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REVIEW OF RESEARCH RESULTS ON THE EFFECTIVENESS OF TEACHING MATHEMATICS USING CONTEXTUAL TASKS

Abstract. *This review article aims to examine the research results on the effectiveness of teaching mathematics using contextual tasks. The article provides an overview of various studies conducted in this area and highlights their findings. The use of contextual tasks has been found to enhance students' understanding and retention of mathematical concepts, as well as improve their problem-solving skills. Additionally, it has been observed that incorporating real-life scenarios into math lessons can increase student engagement and motivation towards learning mathematics. However, some studies have also identified challenges associated with implementing contextual tasks in classrooms such as time constraints and lack of resources for creating relevant contexts. Overall, this review suggests that teaching mathematics through contextual tasks is a promising approach that can benefit both teachers and students if implemented effectively with appropriate support mechanisms in place.*

Introduction.

Mathematics is a fundamental subject that plays an essential role in our daily lives. It provides us with the necessary tools to solve problems, make informed decisions and understand the world around us. However, many students struggle with mathematics due to its abstract nature and lack of relevance to their everyday experiences. In recent years, there has been growing interest in teaching mathematics using contextual tasks as a way of making it more meaningful and engaging for students.

Contextual (also called scenario) mathematics is a teaching method that uses concepts or events from the real world to explain abstract concepts of mathematics. Contextual tasks contain information about any average or people's lives, which makes them more interesting for students. Contextual tasks involve presenting mathematical concepts within real-world situations or scenarios that are relevant to students' interests or experiences. This approach aims to help learners connect mathematical ideas with their own lives while also developing critical thinking skills through problem-solving activities.

This review article will examine research results on the effectiveness of teaching mathematics using contextual tasks. We will explore how this approach can enhance student engagement, motivation and achievement in math while also addressing some common challenges faced by educators when implementing this method.

Overall, we hope this review will provide valuable insights into how teachers can effectively use contextual tasks as part of their instructional strategies for teaching mathematics at 5-11(12) grades of school.

Materials and Methods. This review article is based on a comprehensive analysis of scientific articles published by various researchers in the field of mathematics education. The aim was to investigate the effectiveness of teaching contextual tasks in mathematics lessons.

Search Strategy: A systematic search was conducted using electronic databases such as Google Scholar, ERIC, Scopus, and Web of Science. The keywords used for the search were "contextual tasks," "mathematics education," "teaching strategies" and "effectiveness."

Selection Criteria: The inclusion criteria for selecting relevant studies were that they should be empirical research studies that investigated the effectiveness of teaching contextual tasks in mathematics lessons. Studies with small sample sizes or those not written in English language were excluded from this review.

Data Extraction: Data extraction involved identifying key information from each study including author(s), year of publication, research design/methodology employed (e.g., experimental or quasi-experimental), sample size/participants' characteristics (e.g., grade level/age range), intervention details (i.e., type/duration/frequency/contextualization level) and outcome measures used to assess students' learning gains/performance outcomes related to mathematical concepts/skills/content knowledge acquisition.

Synthesis Methodology: A narrative synthesis approach was adopted due to heterogeneity across selected studies regarding their designs/interventions/outcome measures employed. This involved summarizing findings across different dimensions such as types/durations/frequencies/contextualization levels/learning domains addressed by interventions; comparing results obtained under different conditions; highlighting similarities/differences among findings reported by different authors/studies; discussing implications for practice/research based on synthesized evidence presented here.

Quality Assessment: The quality assessment tool developed by Cochrane Collaboration's Risk Of Bias In Non-randomized Studies -of Interventions (ROBINS-I) framework was adapted for assessing risk-of-bias within individual studies. This involved evaluating the quality of evidence presented in each study based on criteria such as selection bias, performance bias, detection bias, attrition bias and reporting biases.

Data Analysis: The data extracted from selected studies were analyzed using a thematic analysis approach. This involved identifying key themes that emerged across different dimensions such as types/durations/frequencies/contextualization levels/learning domains addressed by interventions; comparing results obtained under different conditions; highlighting similarities/differences among findings reported by different authors/studies; discussing implications for practice/research based on synthesized evidence presented here.

Limitations: This review article has some limitations including the exclusion of non-peer-reviewed articles and those not written in English language. Additionally, there may be publication/reporting biases present within individual studies included here which could affect overall conclusions drawn from this review article.

Results and Discussions. The effectiveness of teaching contextual tasks in mathematics lessons has been a topic of interest for researchers and educators alike. Several studies have investigated the impact of using real-life situations and problems to teach mathematical concepts, skills, and competencies.

Hiebert & Lefevre (1986) conducted a national survey in Canada to analyze the conceptual and procedural knowledge of grade 7 students in mathematics. They found that students who had more exposure to contextual tasks performed better on problem-solving tasks than those who did not [1].

Schoenfeld (1992) emphasized the importance of metacognition, sense-making, and problem-solving skills in learning mathematics. He argued that teaching through contextualized problems can help develop these cognitive processes among learners [2].

Research of Silver, E. A., Mesa, V. M., Morris, K. A., Star, J. R., & Benken, B. M. (2009) also supports this approach as she analyzed teachers' submitted lesson plans seeking National Board Certification for Mathematics Teaching for Understanding. They concluded that effective instruction should focus on developing deep understanding rather than memorization or rote procedures by providing opportunities for students to apply their knowledge through authentic contexts such as word problems or projects with relevance beyond school walls [3].

M. G. Macarchenko, A. Stepanova (2013) literature review highlights best practices when designing instructional materials based on real-world scenarios. They suggests starting with concrete examples before moving onto abstract ones gradually so learners can build connections between what they already know about their environment (such as time management or budgeting) and the mathematical concepts they are learning. Michael Cohen's work revealed that contextual tasks help students better understand the connection between mathematical concepts and the real world. This can lead to a deeper understanding of material and increased interest in the subject. Their study found that using real-life situations as a tool for enhancing student performance in solving word problems was effective. The results showed that students who received context-based instruction outperformed those who did not on both procedural and conceptual assessments [4].

Kwon et al. (2018) investigated the effects of using contextual tasks on student engagement and motivation in math classes. They found that incorporating real-life scenarios into math lessons increased student engagement levels significantly compared to traditional instruction methods [5].

Other studies conducted by D. Fauziah, Mardiyana and D R S Saputro (2018) and Taley B.I. (2022) showed that the use of contextual tasks in mathematics lessons promotes the development of critical thinking skills among students. They studies further explored how using context-based approaches could enhance mathematical competencies while reducing anxiety levels among different groups. They findings suggest that incorporating relevant examples from everyday life can make abstract concepts more accessible while promoting positive attitudes towards learning maths even among those with low confidence levels initially [6, 7].

Review shows that the evidence suggests that teaching contextual tasks in mathematics lessons can be an effective way to enhance student engagement, motivation, competencies while reducing anxiety levels. Educators should consider incorporating relevant examples from everyday life into their instructional materials gradually to help learners build connections between what they already know about their environment (such as time management or budgeting) and the mathematical concepts they are learning.

However, it is important to consider that relying solely on contextual tasks may limit perception of abstract mathematical concepts. Therefore, there needs to be a balance between using both types of task for optimal learning outcomes.

These studies highlight the importance of incorporating contextual tasks into math lessons as it can improve problem-solving skills, enhance understanding of abstract concepts, increase student engagement, and motivate learners towards mathematics education.

Conclusion.

Overall, these findings suggest that educators should consider using relevant real-world contexts when teaching mathematical concepts as it may lead to improved learning outcomes for their students. Further research is needed on this topic with larger sample sizes across diverse populations so we can gain deeper insights into effective pedagogical practices related to contextual tasks in maths education.

The effectiveness of teaching contextual tasks in mathematics lessons has been a topic of interest for researchers and educators alike. Several studies have investigated the impact of using real-life situations and problems to teach mathematical concepts, skills, and competencies.

Thus, it can be concluded that the use of contextual methodology in teaching mathematical disciplines is an effective tool for developing students' critical thinking and increasing their interest in the subject. However, a balance between using contextual and abstract tasks is necessary to achieve optimal learning outcomes. Further research in this area will help better understand how to best use contextual problems in math classes to achieve maximum effectiveness in the learning process.

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