From Self-Doubt to Self-Driven: The Impact of Learning Toolkits on Girl's Agency in Year 5 Math Students

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Abstract

Effective learning happens when girls take ownership of their learning, develop self-awareness and confidence in their abilities, and understand how they learn best. When they feel empowered to embrace challenges and view mistakes as opportunities for growth, their learning becomes more meaningful and impactful. Research has shown that girls tend to disengage from STEM related subjects, such as Mathematics, due to heightened anxiety and avoidance of challenges (Al Zahrani, 2019; Green, 2021). This action research study investigated the connection of understanding oneself as a learner to growth mindset, and the combined impact on student agency in girls aged 10–11 years old in a Year 5 Mathematics classroom. The intervention aimed to educate girls about how they learn and collaboratively build a toolkit of skills to increase student self-efficacy, engagement, and risk-taking in the classroom. Across the 16-week program, the participants were exposed to mini lessons, focussed on the conventions of learning and how to understand themselves as learners. The program was based on the notion of growth mindset, habits of mind, types of mistakes, approaching challenges, and receiving and accepting feedback. The research involved a mixed-methods approach to data collection through reflection, individual interviews, teacher observations, and surveys. Findings revealed that students engaged in richer discussions and actively embraced learning opportunities when they were equipped with an understanding of how they learn and were supported with strategies to enhance their learning experience and increase their learning agency.

Glossary

Learner agency: the degree to which a student can take initiative and meaningfully impact their learning, particularly in the face of challenge.

Active engagement: involvement of students in their own learning, by thinking critically, collaborating and applying their knowledge.

Mini lessons: a series of 15-minute lessons based on strategies of learning; including growth mindset, Zones of Learning, types of mistakes and strategies for what to do when you make a mistake, the benefit of challenge and accepting feedback for learning. Lessons were linked with mathematical concepts and examples.

Self-Efficacy: the belief in one's capabilities to achieve a goal or outcome.

Growth mindset: the belief that abilities and intelligence can be developed through dedication, effort and learning from mistakes. It encourages resilience, persistence, and a focus on the process of learning rather than seeing challenges as unachievable.

Resilience: the ability to adapt well when faced with adversity or stress.

Grit: the perseverance and passion to work towards long term goals.

Learnership: refers to the expertise that a person develops in learning, and like any skill, it must be cultivated over time through repeated exposure to practice and strategies.

Toolkit: an individually designed collection of tangible strategies and resources including personal strategies, and techniques based on effective learning strategies to be utilised in the mathematics classroom.

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When girls feel empowered to actively participate in their own learning through making choices, taking risks, and contributing to the learning process, it can significantly increase their enjoyment and engagement in the subject, leading to a more joyful process (Boaler, 2016; Dweck, 2006). Additionally, understanding the mechanisms of how we learn also increases student engagement and ownership over themselves as learners and their learning (Anderson, 2023).

The overarching research topic for the 2024-2025 IGSC action research cohort, “Girls as Agents of Their Learning: Creating a Culture of Empowerment and Engagement,” served as inspiration to shine a light on the need for a pedagogical shift in teaching. Over the past 10–15 years, we have placed emphasis and professional development resources on the role of the teacher in the learning process and confused the role of the learner in their own learning (Anderson, 2023). Even 60 years ago, however, teachers knew that learning was not only the product of teaching, but the product of the activity of learning (Holt, 1964). Inspired by this theory, I embarked on a journey of reflection and re-evaluation of my current practice within my Year 5 Mathematics classroom. Reflecting on the cohort of students, it became clear that there was a strong need to equip the girls with skills and strategies that would empower them to take ownership of their learning, shifting the focus away from me as the sole source of knowledge. With my role simply as the facilitator, my goal was for the girls to feel like the drivers of their own learning. This led me to my research question “How can co-designing their own toolkits for ‘Learnership’ in mathematics develop agency in Year 5 girls?”

Action research allows educators to undertake a systematic inquiry into their own practice (Mertler, 2020) to improve and reflect on their teaching practice. Using the action research methodology, I developed a series of lessons and interventions that encouraged the girls to co-design their own research-based “toolkit” of skills, aimed at fostering growth mindset, resilience, and grit, thereby increasing student ownership and agency in the

mathematics classroom. This approach empowered girls to take control of their learning, fostering a deeper connection to mathematical problem-solving while building the confidence and perseverance needed to embrace challenges.

Literature Review

Recently, Australian classrooms have faced a growing problem in numeracy, with reports by the Australian Curriculum, Assessment and Reporting Authority stating an alarming number of students fail to meet the basic proficiency standards (ACARA, 2024). This persistent underperformance in mathematics in the primary years, as evidenced by yearly data collected through the National Assessment Plan – Literacy and Numeracy (NAPLAN) (ACARA, 2024), outlines the urgency to address this issue. NAPLAN is a national test in Australia administered in Years 3, 5, 7, and 9. National trends, particularly those from NAPLAN in 2023 and 2024, reveal a significant gender disparity, where male students significantly outperform their female counterparts in numeracy. The datum reveals 5.9% fewer female students in Year 3 and 6.7% fewer in Year 5 achieving at the “exceeding” band, defined as beyond expectations of current year level, ACARA, 2024. This gap affects students' trajectories and has profound implications for their future schooling and workforce choices, mental health, and overall well-being (Stanley, 2008).

Girls are socialised to strive for perfection, which ties their academic performance to self-worth (Damour, 2020; Saujani, 2016; Simmons, 2018). This conceptualisation can result in heightened anxiety, avoidance of challenges, and reduced engagement (Al Zahrani, 2019; Green, 2021). Various strategies aimed at addressing the barriers girls face in mathematics have focused on reducing deficits in key areas, such as maths anxiety, perfectionism, cognitive support, and motivation (Sammallahti et al., 2023). Research has explored cognitive interventions to strengthen problem-solving skills and foster a growth mindset, while motivational approaches have aimed to encourage persistence and resilience (Kaya & Karakoc, 2022; McMaster et al., 2023; Sammallahti et al., 2023).

The gender imbalance in mathematics has long been a focal point in educational research, particularly the research emphasising girls in STEM-related fields (Zander et al.,

2020). Despite the best efforts of teachers and numerous interventions, achieving success in numeracy remains more difficult for female students, raising concerns about the effectiveness of current strategies and further highlighting a need to find a new pathway to stimulate growth in this field (Sammallahti et al., 2023). As student agency, more specifically learner agency, gains prominence in educational conversations (Anderson, 2023; McMaster et al., 2023), this literature review considers how empowering students through understanding ourselves as learners can help to close the gender gap and improve numeracy outcomes within an Australian Year 5 Mathematics classroom.

In “Visible Learning for Teachers” (2012), Hattie states that students account for 50% of the variance of achievement, emphasising the role of student agency in academic success. Agency, closely linked to autonomy and self-efficacy, empowers students to influence their academic outcomes. Coutts (2021) emphasises that learning is best achieved when it is in the hands of our learners. Agency within the Mathematics classroom requires students to be self-navigating, to routinely make choices about the directions that their mathematical inquiries will take. It will invite learners to engage in productive struggle when finding a viable solution, seek feedback, and place emphasis on the effect of effort. That students will make mistakes in their journey and will experience failure is expected and encouraged, as agency is developed via resilience and grit in the face of adversity (Coutts, 2021).

Developing agency is particularly important for girls in mathematics, where societal and psychological factors often contribute to maths anxiety that control the ability to take these risks and recover from mistakes (Dweck, 2006). McMaster et al. (2023) state that to be effective, interventions in agency development, including female perceptions of confidence, expectations, and ability beliefs in mathematics, should be implemented earlier in the educational system if longer-term changes to engagement in STEM careers for females are to materialise.

When student agency is achieved within the classroom, girls can see mathematics as an open, growth, learning subject and have the foresight to see themselves as powerful

agents in the learning process (Boaler, 2016). Equipping girls with a growth mindset, focusing on effort, feedback, and resilience, can significantly enhance their agency and engagement in the classroom (Dweck; Lou & Noels, 2019 & Yager, 2021). Girls with a growth mindset view challenges as opportunities for growth rather than failure, which is particularly important in mathematics, a subject that can be categorised as needing a definitive right or wrong answer (Jaffe, 2020). Furthermore, Boaler (2016) states that students who develop a growth mindset in mathematics are more likely to experience greater achievement, happiness, and a stronger sense of self-worth throughout their lives. Educators can foster this mindset by normalising mistakes as a critical part of learning, helping girls overcome fixed mindsets that limit their potential (Boaler, 2016; Dweck, 2006). By promoting resilience and agency, teachers can support girls in overcoming barriers and thriving in mathematics, opening doors to future STEM opportunities (Boaler, 2016).

This literature review identifies student agency, specifically learner agency and developing a growth mindset as critical factors in addressing gender disparity and encouraging girls' participation in primary mathematics classrooms (Louie, 2019; McMaster et al., 2023). Fostering a girl's sense of self-efficacy and agency will help to shift the onus of knowledge acquisition from the teacher to the student, leading to support greater independence, achievement, and enjoyment. This is particularly true for girls, who have not been well served by traditional instruction (Boaler & Greeno, 2000).

In summary, research focusing on translating theoretical insights into practical strategies for the classroom will be pivotal in understanding what works best for girls in mathematics. By exposing the girls to knowledge about how they learn and allowing them to build a personalised toolkit of skills to use in the classroom that emphasise a growth mindset, agency, and the ability to respond constructively to challenges, this research aimed to empower girls to take control of their learning. Equipping girls with the skills and confidence to persevere in mathematics not only addresses current gender disparities but also lays the groundwork for long-term engagement in STEM fields. This work will directly contribute to

closing the gap by providing actionable strategies for teachers to implement in their classrooms, ensuring that all students, regardless of gender, can succeed in mathematics.

Research Context

Seymour College is an independent, Uniting Church, day and boarding girls' school founded in 1922 and located in Adelaide, South Australia, with, in 2024, some 720 girls aged 6 weeks old–18 years old, including 96 boarders. The vision of the college is to develop women of strength, optimism, and justice who are confident for the future.

In the Junior School, literacy and numeracy instruction are structured through targeted teaching groups, where students are grouped based on similar ability levels. Each group consists of approximately 10 to 14 girls, allowing for focused, individualised instruction tailored to their specific learning needs. This approach ensures that girls receive targeted support and enrichment within a structured and supportive learning environment.

This research project with 12 Grade 5 students took place after obtaining parent permissions in October–November 2024. The intervention occurred in micro lessons, ranging from 10 to 15 minutes up to four times a week across a 16-week period.

The Action

The Learnership Toolkit were built based on micro lessons that were conducted across the week to suit the needs of the girls (see Figure 1).

Figure 1

Table of lesson progressions

Week	**Focus**	
1-3	**Growth Mindset** *"Wired to Grow: Believing in the Power of Yet"*	A focus on how effort and attitude influence success in learning.
3-5	**Zones of Learning** *"Find Your Zone: Where the Magic Happens"*	Exploring the Comfort, Stretch, and Panic Zones and identifying where learning thrives.
5-7	**Challenge** *"Choose the Challenge: Strength Grows in the Struggle"*	Encouraging students to embrace difficult tasks and see challenge as opportunity.
8-9	**Types of Mistakes** *"Mistakes That Matter: Learning from the 'Oops'"*	Looking at different types of mistakes and how they contribute to learning.

9-11	**Feedback** *"Feedback is Fuel: Turning Advice into Action"*	Understanding how to use feedback as a tool for growth and improvement.
11-16	**What does this mean for me as a learner?** *"My Learning Superpowers: Who Am I as a Maths Learner?"*	Reflecting on personal learning style, strengths, and next steps.

In designing the lessons, given the inflexible scheduled time I had teaching this class, all lessons needed to be timely and relevant. At the beginning of the study, the girls displayed high levels of disengagement and low self-efficacy. Therefore, early lessons were based on understanding growth mindset and believing in themselves as learners. These lessons were more collaborative and less onerous and were aimed at engagement and creating a common classroom language (see Appendix A). Lessons, designed using the principles outlined by James Anderson in the book “Learnership” (2020), involved videos, games, and hands-on activities that encouraged communication, understanding and self-awareness.

As we progressed, the lessons became more focussed on building individual skills that girls could employ independently. An example of the individualised co-design was when girls collated a list of personalised strategies to employ when they make a mistake in mathematics (see Figure 2).

Figure 2

What to do with a mistake – task card

Each girl created an entry for their toolkit based on the information or skill they felt would help them as learners. These were compiled as a Learnership Toolkit that were kept on their laptop case (Appendix A). The agency shown by the girls was twofold: firstly, girls were encouraged to use agency in designing their toolkits, and secondly, the toolkits were then used as a means of facilitating learner agency in mathematics.

Data Collection

To determine the effectiveness of the individually designed learnership toolkits on girls' agency and growth mindset, a mixed-methods approach was used to polyangulate the data with an emphasis on qualitative data (Mertler, 2020). While polyangulation supports the amalgamation of both qualitative and quantitative data, the focus of this study was qualitative in terms of identifying and valuing student voice. This was achieved through data collection conducted regularly across the sixteen weeks through a range of methods:

Quantitative Methods

- Maths Mindset Scale - adapted from the Carol Dweck Growth Mindset scale to be Mathematics specific (pre and post-test)
- Lesson Exit tickets – Likert Scale Questions

Qualitative Methods

- University of Melbourne - Ruby Assessment tool - *Assessing Agency in Learning* (pre- and post-test)
- Maths Mindset Continuum Pre- and Post-Survey - adapted from James Anderson's Mindset Continuum (pre- and post-test)
- Reflection surveys/ questionnaires
- Individual open-ended interviews, before, during and after intervention
- Video recordings of lessons
- Lesson Exit tickets, open ended questions
- Transcribed, semi-structured, lesson teacher observations

Given the nature of action research and the small sample size (12 students), the qualitative data were particularly critical in addressing the research question. Triangulating

student interviews and questionnaires with teacher observations was essential (Mertler, 2020), allowing for a nuanced understanding of how student voice aligned with teacher perceptions. Ensuring authenticity in student responses was paramount; students were encouraged to express their genuine thoughts, reassured that their feedback would not influence their grades.

At the study's outset, one-on-one interviews were conducted and transcribed, establishing baseline data alongside students' real-time evaluations. Pre-intervention assessments were repeated at the conclusion of the study to measure any changes in girls' reflections and sense of agency over their learning.

Throughout the study, girls were observed during mathematics lessons, engaging in both individual and small group problem-solving tasks. Field notes organised according to an adapted version of Mertler's framework (2020) documented classroom behaviour, engagement levels, and dialogue, showcasing active participation. To mitigate researcher bias, observations were supplemented by insights from two additional teachers present in the classroom on a once-a-week basis.

Additionally, students completed questionnaires reflecting on their experiences and self-perceptions, focusing on shifts in attitudes and commitment to the progression of their growth mindset and approach to learning. These semi-structured questionnaires, featuring Likert scales and open-ended questions, provided timely qualitative and quantitative data. Throughout the study, these data informed instructional adjustments, addressing the specific needs and progress of each girl.

Ultimately, the mixed-methods and qualitative focus facilitated a comprehensive examination of the girls' growth in mindset and agency, providing a robust framework for understanding their development as active learners in mathematics.

Data Analysis

The data from this study were analysed using a three-step process: organisation, description, and interpretation (Mertler, 2020). Survey and interview responses, along with observations from video recordings and field notes, were coded and organised, allowing for

the grouping of data based on identified information and trends (Mertler, 2020). The data were then interpreted to address the research question. Several patterns were identified that aligned with girls' connection to learner agency, particularly in relation to growth mindset, students' ability to approach challenges, navigate mistakes, process and interpret feedback, and engage with tasks through effort and perseverance. Key findings regarding self-perception, student voice, and student action were critical in assessing the effectiveness of this study.

Discussion of Findings

After analysing the data, I identified the following themes, which helped answer my research question as to how co-designing a collection of personalised skills with the students into a toolbox of learning strategies and skills could assist Year 5 girls in developing agency through their engagement in mathematics.

The Co-Design of a Learnership Toolkit Encourages Student Agency and Promotes Girls' Self-Awareness of Their Learning

By incorporating strategies of learning into mathematical processes, our group established a shared language about learning and how we could improve as learners. Collaboratively building a physical toolkit of these strategies exposed students to lessons that helped create this common language. A common language was grounded in concepts like growth mindset, productive struggle, and resilience, which helped students articulate their thinking, reflect on their progress, and develop metacognitive awareness, which research shows enhances problem-solving skills and deepens conceptual understanding (Boaler, 2016). When students and teachers share a consistent language around learning processes, it fosters a supportive environment where mistakes are seen as learning opportunities, increasing engagement and mathematical confidence (Dweck, 2006).

Allowing girls to have agency by giving them voice and choice in the creation of the toolkit fostered a sense of ownership and connection that wouldn't have been as apparent had the lessons been solely teacher-driven. The language felt more authentic, and students had a real investment in the project. Through the creation of the toolkit, the girls began to understand that the reservations they once felt when facing challenges could be overcome by using tools to move forward in their learning. Student H remarked: "Building the toolkit has been helpful because when I run into a challenge, I feel like I can have a go on my own and really push through." The knowledge gained through the toolkit empowered students not just in achieving positive outcomes, but also in tackling challenging tasks. They became more willing to engage with difficult work. Student J reflected:

> I was [pre-intervention] doubtful of my own abilities, and I think there has been a big change. The toolkit has been helpful, the old me really liked to work in my comfort zone or performance zone where I got all the answers right and where I felt confident. Now I know everybody who is growing as a learner is in the learning zone, and it looks different for everyone.

Agency was particularly evident when one parent shared that their daughter had been bringing up mathematical problems at the dinner table, initiating discussions with her family in preparation for tackling the task the next day. As Student F said, “the toolkit has helped me to understand that if I make a mistake I’m not going to get yelled at or feel down on myself. Now when I get something wrong, I know I got it wrong, but it just means I’m one step closer to the right answer.”

This process not only deepened students’ mathematical understanding but also reinforced their belief in themselves as capable, independent learners, demonstrating the power of agency in transforming their approach to challenges and growth.

When Girls Understand Themselves as Learners, Their Confidence to Engage and Willingness to Take Risks Increases

An essential part of learning is how we gather information. A common misconception in our girls is that mistakes are bad. Damour (2020) reinforces that stress and perfectionism in girls is skyrocketing at rates far higher than their male counterparts. This fixed mindset brings with it feelings of anxiety and withdrawal from challenging tasks. Skilful learners understand that mistakes are merely signposts to tell them what they are yet to know and direct them to where they want to be (Anderson, 2023). Leaning into this stress and learning to work within the uncomfortable is a valuable strategy to stretch beyond their comfort zone (Damour, 2020).

Creating a toolkit of strategies like growth mindset, resilience, and grit empowered students to take ownership of their learning by equipping them with the skills to navigate challenges, persist through difficulties, and see mistakes as opportunities for growth. This fostered student agency, by encouraging students to be authors of their own learning, confidently engaging in mathematics lessons, and developing a deeper understanding of mathematical concepts. Student D commented, “when I try hard at maths and get a question wrong, I look at my toolkit and know that doesn’t mean I am bad at maths.” In a similar vein, student G reflected, “the program has helped me to understand my mistakes better and showed me how I could change my mindset if I make a mistake. If I make a mistake, I used

to just leave it but ever since we started learning about the toolbox program, I have looked at my mistakes and tried to figure out what I did wrong."

Whilst 11 of 12 students began the project with the perspective that if they try harder, they will get better at mathematics, 9 of 12 girls followed this statement by enforcing the belief that some people are just bad at mathematics. This self-critical thought led them to believe that no matter how hard they tried, they would never be as good as the student that "just gets it." Five students reported in the pre-survey that, "if a teacher needs to help me with a problem, it probably means I can't do it on my own." Throughout the study students were presented with many challenging activities that allowed them to utilise tools built within their toolkit and demonstrate agency in their own learning. In this regard, Student G responded: "The Learning Zone has been the most helpful tool for me, as now I am aware of what the zones look like and if I start to think I am working in the Performance Zone, I try to move myself into the Learning Zone."

One of the main goals of the study was to improve students' relationship with challenge and reduce disengagement. Preliminary testing using the Melbourne University Ruby Assessment for Agency in Learning (*Ruby: A Powerful Assessment Platform*, 2024) indicated that 7 of 12 students learnt by interpreting instructions and looking for guidance on what they should be learning. Post-intervention, 10 of 12 girls were motivated to learn independently, engaging with challenges to deepen their understanding. Four of these students progressed further, applying themselves relentlessly to learning and seeking to expand their knowledge and abilities.

There were many rewarding moments throughout this project, particularly when I heard the students using their toolkits and referring to academic struggles or challenges as "signs I am learning," rather than disengaging from the task. They grew in confidence and began taking more risks, immersing themselves in tasks instead of withdrawing and waiting for teacher assistance. It was clear that they were beginning to understand themselves as learners rather than consistently comparing themselves to others, with student B reporting: "You can go slower, it doesn't mean you're worse at maths."

One of the highlights of the project was observing the students' growth during our weekly integrated problem-solving sessions. They were more engaged, sharing ideas, challenging each other's thinking, and tackling difficult tasks. The whiteboards were filled with calculations, and the classroom buzzed with conversation. The pride the girls felt was evident in observations of their increased willingness to engage in lessons through discussions and sharing of information with their peers and demonstrated risk taking. When the students had a sense of control over their learning, they were more motivated and invested in tasks and more likely to take intellectual risks because they saw mistakes as opportunities for growth rather than failures.

This action research project highlights how student agency not only fosters engagement and risk-taking but also empowers students to understand themselves as learners, building confidence in their abilities and approaches to problem-solving.

Use of the Learning Toolkit Increases Girls' Engagement and Risk Taking and Brings Joy to the Learning Process

"Mathematics becomes joyful when children have opportunities to learn mathematics in ways they see as relevant to their identities and when they are encouraged to explore, create, and make meaning in mathematics" (NCTM 2020, p. 17). Developing an understanding of how and why we learn best, allows students freedom to navigate mathematical concepts. Within the classroom we shifted the culture from focussing on the correct answer to enjoying the process, celebrating effort, and embracing productive struggle. Before the action research intervention, 9 of 12 students reported they would prefer to feel confident with the task rather than feel challenged. However, over the course of the project, 7 of those 9 students changed their response to indicate that they seek out challenges and find satisfaction in overcoming tasks they initially struggled with. Before the intervention, student E revealed: "When I came to Seymour, I was so behind on what everyone knew, and I felt so behind and stupid but with the help of the toolkit, I almost enjoy challenges."

Throughout the research, girls became more willing to step outside their comfort zone, especially during group problem-solving tasks. They started sharing ideas, testing hypotheses, and learning from mistakes. When asked about this shift, students shared: “When I get things wrong it doesn’t mean I can’t do it or will never be able to do it, it just means I’m not there yet” (student A), and “I feel excitement when I find things challenging rather than being worried about it” (student H).

Classroom observations revealed a noticeable cultural shift: the noise level shifted from off-task conversations to collaborative discussions of ideas and strategies; students who would normally “wander” or ask for toilet breaks now remained at their desks; and conversations with the teacher shifted from “can you help me?” to “let me try this.” Lesson observation notes indicated that the students became more comfortable with one another and were less afraid to share their opinions and strategies. Student K was quoted as saying, “I actually really love maths now.” Students in small groups began driving their own learning, demonstrating agency by setting goals, making decisions about their learning strategies, persisting through challenges, reflecting on their progress, and seeking out resources to deepen their understanding. The girls’ growth mindset and resilience were evident through their actions, their body, and verbal language. As Student I said, “Now, I don’t love the questions that I know how to do easily, I am learning to love the challenge because it means I am in my Learning Zone, and I can learn more here,” while Student L added, “I think if you’re sitting in the Performance Zone it can be good but a little boring. It feels good when you get a question you’ve been finding tricky. You feel proud.”

The transformation in the girls’ attitudes to mathematics highlights how agency and ownership over the learning process created joy in the mathematics classroom, as students shifted from seeking comfort in easy tasks to embracing challenges with excitement, persistence, and a sense of accomplishment.

Conclusion

The development of “learnership” is an ongoing process. Research has shown that for these skills to become innate, students need to revisit and revise these concepts over extended periods of time. The findings of this research project confirm that the explicit teaching of who we are as learners, alongside collaboratively building resources and Learnership Toolkits with the students, created an environment of shared understanding and a language of learning. The students indicated improved self-efficacy, whilst teachers reflected on the students’ increased ability to independently engage actively in classroom activities and conversations. The students' engagement and the reduction of distraction techniques were evident in the smooth flow of lessons, increased enjoyment for both the girls and their teachers, and, although not measured in this action research, a noticeable improvement in test results.

The positive impact of this intervention was clear; however, it did have its limitations. As the project was undertaken within a small, isolated Maths class, the students felt that the principles of understanding themselves as learners was limited to the maths classroom. Students commented that they wished other teachers would apply the strategies they had included in their toolkits to help them with other areas of their learning. As the intervention was short-term and based on a cohort that has now progressed to a new year level, it would be interesting to track the girls over a longer period to assess the true value and impact of this initiative on student agency. After informally discussing the students’ learning with their new teacher, I was delighted to hear that students have continued to use their toolkits and the language of learning independently, a true reflection of agency.

A potential direction for future research is to investigate how to integrate the concept of learnership and the awareness of learning strategies and skills through a site-wide commitment. I believe this approach would have an even greater impact as our school develops a shared language, empowering the girls in our care to become agents of their own learning.

Reflection

Taking part in a research project through the International Coalition of Girls' Schools has been an incredible experience of growth and achievement for me. Action research was a new concept, and this process certainly pushed me outside my comfort zone on many occasions. There have been so many wonderful highlights throughout this journey and to see my students shine and believe in themselves was a true gift. I feel incredibly grateful for the opportunity to hone my craft and invest time and effort into my progression as an educator. The project has given me a chance to evaluate my educational values, learn from other incredible educators and make professional connections around the world. Working alongside the students, I gained an understanding of what they value and what they need in their learning. This incredible feedback is already governing how I approach my next cohort of students, and I will forever be thankful for what they have taught me.

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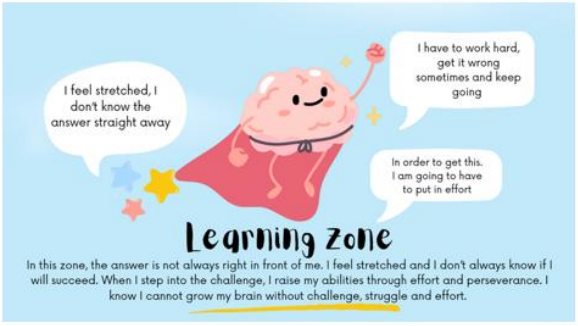
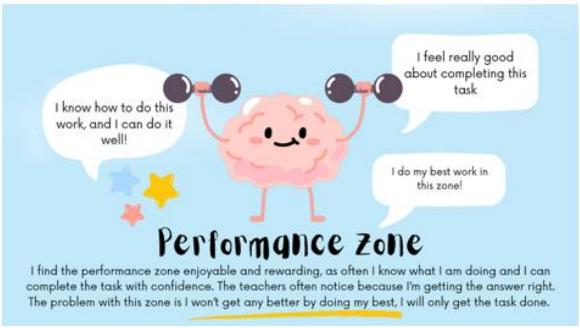
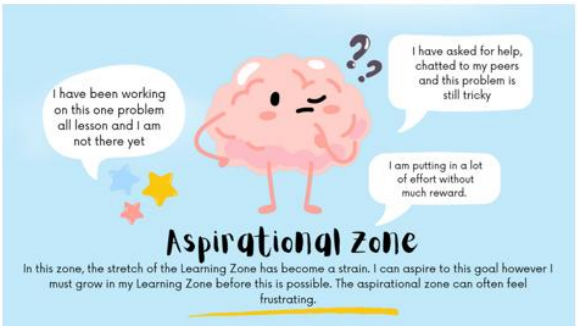
Appendix A

Zones of Learning Display Made by Students







Appendix B

Work Sample Learnership Toolkit

Appendix C

Mindset Survey -Modelled from (Anderson, 2023)

SEYMOUR COLLEGE

Learning

Mindset Continuum Questionnaire – Self Assessment

Student [redacted]

Date: 23/4/2024

Pre/ Post Assessment

World View	Who I am as a mathematician is who I will always be. (e.g. I am good a division, but I can't do fractions.)	I not really a 'maths person'. I have other strengths; maths is just not one of them.	If I keep practicing at _____ I can get better. However, I will always find ____ tricky.	If I put in lots of effort, I can really improve my grades in maths. The harder I work the better I will be.	I regularly set myself goals to improve, spend time outside of school practicing and I know these things will help me to improve in maths.
Challenge	I don't like to be challenged in Maths; it makes me feel uncomfortable when I don't know what to do.	When I start a task in maths, I would prefer to do what I already know how to do, so I can feel confident	I feel good when I can complete many questions quickly, at a level I feel comfortable, and I know what to do.	I enjoy a challenge even if I don't know the answer straight away. Sometimes I must work through a few wrong answers before I find my way.	I seek out challenging questions in maths, I like not knowing the answer. It helps me to feel engaged with the task.
Encountering Difficulties and Obstacles	When I make a wrong choice, get the answer wrong or find the task too tricky, I can give up or move on to another question. I'd prefer to work on problems I can solve.	When I make a wrong choice, get the answer wrong or find the task too tricky, I try a few times and then I give up or move on to another question. I'd prefer to have someone who knows what to do, show me how to do it.	When I make a wrong choice, get the answer wrong or find the task too tricky, I ask a teacher or a friend for help. I can move forward with the help of another.	When I make a wrong choice, get the answer wrong or find the task too tricky, I keep persevering. A few wrong answers just mean, I haven't got the answer yet.	When I make a wrong choice, get the answer wrong or find the task too tricky, I can preserve for a long time. I will not give up. I like to discover different ways to solve problems.

Effort	If I must work hard at a maths problem or concept, it means I'm not good at it and I shouldn't bother.	If I must work hard at a maths problem or concept. It means that I am not as good at maths as those who 'get it' quickly.	I don't enjoy when a problem is hard, and I need to put in extra effort. The more effort I have to put in, the trickier the problem is for me.	When a maths problem is tricky, I need to put in effort to solve it. I know the more effort I put in the easier the problem will become.	Effort is relative, I know that I need to put in effort to improve. How hard I have to work at something, is not a reflection of how good I am at maths.
Feedback and Criticism	When I receive feedback, I feel like it is a list of things I have done wrong. I don't read the feedback the teacher writes on my tests.	I only like hearing the positive feedback about my work. I feel better about myself when I know I have done the question right. I don't read the feedback the teacher writes on my tests.	I can use some feedback to make small changes and improve my work. After a test, I look at the feedback and see what the teacher has suggested.	Positive feedback is a sign the teacher has recognised my effort. I learn from reading or listening to feedback from my teacher. After a test, I look at the feedback and look back over my test to see where I could improve.	I ask questions and analyse feedback given to me. I can actively seek feedback from my teacher and my peers. After a test, I look at the feedback, ask questions and seek ways I can practice and improve in the areas I need to.
Success of Others	I can feel threatened by the success of others. If other people can do things better than me, I can withdraw and not join in. I don't like to feel challenged.	Some people are lucky to be good at things like maths, they just get it straight away and don't have to work that hard. I always have to work hard, which means I am not good at maths.	I like taking part in challenges and competitions when I know what I am doing and how to succeed. I like to keep up and work at the same level as the people around me.	I really enjoy the challenge of competition. I feel inspired by other's success. It drives me to want to succeed	I look to successful people to 'learn their secrets'. I love competition and think I can only improve through challenge. When someone can do something that I can't yet, I feel inspired to put in more effort to succeed.
Making Mistakes	I feel very uncomfortable when I make a mistake. I tend to move past that question or ignore it. I don't like being asked for an answer from the teacher especially if I think I am going to be wrong.	When I make a mistake in maths, I find it hard to accept that I have taken a wrong step. Sometimes I blame others for my mistake. I don't like answering questions in front of my peers.	I expect that sometimes I will make a mistake in maths. I know I can correct my mistakes.	I recognise that mistakes can be a way of finding out what I don't know yet. I can use mistakes to help me learn.	I try to find problems that will encourage me to make mistakes. I think if I don't make a mistake, I am not working in my learning zone.
Offered Help and Support	If the teacher needs to help me with a problem, it probably means I can't do it on my own. I sometimes wait quietly not doing anything.	I will accept help with a maths problem if the teacher asks me. I don't like to ask for help as it shows I don't quite know what to do. When a teacher or a friend helps me, I like them to finish the problem or tell me a solution.	I will accept help with a maths problem, and I sometimes ask for help if I am really stuck. I like help until the solution is found.	I can seek out help for a challenging problem or if I am confused. I ask questions and seek feedback to help me move forward with the problem.	I will seek out the teacher or a peer for help to get started on a problem. Once I have a head start, I like to go back to working out the solution independently. Sometimes I take the problem home or to another teacher to continue the conversation and find out more.