

**Academic Buoyancy: Empowering Year 9 and 10 Girls to Take Risks and Own Their Learning as They Problem-Solve in the Science Classroom**

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**Abstract**

This action research project sought to explore how supporting Year 9 and 10 girls' understanding of their personal academic buoyancy and associated strategies impacted their academic risk-taking and ownership of learning when problem-solving in Science. In July 2021, a class of 23 Year 9 and 10 girls at Ruyton Girls' School commenced a one semester Science elective entitled Marine Encounters. Early in this course, they were introduced to the concept of "academic buoyancy" through a bespoke workshop delivered over two fifty-minute sessions. The workshop focused on understanding cognition, behaviours, and emotions to support personal academic buoyancy, particularly during problem-solving exercises. The students then engaged in a series of authentic scientific problem-solving activities as part of their scientific study, which provided opportunities to put the academic buoyancy strategies into practice. In a mixed methods research design, data were collected through a pre-activity and post-activity survey, written student and staff reflections, and focus-group interviews towards the end of the elective. Analysis of the data indicated increased students' awareness of negative thoughts about their own learning, recognition of their own personal signs of anxiety and worry, and greater recognition of the aspects they could control and develop. Student agency emerged as a strong theme, with students identifying not only how the action supported them in taking greater control of their own learning, but also how it could be improved in the future to support younger students. The results of this project indicate that a deliberate and embedded approach to teaching girls' academic buoyancy and associated strategies enhanced openness to academic risk-taking and increased ownership of learning.

## Glossary

**Academic Buoyancy:** “Everyday academic resilience” or the ability of students to successfully deal with the everyday academic stresses of school life, such as failing a subject, missing an academic deadline, catching up after absence, or an unexpected change of teacher (Martin & Collie, 2021).

**Academic Risk-Taking:** Students’ confidence and courage to try something new when learning in an uncertain situation that can lead to success or failure (Varışoğlu & Ekinci Çelikpazu, 2019)

**Buoyancy Cycle:** Strategies to support the development and maintenance of academic buoyancy, including five important steps: recognising academic adversity; adjusting cognition, behaviour, and/or emotion to navigate adversity; investigating rallying these attributes in self through an ongoing process of refinement; recognise the benefits of this psycho-behavioural adjustment; and continuing to engage in adjustments to develop and maintain their buoyancy (Martin & Burns, 2014; Martin et al., 2013).

**Individual Problem-Solving Competency:** An individual’s capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious (OECD, 2012, p. 12).

**Collaborative Problem-Solving Competency:** The capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution (OECD, 2017, p. 47).

## **Academic Buoyancy: Empowering Year 9 and 10 Girls to Take Risks and Own Their Learning as They Problem-Solve in the Science Classroom**

In an all-girls' educational context building students' academic risk-taking in the day-to-day learning environment is one of the greatest challenges for educators, students, and parents. Problem-solving activities require students to take academic risks, overcoming possible failure and difficulties, and solving the tensions that are inevitable in the everyday learning landscape in the process. In 2017, Ruyton students from Years 5 to 9 took part in a Motivation and Engagement Survey designed by Prof Andrew Martin, University of New South Wales (UNSW), as staff sought to understand more about the difference between student compliance and engagement in an all-girls' setting. The data provided insights into our high potential learners and their motivation, leading to a middle years' project focused on student agency in co-constructing learning. The other significant data to emerge from the Motivation and Engagement Survey related to student anxiety, informing a school-wide project titled "From Student Anxiety to Empowerment." Through his research, Martin identified a set of dispositions, both positive and negative, as impacting student motivation and engagement. As we sought a deeper understanding of these factors and their impact in the following years, we considered the Academic Buoyancy Cycle as a possible strategy to embed in our learning programs in order to support girls in successfully managing academic adversity.

The 2021/ 2022 NCGS action research topic, *Building Problem-Solving Capacity, Confidence, and Skills in Girls*, coincided with our consideration of embedding Academic Buoyancy learning and provided the platform to pilot a student workshop model and study the impact of actively teaching Academic Buoyancy strategies to girls. A Year 9-10 Science Elective class was chosen for the project as this class provided a series of authentic problem-solving scenarios that could provide students with challenging learning situations requiring academic risk-taking in which to apply their learning about academic buoyancy.

### **Literature Review**

In a rapidly changing world where young people require enterprise and transferable skills to confidently navigate their future, the OECD (as cited in Toner, 2011) argues that "the increased rate of innovation across economies requires the workforce to possess both technical competence and what are termed 'generic skills' – problem-solving, creativity, teamwork, and communication skills" (p. 8). Problem-solving, both collaborative and individual, in everyday academic learning engagements, requires students to confront challenges and take risks in their learning, resolving a problem where the solution is not immediately obvious. Martin and Collie (2021) identify that academic buoyancy, dealing with academic setback, adversity and challenge in everyday learning, registers more with girls and lingers longer for girls, for various reasons. They maintain that it is one

of the few psycho-educational attributes not favouring girls and, for that reason, it was an area we wanted to focus on at Ruyton with the vision to improve both our girls' approaches to challenging learning situations and their ownership of learning.

While the 2012 and 2015 Programme for International Student Assessment (PISA) assessed that individual and collaborative problem-solving capacity of students were not directly comparable to one another (OECD, 2012; OECD, 2017), the results suggest the collaborative component of the 2015 assessment demonstrated that girls significantly outperformed boys in every participating country. In contrast, the PISA 2012 results showed boys scored 7 points higher than girls in individual problem-solving on average across OECD countries and were 1.5 times more likely than girls to be top performers (OECD, 2017).

Research conducted in school settings amplifies the learning differences between genders in Science, Technology, Engineering and Mathematics (STEM; Colley, 2008; Cooper & Heaverlo, 2013). Cooper and Heaverlo identified that girls learn best in environments that promote collaborative learning, hands-on experiences, creativity, and practical applications in STEM subject areas, which supports the PISA findings. Furthermore, the research identified four pedagogical methods in Science education that promote these preferred learning approaches, namely, problem-solving, problem-based learning, project-based science, and anchored instruction. The Project-Based Science (PBS) approach, grounded in collaborative and authentic problem-solving learning experiences specific to scientific inquiry, has been identified to increase girls' capacity to confidently problem-solve within a supportive collaborative framework (Colley, 2008). In light of these research findings, the School's research team determined that the starting point for researching the impact of applying academic buoyancy strategies for girls would be in a collaborative problem-solving situation that provided challenge, risk-taking, and uncertainty, whilst also providing a scenario more likely to support their capacity to problem-solve.

Reasons for the learning discrepancies between the genders can be identified in research pertaining to girls' education. Simmons, (2010; 2019) refers to an increased awareness of the toxic messages received by girls and young women concerning effortless perfectionism and the insidious self-doubt that they are not enough as they are, and there will always be someone better than them. In Simmons's (2016) view, the highest achieving girls are often the most debilitated by fear of failure. There is a "long-standing consensus that 'smart' girls tend to be more vulnerable and less confident than smart boys, and as a result deal with challenge in a different way" (Stannard, 2019, p.35). Furthermore, Stannard notes a gap exists between girls' own perceptions and those of their teachers, as girls tend to rank themselves lower in ability than do their teachers, underestimating their respective abilities, yet "they are more likely to be motivated to learn even when results are

not encouraging” (Stannard, p. 36). Stannard also notes that girls tend to be more extrinsically motivated and mastery orientated, whereas boys have a tendency to be more performance goal orientated. Further to this, the study by Patrick et al. (2000) found that engaging in schoolwork with the goal of increased learning and understanding increased self-efficacy perceptions and strategy use over time, but only for females.

Academic risk is evident in students’ willingness to take on an academic direction with an uncertain outcome, without focusing on success or failure (Tay et al., 2009). It is generally associated with the concept of success and evident when students predict or react in unfamiliar learning situations, dealing with problems for which definitive solutions are not available, or where they may not see the consequences or may not be aware of alternative actions (Varışoğlu & Ekinci Çelikpazu, 2019). In an all girls’ learning environment, building academic risk-taking is one of the greatest challenges as it places girls in a situation where the most successful outcome is often to make mistakes and embrace the possibility of failure.

Damour (2020) cautions that “when we allow girls to view all stress and anxiety as harmful, they feel stressed about getting stressed and anxious about getting anxious” (p.31). Adults are able to help them to ease these feelings, recognise the value of stress and anxiety, and take control. Martin and Collie’s (2021) research identified academic buoyancy as one of the relatively few areas whereby gender differences at school do not favour girls. They note that girls typically demonstrate higher motivation and engagement than boys, yet academic setback, adversity, and challenge register more and linger longer for girls. Martin and Marsh (2008) found that anxiety explained much of the variance in academic buoyancy observed. Academic buoyancy, or “everyday academic resilience” refers to the ability of students to successfully deal with the everyday academic stresses of school life, such as failing a subject, missing an academic deadline, catching up after absence, or an unexpected change of teacher (Martin & Collie, 2021). Furthermore, Martin (2007) identified five “Cs” of academic buoyancy, strategies to help support the development of student motivation, and engagement and wellbeing; these being confidence (self-efficacy), coordination (planning), commitment (persistence), control, and composure.

Notably, Martin and Collie (2021) propose that if we can teach girls about academic buoyancy, provide them with a common language, and support them to identify what academic adversity looks like, then they can adopt a pre-emptive strategy before responses to setback, pressure, stress, and fear of failure engulf them. Martin (2002) maintains that this strategy could assist educators to better prepare students to deal with academic setback and pressure from a resilience perspective, opening new pathways for intervention and empowering students to achieve their potential.

## **Research Context**

Founded in 1878, Ruyton Girls' School is a non-denominational K-12 independent girls' school in Melbourne, Australia with approximately 550 students currently enrolled from Years 7 to 12 in the Senior School. Ruyton aims to foster the individuality of each girl, nurturing her intellectual, physical, social, and emotional qualities essential to flourish. Dedicated to educating girls to live lives of impact and purpose, Ruyton is recognised widely as a high performing academic school with a strong co-curricular program where girls excel in sport, drama, music, public speaking and debating.

All Senior School students undertake Science from Years 7 to 10, with the option of additional Science electives in Year 9 and 10. The majority of our students choose to continue studying Science in their Victorian Certificate of Education (VCE) during Years 11 and 12. The participants for this action research project were the 23 students enrolled in the Year 9 and 10 Science elective, Marine Encounters. The class was taught by a Senior Science teacher, and I joined the class to co-deliver the academic buoyancy workshop and to observe student engagement during problem-solving situations. The students and their parents provided written consent for their participation in this project. No names have been included in this report to ensure the anonymity of my participants.

## **The Action**

The need to develop a pre-emptive strategy that would lift girls' academic buoyancy when facing challenge in the Science classroom due to the uncertainty they face when problem-solving was critical to this study. Central to Martin and Collie's (2021) findings, was the need to strategically support girls to know how to identify academic adversity before it engulfs them. Martin and Collie acknowledge that little is known about the instructional practices that could lay the foundation for the intentional development of academic buoyancy, and how these practices may vary across different educational contexts. However, the Buoyancy Cycle was specifically designed with the intention to support students in building everyday academic resilience and adapting to changes beyond their control. Empowering students to know "how" to recognise and adapt their thinking, behaviour, and emotions is foundational to confident engagement with challenging learning situations such as problem-solving scenarios.

The Buoyancy Cycle provides strategies that can be taught and includes five important steps: recognising academic adversity; adjusting cognition, behaviour, and/or emotion to navigate adversity; investigating rallying these attributes in self through an ongoing process of refinement; recognising the benefits of this psycho-behavioural adjustment; and continuing to engage in adjustments to develop and maintain their buoyancy (Martin & Burns, 2014; Martin et al. 2013). This

study aimed to intentionally implement strategies developed from Martin and Collie's (2021) research on Academic Buoyancy, as a potential way to increase girls' confidence and embrace academic adversity when facing the challenges posed by problem-solving activities.

This project involved two main action components. The first was the development and delivery of an Academic Buoyancy online workshop for all students undertaking the Science elective, which was delivered across two fifty-minute sessions. The purpose of the workshop was to support students to identify their personal Academic Buoyancy challenges and set personal goals. The plan had been to deliver the workshop in person, but extended COVID-19 related lockdowns required us to move to an online delivery. Students were provided with an Academic Buoyancy student booklet, a resource developed by our staff and based on work of Martin and Collie as part of the Motivation and Engagement Study (MES). The workshop and booklet identified Academic Buoyancy, the Buoyancy Cycle and the 5Cs of Academic Buoyancy. They outlined example strategies for each of the 5Cs, with the booklet providing students with the opportunity to take notes and identify the strategies they already used and the ones that could be of use to them personally.

The second action involved the students undertaking collaborative problem-solving activities and putting into action their identified strategies to support academic buoyancy. Students were introduced to an authentic aquatic ecosystem problem and provided with all the available data to review individually. Students were then grouped into three "specialist groups" to research one component of the data. Once completed, new groups were formed with one person from each specialist group then analysing all data and determining their solution to the scenario. Each group shared their solution with the class. For the purposes of this study, the Project-Based Science (PBS) approach was adopted, which is grounded in collaborative and authentic problem-solving learning experiences.

### **Data Collection**

Action research engages and empowers teachers in schools to collect data in order to make informed decisions about their students and classrooms (Mertler, 2019). This, in turn, ensures student centred action, enabling systematic inquiry focused "specifically on the unique characteristics of the population with whom a practice is employed or with whom some action must be taken" (Mertler, p. 6). Martin and Marsh (2009) proposed that students could learn to be more academically buoyant through a strength-based approach of positive cognitive, affective, and behavioural orientations to academic life. Martin and colleagues (Collie et al, 2017) note that their findings suggest the merits of targeted interventions that promote academic buoyancy where students recognise the academic challenges they face and use identified approaches to address or offset the challenge. With this in mind, action research was considered the most appropriate

method to learn about the impact of academic buoyancy strategies for girls in our school when engaged in challenging problem-solving strategies in Science.

The research question informed the design of a mixed method approach using quantitative and qualitative data to ensure the “polyangulation” (Mertler, 2019, p. 42) of potential findings and support the credibility, trustworthiness, and authenticity of the collected data. Specifically, the qualitative methods involved student reflections on personal experiences related to academic adversity, practices employed to deal with adverse situations, and self-reflection on personal development, as well as teacher observation of how students responded during these problem-solving challenges. Quantitative data were gathered via a student survey that used a Likert scale, rating students’ self-efficacy through measurement of attitudes and self-perceptions in relation to academic buoyancy. The survey was administered in a pre -and post-test design, before and after the action took place.

Qualitative data were collected from the girls to amplify student voice, as their self-perceptions and attitudes were central to analysing the impact of the action. During the action phase, researcher observations and field notes were documented. Written reflections were gathered from students and staff via an online collaboration tool after each problem-solving exercise. A semi-structured student focus group interview was conducted after the action. Impromptu conversations between individual students and the teacher also occurred, particularly when students returned to face-to-face learning at school.

The data obtained from the study remained confidential, with no personal identification or specific connections made to individuals in this report. Students were informed that they might withdraw from the study at any time with no academic or personal repercussions.

### **Data Analysis**

Initially, the quantitative data collected through the pre -and post-surveys were analysed, and the results, a selection of which are visually presented in Figures 1 to 6, provide a snapshot of the students’ responses to the buoyancy cycle actions.

The qualitative data provided a narrative of the students’ experiences as well as supporting the analysis of the quantitative data collected, ensuring the utilisation of polyangulation. The process commenced with a blind audit involving two additional educators not directly involved in the research study, independently reading then coding the qualitative data, and identifying emergent themes to increase rigour and validity. I then met with the two educators to collaboratively define and describe the main features of each identified theme. Throughout this process of analysis, our intention was to remain open-minded to reduce conscious, unconscious, and confirmation bias, whilst making sense of the data.

## Discussion of Findings

The goal of the action was to support Year 9 and 10 Science students in developing an understanding of academic buoyancy and associated strategies, then implement them in problem-solving scenarios that required academic risk-taking. Despite the impact of lengthy COVID lockdowns, as well as a 14-day school wide quarantine order during this time, a small group of students remained committed to the project, resulting in the identification of three emergent themes. Nine students participated in the pre-test survey and eleven students in the post-test survey, with six students from this group taking part in the semi-structured focus group interview.

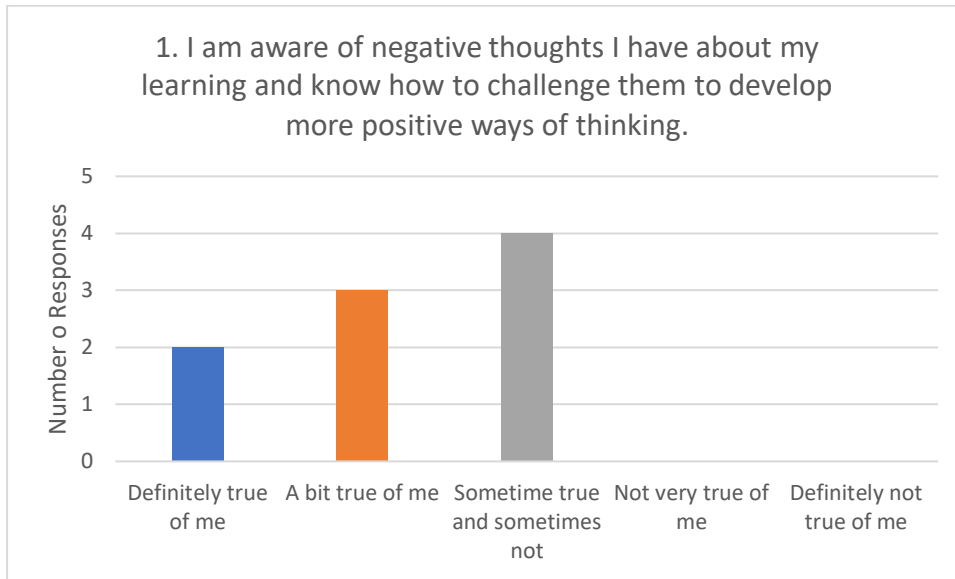
### **Raising Awareness of Academic Buoyancy Strategies to Navigate Problem-Solving Scenarios**

The data indicated that during the project, students developed a greater understanding of their own response to the challenges posed by the problem-solving scenarios. This was evident in their self-identification of employing one or two of the buoyancy strategies to take control of their learning. In the post action survey, of the 11 students who responded, most identified an awareness of negative thoughts about their learning in these situations and the need to develop more positive ways of thinking (see Figs 1 & 2). This was also evident in the focus group interview, with students identifying feelings that recognised the need to utilise a buoyancy strategy; for example, “when I was feeling very anxious” (Student A), “to reduce my stress levels” (Student B), “feeling overwhelmed” (Student C) and “to be in a calm frame of mind” (Student D).

The girls’ responses to the Academic Buoyancy Workshop highlighted making adjustments to navigate adversity: identifying your own cognition (thinking) about adversity; identifying possible behaviours to assist in responding to this adversity; and reflecting on how you manage your emotional response. These comments were supported by teacher documentation of student conversations, action, and reflections during the problem-solving scenarios. Further to this, one student in the focus group noted that “building confidence by using the different strategies struck me when we were going through the booklet” (Student D), while another responded in reference to putting the strategies into action during the problem-solving scenarios, “the strategies did help my awareness, especially around the things I can’t control” (Student E). All students in the focus group agreed with this statement. When asked which of the strategies they would carry forward into next year to support their learning, one student suggested, “writing out a list of everything you have to do to take it out of my brain was helpful and ticking off completion of things is very satisfying” (Student A).

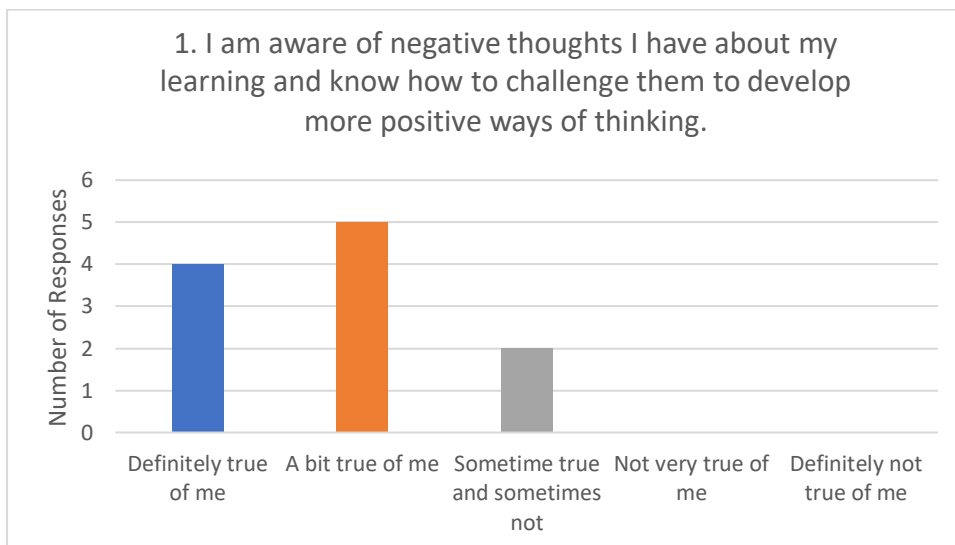
**Fig. 1**

*Year 9 / 10 Science Elective Pre-Survey: Awareness*



**Fig. 2**

*Year 9 / 10 Science Elective Post-Survey: Awareness*



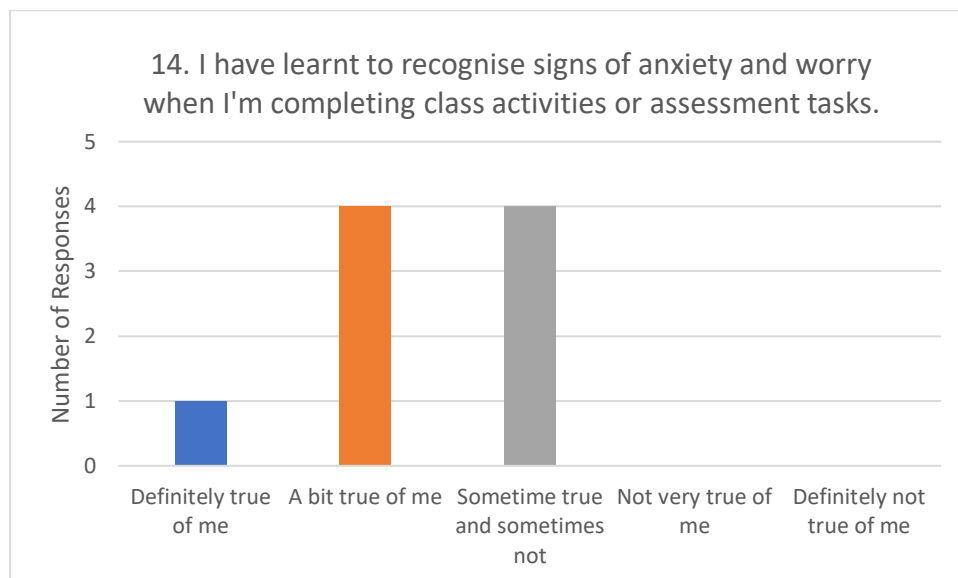
Martin (2002) notes, “to build students’ self-belief it is important to challenge their negative thinking” (p. 42). Student responses to the post-action survey indicated that during the action a majority of the class had increased their ability to recognise their own signs of anxiety and worry. This result aligned with the Academic Buoyancy Workshop focus on making adjustments to navigate problem-solving scenarios in the Science course (see Figs 3 & 4). This action research took place in the second year of the COVID-19 pandemic, a time of intense emotions and interruptions for students. Damour (2020), notes that if we “help our teenagers embrace a view of psychological

health that includes feelings both easy and hard — to find that they can withstand emotional discomfort — they'll come out of this pandemic with more freedom than they had before” (para. 13).

The data indicated that the students identified and implemented practical ways to deal with their negative feelings when engaged in the problem-solving activities. The teacher noted that in the online collaboration reflections and in conversation, students would “refer back to the workshop or booklet and identify the strategy or strategies they could employ to support them when problem-solving or experiencing challenge.” One student did note, however, that she “tuned out a bit when it was introduced online, but this was because of Distance Learning” (Student E).

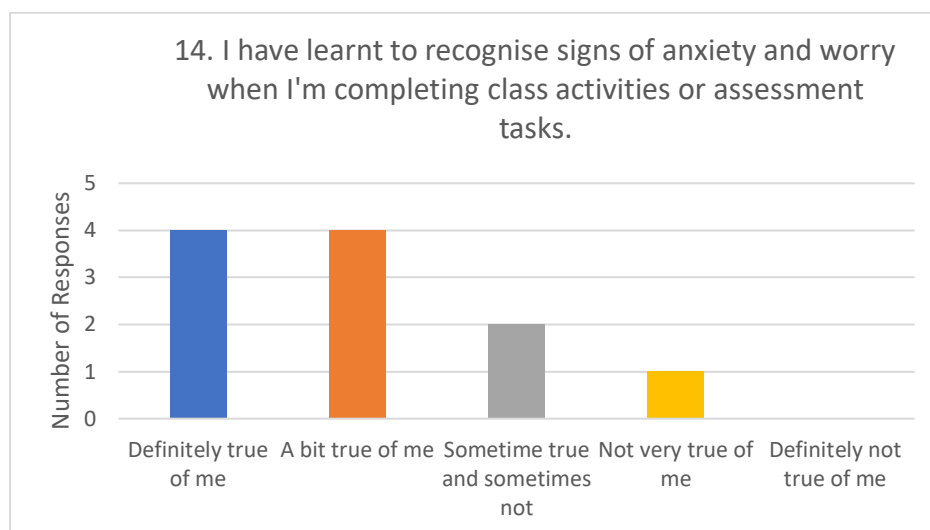
**Fig. 3**

*Year 9 / 10 Science Elective Pre-Survey: Ability to recognise anxiety & worry*



**Fig. 4**

*Year 9 / 10 Science Elective Post-Survey: Ability to recognise anxiety & worry*



### **Commitment and Coordination Identified as the Most Used Academic Buoyancy Strategies**

During the initial Academic Buoyancy workshop, students were introduced to the five Cs (Confidence, Coordination, Commitment, Control and Composure) as factors supporting the development of motivation, engagement, and wellbeing. The data gathered in the focus group interview suggest that Commitment (persistence) and Coordination (planning) were most utilised by students during the problem-solving scenarios that followed the workshop.

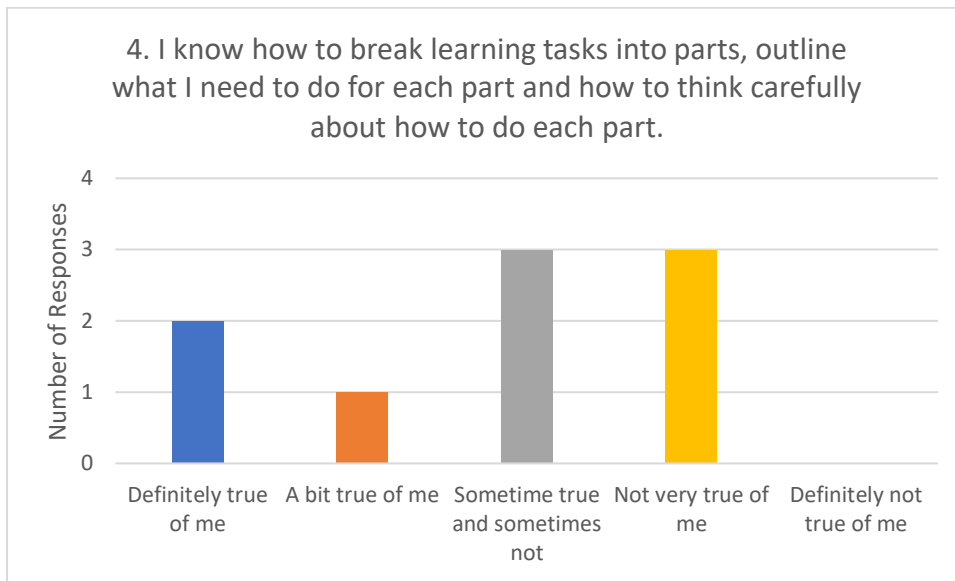
The Commitment factor is about developing strategies to persist, particularly when trying to work out a solution or understand a problem that is difficult or challenging. The focus group interview commenced with the question: What academic buoyancy strategies helped you most when problem-solving during the Science Elective? Commitment (persistence) was evident in one student's response: "the strategy where we needed to persist when we found it hard, by taking a break and coming back to the hard bit later" (Student C). This response was supported by all students in the discussion, evidenced by their verbal agreement or head nodding. Additionally, one student noted, "I was feeling very anxious when I decided to use the technique, as it was around assessment time" (Student F), while another student commented that "this strategy was also helpful in English and Maths" (Student B). While this intervention focused on student responses to problem-solving scenarios in Science, these comments demonstrate students identified adversity in other academic situations and adjusted their response to navigate the situation. The responses suggest that students require internal (self-talk) and external (teachers, peers) encouragement to persist when feeling challenged in their learning.

Coordination (planning) emerged as a positive buoyancy factor in the response: “breaking down the question, as well as writing all the things I have to do as a list and then crossing off things as I complete them. This strategy reduced that feeling of being overwhelmed” (Student C). The factor of coordination appeared to support ownership of learning through self-regulation, evident in another student’s response: “breaking down the question required me to be in a calm frame of mind so I could think it through more carefully. It also helped me to stop and come back to work that I am not good at because I can get so distracted, so that reduced my stress levels” (Student D). During the focus group discussion, all six students agreed with these reflections. Given this intervention took place during extended lockdowns it is possible that students’ regular planning processes had been impacted, particularly where and when they could study and concentrate well. Coordination as a supportive factor was also evident in the post-action survey where all student responses indicated “they can break down learning tasks into parts” (see Figs 5 & 6).

The application of buoyancy strategies by students suggests that the intervention positively impacted their ownership of learning and self-efficacy in problem-solving situations. Martin (2002) notes that students high in self-efficacy deal better with problem-solving situations as they are more likely to generate and test alternative courses of action in challenging learning situations and they function better in the classroom through elevated levels of effort and persistence. Whilst this intervention planned to focus on problem-solving situations in Science, the students reported applying the strategies across other subject areas. Students were also placed in a challenging and lengthy distance learning environment that challenged the wellbeing of staff and students alike. Comments referring to a calm frame of mind, reducing stress levels, and reducing the sense of being overwhelmed suggest that the intervention has impacts beyond the intended and supports student wellbeing.

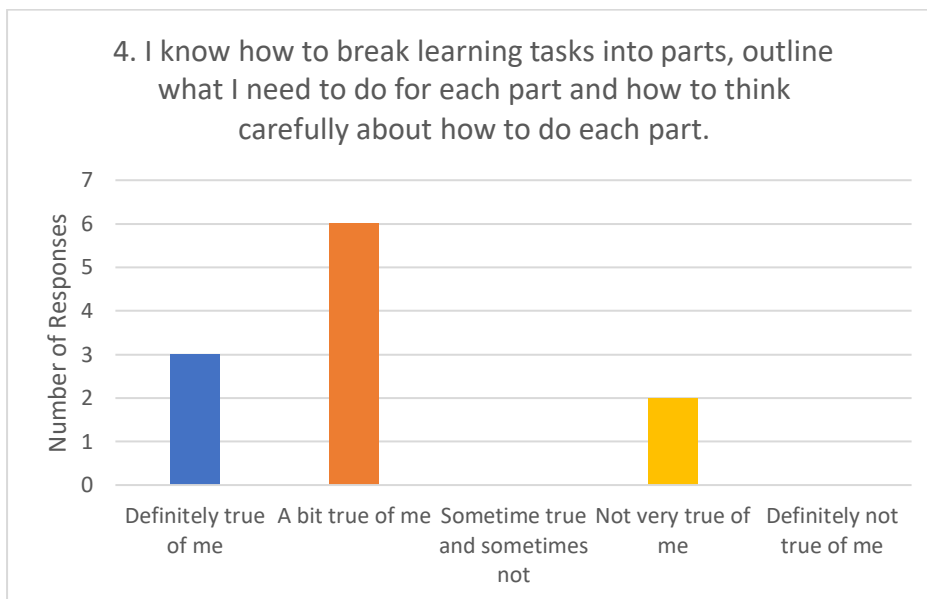
**Fig. 5**

*Year 9 / 10 Science Elective Pre-Survey: Breaking down tasks into parts*



**Fig. 6**

*Year 9 / 10 Science Elective Post-Survey: Breaking down tasks into parts*



### **Student Agency and Ownership Help Support Risk-Taking and Problem-Solving**

As noted in the findings above, the students identified their application of the academic buoyancy strategies to problem-solve beyond the Science classroom. They identified using academic buoyancy strategies in Maths and English, as well as during the assessment time (examinations), particularly in terms of their personal management of time, multiple tasks, and their personal

response to academic pressures. This demonstrates an application of the strategies beyond problem-solving in Science, to problem-solving in the wider academic realm.

During the focus group interview, the theme of student agency and ownership emerged in response to the question: Do you have a greater sense of academic safety by knowing about these strategies that you can use? All students agreed with this statement; however, it ignited a conversation about how to improve the Academic Buoyancy workshop and booklet to provide greater learning opportunities for younger students. One student reflected that “it would be a great thing to learn at Year 7 because once you’ve got to Year 9 you’ve developed your habits and what works for you. In Year 7 you’re fresh from primary school and not familiar with pressure around assessments, so this would be a better time to learn these strategies” (Student D). This reflection was strongly supported by the other five students, which led to further thinking. One student said that she “came from a system where we had no assessments, so I was really unprepared for Year 7, I had no idea how to handle the workload. It affected my mental health and increased my anxiety, so this would help a lot of people who don’t know how to study or are not used to grades and tests” (Student B). This comment highlights the importance of understanding and supporting the development of student motivation, engagement, and wellbeing. Another student highlighted that “learning these strategies would have been so much more helpful in Years 7 and 8 and we would have known how to manage our time and anxiety by Year 9” (Student F).

The issue of equity of access was also highlighted: “starting in Year 7 and 8 would include all students coming from different feeder schools and provide equity access. It would start the building blocks for great study skills and strategies for the later years” (Student D). All six students in the focus group then identified their concerns with the academic buoyancy booklet: “it was too dense and wordy, which turned off students” and “it was hard to review when academically struggling because it was too time consuming to read.” Students proceeded to problem-solve ways to improve the booklet: “a summary of the key points for each strategy,” “a more interactive booklet,” “more reinforcement of the strategies,” and “more practice applying the strategies.” These responses demonstrate students not only embracing the strategies and owning their learning, but also looking to improve the learning of others.

The timing of introducing academic buoyancy was recognised, with a student identifying the following: “maybe do the sessions well before the heavy assessment times and exams, so that students can see the purpose of the strategies and use them when they have heaps of assessments and tests. It would not be helpful the week before exams, for example, when things are due” (Student E). This reflection was strongly supported by all students.

The final piece of advice offered by students from their learning experience was to include students in the design and facilitation of the sessions on academic buoyancy. One student suggested, “why not ask older students to share their experiences using the strategies with younger students. They could use real life examples which would be interesting and engaging” (Student B). This was taken up by another student: “the Year 10s could be trained to co-facilitate a study skills program for Years 7/8 with the Year 7/8 Mentor Teachers based on the strategies. The current Year 9 Science Elective students could be the pilot group (Year 10 girls) for next year” (Student A), a suggestion supported by all students. While the students were actively problem-solving how to improve the action, they were also supporting Martin and Collie’s (2021) focus on the development of a pre-emptive strategy: that if students know what adversity looks like they can spot it before it engulfs them.

The emergence of student agency and ownership of academic buoyancy in a wider context beyond problem-solving scenarios in the Science classroom was an unexpected development. Students also demonstrated the capacity to identify possible improvements to the academic buoyancy action, as well as ideate student-led solutions that could be practically implemented in the school.

The findings of this study show that the action was effective in supporting our students to navigate their response to the everyday academic challenge provided by problem-solving scenarios in Science. This included identifying negative personal responses and academic buoyancy strategies to support them through the challenge, in turn providing them with a sense of endeavour and purpose, essential to developing ownership of learning. The research question was answered through the identification of three themes that emerged from the analysis of data. Students indicated a greater understanding of their own response to the challenges posed through problem solving, clearly identifying the academic buoyancy strategies they adopted to support them through this challenge and build their self-belief and sense of purpose. Their ownership of learning appeared to result from a deeper understanding of the components and strategies of academic buoyancy, provided through the targeted academic buoyancy workshop and booklet. This experience acknowledged openly that failure and mistakes were expected during problem-solving and challenged students to identify their own negative feelings and determine how they could take personal action to overcome them. The students identified Commitment (persistence) and Coordination (planning) as their most utilised strategies during this study and reflected on their own experiences with these challenges, particularly in Year 7, identifying the transition to the Secondary School setting as an appropriate time to focus on the development of academic buoyancy strategies and understanding.

Whilst this action research project only provided feedback from a small sample of students, it provides promising evidence of the positive impact of embedding academic buoyancy in a student educational development program and the opportunity to co-create these experiences with students.

The research context for this study was the students' response during Science, so it was of interest that the girls reported applying the strategies to other areas of their academic program, notably English, Maths and assessment tasks (examinations). This is important to note, as it does provide further evidence to answer the research question, beyond our expectations. The students' ownership of learning was not confined to Science as they identified other challenges and experimented with the academic buoyancy strategies.

In considering the findings of this study, we have learned that girls in our school could benefit from a focused academic buoyancy program from the commencement of Year 7 with further refinement of the academic buoyancy workshop model in terms of presentation style and year level focus. Ideally, this would be led by Wellbeing Leaders and teachers across all areas of the curriculum. This work has commenced this year at Ruyton to further evaluate the effectiveness of this approach for girls and the long-term educational value. As much of the data of this study relied upon student self-assessment and reflection, alternative data sources are being considered to add further validity to our research, notably the strengthening of teacher observations and assessment.

### **Reflection**

This action research took place during the second year of extended lockdowns and online learning in Melbourne, Australia due to the COVID-19 pandemic. The students in our school also experienced a school wide 14 day quarantine during this time. Initially the action was delayed in the hope that the students would return to face to face learning, but this was not possible.

Whilst the research study was intended to explore academic risk-taking and ownership of learning in the face-to-face learning environment it is understood that here may have been other significant factors impacting student learning, wellbeing, and engagement in this extended online setting.

Further research is required to refine the student workshops, explore how these factors affect student academic risk-taking and ownership of learning, and identify what steps could be taken to build this into the learning culture of the school. What was highly evident during this action was the students' high value of student agency and their support for the opportunity to co-construct learning opportunities.

The professional collaboration and learning I have gained from being a member of the National Coalition of Girls' Schools (NCGS) Global Action Research Project has been exceptional. A

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