ENCOURAGING PERSEVERANCE IN YEAR 5 BOYS THROUGH COLLABORATIVE PROBLEM-SOLVING IN MATHEMATICS

Chloe Collett

The Scots College, Sydney, Australia

Abstract

There is a general perception that maths is hard, irrelevant, and a source of anxiety in boys' lives. This contributes to a lack of perseverance and resilience in maths learning, which 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 & McDonough, 2006). This research sought to investigate how participation in collaborative problem-solving projects might encourage perseverance in maths learning amongst Year 5 boys, and in so doing, transform their performance in, and attitude towards, maths.

A learning intervention was designed that focussed on boys' participation in four collaborative, real-world, problem-solving challenges. An action research methodology was used and both qualitative and quantitative data were collected from a range of sources. Three key findings emerged from the study. Firstly, it was found that perseverance was encouraged by a positive shift from a fixed to a growth mindset. Secondly, the collaborative tasks contributed to a greater sense of self-efficacy amongst boys. Finally, the collaborative, real-world nature of the tasks led to increased knowledge and understanding of mathematical content. This suggests that quality teaching in maths needs to be holistic, directly addressing those attitudes and perceptions amongst students which inhibit their capacity to learn.

Introduction

In my experience as a preparatory teacher, I have observed increasing disengagement with numeracy amongst children. In my current context, the Year 5 cohort are graded into classes, referred to as "Sets." Most boys in the lower sets are highly aware that they are amongst the lowest performers in the year. Subsequently, a powerful general perception exists that maths is hard, irrelevant and anxiety-inducing. This contributes to a lack of perseverance and resilience in

maths learning, which inhibits boys' progress and performance. This situation was highlighted to me at a recent mental health and wellbeing forum at our College in August 2016, where a student commented: "Well I'm mostly depressed, just depressed…. When Set 5 was called out I felt kind of ashamed and some people were looking at me and they were thinking, 'They're the bad kids at maths.' I also hate when people look at my Maths pre-test scores because I always get the lowest and people laugh inside."

I have always believed that the incorporation of meaningful, real-life experiences significantly aids students' knowledge and understanding in any domain. I have also questioned whether a traditional classroom setting is the right platform for engaging boys who struggle significantly in the subject. By introducing projects where students spend time covering the curriculum in an indirect way, it was my sense that buoyancy and optimism would result and aid academic outcomes. I paired this idea with collaboration, which has been identified as a positive and significant tool in promoting learning and perseverance amongst reluctant students, to design real-world problem-solving projects. As such, the question underpinning this action research project was: *How might participation in collaborative problem-solving projects encourage perseverance in maths learning in Year 5 boys?*

I used action research as my methodological framework to address the research question. Stringer (2014) theorises that the trial and error approach of action research produces a repetitive precept, where both the teacher and students benefit from the experience. Action research also involves an exploration and immersion into a messy and unordered situation. It is a methodology where the researcher "will be both subjectively involved and will interact with the research participants and the research environment" (Stringer, 2004, p.28) in order to "construct educational activities that are truly meaningful and worthwhile within their [students'] lives" (Stringer, 2004, p.25). This subjective "messiness" allowed me to make ongoing changes to the way I facilitated numeracy teaching in my class. It allowed me to assess problem-solving and the effectiveness of strategies in group-worthy projects. It also enabled practice-based solutions to the real experiences and challenges I faced within my classroom, ultimately improving my pedagogical skills and leading to student achievement.

Literature Review

Horn (2013) defines maths as "the science that deals with the logic of shape, quantity and arrangement. Math is all around us, in everything we do. It is the building block for everything in our daily lives" (p.1). The curriculum expects that boys will master this enormous range of content, but this expectation often leads to anxiety, underperformance and avoidance. As stated by Ashcraft (2002), highly maths-anxious individuals are characterized by a strong tendency to avoid maths, which ultimately undercuts their maths competence and forecloses important career paths.

One major area of exploration underpinning my project was that a lack of perseverance could hinder a boy's performance in maths. In defining perseverance in the context of mathematical problem solving, Thom and Pirie (2002) state that it "refers to the student's sense in knowing when to continue with, and not to give up too soon on a chosen strategy or action, and knowing when to abandon a particular strategy in the search for a more effective one" (p.2). This gave me clarity and supported my choice of implementing a project-based learning model. This was particularly important, given research identifying the implications or effect of not developing perseverance, whereby students:

> Lose confidence in themselves, tend to denigrate their own intelligence, exhibit plunging expectations, develop negative approaches, have lower persistence, and deteriorating performance. Such students particularly seek positive judgments from others and avoid negative ones. (Sullivan, Tobias and McDonough, 2006, p. 83)

As Rodd (2006) similarly states, "Many, if not most, of us, as learners and users of mathematics, experience negative effects like defensiveness, vulnerability, mental numbness and anxiety to some extent and from time to time" (p. 231). Moreover, by having this approach to learning, such learners may go on to "lead a tortured existence, afraid to try hard, yet afraid not to" (Meyer, Turner & Spencer, 1997, p. 503). By building boys' capacity to persevere, it was my hope that this collaborative project would change both their performance in, and attitude towards, maths.

By creating a real-life, boy-centric project, I sought to cultivate an optimistic attitude towards maths learning while simultaneously developing boys' understanding of key concepts. It was my hypothesis that boys working collaboratively on a group-worthy project would be more committed and engaged learners of real-life maths. Furthermore, I anticipated that this project work would enable boys to demonstrate mastery of some day-to-day experiences and problems, which would lead to improved self-efficacy and, in this sense, would fulfil the National Council of Teachers of Mathematics' (1991) belief that "the very essence of studying mathematics is itself an exercise in exploring, conjecturing, examining, and testing - all aspects of problem solving" (p. 95). My findings supported this conclusion and were reinforced by Thom and Pirie's (2002) study, which revealed "that students' development and understanding of problem solving can only be achieved when learners experience many different situations in which they are encouraged to formulate and create new problems" (2002, p.1).

Key to the project's success was the design of the four projects or "new problems" which drew on Meyer et al.'s (1997) use of learning strategies and higher-level thinking skills. These were elicited in the projects through the use of project-based learning, which was designed to involve boys in investigations of "authentic problems"; authentic in this sense hat they were "cognitively complex ... [and] have the potential to help students learn because they must represent knowledge in a variety of ways, pose and solve real problems" (p. 506).

A further intention of the project was to explore the positive impacts of a collaboration on this group-worthy maths project. Problem-solving and collaboration are essential 21st century skills (Wismath & Orr, 2015). Pareto, Haake, Lindström, Sjödén and Gulz (2012) argue "that the math game's potential for combining collaboration and competition helps increase student motivation and improve learning outcomes" (p.745). These findings reinforced the aims of my group projects. Furthermore, Pareto et al. (2012) suggest that "providing flexibility for collaboration and competition can contribute to creativity in game-playing, which in turn can engage students more fully with the subject matter" (p. 745). In order to build agency and engagement, the projects were designed to intentionally include opportunities for, and parameters within which, the boys could take ownership and responsibility. Clear structures and explicit processes supported the potential for boys to experience success in undertaking these projects. The extent of this success was enhanced when consideration was given to both their individual and collective capacities for creativity.

One final important dimension of my project design was the incorporation of challenge. Research suggests that challenge offers boys intrinsic rewards as they set goals and work strategically to attain them. Challenge helps build a bridge to higher knowledge, providing boys with opportunities to develop self-monitoring and self-regulation strategies (Meyer et al., 1997). By combining a trip to the local supermarket as one of the four group project tasks, I challenged and enticed the boys to purchase goodies for an end-of-action-research-project party, which in turn acted to bring closure and reward.

Research Context

My research focussed on a participant group of fifteen maths students from Year 5 at The Scots College, a Presbyterian boys' school in Sydney, Australia. The school comprises over 1850 boys aged between 3 and 18 years-old. Scots is a non-selective day and boarding school spread across six campuses, which inspires "boys to learn, lead and serve as they strive for excellence together" (College Mission Statement). As the school is academically nonselective, there is an ongoing challenge to meet the learning needs of a diverse range of boys and engage them across all subject areas, particularly in core subjects such as maths. The participating boys were generally from high socio-economic backgrounds and the majority were of Anglo-Saxon descent. Their learning needs included Autism Spectrum Disorder (ASD), low IQ, Attention Deficit Hyperactivity Disorder (ADHD) and potential anxiety, low self-efficacy, and lack of perseverance. The selected boys were in the lowest maths class in Year Five and were between 10 and 11 years-old. Strategic, heterogeneous groupings were created by the school to ensure a relatively even spread of needs in regards to targeted learning disability, individual needs, task orientation, ability and learning style. The boys were spread amongst four project groups according to the categories: maths anxiety; Individualised Education Program (IEP) student with low IQ, ASD, psychological issues; under achiever; poor growth mindset; and low self-efficacy.

The participants engaged in this research during their regular class time. Participation was entirely voluntary. Focus groups were held with students at a time of their convenience. The respondents' anonymity was guaranteed and where I wanted to share specific responses, permission was obtained. Online questionnaires were filled in anonymously, yet the paper-based ones had names attached, so that I could assist boys after the project. Video footage, photographs, and other images of the boys were used after further parental consent. Parental and

participant consent was sought before the project commenced. Only those who gave consent could participate in the project. No participant in this research was disadvantaged in any way.

The Action

The collaborative, problem-solving challenges were designed specifically for the boys who participated in my project. By constructing and creating, groups were to be actively involved in the outcome and have an end product. Throughout the year, I had noted what "boyology" related tasks had generated interest and excitement in the class. This informed my decision to focus on cooking, designing and travelling. In doing so, boys made meaningful connections between the world of maths and their daily lives. Much of the reading I have done over the years suggests that boys are most engaged in learning when lessons end in a product, require motor activity, and when teamwork and competition is combined. As such, the action was divided into four collaborative problem-solving challenges:

Challenge A: Collaborative construction with Lego

Boys built either an open-ended construction or followed a step-by-step instruction to build a model. "Big Ben" and "Eiffel Tower" kits were offered, but if the group decided that they preferred their own project, this was acceptable. Additionally, the group needed to consider measurement and spatial awareness by drawing up a bird's eye, 2D, and 3D plans of the construction of their choice.

Challenge B: Group-worthy baking and cooking

The group worked together to decide on a bake-free recipe. Following this, the boys budgeted, searched online for actual pricing and compiled a list of ingredients for the teacher to purchase. In addition, they represented their culinary ability in two different shapes to display equivalent fractions and percentages.

Challenge C: Planning and scheduling a trip to the shops

Collaboratively, the group planned a morning trip to the local shops to buy some goods for a party. They had to manage their time by consulting the bus timetable and calculating the intended duration of the trip. Moreover, boys sourced a map of the suburb and drew the route (with coordinates). They worked together to estimate the distance of walking one way and

returning via the public bus. Finally, they collaboratively chose a healthy item to buy at the local supermarket and estimated the change they would receive from $10.

Challenge D: Tangrams and coaster design

This group-worthy task involved the manipulation of shapes to create differing designs. Initially, boys collectively spent time experimenting with shapes and colour. This led to discussions and decisions on what group design should be made for a team motto. Following this, they jointly planned and made up their group design. Furthermore, they were made, created, laminated, and taken home as a set of coasters.

Data Collection

Both qualitative and quantitative data were collected as they provided access to different sets of information. Furthermore, data from differing sources were used to complement one another. Qualitative data to examine student perception and experience were collected via a variety of methods: verbal or written reflections through open, unstructured interviews; whole class, focus groups during lessons; lesson observations; student work samples, including thinking routines; still photography; field notes; and student math journals (Appendix A). 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 were collected through questionnaires completed as both hard copies and online in the form of a Google Survey (Appendix B). The online survey was administered during the initial phase of the project and again during the final phase so that changes in boys' attitudes, including areas of growth and areas of continued challenge, could be measured. These questionnaires focused on identifying boys' current feelings towards, and mindset regarding success in, maths. The results of the pre- and post-action surveys helped me identify and examine any change in boys' self-perception. Feelings such as anxiety and accomplishment could be graphed and conclusions drawn.

Data Analysis

The data were analysed for any predominant changes in the boys' maths performance and collaboration skills. Collecting and analysing the data determined whether the action addressed the overarching research question. Williamson & Bow (2002) state that there are "no strict rules

which have to be followed in qualitative analysis" (p.293). In light of this, trends, patterns, and relationships were explored through the data analysis process. Investigating the data enabled me to better understand boys' learning within maths. In particular, the positive and negative effects on self-efficacy and learning emerging from the analysis enabled me to better understand and respond to student needs.

I categorised the gathered information into organisational constructs. This included sorting by categories of observation, project, place, individual, group, time of observation, group combination or some other standard. Rabinowitz and Fawcett (2016) suggest that, "When possible, necessary, and appropriate, transform qualitative into quantitative data. This might involve, for example, counting the number of times specific issues were mentioned in interviews, or how often certain behaviors were observed." Consequently, I grouped together observed responses and behaviours, counting and tallying common threads through the various forms of data in order to draw conclusions and make connections.

Discussion of Results

After combining and analysing the data, three key themes became apparent: a positive shift in mindset; growth in self-efficacy; and an improvement in mathematical content knowledge.

The initial written questionnaire disclosed that boys perceived the main goal of group problem-solving was "to work together." Given the focus of my research, this comment reinforced my focus on collaborative skills in maths. The questionnaire also revealed that most boys "asked for help" when there was a problem, maximising the value of having team members. Finally, when asked if they could do maths, the majority responded that they would be intrinsically happier in life, with one boy stating, "I would have an easy life," and it would make their aspirations a reality: "I'd build a building that no one would be able to build." These students saw a purpose and despite their low ability and self-efficacy, were eager to succeed and develop mastery in numeracy.

A positive shift in mindset

Participation in collaborative, real-life problem solving projects enabled boys to shift from a fixed to a growth mindset, a finding supported by McKay (2017). Through note-taking, several boys expressed their struggle with maths, stating that they would "always be in the lowest group"

because they did not have the necessary ability. Many boys had previously exhibited a lack of interest in, and stamina for, maths. Their apathy towards achievement was demonstrated in their assessment results and motivation for learning during class. This, when combined with little visible improvement in their results and an absence of motivation to master specific mathematical skills, underpinned their fixed mindset. Their capacity for intrinsic growth and achievement was thus impeded.

A motivation questionnaire administered during the early stages of the intervention uncovered several findings. In response to a question targeting boys' perception of maths as either easy or difficult, the majority of the boys responded that it was difficult. These data were then used to devise and revise problem-solving tasks that would facilitate success and a growth mindset. Where the collaborative, hands-on projects were engaging, authentic and achievable, boys were interested and motivated. Like McKay (2017), I found that, "Students' mindsets–how they perceive their abilities–played a key role in their motivation and achievement, and ... if we changed boys' mindsets, we could boost their achievement."

Through the group-worthy task, boys slowly learnt to embrace failure. This growing confidence was expressed as they verbalised findings in a constructive and meaningful way. One student commented: "This all worked mathematically because we found the time of the bus, calculated cost, how many metres were covered with a trundle wheel whilst working as a team." In addition, one boy working on tangrams claimed, "I can't work with shapes and patterns, I'm bad at it," but watching as the group work unfolded, encouraged by his team, he concluded, "All the different parts that we added and did together, has made us the best coaster." Affirmation and positive reinforcement from teammates, along with the input and contribution of others led to a sense of both individual and collective achievement.

Indirect learning of specific mathematical knowledge was gained through hands-on experiences including shopping, baking, building and patterns. These activities encouraged competency-based learning. 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. The goal of each lesson was intentionally framed not as a search for the "correct" answer, but as a pursuit for understanding.

Creating tangrams

Increased self-efficacy

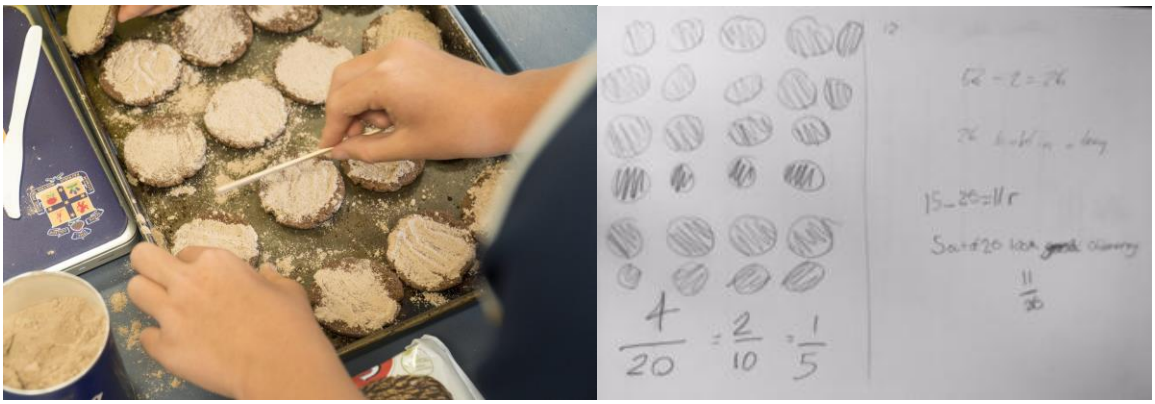
As the lowest class in a streamed cohort of 125 students, the boys had exhibited low self-efficacy since the start of the year. They felt the stigma attached to their rank and this inhibited their desire to do well. They lacked confidence in their capacity to achieve in maths. As articulated by boys, low self-belief was associated with a lack of hope, frustration and anxiety.

Findings suggest that these negative beliefs shifted positively during the action. First and foremost, the group-worthy activities equipped boys to become "experts," drawing on their prior knowledge and existing strengths, and enabling knowledge to be shared. As one boy expressed, "I cook all the time at home and help mum measure the ingredients. I know that I can make this work for us." Interestingly, as the projects progressed, each boy in each group demonstrated mastery in a particular area or skill. In doing so, they sought not only to benefit themselves, but to contribute to the collective achievement of the whole group. This was exemplified as Boy A, diagnosed with a learning disability, used coordinates to confidently direct his group via their chosen route to the shops. Through their engagement in the activities and their collaborative group work, the boys grew in buoyancy; that is, they grew in their adoption of a cheerful and optimistic disposition towards learning in maths.

Secondly, boys were empowered through the structure and scaffolding of the chosen group-worthy activities. All activities were intentionally designed to be achievable and experiential, with indirect mathematical content grounded in the everyday, promoting content learning

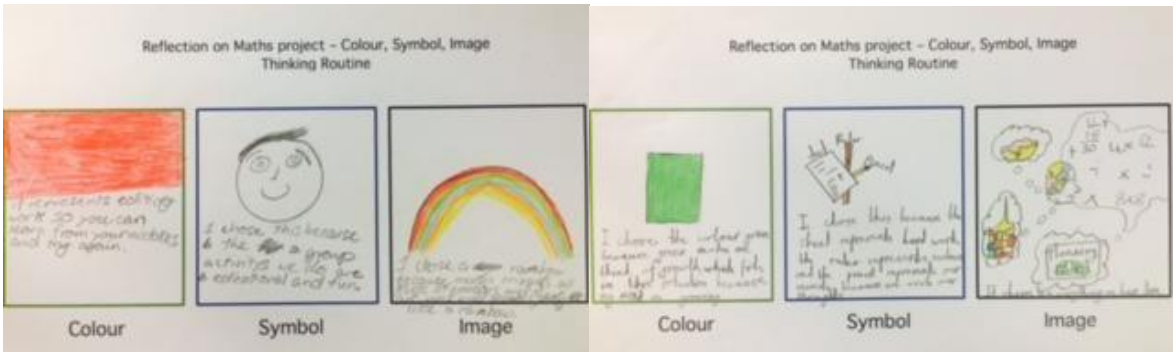
Planning and scheduling a trip to the local shops- (i) Looking at the local bus timetable and collaboratively determining the best route. (ii) Using grid paper, the team using coordinates to map the shortest trip.

throughout the venture. After the completion of the tangram activity, one boy asked, “Can I have copies for all my 10 family members as they will be proud that I did this in maths?” Students expressed hope, optimism and anticipation for the project and this encouraged self-direction and agency. For example, after explaining the project, boys exclaimed, “Can we start right now?” “Can we choose our own recipes/routes that we decide on as a group, and not what the teacher says?” Such statements demonstrated that, through the careful construction, intentional design, and specific selection of group-worthy activities, boys willingly took responsibility for their learning in mathematics and felt empowered to do so. This finding places an increased emphasis on preparation and planning for learning.



Group-worthy baking and cooking- (i) cooking chocolate cream sandwiches (ii) displaying the baking in terms of fractions and parts of a whole.

Further contributing to increased self-efficacy amongst boys during the group-worthy projects was their experience of success and achievement. Demonstration of accomplishment was firstly visible in the area of personal growth, or perhaps more importantly, self-perceived personal growth. This was highlighted as one boy, initially nervous about the project, chose green as his reflective Colour Symbol Image because he said, “It makes me think of growth which fits this situation as my mind is growing.” Secondly, cognitive engagement improved, as expressed in a more consistent and coherent work ethic. In another reflection exercise, symbols of equations, rulers and brains were drawn by a different boy, who stated, “These represent hard work, neatness and minds because we write our thoughts in the project.” Further contributing to success and self-efficacy was greater emotional engagement amongst boys. Another boy, initially identified as possessing low self-worth, drew a rainbow as his reflective image stating, “I chose a rainbow because maths triggers all emotions and there is ups and down like a rainbow but it is happiness.” This boy correlates many different emotions to his experience of learning in maths, but his choice to focus on happiness is ultimately positive. Fourthly, a sense of accomplishment was cultivated through collective confidence in both the potential and realised achievements of the group. Boys’ comments included, “Working in a group is education and fun,” and, “If you work as a team you can achieve anything.” Aiding this was a greater sense of social responsibility and other-person centredness, with the more competent group members assisting the less confident group members. This collegiality and group mindset also helped to build resilience through difficulty and in the face of failure. As Boy B reflected, “Working in a group helped me push through hard times.” All of these factors contributed to not only a sense of achievement and success, but also to improved self-efficacy amongst the boys.



Colour Symbol Image responses that display interesting, important, or insightful responses to being in the project.

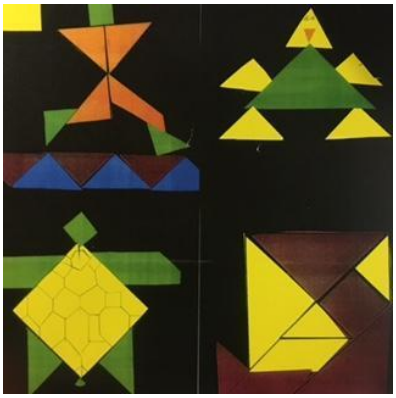
Improvement in mathematical content knowledge

Pre-tests found that most boys' attitudes towards learning and mathematical content knowledge were poor. As one boy reflected, "Basically everything" was difficult. I hoped that boys would experience success in an indirect and implicit way, hence the focus of connectedness of projects to real life and every-day problem solving.

The findings suggest a growth in mathematical content knowledge. At the conclusion of the project, all boys were able to articulate multiple mathematical strategies that were implemented and used in the varying activities. In the cooking activity, boys could draw and verbalise fractions, together with measuring ingredients with different instruments. Comments included Boy C's reflection, "We had to know capacity, measurement, mass and weight to make our dessert." This showed me that mathematical content had been calculated and utilized.

Collaborative construction with Lego- fine tuning and working together.

In observing the tessellation work, content knowledge was expressed in the frequent and correct use and application of mathematical terminology and concepts. During group work, one boy was overheard explaining that they "need to know elements of two dimensional shapes, their length, measurement and how they slide, flip, rotate and reflect in order to do our best pattern." This use of mathematical language, or metalanguage, showed that curriculum content was being reviewed and grasped at both the individual and group level. The quality of the final products supported this finding.



Completed tangram design converted into a coaster, for boys' families to enjoy.

Throughout each activity, boys moved between being instructor and learner, depending on their level of interest and knowledge. I found that experiential learning, characterised by creative, real-world tasks was positive for growth in mathematical content knowledge. It was clear that by having a less formal, collaborative mathematical approach, boys were able to grow not only in knowledge but also understanding and application.

Conclusion

This research found that collaborative problem-solving projects successfully encourage perseverance in maths learning amongst Year 5 boys, as evidenced through increased self-efficacy, content knowledge and the development of a growth mindset.

Myriad factors aided boys' learning as related to these key findings. Most significantly, participating in the projects engaged boys in real-world problem-solving. These projects facilitated the development of higher-order thinking, oral communication, and leadership skills in applied settings. Due to the collaborative nature of the projects, boys grew in their capacity to work alongside their peers, listening and troubleshooting together. This led them to accept, understand, and value others' perspectives. They had to learn how to negotiate these differing views in order to make decisions about how to best complete the projects together. As a team, the boys developed and expressed the attributes of integrity, honesty and fairness.

The projects indirectly facilitated a significant transfer of prior knowledge to the present context. In drawing upon, applying, and then extending this existing knowledge, the boys exhibited significant growth. Within the project structure, space was created so that quieter boys had an opportunity to speak and be heard, often a challenge in whole class contexts. The success of this

project is encapsulated in the following student reflection, “There has been growth in our companionship and knowledge by working better together, not against each other. If you work as a team, you can achieve anything.”

There were, however, a number of limitations to the research. Firstly, the findings were not generalisable as they were limited to a single low-ability class. However, this was also a strength as it was responsive to the particular needs of this class and might be less effective or require modification if applied to the wider cohort. The project also required high levels of staff resourcing and support. This is a significant consideration in thinking about future implementation. In addition, as a process, boys were removed from their year-group learning, which may have impacted on other core content being delivered.

The findings from this project have lasting implications for both pedagogy and curriculum. They suggest that quality teaching in maths needs to be holistic, directly addressing the attitudes and perceptions of students which inhibit their capacity to learn both in the short and long term. In the first instance, 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. If you reduce pressure within the classroom environment, showing students how to employ this conceptual knowledge alongside one another in an applied setting, they are more likely to do so with confidence, while remaining engaged in the learning. This implies that a child’s attitude towards a subject, whether positive or negative, ought to be an important consideration in the planning and implementation of curriculum.

Reflection Statement

Being involved in action research has had a direct impact on my pedagogical views as a teacher, particularly in relation to improvement in student performance and their development as successful learners. I have become a more reflective practitioner in terms of the boy’s feelings and attitudes towards subject areas as I understand how this directly impacts on their development, both emotionally and academically.

Attending and participating in the IBSC action project team has been inspiring and transformational for me, as an educator and learner. The process of learning, taking, applying and reflecting on an action has been seamless due to the support of my Scots College mentor, Caitlin Munday, my IBSC mentor, Bruce Collins, and the IBSC professional team. By being part

of this process, as well as learning from other keynote speakers and presenters, I have been immersed in and exposed to new ways of thinking which has made me eager to broaden my knowledge in so many fields.

In short, despite years of experience as an educator, I can continue to flourish in my role by exploring new techniques and delving into what makes students reach their potential. A child's attitude towards a subject, whether positive or negative, needs to be taken into consideration as this will directly impact their mindset and potential growth. If any student is positively and intrinsically nurtured, they will reap the rewards in their learning. My pedagogy has been transformed and I know the boys and myself will both benefit.

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APPENDIX A

Sample maths feeling journal*:*

Year 5, maths Set 5

Feelings journal

Term 3, 2016

Keep a record of your feelings during problem solving tasks, particularly the negative ones.

The feelings and thoughts column give you permission to explore your own confusion and to find out what is bothering you specifically about the problem at hand.

My feelings/thoughts	My work
Eg. ● *What am i feeling now, this minute?* ● *What does this remind me of?* ● *What is making this problem difficult for me?* ● *What can I do to make it easier for myself?*	

APPENDIX B

Sample maths survey questions:

Year 5, maths Set 5

Maths Survey

Term 3, 2016

When I make a maths mistake, I …….

When I'm embarrassed about doing maths, I …..

When I see a problem I can't do, I …..

If I could do maths, I would …..