EFFECTIVENESS OF REALISTIC MATHEMATICS EDUCATION IN ARITHMATIC PROBLEM SOLVING IN CHILDREN WITH SPECIFIC LEARNING DISABILITY

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ABSTRACT

The study focused on the effectiveness of Realistic Mathematics Education approach in improving arithmetic problem solving skills in children with Specific Learning Disability. To help students with difficulties in mathematical thinking and problem solving skills new methods were developed by experts in mathematics education. These methodswere intent to help the students to be active participant and creative in solving mathematical problems according to real life situations. It also emphasizes on cooperative and communicative learning of the students and makes the students more interested in learning and doing mathematics. Realistic Mathematics Education is a contextual way of understanding mathematics and applying the concepts in everyday life. The method used in this paper was literature review which used literature findings as the resources. According to the literature research, it was found out that the students have difficulty in application of the math concepts in real life situations due to which they tend to avoid math subject as a whole. The application of Realistic Mathematics Education approach in teaching arithmetic is found to be very effective in teaching students problem solving skills to students with specific learning disability.

KEY WORDS: Realistic Mathematics Education (RME), Specific Learning Disability (SLD), problem solving skills.

1. INTRODUCTION

1.1.REALISTIC MATHEMATICS EDUCATION (RME)

Realistic Mathematics Education (RME) is an approach developed by Freudenthal Institute in Netherlands and is still widely used there. It is now adopted by many countries including United Kingdom, Germany, France, and United States of America. A lot of research has been done to find out various methods to apply Realistic Mathematics Education and to know the impact of the same of the mathematical abilities of the children in school or otherwise. This approach was developed in early 1970s. Later it was introduced and was researched in University of Wisconsin. It took about 30 years to understand and fine the right context regarding Realistic Mathematics Education and to use it universally. Before the final compilation of all the studies it was used in different context of mathematics. It was an approach to understand the mathematics and to develop math teaching-learning materials for the students. It was also used as a teaching strategy in classroom to involve basic math concepts and relate it to real-life mathematics.

Realistic Mathematics Education is successfully used to teach students problem-solving skills and to use their experiences and knowledge to apply their mathematical skills to solve math problems. It is similar to using real life problems to learn problem-solving skills but Realistic Mathematics Education is broadly related to contexts taken from real world, from fiction or from an area of mathematics that students are already familiar with i.e. things that are importance to engage them and follow. The curriculum of Realistic Mathematics Education was initially trialled in Manchester and later many schools in the United Kingdom collaborated and volunteered to participate in developing Realistic Mathematics Education materials for the students in schools.

The aim of the RME is to transform mathematical learning into a fun and logical way for students to introduce problems within contexts. The RME begins by selecting problems related to the student's experience and knowledge. The teacher then acts as an assistant to help the students solve the problem's situation. This content-solving activity brings a positive impact on students' mathematical representation, which is related to their problem-solving skills. A great way to teach math is to provide students with insightful information by solving problems that they face daily or by dealing with situational problems. Mathematical studies make a change in the concept of mathematical objects and their relationships. Real mathematical education transforms a culture from one that is powerful, but it is still in the process of teaching. Therefore, rational mathematics education is a new learning method that emphasizes mathematics as a human activity that must be accompanied by real life using the real world context as a starting point for learning.

Realistic Mathematics Education approach helps the students to connect their informal representation of the world to formal presentation in mathematics. It helps in building logics and base to build clear understanding of the purpose of learning mathematical concepts and their reverence in real world. Students with the help of this approach recognize and understand the mathematical contexts and sameness of different mathematical problems to select appropriate model to solve the problem.

Realistic Mathematics Educationclassrooms create a shift in “socio-mathematical norms” (Yackel & Cobb, 1996) which make them more inclusive – students are able to develop ownership of mathematics and engage confidently in discussion. They are encouraged to take their modelling as far as they can, while maintaining links to the context from which they are generated.

The materials used in implementing Realistic Mathematics Education in classrooms are developed in such a manner that the students have to become an active learner and gradually each student solves the same problem with different approach according to their mathematical understanding and previous knowledge and experiences. There are four key features of Realistic Mathematics Education mentioned below:

- Extended and elaborated discussions are held of multiple contexts.
- Each student is given opportunity to represent the context according to their knowledge and understanding.
- Multiple strategies and methods are accepted to solve same problem.
- Equal opportunities are given to the students to explain and share their ideas, methods and strategies to solve a particular problem.
- Students share imaginable contexts to recognize the problem and relate it to their previous experiences to solve the new problem with previously used strategies.

Teaching and learning RME has five main approaches, namely, (Yuanita et al. 2018)

1. Students' knowledge in daily life.
2. Converting a virtual reality into a model and converting the model into a vertical maths process before converting it into a formal system.
3. The use of effective student style.
4. The use of dialogues and questions and answers are ways to develop students' mathematical skills.
5. To build connections between concepts and topics until learning becomes complete and complete.

1.2 SPECIFIC LEARNING DISABILITY (SLD)

Specific learning disability is a neurological disorder which is identifies in school going students. It leads to learning gaps in students who are having learning difficulties. There are various psychological tools used to assess the difficulty areas in the students. It begins at a very early age around 8 years and which can sometimes not recognized until adulthood. Learning disability is not curable but the gaps can be filled to a certain extent with continuous interventions.Specific learning disability is estimated around 12% in school going students who struggle with some kind of learning disability and which later tells us the specific areas of difficulties and we used the term specific learning disability. Learning disability occurs in three areas i.e. reading, writing and arithmetic.It is further divided into various types i.e. reading, writing, mathematics, comprehension, expressive language, non-verbal learning disability, audio-visual processing disorder, language disorder etc.

Learning disorders, if not recognized and managed, can cause problems throughout a person's life beyond having lower academic achievement. These problems include increased risk of greater psychological distress, poorer overall mental health, unemployment and dropping out of school (American Psychiatric Association, 2020).

The students with specific learning disability show characteristics such as low self-esteem, lack of confidence, poor reading fluency, lack of self-monitoring skills, difficulty in expressive and receptive language, difficulty in writing thoughts on paper, lack age-appropriate vocabulary, low attention span, anxiety, anti-social behaviour, disoriented, lacks time management skills, requires prompts and cues to do any certain task related to academics.

2. REVIEW OF LITERATURE

Rohman et al. (2019) conducted a study on "An analysis of students' literacy ability in mathematics teaching with realistic mathematics education based on lesson study for learning community". The aim of the study was to understand the students' literation ability descriptively and teachers' response in math instructions of lesson study with realistic mathematics education aims to present the real world context to students. The study was done of 29 students of grade 7. It was a descriptive research of qualitative method. Data collection was done by observations, interviews and documentations. Data was analysed using the theory of induction and reduction. The findings of the research suggested that the students positively responded to this approach.

Sarifah&Kurnianti (2019) conducted a study on "Developing geometry students worksheet based on Realistic Mathematics for Learning in Elementary school". The aim of the studywas to conduct worksheets on geometry based on realistic mathematics. The study took place over a year with research and development (R&D) method adapted with Borg and Gall and Dick, Carey and Carey model. The findings of the research concluded that the geometry worksheets made with realistic mathematics prove beneficial for mathematics learning in elementary school.

Bustanika&Suparman (2019) conducted a study on "Design of pop-up books based on Realistic Mathematics Education to improving special ability students of class VIII". The study aims at designing teaching materials in the form of pop-up books based on Realistic Mathematics Education (RME) to improve students' special ability in three-dimensional material. The type of research used was research and development (R&D)method with ADDIE model. Students of grade 8 and teachers teaching grade 8 were selected as samples. The research data was obtained by interviewing to describe students' needs, learning

information used, as well as document analysis to analyse curriculum, learning materials, and teaching materials. The data was qualitative analysed. The findings of the research suggested that using pop-up books helped in improving special ability of the students of grade VIII.

Theodora &Hidayat (2018) conducted a study on "The use of Realistic Mathematics Education in teaching the concept of equality". This study aims to review the use of the Realistic Mathematics Education theory in teaching the concept of equality within the Biblical perspective as the parameter of the implementation for mathematics as one of God's tools to reveal His glory and wisdom.The method of the study was literature review. According to the literature resources that were studies for this paper it was found out that the main problem in students' learning is the misconception about equality. The study suggested the use of the Realistic Mathematics Education theory can help teachers to teach the "equality" concept to help student learn contextually.

Yuanita, Zulnaidi& Zakaria (2018) conducted a study on "The effectiveness of Realistic Mathematics Education approach: The role of mathematical representation as a mediator between mathematical belief and problem solving". This study aims to identify the role of mathematical representation as a mediator between mathematical belief and problem solving. A quasi-experimental design was developed that included 426 Form 1 secondary school students. Respondents comprised 209 and 217 students in the treatment and control groups, respectively. SPSS 23.0, ANATES 4 and Amos 18 were used for data analysis. Findings indicated that mathematical representation plays a significant role as mediator between mathematical belief and arithmetic problem solving. The Realistic Mathematics Education (RME) approach successfully increased the arithmetic problem-solving ability of students.

Saleh et al. (2018) conducted a study on "Improving the reasoning ability of elementary school student through the Indonesian Realistic Mathematics Education". This research aims

to analyze the achievement and the improvement of students' mathematics reasoning ability through the implementation of Indonesian realistic mathematics education (PMRI) approach. The research subject consisted of 51 students in the experiment group and 45 students in the control group which categorized into three levels (low, intermediate, and high). The result suggests that the achievement and the improvement of students' reasoning ability in the mathematics learning using PMRI approach are better than the conventional learning.

Mulbar&Zaki (2018) conducted a study on "Design of Realistic Mathematics Education on elementary school students". This study focuses on developing learning design based on realistic mathematics education. The learning design developed related to the real life of students, so students are expected to enjoy and tend to like mathematics. The results showed that the realistic mathematics education design consisting of a lesson plan, a teacher's guide, a student book, a student worksheet, and mathematics achievement test are in good quality, which meet the criteria of validity, practicality, and effectiveness. Mathematics achievement test as a research instrument meets the criteria of validity, sensitivity, and reliability. In learning process by using realistic mathematics education, the students are more active, have an energy and motivation to learn, so there is a good impact on the improvement of students learning achievement.

3. DISCUSSION

Transformations in studentswith or without disability come in many forms. Students with learning disabilities (LD) are increasingly receiving most of their math instruction in the regular classroom and resource rooms. This study verifies that these students benefit from Realistic Mathematics Education if it is adapted to meet the needs of each student with different educational need. They can be as simple as using graph paper to help a student with mathematics difficulties to keep the column intensities straight or as complex as solving

mathematical calculations. To ensure effective teaching, adaptation to teaching is required in the areas of lesson planning, instructional strategies, content formatting, media transformation for instruction, and assessment of adaptation.

In classrooms, flexibility in math courses is appropriate for all students, not just students with learning difficulties. Mathematics teachers will find that the simple changes in the introduction of mathematics give students the opportunity to gain a clearer understanding of the process rather than just the right answer. In addition, adapting and changing student orders creates a positive atmosphere that encourages students with learning gaps to take active participation in problem solving, which strengthens students' understanding of the concept, also has difficulties in logical reasoning and takes time to adjust to new places, situations or with new people and environment.

4. CONCLUSION

The students learn better when questions are provided with real life situation where they can use their previous learning and implement them for new knowledge creation. The teacher can use Realistic Mathematics Education to teach problem solving skills.Problem solving can be adapted for students with disabilities in various ways. Students with mathematical disabilities develop their problem-solving skills through teacher-directed tasks that include:

(a) Getting students to read or listen to a problem carefully;

(b) Involve students in suggesting a solution to the problem using a drawing or sketch where appropriate;

(c) Develop problem-solving strategies by writing a suitable mathematical sentence;

(d) Perform the necessary calculations, evaluate the hypothesis response, and write the answer in appropriate terms.

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