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RECONNECTING LEARNING: EMPOWERING REMEDIATION FOR AT-RISK DYSCALCULIC PUPILS

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Abstract

Dyscalculia is a specific mathematics learning disability which can lead to a diverse range of difficulties with mathematics. After we identify the pupils with dyscalculia, it is essential to help them to master the basic numeracy skills, so they can further their study of mathematics in higher education. Reconnecting Learning is an instructional-based intervention that aims to help at-risk dyscalculic pupils to learn basic numeracy. It was developed based on two theories from mathematics education and special needs education, Tall's (2013) theory and Feuerstein's (2015) structural cognitive modifiability theory.

Keywords: Dyscalculia, Child

INTRODUCTION

Mathematics is an essential life skill to manage our lives (Butterworth, 2019; Haylock & Manning, 2019) and understanding the world (Haylock & Manning, 2019). Take for instance, we might require basic mathematics skills and knowledge to solve every day real-life problems such as buying food, reading time, recording and analysing numerical data and information, and so on. However, some pupils still encounter problems with learning mathematics (Kunwar, 2020). Not all pupils struggle with mathematics for the same reasons (Lewis, 2014). One of the reasons pupils struggle with mathematics is dyscalculia (Butterworth, 2019).

Dyscalculia is one of the specific mathematics learning disabilities characterized by persistent difficulties in numbers and arithmetic, more specifically due to core deficits in representing and processing numerosities (Butterworth, 2019). Similar to dyslexia, dyscalculia affects about 3–6% of the population (Bird, 2017), is about one pupil out of twenty pupils in the classroom has the tendency of dyscalculia (Hannell, 2013). Pupils with dyscalculia are poor in processing numerosity as they cannot perform subitizing (recognise the small quantities without counting) and counting, slow responses to give answers to mathematics calculation, reasoning, and writing mathematical symbols (Bird; 2017; Hannell, 2013). Unfortunately, remedial teachers still wondering how to handle pupils with dyscalculia in their classrooms (Fu & Chin, 2017). However, careful design intervention and well-targeted support can have a significant effect on pupils with dyscalculia (Morsanyi et al. 2018).

Encouraging at-risk dyscalculic pupils to follow their peers for learning basic numeracy skills is a challenge for remedial teachers. A one potentially useful way to do so is to provide suitable intervention or remediation to support at-risk dyscalculia pupils to learn basic numeracy skills. This intervention aims to help at-risk dyscalculic pupils make sense of numbers, perform counting, which is called Reconnecting Learning. Examples of Reconnecting Learning are easy to be implemented in a

remedial classroom. A remedial teacher plans a lesson plan with intended learning goals, prepares for the suitable teaching materials, sets up a conducive learning environment for the at-risk dyscalculic pupil. Additionally, demonstrates the mathematical process in front to helps pupil learn the mathematical concept. Leading the pupil to engage with the learning materials to build up his or her mathematical concept. Lastly, the pupil is allowed to play actively with the learning materials.

Researchers have explored the potential benefits of implementing Reconnecting Learning to support pupil's engagement, improve pupil's basic numeracy skills, and promote pupil's learning confidence. As remedial teachers comprehend the framework of Reconnecting Learning and how to apply it to their classrooms, the intervention is more effective to guide at-risk dyscalculic pupils to learn basic numeracy skills. As a result, this article aims to introduce Reconnecting Learning and provide remedial teachers with a comprehensive picture of Reconnecting Learning to implement for meeting the intended goals of their at-risk dyscalculic pupils.

The framework of Reconnecting Learning

Reconnecting Learning is an instructional-based intervention that aims to help at-risk dyscalculic pupils to learn basic numeracy. It was developed based on two theories from mathematics education and special needs education, Tall's (2013) theory and Feuerstein's (2015) structural cognitive modifiability theory respectively. Compatible with Deruaz et al (2020) views, researchers should investigate dyscalculia by taking into account different perspectives such as mathematics education, special education, psychology, and cognitive science.

Reconnecting Learning's element

Based on the Reconnecting Learning framework, 5 elements have potentially positive effects on pupil's intended outcomes:

Three systematic and simple steps

Fundamentally, Reconnecting learning consists of three systematic and simple steps which are demonstration, mediation, and active learning. For example, firstly the remedial teacher demonstrates matching the same shapes in front of the pupil, using suitable teaching material i.e., Lego. Then, the remedial teacher grabs the pupil's hand to match the same shapes together, mediates the meaning of matching to the pupil. At last, the pupil is asked to match his favourite shapes.

Compatible with innate abilities

Tall (2013) proposed human beings are born with three innate abilities which are recognition, repetition, and language. In parallel with Reconnecting learning, the pupil is asked to recognise the mathematical process during the demonstration. Then, the pupil is asked to do the repetition, for example choosing and matching the same shapes. At last, the pupil is encouraged to explain and reasoning how he or she gets the answer using language.

One-to-one setting

Reconnecting Learning's setting is a one-to-one setting. This is because this setting is suitably implemented in a remedial program (Bean & Dagen,2012), and the remedial teacher can respond immediately without any interruptions (Berman & Graham, 2018). The remedial teacher will sit in front of the pupil during the demonstration, to make sure the pupil pays full attention to the learning process. During mediation, the remedial teacher changes his or her position, walks near the pupils, and grabs the pupil's dominant hand to do the remedial activity together. Lastly, the remedial teacher may remain sitting beside the pupil to facilitate the pupil's learning in the active learning step.

Learn in chunks

More significantly, Reconnecting Learning consists of 15 different teaching and learning activities that were designed explicitly at every moment following Liebeck's (1984) sequence. It breaks topics down into chunks; thus, making it easy for the at-risk dyscalculic pupil to catch up with the pace confidently. Start form build-up pupil's fundamental pre number skills such as matching, pairing, ordering, etc. Continue with introducing pre counting skills such as subitizing and number sequence to construct pupil's number concepts. It is easier for the pupil to learn in chunks and accomplish given achievable tasks.

Remedial teacher's role

In Reconnecting Learning, there is a shift in the remedial teacher's role that is from demonstrator to mediator then change to a facilitator. The remedial teacher acts as a demonstrator to show the learning intentions to his or her pupils, then the remedial teacher plays the role of mediator to mediate the meaning and construct meanings to the pupils. Lastly, the remedial teachers impersonate, as facilitators and passionately guide the pupils to learn the initiative and actively.

Communication mode

Also, the communication mode in the Reconnecting Learning will change from explanation to questioning, and last, more focus on reasoning. Start from the demonstration, the remedial teacher focuses on his or her explanation of the mathematical concepts to the pupil. Take for an instance, the remedial teacher explains the counting: "Look at here, I start to count the sweets, one, two, three…" Then, the remedial teacher shifts his or her focus to question the pupil during the mediation. For example, the remedial teacher may ask: "Can you count the sweets?". At last, the remedial teacher may ask: "Can you take me 5 sweets?" to encourage the pupil to do his reasoning.

CONCLUSIONS

In a conclusion, basic numeracy skills are essential in our lives, Reconnecting Learning can be one of the potential useful interventions to help an at-risk dyscalculic pupil to better understanding and develop basic numeracy skills in the context of remedial education. Remedial teachers may be aware of the dyscalculia issues, they know the ways to help at-risk dyscalculic pupils to master the basic numeracy skills. However, Reconnecting Learning can be an alternative way to help guide them to rethink their remedial teaching practices and empower them to promote their pedagogical content knowledge. Additionally, Reconnecting Learning merely can provide remedial teachers with another strategy to build pupil's basic numeracy skills in chunks and lead to mathematics success in their future learning.

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