of note, two teachers commented that *"I was not aware that we could use the theatrette"* (Teacher 7), and "I *do not see how it will benefit my teaching"* (Teacher 4).

Teachers were also asked what they had found most beneficial in the prototype spaces and, what they had found most challenging. Several comments relate to the aesthetics and environmental qualities of the prototype spaces—that they were well lit, spacious, and with good acoustics, for example:

> *The light is good, and it is positive to teach in natural light, the rooms are also spacious which is positive in everyone feeling they have breathing room.* Teacher 8
>
> *Large rooms. Students not working on top of each other. Space to move when required.* Teacher 9
>
> *Good acoustic treatment reducing noise transfer between rooms.* Teacher 11

However, there were also comments suggesting that teachers had found challenges with the inbuilt technology, equipment, and storage, for example:

> *Another important issue is charging, there needs to be accessed to charging all around the classroom.* Teacher 2
>
> *There are no walls upon which we can write, and there are no shelves to put up miscellaneous materials, even a pot plant or two.* Teacher 5
>
> *I would like spaces that help students concentrate, that allow the teacher to move around freely and in which the tech is reliable and functions every time… The audio for the projector is poor and can barely be heard.* Teacher 10

Several teachers also comment on the windows *"which open automatically on CO2 levels"* at *"inopportune moments" "disturbing the flow"*, are *"very loud"*, *"we can't override"* and when left open, *"it is freezing"* (Teacher 11 & 14). This was found to be *"intruding on in-situ learning"* (Teacher 5).

There were some comments about the benefits of the furniture providing increased flexibility, for example:

> *The only thing that is helpful is flexible furniture.* Teacher 2
>
> *The ease at which the tables' arrangements can be re-formed continually keeps the students alert to a new environment as well as different ways of working together.* Teacher 5

However, more often, the bulk of the comments related to challenges associated with using the furniture. Teachers commented on the style or layout of furniture that impacts on students' behaviour, or the inability of students to face the front or the screen, or the students being more distracted. This comment by one teacher summarises some of the challenges:

> *24 students, 4 big tables and 4 separate screens means students cannot all be looking at you regardless of where I stand in the room. There is not a board/screen big enough that can be the single focus when required. Half the students must have their backs to you. Six year 7's on each table is quite crowded and encourages them to lose focus. We are unable to use a grouped table arrangement, they don't all fit.* Teacher 7

The survey also asked teachers to think about the future, and consider what spaces, resources, and furniture would support their teaching. Of note, several teachers asked for a more traditional setting such as this:

> *More traditional classroom types or clustered tables where students are still able to face the front of the room.* Teacher 3

Many of the comments relate to the suitability and flexibility of the furniture, for example:

> *Flexible smaller tables that can be arranged to suit a variety of teaching approaches. The ability to have all students focussed on one central screen when required. Break out area or furniture outside the classroom for students who need to complete assessments on alternate days.* Teacher 7

> *A smart screen is essential now for teaching. I like the idea of whiteboard desks for students for collaboration. Natural light and space are also appreciated, and a lectern is a positive addition to the classroom.* Teacher 8

> *Square individual desks, these have the most flexibility to be moved to the needs of the specific lesson. Break out spaces to allow movement of students when learning individually.* Teacher 12

There were also requests for additional equipment, for example, writable walls or glass doors (Teacher 5), screening of walls to exclude distraction from passers-by and noise (Teacher 6), control of windows (Teacher 6), and breakout spaces with glass which are visible from the main classroom (Teacher 14). In addition, there was a request to consider the way adjacent classes were scheduled:

> *Timetabling needs to ensure that these spaces are best used. As an example, if my Methods class is neighbouring a Year 8 class, it is not helpful having the space opened.* Teacher 9

Finally, teachers were also able to record general comments which they felt had not been addressed in the rest of the survey. One teacher noted the increased opportunities for teacher collaboration stemming from the sliding doors and amount of glazing:

> *Floor to ceiling glass and sliding doors allow for ad-hoc collaboration between teachers sharing best practice.* Teacher 11

Another teacher commented on the suitability of the room for a class considered 'more challenging':

> *The rooms are conceptually good. I don't mind having my year 7 class in them but would not want to have some more challenging classes in the space with more elements to monitor to ensure engagement.* Teacher 8

Teachers also sought more consultation about the design of learning spaces and professional learning, which would lead to more optimal use of the new spaces:

> *If you have special classrooms, you need to train staff on how to use them. R1 has a breakout room that seems like it has meetings in it most of the time, R2 has four screens which is difficult for staff to use effectively, R4 doesn't make a lot of sense in so many ways, corner workstations, curved screen that is blurry, hard to read and can't be seen in all locations.* Teacher 2

> *It is a shame staff were not asked what they required rather than being told how to investigate how they could use the spaces that were delivered.* Teacher 6

> *Wanting to experiment but not knowing exactly the best ways for my subject.* Teacher 9

> *PD required on getting optimal use out of interactive screens.* Teacher 14

Discussion

The aim of the study was to support teacher-led inquiry in using and evaluating pedagogical practices in the prototype learning spaces in the Robertson Corridor. The spaces, refurbished as part of an initiative to inform school infrastructure developments and master-planning, were designed to support new and innovative pedagogical practices more readily than existing school spaces. By developing prototype spaces in schools ahead of large-scale investment, teachers can trial new spatial arrangements, use of furniture and technology, and approaches to teaching and learning.

The study involved four teachers and utilised data collection from various mixed method sources involving video observations, teacher and student surveys, as well as artefacts produced from three co-design workshops. Additionally, the results incorporated images supplied by teachers and students, qualitative analysis of data gathered from open-ended questions as well as lesson plans and reflective texts from teachers. The study also collected data from other teachers using the prototype spaces but not included in the professional learning. This report discussed the findings from four case study teachers and the broader teacher feedback survey.

The findings from the study provide critical insights into the way teachers and students perceived the prototype spaces and furniture layouts, and how teachers leveraged opportunities presented in the new spaces to adopt a more personalised approach to learning. Findings from the study can be summarised as follows:

- Measures of student learning, engagement, and agency increased after the post-intervention lesson for two of the case studies (Alex and Bailey). There was some variability with the other two case studies, with learning and agency improving for Year 11 Politics students and engagement improving for Year 8 Geography students.
- Measure of teacher efficacy increased for Bailey and Dani. However, the means of teacher efficacy increased after the post-workshop but decreased after the post-lesson for Alex and Charlie.
- Teachers' confidence and knowledge about teaching in a more flexible and agile teaching space increased for all case study teachers.
- Video analysis of lessons showed a change in their teaching practices, most noticeably, resulting in a reduced amount of time spent in didactic instruction and increased time facilitating learning.
- Case study teachers responded positively to the opportunity to trial different teaching practices in the prototype spaces. However, they acknowledged several challenges, including the additional planning time required and the need to adapt previous practice.
- Survey responses in the larger cohort of teachers were split fairly evenly between positive and negative responses. Positive comments suggested that teachers found the spaces well-lit and with good acoustics, and for some, the opportunity for students to collaborate in groups was a positive feature. On the other hand, many of the negative comments referred to difficulties with the furniture and its layout, and the need for spatial arrangements that reduced distraction. They also cited a need for knowledge-building and professional learning on how best to use the spaces in their teaching.

Implications and Next Steps

The findings of the study provide several important implications and next steps, critically involving the pedagogical vision, school design and professional learning. Taken together, this will enable Trinity Grammar School to transition into their new learning environments with confidence.

The concept of personalised learning is interpreted in several ways between the participating teachers. To ensure consistency and sustainability across the school, it is critical to ensure that there is a shared agreement within the whole school community. A critical piece of work, therefore, would be to co-develop with teachers a set of key beliefs and underlying principles pertaining to personalised learning. This would ensure that teaching practices are aligned, there are shared expectations, and developing more coherent ways of evaluating their effectiveness.

The prototype spaces in the Robertson corridor have been set up with the intention of providing teachers with a context in which to trial new ways of teaching. It would be beneficial to establish a methodology for how this current work will inform future design conversations—how will findings from the use of these spaces inform the shape, size, layout, and adjacencies of learning spaces and the selection of furniture within them? How will teachers (and students) be further consulted about the design of future learning spaces? Incorporating teachers' voice in the design of their learning environments not only ensure buy-in but also empower them to actively align learning space and teaching practices.

Teachers involved in the study valued the professional learning opportunity to trial new spatial and furniture settings. This is also reiterated by the feedback from the broader teaching staff. Professional learning can occur in several ways:

- Scaling up the professional learning workshops to include a larger cohort of teachers and/or the whole school community.
- Providing ongoing support as well as a forum for professional conversations through the establishment of professional learning communities (PLCs).
- In tandem with the PLCs, engaging teachers in teacher-led inquiry, one that enable teachers to focus on and evaluate a specific part of their practice.

Such professional learning not only provides teachers with a deeper understanding on the need to design more flexible and agile learning environments, but also provide them with the skills to use the physical space to enact a range of teaching practices. Additionally, it fosters teacher agency and provides a means to focus attention on making teachers' thinking visible.

This study sets out to support teacher-led inquiry in using and evaluating pedagogical practices in the prototype learning spaces at Trinity Grammar School. The findings provided important insights on the importance of aligning learning space design to the school's pedagogical vision (Mahat et al., 2018), the importance of including teachers' voice in the design of school learning environments (Bøjer, 2021) as well as the need for professional learning to enhance teachers' spatial competency (Mahat & Loh, 2024). These have important implications for Trinity Grammar School as their teachers and students transition into more flexible and agile spaces.

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