



The Scots College
Sydney Australia

Encouraging Perseverance in Year 5 Boys through Collaborative Problem-Solving

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Further Information
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Introduction

Amongst the boys that I have taught, there is a general perception that maths is hard, irrelevant, and a source of anxiety in their lives. This contributes to a lack of perseverance and resilience in maths learning, which in turn, inhibits their progress and motivation. Discussion in the wider literature supports such claims linking a lack of perseverance to loss of confidence, negative self perception regarding intelligence, low expectations, and deteriorating performance (Meyer, Turner & Spencer, 1997; Sullivan, Tobias and McDonough, 2006). In responding to these challenges, this research sought to transform both boys' performance in, and attitude towards maths. To this end a learning intervention was designed that focussed on boys' participation in four collaborative, real world, problem solving challenges.

The Research Question

How might participation in collaborative problem-solving projects encourage perseverance in maths learning in Year 5 boys?

Research Context and Participants

Scots College is a Presbyterian boys' school rich in Scottish tradition and based on Christian principles that inspire "boys to learn, lead and serve as they strive for excellence together" (College Mission Statement). It was established in 1893 and is located in Sydney, Australia. The school comprises over 1850 boys from the ages of 3 to 18.

My participant group consisted of 15 Math students from generally high socio-economic backgrounds, the majority being of Anglo-Saxon descent with learning needs including: ASD, low IQ, ADHD and potential anxiety, low self efficacy and lack of perseverance. Participants were in the lowest maths class in Year Five (10-11 year olds). Strategic, heterogeneous groupings were created to ensure that there was a relatively even spread of needs in regards to targeted learning disability, individual needs, task orientation, ability and learning style.

The Research Action

The action was divided into four collaborative problem solving challenges:

Challenge A: Collaborative construction with Lego

Challenge B: Group-worthy baking and cooking

Challenge C: Planning and scheduling a trip to the shops

Challenge D: Tangrams and coaster design

Data Collection and Analysis

Both qualitative and quantitative data collection methods were adopted. Qualitative data were collected to examine student perception and experience, and included: verbal or written reflections; unstructured interviews; whole class, focus groups; lesson observations; student work samples, including thinking routines; still photography; field notes; and, math journals. The diverse range of data sources helped provide a holistic picture of boys' responses to the Maths group-worthy tasks and ensured that student voice remained central within the research process. The quantitative data involved questionnaires and surveys. The diverse range of data sources helped provide a holistic picture of boys' responses to the maths group-worthy tasks and ensured that student voice remained central within the research process. Information was analysed thematically. Trends, patterns and relationships were identified and explored in order to draw conclusions and make connections.

Key Findings and Discussion

It was found that participation in collaborative, problem solving projects encouraged perseverance in maths in three key ways:

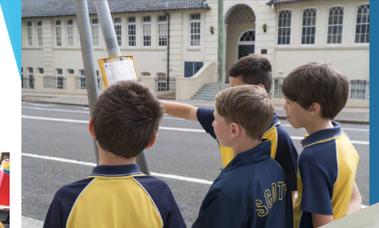
- **Shift in mindset - from fixed to growth:**
 - Through the group-worthy task, boys slowly learnt to embrace failure. This gave them confidence which was expressed as they verbalised findings in constructive and meaningful ways.
 - Boys felt engaged and excited about the subject matter as it connected them to the real world, held future value, and represented tangible building blocks for growth.
- **Growth in self efficacy:**
 - Boys were empowered through the structure and scaffolding of the chosen group-worthy activities.
 - A sense of accomplishment was cultivated through collective confidence in both the potential and realised achievements of the group. Boys commented "working in a groups is educational and fun" and "if you work as a team, you can achieve anything."
- **Improved mathematical content knowledge:**
 - At the conclusion of the project all boys were able to articulate multiple mathematical strategies that were implemented and used during the varying activities.

Conclusions

The findings from this research suggest that when working with low ability students who experience anxiety when learning maths, it is highly valuable to engage them collaboratively in real life problems which indirectly employ key concepts and knowledge. By reducing pressure within the classroom environment and showing students how to employ this conceptual knowledge in an applied setting, they are more likely to participate with confidence while remaining engaged. This implies that a child's attitude towards a subject, whether positive or negative, needs to be taken into consideration in the planning and implementation of curriculum.

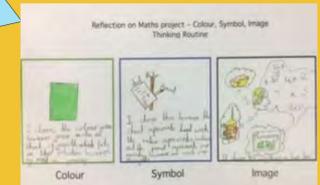
Key Readings

- Thom, J.S. & Pirie, S. E. B.(2002). Problems, Perseverance, and Mathematical Residue. *Educational Studies in Mathematics*, Vol. 50, No. 1, pp. 1-28
- Meyer, D., Turner, J., & Spencer, C. (1997). Challenge in a Mathematics Classroom: Students' Motivation and Strategies in Project-Based Learning. *The Elementary School Journal*, 97(5), 501-521.
- Wismath, S. & Orr, D. (2015). Collaborative Learning in Problem Solving: A Case Study in Metacognitive Learning. *Canadian Journal For The Scholarship Of Teaching And Learning*, 1-19.



"If you work as a team, you can achieve anything"

"I drew a rainbow because mathematics triggers all emotions and there is ups and downs but it is happiness"



**International Boys' Schools Coalition Action Research Program 2016 - 2017:
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