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Modifying the Mathematics curriculum for gifted students in Barker Junior school: What effect does mentoring have on learning in Mathematics?

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About the Author

Jo Quinlan sees teaching as her vocation. She has loved working in a variety of roles in primary and secondary education over 25+ years and is currently enjoying the challenge of her multi-faceted role in Barker Junior School as Numeracy Specialist, Aspire and Digital Learning Leader. She draws on her post-graduate studies and ongoing interest in the area of gifted education to work collaboratively with class teachers in exploring, designing and modelling effective ways of engaging and inspiring gifted learners to achieve to their potential. She is co-ordinator of the IPSHA Gifted and Talented Umbrella Group.

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Abstract

Mentoring can be a valuable experience for gifted learners. A mentoring relationship has the potential to engage, inspire and encourage both mentee and mentor. This article describes an approach to modifying the Mathematics curriculum for a group of high achieving students in Barker Junior School. After briefly describing a variety of strategies used to modify the curriculum, the article focuses on how two teachers worked collaboratively to establish a peer mentoring project between Year 6 and Year 9 students in 2020, including initial outcomes of the project and suggestions for further development of this approach to learning.

MacLeod (2004) suggests that curriculum designed to challenge and meet the needs of gifted learners must address their need for increased pace and complexity and allow for instruction and scaffolding for learning that may not require the level of repetition and support needed in a regular classroom.

At the start of 2020, the Gifted Education support teacher in the Junior School worked collaboratively with Year 6 teachers to analyse a range of qualitative and quantitative data collected on student achievement in Mathematics. This included anecdotal observations from 2019 Year 5 teachers and early observations from 2020 Year 6 teachers, 2019 APSMO Maths Olympiad scores, off-level PAT Mathematics results and Numeracy results from the Year 5 NAPLAN test, to identify a group of students who could benefit from involvement in a more challenging Mathematics curriculum.

The Mathematics' curriculum was differentiated using the following teaching approaches that are well suited to gifted learners (Munro 2012, p. 3):

- Clustering students achieving highly in Mathematics.
- Completing an end of Year 6 Mathematics test at the beginning of the year to determine student's existing knowledge and skills. This allowed compacting of the Mathematics curriculum, reducing time spent on reviewing Year 6 syllabus content that students had already mastered to focusing on addressing a few gaps.
- Telescoping the Mathematics curriculum by teaching content at a faster rate and accessing content and skills from resources typically developed for older students.

- Participating in extra-curricula programs such as the Senior Division of the Maths Olympiad competition (developed for high achieving mathematics students in Yrs 7 & 8), the BEBRAS Challenge, and the Australian Maths Trust's Australian Mathematics Competition.

Recognising that there is still a range of abilities within this cluster of students, many of the mathematical tasks designed for this modified Mathematics curriculum make use of the low-floor-high-ceiling (LFHC) framework advocated by Jo Boaler (Professor of Mathematics Education at Stanford University and founder of YouCubed). LFHC tasks are sometimes inspired by real-world problems, usually open-ended and often visual, with a layer of abstraction and/or complexity that allows everyone to get started at the 'floor' that best suits them, and continuing to work mathematically until they get stuck at their own 'ceiling' (NRICH Maths 2013). LFHC tasks encourage students to manage the pace and depth of their own learning. When students are exploring LFHC tasks, the teaching role shifts to that of facilitator, checking in to guide or ask the right questions at the right time, helping students stretch themselves wider and/or deeper as they explore further. Well-designed LFHC tasks aim to put students into places of struggle as Boaler (2019) states:

> Neuroscientists have found that mistakes are helpful for brain growth and connectivity and if we are not struggling, we are not learning. Not only is struggle good for our brains but people who know about the value of struggle improve their learning potential.

Working in a Pre-K to Year 12 school where there is access to human resources and expertise on site, provided an ideal opportunity to explore another strategy that is of particular benefit to gifted students — mentoring. Berger (1990) maintains that exposure to a mentor who is willing to share values, interest, time and talents is one of the most valuable experiences a gifted student can have.

Two teachers — a Senior School Maths teacher and a Junior School Gifted Education support teacher - met late in 2019 to consider the possibility of establishing a mentoring relationship between high achieving Year 6 Mathematics students and high achieving students in the top Year 9 Mathematics class. The teachers agreed to run a trial program in 2020, to see if and what value could be added to learning in Mathematics for both mentee and mentor students. The teachers had an open-minded and flexible approach to the program. They did not go into it with pre-conceived expectations or goals, or a fixed plan in mind. Both teachers committed to supporting the mentoring program for the year, sharing responsibility for the design and development of mentoring sessions. Teachers made use of resources they were already familiar with and they adapted activities to a LFHC design to facilitate learning for both Year 6 and Year 9 students. Technology can be a useful aid to mentoring programs, so a shared Class Notebook was created, so students could continue working together asynchronously in the Collaboration Space if desired.

The success of mentorships usually depends on the compatibility of the partners (Schatz in Bisland 2001) and the mentor and mentee feeling they have not had a mentoring relationship forced on them (Clark 1995). This mentoring program could have been doomed from the start given that it was initiated by teachers, with students randomly paired by the teachers. However, the opposite outcome has eventuated, where students have been keen to meet with their partner, eagerly anticipating each of the mentoring sessions.

Student commitment to the mentoring relationship is more likely to result in a successful partnership. Teachers have observed varying levels of commitment from both mentors and mentees. Some of the Year 9 mentors have demonstrated high levels of commitment to the partnership as evidenced through kind and helpful asynchronous feedback they wrote on work that Year 6 students submitted to their shared Class Notebook, while others left no feedback at all. Some Year 6 students have responded to feedback from their mentors, while others have not.

Clasen & Clasen (1997 in Bisland 2001) suggest that mentors can be motivated, stimulated and challenged through mentoring, while Berger (1990) found that mentees reported benefiting from

having a role model from whom they received support and encouragement. Teacher observation of partners interacting together on mathematical tasks and listening to learning conversations between mentor and mentee suggests that these benefits occurred. Feedback from students supports this:

> 'I like seeing how the Year 6 students see and think about problems differently to how we might do them'
>
> 'I like having the opportunity to explain my understanding and play the role of the teacher'
>
> 'I like seeing what is ahead of us in Maths and working with older students'
>
> 'I like working with a Year 9 student who thinks and works differently to most of my Year 6 peers'

The mentoring program has faced challenges too. The Year 6 and Year 9 Mathematics' timetables align for one period once each fortnight. Disruptions to the timetable resulting from online learning and a re-imagined school year meant that face-to-face mentoring sessions have occurred infrequently. Use of the Class Notebook to support collaboration on tasks asynchronously has not eventuated.

However, both teachers feel that the mentoring program has had very positive outcomes. It would be worthwhile applying learning from this year's open-ended, relaxed project to a more rigorous mentoring program in the future such as:

- Developing and administering a survey to 2020 mentors and mentees to gather data about their evaluation of and reflection on mentoring in Mathematics.
- Analysing student survey submissions and teacher evaluations to determine if/how the program has affected learning in Maths for either or both Year 6 and Year 9 high achieving Mathematics students.
- Clasen & Clasen (1997 in Bisland 2001) maintain that mentoring needs to be a flexible arrangement, so that emerging needs, interests, and issues can be explored, which suggests that students need choice regarding participation in a mentorship, and more input into the design of the mentoring program. Consideration also needs to be given to how mentoring relationships can be personalised and facilitated to better meet the needs, interests and issues of the partners involved.
- Making use of Clark's three phases of the mentoring relationship (1995) to pre-plan mentoring programs:
    - Establishment of the mentoring relationship where mentors and mentees are identified, goals and expectations are discussed and a development plan is created, so that mentors and mentees understand the purpose of the relationship, their responsibilities and the benefits they hope to achieve.
    - Implementation of the development plan. Students could be encouraged to keep a journal documenting the experience, which would provide a powerful means of self-evaluation.
    - Evaluation of and reflection on the mentorship by mentor and mentee.

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