

SOMERVILLE HOUSE

ACTION RESEARCH PROJECT REPORT

What impact will innovative pedagogies in STEM learning areas have on effective student Learning Behaviours for girls in Upper Primary?

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INTRODUCTION

Future-focussed practices, 21st century teaching and learning principles, and expert Learning Behaviours are all terms often discussed in literature in regard to current and future education, as well as by educators themselves. In 2016, a team of Junior School staff was fortunate to be involved in a *Teachers as Researchers* project conducted by Independent Schools Queensland. One of the key reasons for undertaking this research project was to investigate how these principles and actions apply directly to the classroom, and how they can move beyond just being 'buzz words'. The goal was to implement action research that supported staff to articulate and demonstrate 21st century pedagogical practices, and for students to be able to articulate and demonstrate effective Learning Behaviours, skills and dispositions.

Any initiative being implemented in a school environment should always have the students at its core. Initially, attention was given to future-focussed learning spaces; however, as preliminary discussions and readings occurred, it became evident that concentrating on spaces was not enough. The focus shifted to the Learning Behaviours and skills of the students. The question then centred on effective teaching and learning practices that facilitate the development of the students as learners. A number of factors contributed to the development of the research question, with the research team eager to ensure that the impact of the project extended further than just one or two classrooms, and that it was sustainable beyond the time-frame of the action research program.

BACKGROUND AND CONTEXT

The project team consisted of three members of the Junior School staff: – Amy Woodgate, Assistant Head of Junior School (Teaching and Learning); Tammy Gregg, Years 5 and 6 Co-ordinator and Year 6 classroom teacher; and Claire Reynish, Year 4 classroom teacher.

Three core areas underpin the Somerville House 2017 Strategic Intent. These are Learn & Explore, Evolve & Grow and Engage & Inspire. Through the Strategic Intent, and the Somerville House Curriculum and Pastoral Care Frameworks, the School engage in cycles of continuous improvement in order to optimise the learning programs for students. The goal is exceptional educational outcomes through innovative and contemporary practices that utilise quality learning platforms in future-focussed ways.

These core areas are directly related to the *Teachers as Researchers* project. Through this project, it was the team's vision to provide students with learning opportunities that inspired them and allowed them to know themselves as learners, which is key for their future success.

LITERATURE REVIEW

In recent years, the School has engaged in a wide variety of professional learning. Staff have explored aspects of Visible Learning, as presented by Hattie (2008), and have implemented this knowledge and understanding in their classroom practices. Another focus has been the development of the positive Pastoral Care Framework, along with Dweck's (2008) *Mindset* and Seligman's work on positive psychology in *Flourish* (2012). Although not directly a part of the project, key aspects of these works, as well as many others, underpin both the Curriculum and Pastoral Frameworks at the School and, therefore, are the foundation for all practices within and outside of the classroom, including those being implemented during the action research cycles.

When beginning this project, the initial research focussed on 21st century teaching and learning principles, with attention given to exactly what characteristics and features need to inform 21st century classrooms in order to prepare students to enter the world as active citizens of the globalized world. One article, written by a United Kingdom organisation called the Innovation Unit (Hampson, Patton & Shanks),

identified and unpacked key ideas that are essential for 21st century education. The ten key principles presented resonated strongly with the project team in terms of our aim to implement and enhance innovative pedagogies. The article suggested focussing on relationships, thinking outside the classroom walls, making learning meaningful and developing student agency, all concepts that the team agreed are essential for good practice.

To continue with a focus on the students, the team also examined Vivienne Robinson's work on *Student-Centred Leadership* (2011). The project team was clear that any actions implemented had to have a direct impact upon students and student achievement. Correlations began to appear between actions and Robinson's leadership capabilities and domains.

As the project progressed, the team undertook reading in the area of the inquiry approach to teaching and learning. *The Power of Inquiry* by Kath Murdoch (2016) became a focus for not just the project team but also the wider Junior School staff. Through the inquiry cycle, students engage in the process of inquiry, identifying problems, asking questions, seeking information, analysing and synthesising their data, and then applying it to create a solution. The inquiry approach continues to be a focus for the wider staff group.

From initial ideas, the reconnaissance cycle led to the development of the research question that focussed on both innovative pedagogies in STEM learning areas and the development of effective Learning Behaviours in students. Through readings on innovative pedagogical approaches, as well as the characteristics and principles of 21st century teaching and learning, the project team was affirmed. The literature supported our thinking and actions.

FINDINGS and DISCUSSION

The project team engaged in three cycles of action research, and used a variety of data collection instruments to gauge the understanding and implementation of Learning Behaviours in the School. The team found that from Cycle One to Cycle Three, there was a significant change in the mindsets of teachers and students towards specific Learning Behaviours. Below is a summary of findings for each action research cycle, with a focus on the students, teachers and project team.

Cycle One

From an initial survey and Y Chart activity, students observed had a very basic understanding of the School Learning Behaviours. They were familiar with, and able to explain, 'Completing Set Tasks' and 'Is an Enthusiastic and Positive Learner'; however, they lacked a deeper understanding of behaviours such as 'Contributing to Collaborative Tasks' and 'Taking Intellectual Risks'. The team observed many misconceptions about Learning Behaviours, as students appeared to have a set vision of what a successful learner looked like. Specifically, they believed that successful learners are passive, take in information, and work without discussion. This was apparent through class observations and initial baseline data on successful learners.

After initial focus lessons were completed, integrating relevant learning behaviours was achieved through STEM lessons, specifically Mathematics and Science. For example, within problem-solving sessions in Year 6, 'Strives for Precision and Accuracy' was the Learning Behaviour focus. Students were encouraged to apply the learned mathematical skills in relation to this behaviour. They strove for accuracy and precision by ensuring numbers were lined up, work was checked thoroughly and information was communicated clearly. An example of one such problem-solving task is located below.

MATHS CHALLENGE

You're sitting in class, minding your own business, when in walks Bill Gates. He has a job offer for you.

He doesn't give too many details, mumbles something about the possibility of danger. He's going to need you for 30 days, and you'll have to miss school. (Won't that just be too awful?) And you've got to make sure your passport's current.

You'll have your choice of two payment options:

1. One cent on the first day, two cents on the second day, and double your salary every day thereafter for the thirty days; or
2. Exactly \$1,000,000.

You jump up out of your seat at the offer - and decide to take the million.

Just as you're about to depart for your mission, you sit down and think about your choice of payment.

Did you make the best choice?

Work in a small group and show proof of which is the best payment option. You will need to show your working and justify your answer to the class.

The student's work shows a table of cumulative payments for 30 days:

1	-1¢	17	-\$65636
2	-2¢	18	-\$131072
3	-4¢	19	-\$262144
4	-8¢	20	-\$524288
5	-16¢	21	-\$1048576
6	-32¢	22	-\$2097152
7	-64¢	23	-\$4194304
8	-1.28	24	-\$8388608
9	-2.56	25	-\$16777216
10	-5.12	26	-\$33554432
11	-10.24	27	-\$67108864
12	-20.48	28	-\$134217728
13	-40.96	29	-\$268435456
14	-81.92	30	-\$536870912
15	-163.84		
16	-327.68		

Handwritten notes include: "very accurate and clear", "very easy to read", "very easy to understand", "very easy to read", "very easy to understand", "very easy to read", "very easy to understand".

The student concludes: "The 1 cent deal is better than the 1 million deal!" and "Answer = \$5,368,709.12".

Teacher observations of this activity described how, by focussing specifically on the Learning Behaviour, the precision and accuracy of student work were enhanced in comparison to previous lessons, which lacked a specific focus.

In the Year 4 project class, students created videos demonstrating their understanding of individual Learning Behaviours. The focus in these Year 4 classes was to develop the understanding of the concept. The teacher spent time with these students, unpacking the concept, exploring vocabulary and the way in which a particular Learning Behaviour might be applied in different learning experiences.

Cycle Two

The project team noticed students in both Year 4 and Year 6 using the vocabulary in their day-to-day learning. They were commenting on Learning Behaviours they were seeing in themselves or in other students. Students articulated what Learning Behaviours they used, needed to use, or could identify in others. They used the feedback in their Semester 1 report to expand their understanding of their strengths and areas for consolidation.

Students began making the connection across different learning areas and to discuss what Learning Behaviours they may need to focus on in different learning experiences.

To gather qualitative data to support this, the staff encouraged students to reflect on their progress using Learning Behaviours to highlight areas of strength and areas for consolidation. Students then set goals for the term using a planning sheet with a specific focus on these Learning Behaviours.

There were two key elements to the research question – ‘effective student Learning Behaviours’ and ‘innovative pedagogies in STEM learning areas’. The team found that it had a strong focus on the Learning Behaviours but needed to incorporate innovative pedagogies in relation to STEM to further support the research question. Teacher engagement increased owing to the specific assessment of Learning Behaviours for Semester 1 2016 report cards. Teachers collaborated to determine how best to gather evidence about a student’s development across the Learning Behaviour continuum. Teachers also shared resources among year levels and the wider Junior School teaching community. Resources included Student Learning Reflection sheets, like the one pictured below.

Learner Reflection: _____

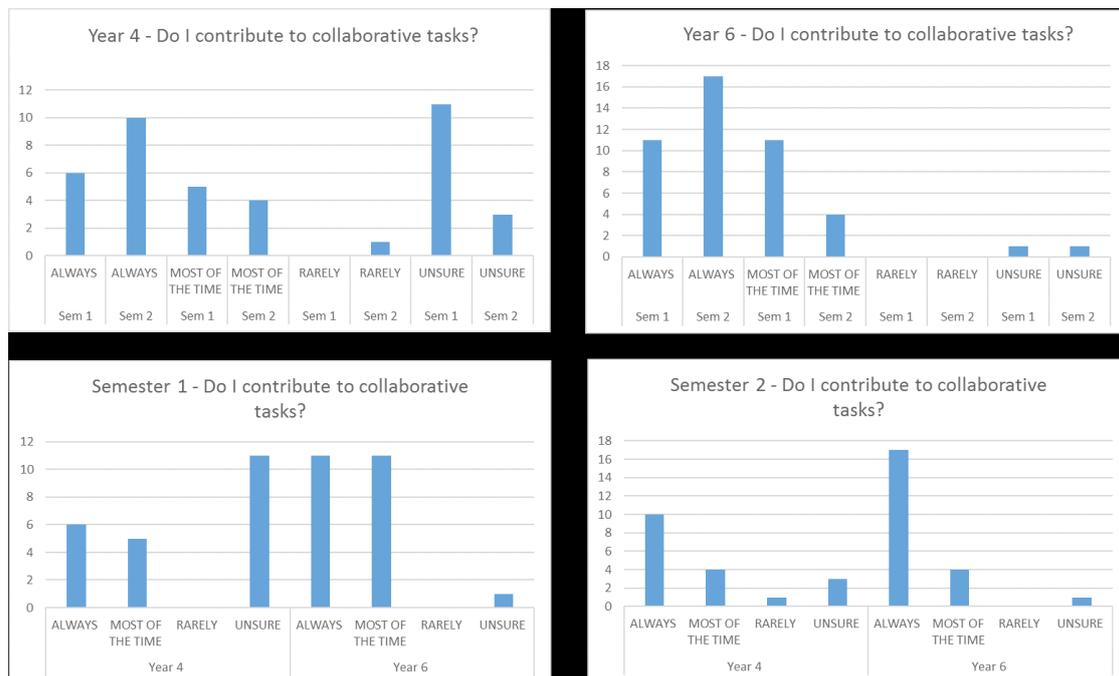
+	What kind of learner are you?	
	When do you like learning the most?	
	When do you have the most fun learning?	
	When do you find learning the least fun?	
	What kinds of things challenge you as a learner?	
	What do you think you are best at? Why do you think that?	
	What is something you could teach others?	
	What would you really love to be better at/know more about? Why?	

Data gathered from these reflections included students identifying specific areas to work on and strategies to assist in improving these areas. The reflection tasks showed students critically analysing their learning goals and identifying what still needed to be developed.

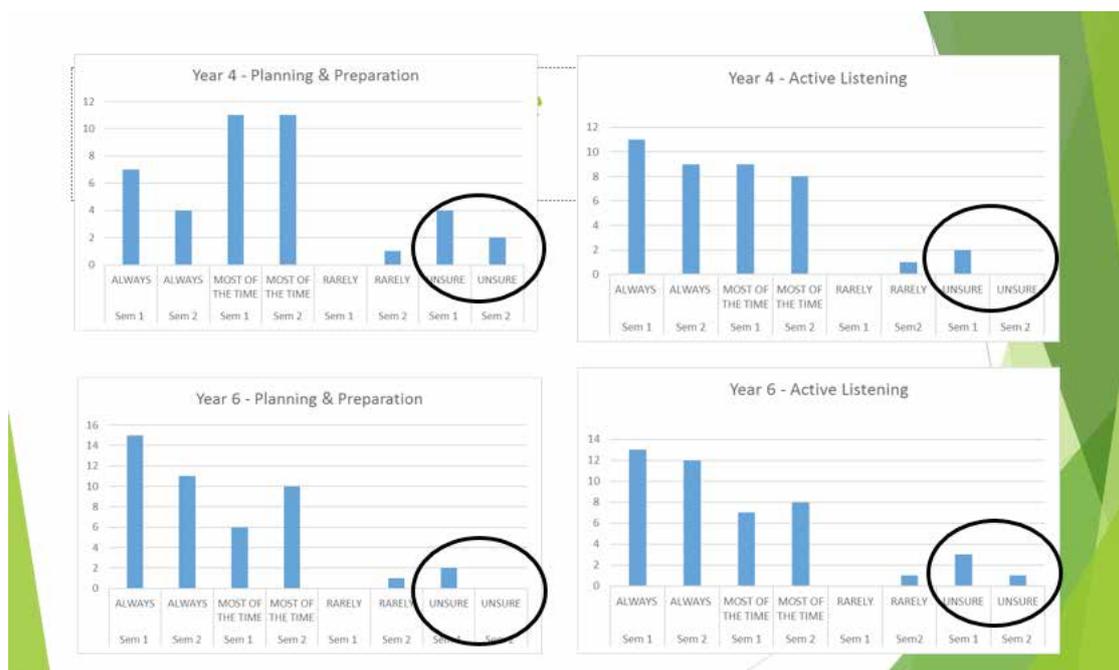
Although there was already some interest from other staff, the challenge for the research team as Cycle 2 concluded was to take on a mentoring role. All teachers were required to do professional reading about inquiry learning. This prompted professional discussions about best practice, which linked directly to the project and to the required skills students needed for application. By having open discussions in year level meetings, wider team meetings and with each other, teachers were encouraged to be more confident and supported when working with students to implement Learning Behaviours in their everyday learning.

Cycle Three

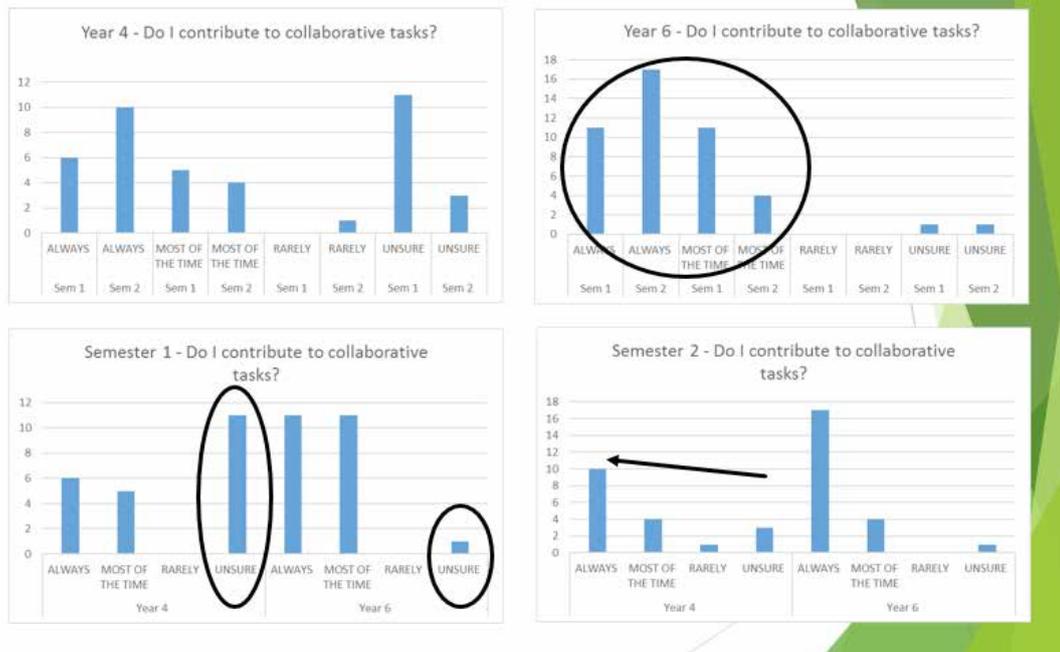
After extensive immersion with tasks focusing on Learning Behaviours, students were encouraged to apply these behaviours in activities across the curriculum. Students were re-surveyed using the original survey questions about Learning Behaviours. Results showed a decrease in *Rarely* and *Unsure* responses across various Learning Behaviours, which the project team attributed to progression along a continuum of understanding. Particularly in 'Contributes to Collaborative Tasks' and 'Taking Intellectual Risks', there was a significant increase in understanding, with minimal responses of *Unsure*.



Comparative data example



Data set example 1



Data set example 2

The above images provide data samples for key questions asked during the follow-up student survey. Comparisons and trends can be identified between year levels and from Semester 1 to Semester 2. The second survey conducted showed that both Year 6 and Year 4 students had improved their understanding of Learning Behaviours after explicit teaching and application across various curriculum areas. This was also supported through the filmed interviews of students in regard to their learning.

The data gathered throughout the project showed that in the focus classes, and with the focus group students, appropriate vocabulary was now being used across content areas, and the language was embedded in classroom culture. The staff needed to ensure that there was an authentic link between the actions being implemented and the learning of students. It was not about reinventing the wheel, but more about adapting and refining current practices.

Students were not only identifying effective Learning Behaviours in themselves and others; they were beginning to demonstrate a shift in their understanding of what an effective Learning Behavior actually looks like, and how they could seek and apply feedback to improve.

From the point of view of both the students and the teachers, the focus was on continual improvement. Learning Behaviours were not 'fixed', and each individual could make progress. The data obtained showed the effectiveness of the project across year levels and subject areas.

CONCLUSION AND REFLECTION

Over the course of the project, the project team was able to embed the Learning Behaviours successfully into current classroom practice. It is important to note that, although the approach differed between Year 4 and Year 6, there were similar outcomes. After collecting data and being reassured by the results, the team was confident in mentoring teachers from other year levels in regard to best practice. The focus of the research project was able to extend to implementation in STEM units, such as Engineering and Robotics.

Ultimately, it is possible to make a difference, and sometimes a 'quick fix' is not the answer. It is a matter of gaining a deeper understanding and analysing data over time. It is hoped that research can continue over subsequent years, and a change in student understanding and culture reflects 21st century learners who are able to collaborate, communicate, think critically and show creativity. Our message for other teachers is to start with a focus on the Learning Behaviours and integrate these into everyday teaching and learning. The examples that we have shown are just some of the ways this can be achieved, and we look forward to seeing the progression of ideas and teaching practice over time.

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