

SUPPORT FOR DYSCALCULIA

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A MIDDLE YEAR LITERACY AND NUMERACY SUPPORT TEACHER'S CASE STUDY OF SUPPORTING YEAR 6 STUDENTS WITH MATHS LEARNING DIFFICULTIES

In January 2022 after months of research to find an appropriate professional body to learn more about dyscalculia. I could not find any organisations that offered a practical course with evidence-based research on how to teach students with maths learning difficulties in Australia.

Through prior professional learning at SPELD Victoria, I encountered Dyscalculia Association UK and started the year long online course. The course is an interactive hands-on course designed by Professor Steve Chinn and Judy Hornigold of the Dyscalculia Association UK. This reflection is the Final Practicum I submitted after successfully completing 10 hours of teaching maths to a group of learning difficulties students in Year 6.

In this article, I have outlined critical evaluation and reflection on the lessons. I have included a structure of a multisensory maths lesson plan based on the Singapore Maths pedagogy (Chinn, 2017; Hornigold, 2017). I then tailored the lessons to the students' learning needs and taught accordingly.

THE NATURE OF DYSCALCULIA AND GENERAL MATHS DIFFICULTIES

Dyscalculia is defined as 'a condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence.' (Bird, 2021, p 5).

To understand Maths Learning Difficulties (MLD) and their connections to ADHD and dyslexia, it is helpful to look at the two types of cognitive processes involved in doing math. Researchers break these processes down into domain-general processes and domain-specific ones. (Emerson & Babbie, 2014). Domain-general processes refer to the basic



processes of the brain, such as working memory, processing speed, executive functioning, and language processing, which underlie many tasks. These are the processes responsible for most of the overlap with other learning disabilities. (Henderson, 2012). Domain-specific processes solve math problems using the brain's hard wiring, often referred to as the 'number module.' These processes specifically affect maths and are responsible for maths learning disabilities. And, of course, everyone will have a different profile of MLD and co-morbid ADHD and other Learning Difficulties (Bird, 2021; Chinn, 2017).

Numeracy teaching should aim to help learners build up a sound mathematical understanding of numbers and their relationships (Chinn & Ashcroft, 2017). The basis of my own teaching approach with students with special learning needs such as dyscalculia would be to focus on the mastery of number sense. These include arithmetic and using a variety of manipulatives. My main manipulatives are the Integer blocks, Cuisenaire rods and

counters. Once a numeral concept has been understood at the concrete level, then, I will begin to lead the students towards abstract. That is, the students would need to build, draw, and write. Abstract always come last.

Critical evaluation and reflection on the lessons

Throughout the ten lessons, I followed the Multisensory Maths Lesson Plans and used manipulatives throughout each lesson. These included the Maths U See's Integer Blocks and Fraction tiles. In addressing the students' learning diversity as all students had learning difficulties such as Dyslexia, Developmental Language Disorders and ADHD. I had to keep the lesson short and sharp with a clear focus and chunking information to ensure that the messages got through to them.

Here are the main steps I took in planning each lesson in alignment with the Dyscalculia Association UK's Multisensory Maths Lesson Plan (Dyscalculia Association UK, 2022):

Review

Previous learning/concept: multiplication is fast counting of the same number.

New concept or review of recently introduced skill/concept

The review concept section of the lesson provided an opportunity to revise the materials presented in the last lesson, and for the teacher to clarify any misconceptions.

Word problem

The word problems I used have been adopted by Singapore Maths strategies. Where possible, I used the bar model to show student how to solve a word problem using the Singapore Maths method. There are five steps in a Singapore Maths lesson:

- Metacognition
- Processes
- Concepts
- Skills
- Attitudes

If children develop these skills in a maths lesson, they will develop as mathematician and work collaboratively with their peers.

Students talk for 85% and teachers talk for 15%. Furthermore, there is constant exploring in Singapore Maths. In Australia, once the students provide the answer to a maths problem, the solution stops there. It is a closed question. Whereas with Singapore Maths, the students are encouraged to find different solutions to a problem. This in turn creates critical and creative thinking. These are important skills for 21st Century not just in school but in the real world.

Reflection

I always ask students to reflect on what they learn and what they want to work on for the next lesson. That way, I can plan for the next lesson to teach at point of needs.

RATIONALE

The rationale behind my intervention and lesson content was based on my knowledge of the students and where are they at on a given topic.

The structure was as follows:

- Understanding
- Fluency
- Problem Solving
- Reasoning

Using concrete materials to support students' understanding of the communicative relationship between these numbers. In addition, most students who are struggling with maths do not know the basic number sense. The students did not know their timetables. Timetables are often taught by memorisation. This can be very daunting for children, more so for children with maths anxiety and maths difficulties.

HOW SUCCESSFUL WAS THE INTERVENTION?

In designing the ten lessons to support these students and teaching them at point of need, I kept in mind what the students know and their gaps of knowledge and taught them accordingly.

My objective was to ensure students could explain how they arrived at a particular answer and can explain the concept. I wanted to make sure they understood the concrete concept by using manipulatives to demonstrate understanding. I avoided launching into the abstract form of concept when they had not fully grasped the fundamental numeracy concept of number sense.

Before introducing any new concepts, I ensured that the students understood what we learned in the previous lesson. By doing so, I was hoping to avoid the cycle of confusion for the students. As Sharma & Chinn (2022) articulated, many teachers begin at the abstract form of the concept. The students may face difficulty in learning the concept being taught. In a later lesson, when the teacher begins a new concept, they may assume that the mastery in the previous lesson has been understood by the students. The teacher then would begin teaching the new concept at a higher level. When this occurs, the students might not understand the teacher's explanations and might have difficulty in learning mathematics, which then results in the failure and the fear of mathematics. (Sharma & Chinn, 2022)

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MAV consultants can assist teachers at your school with implementing strategies to support students with dyscalculia. Contact Renee Ladner, rladner@mavvic.edu.au to learn more.