Challenges in Teaching and Learning Mathematics among Remedial Students

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Abstract
Mathematics is essential for academic success, yet many remedial students struggle due to cognitive, socio-emotional, and instructional challenges. These difficulties hinder their ability to grasp fundamental mathematical concepts, leading to persistent low achievement and limiting their overall academic progress. Addressing these challenges is critical to improving learning outcomes and ensuring equitable education. This study examines the key obstacles faced by remedial students in learning Mathematics and identifies effective teaching strategies to support their needs.This qualitative study employed semi-structured interviews with remedial teachers from schools in Perak, Malaysia. Purposive sampling was used to select teachers with expertise in remedial education. Data were collected through in-depth interviews and analyzed using thematic analysis. Coding and categorization were conducted manually and with the assistance of ATLAS.ti software to identify recurring themes. The findings highlight three key challenges: unable to achieve learning objectives, difficulties in mastering 3R (Reading, wRiting, aRithmetic) and poor recognition of whole numbers. Teachers emphasized that conventional methods are ineffective and stressed the importance of using manipulatives, visual aids and interactive learning techniques to enhance students' understanding. Future research should explore the long-term impact of differentiated instruction, hands-on activities, and technology-based interventions on remedial students' mathematical performance. Additionally, further studies should examine teacher training programs that equip educators with effective strategies tailored to remedial Mathematics education.
Keywords: Remedial Education, Mathematics Difficulties, Differentiated Instruction, Learning Aims, Whole Number Recognition, Interactive Learning

Introduction

Mathematics is not only a subject vital to academic success but also a key skill for living as an educated adult. Mastering Mathematics can be a struggle, particularly for remedial students who face cognitive and socio-emotional obstacles. These barriers range from challenges with memory, attention, and processing speed that can prevent one from understanding or remembering mathematical concepts (Geary, 2020). In addition, remedial students tend to be more anxious about Mathematics, contributing to the difficulties (Ashcraft & Moore, 2009).

Realizing that teaching Mathematics to remedial students often requires the use of more conventional methods, educators must adapt their strategies to ensure effective learning. Research has indicated that these students are more likely to thrive in a differentiated classroom, which means the lessons delivered meet (to the greatest extent possible) individual student learning levels and needs (Tomlinson, 2019). This helps target the specific areas of weakness and creates an open atmosphere in the classroom. Furthermore, using manipulatives and visual aids is a proven method to improve mathematical understanding and retention among students with learning difficulties (Gersten et al., 2021).

It is evident that motivation and engagement are the most critical aspects in ensuring a successful learning experience for remedial students. Studies have proven that students who actively engage in their learning demonstrate positive academic outcomes (Fredricks, Blumenfeld, & Paris, 2004). That is why a learning environment that motivates people to do things tactilely and interactively should be created instead of only using technology as the medium. For example, integrating technology and gamification into the instructional delivery of Mathematics can enhance student engagement and enjoyment (Hattie, 2020).

In addition, socio-emotional support is a powerful predictor of academic success for remedial students. Teachers are expected to pay attention to the feelings and personal well-being of their students and foster independent learning environments in which children can talk about their failures without fear and seek help (Putwain, Symes, Nicholson, & Becker, 2018). Thus, establishing a robust teacher-student relationship can affect the students' behavior in Mathematics and the acumen of Mathematics learning (Roorda, Koomen, Spilt, & Oort, 2011).

The literature demonstrates how the problem of poor performance in Mathematics in learning institutions is multifaceted by design, with over seven centuries of a longstanding tradition. Challenges like these need a holistic approach that involves cognitive, motivational, and socio-emotional scaffolding.

This study determines the worst challenges in Mathematics faced by remedial students and analyzes whether the teaching methods are making it easier for these students to learn. It seeks to establish the best academic solutions to improve learning outcomes for remedial students of Mathematics.

Literature Review

The literature review examines theories and previous research on the challenges and strategies in teaching mathematics to remedial students. Key theories include Vygotsky's Zone of Proximal Development, which emphasizes the importance of scaffolding, and Piaget's

theory of cognitive development, which highlights the need for concrete operational strategies in teaching mathematics. Recent studies indicate the effectiveness of differentiated instruction and the use of manipulatives in enhancing the learning experiences of remedial students (Smith, 2019; Johnson & Brown, 2021). Despite these advancements, there remains a gap in research on the long-term impacts of these strategies, particularly in diverse educational settings. This study aims to fill this gap by exploring how these strategies can be tailored to meet the needs of remedial students in Malaysia. A compilation of previous research identifies numerous obstacles to effective Mathematics education for remedial students, such as cognitive problems, low motivation, and inadequate teaching techniques (Alves et al., 2016). Notably, traditional methods are too teacher-centered and do not reach students that way, necessitating a push for new strategies exposing them to what they learn in other classes. In addition, research has demonstrated that when this type of instruction is differentiated (or individualized) and supported by the use of manipulatives, students who are behind in their Mathematics can both understand and retain concepts at a significantly higher level. Learning Mathematics depends on cognitive processes of memory, attention, and problem-solving, which are difficult for students to remediate. Therefore, these cognitive challenges can heighten anxiety and diminish self-efficacy, making them less likely to succeed in the classroom (Geary, 2020). Furthermore, the literature suggests that certain cognitive interventions can increase the performance of working memory and problem-solving skills required to learn Mathematics (Peters, De Smedt, & Kaufmann, 2020).

The second main hurdle is a lack of motivation. Note that remedial students get bogged down in their problems, which breeds disinterest, and they lose interest in Mathematics. Hence, for these students to create a positive and provide an enabling learning environment is essentially needed (Myers, Wang, Brownell, & Gagnon, 2015). Recent findings from the field suggest that student motivation and academic performance can be notably improved by utilizing goal-setting and self-regulation strategies (Schunk & DiBenedetto, 2020).

Most of the time, remedial students are disadvantaged as the traditional methods, which involve rote memorization and passive learning, do not work well with them. On the other hand, these approaches fail to accommodate the various learning styles of students for whom more interactive or hands-on methods are essential (Gersten et al., 2021). Therefore, interactive modes of instruction like technology integration and cooperative learning methods have been considered effective in student engagement and comprehension in Mathematics (Hattie, 2020).

Problem Statement
Mathematics is frequently identified as a common subject in which remedial students do not achieve at the same rate as their typical peers. Additionally, this gap is enhanced by old teaching techniques that do not address the specific learning needs of these students (Chodura, Kuhn, & Holling, 2015). Many teachers use traditional instructional approaches unsuitable for students with learning disabilities, which can contribute to continual underachievement and frustration (Griffin, Jitendra, & League, 2021).

Combatting Curriculum Standards Pressure - Many teachers feel pressured to meet curriculum standards, leading them to focus on procedural knowledge and rote memorization over conceptual understanding and problem-solving skill development (Gojak & Miles, 2015).

This can especially harm remedial students, who require additional time and assistance apprehending fundamental ideas.

Remedial students reportedly also often suffer from social-emotional challenges such as low self-esteem or test anxiety, which can lead to impaired academic performance (Putwain et al., 2018). Moreover, failure in Mathematics is likely to be a recurring experience for many of these students, which can only make them hold more negative attitudes toward the subject and decrease their willingness to learn.

There is an urgent need to identify the discrete obstacles faced by remedial students. In addition, understanding these challenges helps educators refine their instructional strategies to cater to the academic and emotional demands of remedial students, making learning more inclusive and understanding.

Research Objective
1. Identify the challenges in teaching and learning Mathematics among remedial students.

Research Question
1. What are the main challenges in teaching and learning Mathematics among remedial students?

Methodology
This study utilized qualitative research, and findings were drawn based on interviews conducted with teachers from different schools who had struggled to teach Mathematics remedial students. The sample was selected through a purposive sampling of five teachers (three females and two males) with no less than five years of experience in remedial teaching, all with certification in remedial teaching from the teacher education institute. This group was intentionally selected to capture data saturation in this study (Merriam, 2009). However, some participants must have basic qualifications relevant to the research (Chua, 2012; Gay & Airasian, 2003).

Respondents, particularly remedial teachers, were selected according to their skill set in teaching recovery skills in Mathematics and their availability to provide suitable information. This methodology is consistent with the research focus on individual attributes and resource availability (Creswell, 2009). This study was conducted in a district of Kuala Kangsar, Perak, for no prior studies have been discovered related to this issue due to the high number of schools that provide remedial programmes (Ministry of Education Malaysia, 2019).

In this paper, detailed data regarding the challenges faced in teaching Mathematics to remedial students were collected using a semi-structured interview with remedial teachers. This approach is more flexible in terms of questioning and allows for a better exploration of respondents' answers (Castillo-Montoya, 2016; Chua, 2012).

In relation to the research objectives and research questions interview protocol development, an in-depth discussion was followed on concerns and obstacles in teaching remedial students. The use of semi-structured questions was applied to facilitate variation in question order and wording to maintain a loose structure that acknowledged the emergent features in interview

conversations (Gikas & Grant, 2013). In order to validate the data and language of the interview protocol, a researcher conducted content validation along with face validation and combined this data with several triangulations as methodological triangulation (Castillo-Montoya, 2016).

Thematic analysis was utilized to analyze both interview transcripts. The data were organized, and texts were classified deductively and inductively based on the research questions. The researcher undertook three crucial steps: transcription, coding, and categorization, both manually and with the assistance of ATLAS.ti version 23 software. This aligns with the qualitative data analysis process suggested by (Miles & Crisp, 2014), involving data condensation, data display, and conclusion drawing and verification.

Findings

The findings from the needs analysis phase identified several challenges in teaching and learning Mathematics among remedial students. The analysis revealed three main themes.

Unable to Achieve Learning Objectives

Outcomes, according to the teachers, were subpar, especially regarding basic skills, such as mastering the fundamentals of key subjects. For many remedial students, if they can obtain the minimum competencies required for their grade, they are struggling. This issue is only worsened by holes in their base knowledge, which stop them from moving forward to new, more difficult mathematical ideas.

For example, Participant 1 highlighted the persistent low achievement levels among remedial students.

"*The level of student achievement is still low in Mathematics. Most of the students have not mastered the basic skills of Mathematics, and they are still at levels one and two of achievement level*" (P1: 45-52).
Participant 5, with long-term experience as a teacher in a school that serves Indigenous communities, also stressed that students' developmental ages did not match their mathematical skills.

"*Based on my experience as a remedial teacher at an Indigenous school for ten years, I have noticed that the achievement of Indigenous students in school is very poor, which means that the achievement is not in line with the age level.*" (P5: 63-67).

These results suggest the disconnection between what high school courses expect of students and what students can do, or at least do well enough that they should not need remediation if the high schools had clearly articulated that the central objective was for kids to earn and understand content mastery. Teachers added that even getting students through "year-over-year" concepts could prove challenging, stifling the ability of these students to learn more detailed material.

Teachers also highlighted that the curriculum moves rapidly and is challenging for many students in remedial classes, further enraging and frustrating them. Thus, the misalignment

between what students are capable of and their curriculum leads to many pupils struggling, slowly falling behind, and unable to keep up with their peers.

Difficulties in Mastering 3R (Reading, Writing, Arithmetic)
Despite memorizing the numerical sequences, students find it challenging to apply them in real life. Disengagement: Teachers reported that a common problem among remedial students was the ability to say numbers out loud but having little meaning attached to this. For example, they could count and recite but struggle with tasks like putting numbers in order or spotting patterns in numbers, to name a few.

Participant 2 explained:

"*In my experience teaching remedial Mathematics, there are some pitfalls that I have seen again and again. For one thing, a lot of my students can count from 1 to 10, but they have a hard time actually pointing at which one is 'number one,' 'number three,' and which is 'numero quatre.' They are not so dexterous with the whole numbers game*" (P2: 61-65).

However, this indicates that remedial students still rely heavily on memorization of equations without understanding them. Participant 2: Numerical sequencing is another weak point in English.

"*Some students can count, but they cannot rearrange the numbers. When they are asked to arrange the numbers in descending order, they cannot solve them correctly.*" (P2:66-68)

There is a huge hurdle in literacy: the very basic 3Rs (reading, writing, and arithmetic). While many students can memorize sequences, they often do not gain a real understanding of the elements involved. This leads to an inability to apply such knowledge in a real context.

Poor Recognition of Whole Numbers
Some students find the concept and manipulation of whole numbers difficult, impacting many other aspects of their ability to perform mathematical processes. This is a crucial issue since whole numbers are at the center of many mathematical constructs that students will interact with in their mathematical studies.

There seem to be numerous learning difficulties concerning the students' general work with whole numbers. Participant 4 stated:

"*Generally, these people face learning problems in reading, writing, counting, listening, thinking, speaking, drawing, reasoning, understanding, and recalling. A basic recovery skill is a whole number topic. Whole number skills involving numbers 21 and up. This is because students are always confused when writing numbers like 22, 23, 24, and so on. They will write 13 instead of 31..*" (P4: 38-45)

Participant 2 highlighted the critical importance of mastering whole numbers for overall mathematical proficiency:

"*Among the skills that are difficult for students to master is whole numbers because these whole numbers are very important as they are the basis of Mathematics. If the student can achieve whole numbers, then they can achieve all the basic skills of Mathematics*" (P2: 50-58).

Participant 3 shared a strategy used to address these difficulties, focusing on mastery:

"*My usual strategy is to use mastery, which means we prioritize identifying the numbers first, and once that has been mastered, then we can move to the value of numbers*" (P3: 80-85).

Understanding this basic principle is key to learning more complicated mathematical concepts. When students are unable to understand the concept of whole numbers, they will not improve their mathematical proficiency level. Consequently, it may also impede their academic progress.

In addition, teachers focused on the significance of regular practice and continued solid grounding in these basic skills to ensure that students feel well-prepared to tackle higher-level topics. Furthermore, frequent reviews and focused interventions can identify gaps in foot practices that deprive these steps of effectiveness.

Discussion

Notably, inadequate learning of Mathematics can be improved through innovation aimed at enhancing active learning and engagement, which, on the whole, improves the quality of remedial education in Mathematics. Differentiation of instruction as a tool for helping the needs of students in remedial classes when lessons are designed with each student's strengths and weaknesses in mind, teachers and schools can provide better support to enable learners to reach their learning target (Tomlinson, 2019). Including hands-on, concrete activities about counted Mathematics can help students experience and know mathematical concepts. These kinds of activities can help students close the gap between what they study in learning and the actual things they will do in their work (Gersten et al., 2021). Meanwhile, visual aids and manipulatives can help make these abstract concepts concrete for students. With the help of these tools, learning is more interactive and fun. In addition, students can learn in a playful manner, which results in understanding the concept from the root level (Geary, 2020). Higher education reform advocates often point to policy recommendations for strengthening remedial students' Mathematics education. However, evidence to support these interventions still remains limited. Therefore, by incorporating differentiated instruction, hands-on tasks, and innovative teaching methods, we can help remedial students perform and gain more in their educational journey. Professional development and training can assist in equipping teachers to support these students more effectively (Myers et al., 2015). Nevertheless, additional research is required to investigate the impact of manipulating strategies of differentiated instruction and manipulatives on the academic performance of remedial students across time. Therefore, research should explore the use of technology in remedial Mathematics instruction (Schunk & DiBenedetto, 2020).

Conclusion

The findings underscore the necessity for differentiated instruction, which tailors teaching methods to meet individual student needs, thus providing a more inclusive and supportive learning environment. Hands-on experiences and the use of visual aids and manipulatives are

essential strategies that can enhance students' understanding and retention of mathematical concepts. Additionally, incorporating technology and gamification into instruction can boost student engagement and enjoyment, thereby improving learning outcomes.

In conclusion, addressing the unique challenges faced by remedial students in Mathematics requires a holistic approach that includes cognitive, motivational, and socio-emotional scaffolding. By employing innovative teaching techniques, differentiated instruction, and socio-emotional support, educators can help remedial students overcome their difficulties and achieve more positive learning outcomes. Future research should continue to explore the effectiveness of these strategies and investigate new approaches to support the academic success of remedial students in Mathematics.

Statements and Declaration
The authors declare no conflict of interest.

Authors Contributions
The first author conducted the research and wrote the research paper. The second author revisited the article, reviewed and revised the whole paper accordingly and gave input on the technical aspects, while the third author contributed with educational perspectives. All authors had approved the final version.

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