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Research Article

The Role of Realistic Mathematics Education in Teaching Mathematics from the Perspective of Mathematics Teachers

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Abstract
The National Center for Curriculum Development, in cooperation with the Jordanian Ministry of Education, has implemented significant modifications to its mathematics curriculum. These modifications focus on connecting mathematics education to students' real-life experiences and highlighting the role of mathematics in practical applications. Therefore, this study aimed to demonstrate the role of Realistic Mathematics Education (RME) in mathematics teaching and its positive impact as a teaching method, from the perspective of mathematics teachers using the revised curriculum. The study employed a descriptive research methodology, designing a questionnaire to assess the role of RME in mathematics instruction. Frequencies and averages of responses from mathematics teachers were calculated. Descriptive research, used in field research, helps to define the role of RME accurately and clearly. The study population consisted of 474 teachers, and the sample comprised 271 teachers. The findings show that RME plays a significant role in enhancing mathematics learning at the basic stage, with an overall high rating. Teachers emphasized that RME is most effective in providing students with meaningful mathematical knowledge and deep understanding, fostering creative and critical thinking through realistic activities, and encouraging learners to connect mathematical ideas with real-life examples. Overall, RME supports student-centered learning, strengthens enthusiasm, links mathematics to everyday situations, and promotes interdisciplinary connections, making mathematics more relevant, engaging, and deeply understood. The results also showed no significant differences in mathematics teachers' responses to the questionnaire based on gender or academic qualifications. The study's findings also help curriculum designers in Jordan evaluate the Jordanian curricula developed between 2019 and 2022 and obtain feedback on the updated curricula and their impact on teaching. This study is one of the few that has shed light on these curriculum developments.

Keywords: Mathematics Teachers, Realistic Mathematics Education, Teaching Mathematics, Perspective

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1. INTRODUCTION

Educational systems have adopted modern and advanced strategies, in line with the development accompanying all aspects of life, whether economic, social, technological, or others. All educational systems try to limit traditional teaching methods and work to enrich educational situations with strategies that enhance the acquisition of life principles and abilities in a relevant and realistic way, by relying on educational strategies and approaches that work to link what is learned inside with what the student lives outside the classroom.

Mathematics occupies a great scientific position in educational systems, as it is considered a branch of abstract sciences concerned with the smooth transfer of ideas and knowledge. As is known, mathematics is a solid structure based on a set of attitudes, concepts, and skills that develop the mental abilities of

students. Acquiring mathematics with all the concepts, theories, and skills it contains makes it easier for students to understand knowledge in other fields, such as physics, life sciences, engineering, astronomy, and others. This can only happen by emphasizing the importance of mathematics in these fields.

Carman et al. (2017) pointed out the role of learning activities that are truly related to students' real lives and the problems facing the real world, activating students' motivation towards learning mathematics, and then students realize that mathematics is an important and effective means of understanding and solving these problems. Papadakis et al. (2017) mentioned that mathematics stimulates students' passion for learning when they possess the ability to link their mathematical knowledge to realistic situations in their lives and daily experiences.

A subfield of mathematics known as realistic mathematics education (RME) focuses on the investigation and analysis of issues and occurrences that occur in the actual world. The foundation of this mathematics is found in its real-world applications in a variety of disciplines, including computer science, engineering, economics, and the natural sciences. Real-world mathematics deals with a variety of issues, including data analysis, modeling of natural events, systems design and management planning, and physics and engineering problem-solving. The goal of real-life mathematics work is to solve real-world problems and make wise decisions in a variety of fields by applying advanced mathematical tools like calculus, applied geometry, probability, statistics, linear algebra, and numerical analysis, among others. In summary, real mathematics is widely regarded as an essential instrument for comprehending and evaluating intricate real occurrences. Its applications span numerous domains, fostering advancements in a multitude of scientific and biological sectors.

RME is considered an effective strategy in teaching mathematics that was designed and developed at the Freudenthal Institute in the Netherlands. Hans established its foundations and philosophy, and focused on student-based learning, and that students be active and effective in the learning process, which is consistent with the constructivist theory of learning, and students must develop their mathematical ideas on their own. Freudenthal stated that there are two types of mathematics: horizontal mathematics and vertical mathematics. Horizontal mathematics is based on students using a set of means to organize tasks in real-life situations and moving to symbolism. As for vertical mathematics, the student must reorganize within the mathematical field, which results in shortcuts that combine concepts and skills (Heuvel-Panhuizen & Drijvers, 2020).

Since 2016, RME has been increasingly popular as a reemerging pedagogical approach to teaching and learning (Nguyen & Pham, 2023). The ideas of Freudenthal (1991) paved the way for the development of a sophisticated theory of mathematics education in the Netherlands known as RME, which is based on the two tenets that mathematics must be seen as a human endeavor in addition to being connected to reality (Da, 2022).

Mathematics began to be used as a form of philosophy or philosophy in education (Peek, 2016). It follows the path of the horizontal mathematical solution and the path of the vertical mathematical solution, by moving from the mathematical situation that represents a problem, to the process of description and clarification using correct mathematical language, then using the capabilities and tools available to solve that mathematical situation and following mathematical procedures and algorithms (Van den Heuvel-Panhuizen & Drijvers, 2014). Figure 1 shows this.

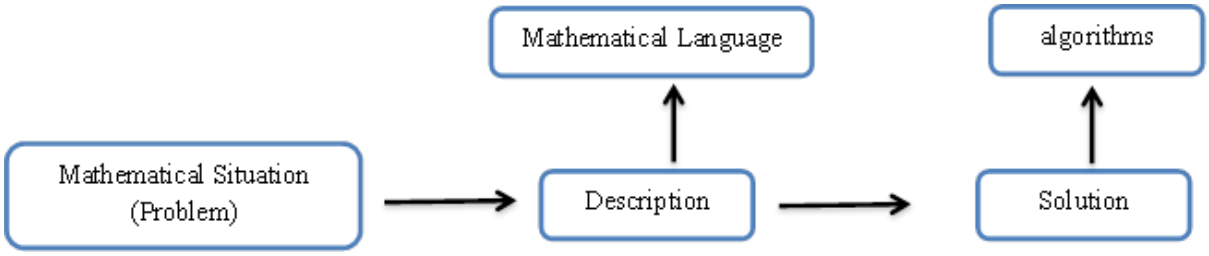

Figure 1. The Path of the Horizontal Mathematical Solution and the Path of the Vertical Mathematical Solution

RME is based on a set of principles, as indicated by Heuvel-Panhuizen and Drijvers (2020), which are:

1) Guided rediscovery: An educational environment is provided that gives students the opportunity to experience situations similar to mathematical situations and link them to their cognitive structure, which generates a new structure.
2) Using contexts: The essence of RME shows that the mathematics to be learned must be linked to realistic situations, so contexts must be provided that are relevant to the lives of students, connected to society, and give human value.
3) Using models: Models used in RME are an important means of understanding and solving mathematical problems.
4) Interaction: Studying RME allows students to interact with one another as well as with teachers. It is a group activity rather than an individual one.

Paul et al. (2008) conducted a series of studies on classroom design and examined three changes made to the RME theory. The first of these adjustments entails adopting a more comprehensive viewpoint that encompasses the structure of classroom activities as well as the type of discourse that occurs in the classroom when assisting students with their mathematics learning. The second adaptation is a shift in perspective that recognizes the teacher's mediating function. Creating tools that teachers can utilize to accomplish their instructional agendas takes precedence over actually assisting students' learning as the aim of instructional design. The third adaptation, which also focuses on the teacher, addresses the potential value of instructional materials that have been created to enhance both instructors' and students' learning.

Many previous studies have shown a positive impact of the RME in teaching mathematics. Some studies indicated the role of RME in increasing the degree of academic achievement (Arniansyah, 2015; Effandi & Muzakkir, 2017; Laurens et al., 2017; Saleh et al., 2018; Zubainur et al., 2015). Hidayat and Iksan (2015) and Kizito (2012) also verified the role of the RME in acquiring mathematical concepts and conceptual understanding. Arniansyah (2015) and Effandi and Muzakkir (2017) showed the presence of an impact on students' beliefs towards mathematics and the presence of a positive impact on attitudes. A group of studies also showed the presence of a positive impact of the RME in developing deductive thinking skills, visual perception, and learning geometry, such as those by Mahendra et al. (2017), Karaca and Ozkaya (2017), and Yuanita et al. (2018).

A learning model known as Realistic Mathematics Engineering (RMEng) was created by Nurmasari et al. (2024). It assesses the efficacy of the model by integrating the Realistic Mathematics Education method with the Engineering Design Process phases. Seven specialists from three Indonesian universities validated the model, and its Aiken validity index value of 0.786 showed that it was legitimate. The processes in the RMEng model are as follows: comprehending real-world issues, figuring out informal solutions, creating formal mathematics, creating products, and drilling. Every one of these five steps can include talks and demonstrations. Following phases of initial and main field testing, the RMEng model was modified in response to feedback from educators and observers. At the 0.000 significance level, experimental research demonstrated that the RMEng model was superior to a control group in terms of improving the mathematical literacy of elementary school kids.

Dinglasan et al. (2023) assessed how well students understood the problem, came up with a strategy, and carried it out in order to assess the efficacy of the RME approach. Additionally, 35 grade 9 students who were selected using the cluster sample technique had their problem-solving skills assessed using tests given both before and after the test. The average pre- and post-test scores for participants before and after implementing the RME approach in each of the four stages of problem-solving changed significantly (p-value=0.000), according to the data. This demonstrates that RME is a successful teaching strategy that raised students' mathematical competency, particularly in all areas related to problem-solving abilities. The results confirm that teachers can expose students to more collaborative teaching-learning processes that involve real-world scenarios by using the RME technique.

Juandi et al. (2022) looked at mediating variables to investigate the effects and performed a meta-analysis to determine the overall effect of RME. The sources of empirical data included semantics, Google Scholar, Sage, Springer, and the ERIC database. The study looked at 54 impact sizes from 38 different trials with 6,140 participants that were carried out over the last 20 years. A random effects model was used for estimation, and CMA software was used for statistical computations. The study's overall impact size was 0.97, per the research findings. It also indicates that the application of RME significantly improves students' mathematical proficiency. The results of the moderator variable analysis indicate that when sample size,

intervention length, learning mix, and educational level are taken into account, RME implementation will be more effective. This discovery aids in the future application of RME by taking into account the variables that have been demonstrated to alter study impact sizes. Lastly, a discussion of the study's limitations and comparisons of RME across nations is included, offering important background data for future research and the advancement of RME.

Isnaintri et al. (2024) investigated the impact of RME on Indonesian students' mathematical proficiency. They used meta-analysis. The initial stage in gathering data was locating articles that were published in national journals and sessions. 36 papers were examined using the random effect framework for estimation in accordance with the inclusion criteria and the meta-mar website. According to the random effects model, the application of RME has an overall influence on students' mathematical competency of 0.95, placing them in the strong effect group.

Sulawi and Alshehrie (2023) investigated the teachers' perceptions towards applying the RME strategy in teaching mathematics at the High School, and explored statistically significant differences in teachers' perceptions according to the variables (gender and years of experience). To collect data, a questionnaire was used. The study sample consisted of 136 mathematics teachers at a high school in the General Administration of Education in the Jazan region. The results concluded that the teachers' perceptions regarding knowledge of applying the RME strategy were very high, with a mean of 4.44. Teachers' perceptions of the requirements for implementing a realistic mathematics strategy were very high, with a mean of 4.28. Teachers' perceptions of the challenges faced in implementing the RME strategy were high-level, with a mean of 3.78. There are statistically significant differences according to the gender of teachers in their perceptions of applying the RME strategy in teaching mathematics at the high school, in favor of female teachers.

The study conducted by Mariana et al. (2020) examined how elementary teachers perceived the application of the RME method in their best practices following their participation in a series of RME workshops. The study's perspectives include the following: (1) teachers' trust in their comprehension of RME and how to apply it in their greatest practices; and (2) the RME criteria, which teachers found most difficult to plan and execute. 296 primary teachers who attended the course are the study's subject. The RME supplies, simulations during the workshop, application in teachers' best practices, and experience-sharing workshop were all supplied by the workshop series. This investigation yielded two conclusions. First off, a greater comprehension of RME traits is possessed by most teachers. Nonetheless, the majority of educators think that most mathematical topics may be approached using the RME method. They were at ease applying the RME methodology to their best practices. Second, when organizing the RME lesson, teachers discovered that the most difficult part was locating appropriate media pertaining to mathematical subjects. Furthermore, teachers reported that the hardest part of implementation was getting students to use formal mathematics. These findings imply that the most effective workshop is superior, which involves best practices and post-workshop reflection from participants.

1.1. Statement of the Problem

The National Curriculum Center in Jordan created the Collins mathematics curriculum, and the study sought to understand the function of RME in math instruction from the perspective of math teachers. The Collins International Series states that the design of these courses started in 2019. The curriculum for the first and fourth grades was developed first, followed by updates for the remaining classes in phases. Based on student-based learning, the designed mathematics curriculum aims to connect mathematical ideas and abilities to students' everyday lives by offering a collection of activities and examples pertaining to various facets of students' lives. This is due to the importance of mathematical curricula in the educational process in Jordan. Specifically, the study attempted to answer the following questions:

1) What is the role of RME in learning mathematics?
2) Are there statistically significant differences ($\alpha = 0.05$) in the role of RME in learning mathematics depending on the gender variable and the academic qualifications of mathematics teachers?

1.2. Significance of the Study

This study's significance stems from the National Curriculum Center's efforts to provide mathematical curricula for Jordanian schools. The Collins mathematics programs, which emphasize connecting mathematics to students' everyday lives, were used at the Center. The study's findings provide light on the function of RME in mathematics education. This aids math teachers in creating and designing their lesson plans and provides ample opportunity to boost students' enthusiasm for the subject.

The findings also assist educational leaders and curriculum designers in elucidating the function of mathematical exercises and activities in creating a practical and scientific curriculum. This is to give math teachers all the tools and resources they require. Given the significance of educational preparation and qualification for math teachers in Jordan, offering them suitable qualification courses.

1.3. Study Delimitations

This study was restricted to math teachers who teach mathematics curricula created in accordance with the Collins requirements for the basic stage in the second academic year 2023–2024 AD and who work in schools connected to the First Education Directorate in the Irbid Governorate, Jordan. In that directorate, there were 474 math teachers. Additionally, the study tool was restricted to a questionnaire that the researcher created after examining earlier research. The study made an effort to confirm the RME's function in math instruction. The survey only included responses from math teachers categorized by gender (male, female) and level of education (high diploma or higher, bachelor's degree or less).

2. METHODOLOGY

2.1. Study Design

By creating the study instrument (a questionnaire) to confirm the function of the RME in mathematics instruction, the researcher used a descriptive research methodology to calculate the averages and frequencies of the response values provided by math professors. In field research, descriptive research is employed to precisely and clearly characterize the role. There were 474 male and female teachers in the research population. According to Abu Saleh and Awad (2012), the study results have excellent validity and impartiality, and quantitative data can be extrapolated to the study population.

2.2. Study Population and Its Sample

For the academic year 2023–2024 AD, the First Education Directorate in Irbid Governorate employed 447 math teachers, according to the directorate's data, who taught the developed mathematics curricula for the basic stage. These teachers made up the study population. There are 234 female instructors and 240 male teachers among them. There were 271 male and female teachers in the study sample (142 males and 129 females). They were chosen using the stratified random sampling approach, and according to Abu Saleh and Awad (2012), the greater the sample percentage, the more accurately the community is represented. The numbers of the study sample by gender (male, female) and academic qualification (Higher diploma degree or less, Master's degree or above) are displayed in the following Table 1.

Table 1. The Numbers of the Study Sample according to Academic Qualification and Gender

Variables	Categories	Number
Higher diploma degree or less	Male	97
	Female	93
	Total	190
Master's or above	Male	45
	Female	36
	Total	81
Academic qualification	Higher diploma degree or less	190
	Master's or above	81
Gender	Male	142
	Female	129

The sample is representative of the study population, comprising all mathematics teachers teaching mathematics at the First Education Directorate in Irbid Governorate, Jordan. Irbid Governorate is one of the largest cities in Jordan and enjoys significant attention in the education sector. The First Education Directorate provides training courses for all teachers, particularly those related to teaching strategies. Focus was placed on teachers' academic qualifications only.

2.3. Study Instruments

In light of the research literature, including studies by Laurens et al. (2017), Arniansyah (2015), Effandi and Muzakkir (2017), Zubainur et al. (2015), and Saleh et al. (2018), the researcher created the study instrument, where the purpose of the fifteen-paragraph questionnaire was to ascertain the function of RME in mathematics instruction in relation to the curricula. Jordan is where mathematics originated. The teachers' answers to the 5-point Likert scale questionnaire items were as follows: extremely high and (5) grades, high and (4) average grades. She received three marks from me, two from me for a little, and one from me for a very little.

The following equation was used to categorize the arithmetic averages for the degree of inclusion into five levels: very large, large, moderate, little, and very little.

(Highest value of answer alternatives - minimum value of answer alternatives) ÷ Number of levels.

(5-1)/5=4/5=0.8

This value is equal to the length of the category, and therefore:

From 1.00 to 1.8; very low

From 1.81 to 2.6; a few

From 2.61 to 3.4; medium

From 3.41 to 4.2; high

From 4.21 to 5.00; very high

The SPSS program was used to analyze the responses of 45 teachers who were not included in the study sample in order to ascertain the difficulty and discrimination coefficients of the test items. Table 2, which shows the difficulty and discrimination coefficients for each test item, was used to calculate the discrimination coefficient for each item based on the item's association with the total score. The percentage of teachers who answered the paragraph incorrectly was used to calculate the difficulty coefficient for each test item.

Table 2. Difficulty and Discrimination Coefficients for Items

Items	Difficulty Coefficients	Discrimination Coefficients
1	0.44	.40(*)
2	0.40	.47(**)
3	0.48	.56(**)
4	0.48	.55(**)
5	0.48	.70(**)
6	0.32	.52(**)
7	0.32	.55(**)
8	0.48	.44(*)
9	0.56	.59(**)
10	0.60	.54(**)
11	0.20	.41(*)
12	0.44	.40(*)
13	0.52	.43(*)
14	0.68	.55(**)
15	0.68	.48(**)

Table 1 shows that the paragraphs' discriminating coefficients ranged from 0.40 to 0.70, and their difficulty coefficients ranged from 0.20 to 0.68. According to Odeh (2010), the acceptable range for a paragraph's difficulty and discrimination is between 0.20 and 0.80. A paragraph is deemed good if its discrimination coefficient is higher than 0.39; it is acceptable and should be improved if it falls between 0.20 and 0.39; it is weak and should be removed if it falls between 0 and 0.19; negative discrimination should be eliminated. Consequently, neither the difficulty coefficient nor the discrimination coefficient led to the deletion of any paragraphs.

2.3. Validity

The researcher administered the initial version of the study questionnaire to a group of competent and expert arbitrators with a variety of academic credentials and doctorates in order to verify its validity. The study tool was evaluated by twelve arbitrators. They made a number of recommendations in their remarks, including rewording some terms, interpreting certain passages, and avoiding complicated objectives. Additionally, they recommended relating the paragraphs to actual mathematical scenarios. Following the arbitrators' recommendations, a revised questionnaire was created and given to eight of them once more. The researcher then created the final version of the questionnaire based on their few and restricted recommendations.

The study retrieved correlation coefficients between each item and the overall score, between each item and its association with the field to which it belongs, and between the fields with each other and the total score in order to extract the implications of the scale's construct validity. This was carried out in a survey sample of forty-five male and female teachers that was not part of the study sample. The overall correlation coefficients for the tool's items fell between 0.36 and 0.84, with a range of 0.35 to 0.87.

2.4. Reliability

The test-retest method was used to confirm the study tool's reliability by administering the scale to a group of 45 teachers who were not included in the study sample and then reapplying it two weeks later. The Pearson correlation coefficient between their two estimates was then computed. Repeat reliability (0.85) and consistency coefficient (0.84) were the values. These values were deemed suitable for the investigation's objectives.

2.5 STUDY PROCEDURES

The study procedures began after the researcher was acquainted with the newly developed Jordanian curricula, and the researcher realized the nature of the mathematical examples and situations mentioned in the curricula, as most of them are related to real-life situations. Then, previous literature related to RME and its impact on teaching mathematics was reviewed, and the study tool (the questionnaire) was designed by the researcher after ensuring the characteristics of validity and reliability. Then, the study population was determined, which is the first Irbid District of Education, since the researcher lives in the same region, Jordan, and the characteristics of the study sample members were determined in terms of number, gender, and academic qualification. The study was published electronically by using a Google document by sending links to teachers through WhatsApp groups and e-learning systems, and the publishing process took 5 days. Then, the validity, objectivity, and analyzability of all questionnaires were confirmed. The data results were collected and analyzed using SPSS, and the study results were reached.

3. RESULTS

The study presents its results, as the number of study questions was two, and they were answered through the questionnaire prepared for this study.

3.1. The First Question: What is the Role of the RME in Learning Mathematics?

Male and female math teachers responded to this issue by calculating the arithmetic means and standard deviations for each item of the training demands of math teachers in light of the developed Collins mathematics curricula. The arithmetic means and standard deviations are displayed in Table 3.

Table 3. Arithmetic Means and Standard Deviations for Training Needs Scores

N	Paragraph	Arithmetic Mean	Standard Deviation	Degree	
1	Developing productive thinking skills (creative and critical) by providing realistic mathematical activities	3.67	0.85	High	2
2	Developing students' mathematical representation skills	3.48	0.94	High	11
3	Encourages students to give real-life examples of mathematical ideas	3.63	0.87	Medium	4
4	Encouraging students to use mathematical language to express mathematical situations	3.37	0.99	Medium	14
5	Linking mathematical knowledge to students' real-life situations and problems	3.61	0.94	High	5
6	Connect different mathematical fields (algebra, geometry, etc.) to real-life situations	3.53	0.88	Medium	8
7	Urging students to present realistic situations relevant to learning mathematics	3.50	0.96	High	10
8	Enhancing student-based learning in mathematics education	3.67	0.95	High	3
9	Follow a smooth transition in representing students' mathematical ideas	3.48	0.96	High	12
10	Providing students with meaningful mathematical knowledge and deep understanding	3.81	0.88	High	1
11	Providing feedback to students while they are learning realistic mathematical situations	3.31	0.94	High	15
12	Increasing students' enthusiasm to learn and explaining how mathematics functions in their everyday lives	3.59	1.02	High	6
13	Encouraging students to have creative and innovative ideas	3.39	0.97	High	13
14	Stimulating students' previous experiences and expertise in learning mathematics	3.57	0.86	High	7
15	Explaining the role of realistic mathematics in other disciplines such as physics, chemistry, etc	3.51	0.94	High	9
Total		3.54	0.93	High	

Table 3 indicates that the role of realistic mathematics in teaching mathematics for the basic stage was high, with an arithmetic mean of 3.54, and it is clear from Table 3 that the highest role of RME was paragraph 10, with an arithmetic mean of 3.81, and with a high degree, and it was ranked the second, paragraph 1, has an arithmetic mean of 3.67 and a high score. Paragraph 3 came in third place with an arithmetic average of 3.67 and a high degree.

3.2. The Second Question: Are There Statistically Significant Differences ($\alpha = 0.05$) in the Role of RME in Mathematics Education Depending on the Gender Variable and the Academic Qualifications of Mathematics Teachers?

Arithmetic means and standard deviations were calculated for the degree of training needs of mathematics teachers according to the variables of gender and educational qualification. Table 4 shows this.

Table 4. Arithmetic Means and Standard Deviations for the Degree of Training Needs of Mathematics Teachers According to the Variables of Gender and Educational Qualification

Variables	Categories	Arithmetic Mean	Standard Deviation	Number
Higher diploma degree or less	Male	54.13	3.83	97
	Female	52.68	5.27	93
Master's or above	Male	52.31	4.77	45
	Female	53.08	4.91	36

Table 5 illustrates the results of a one-way analysis of variance test that was used to determine how the factors of gender and academic credentials of math teachers affected training demands.

Table 5. Values of the One-Way Analysis of Variance Test to Show the Effect of the Variables of Gender and Academic Qualification of Mathematics Teachers on Training Needs

Source of Variance	Sum of Squares	Degrees of Freedom	Sum of Means Value	F-value	Significance
Gender	6.38	1	6.38	0.29	0.58
Academic Qualification	28.68	1	28.68	1.31	0.25
Gender *Academic Qualification	69.23	1	69.23	3.17	0.07
Error	5815.6	267	21.78		
Total	772828	271			

Table 5 shows that there are no statistically significant differences in the scores of mathematics teachers' responses regarding the role of the RME in teaching mathematics due to the variables of gender or academic qualification.

4. DISCUSSION

According to the perceptions of math teachers, RME has a high and significant role in teaching mathematics since it gives students a deeper understanding of the subject and connects what they learn to real-world scenarios. Additionally, it encourages students to develop their knowledge independently and strengthens their critical and creative thinking.

4.1. What is the Role of RME in Learning Mathematics?

The results showed that mathematics teachers who teach the curricula developed in Jordan believe that the role of RME in teaching mathematics is high, and this indicates the importance of realistic mathematics in students' acquisition of mathematical concepts and mathematical thinking skills included in the mathematics curricula. These curricula provide an excellent set of contexts and models that encourage students to discover mathematical knowledge, and allow them to interact with mathematics teachers in exchanging mathematical ideas and developing thinking skills, in addition to the importance of interacting with their fellow students in transferring mathematical knowledge and expressing their mental perceptions. This is consistent with studies by Hidayat and Iksan (2015) and Kizito (2012) that also showed the role of RME in acquiring mathematical concepts and conceptual understanding. Studies by Arniansaya (2015) and Effandi and Muzkir (2017) showed an impact on students' beliefs toward mathematics and a positive impact on attitudes.

RME, through the real-life activities included in the curriculum, provides the ability to deeply understand mathematical knowledge and provides meaningful mathematical knowledge by linking educational situations to realistic situations that students live or hear about. Figure 2 shows an example from a mathematics curriculum of how mathematics is linked to students' real lives.

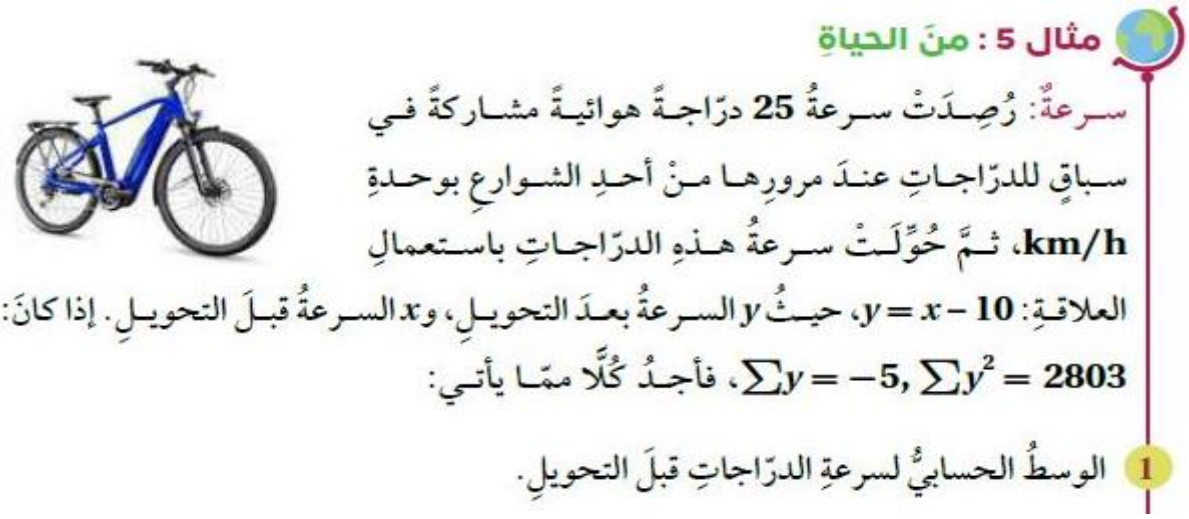

Figure 2. Example of How RME is Linked to Students' Real Lives

The previous example in Figure 2 shows an application of using RME and linking it to the student's real life. The example asks to find the arithmetic mean of the speed of 25 competitors in one of the races using bicycles. Calculate the amount of change in speeds using the mathematical relationship y = x-10.

RME encourages students to possess productive thinking skills, as productive thinking includes creative thinking skills, which motivate students to create their mathematical ideas and search for original and innovative mathematical ideas, as educational situations in realistic mathematics require students to engage in situations that require innovative and creative solutions. In addition, productive thinking includes critical thinking skills, and here RME appears through students' research, cognitive curiosity, analysis, and logical reasoning to reach the desired mathematical knowledge. Figure 3 shows an example of a mathematics curriculum of product thinking skills and linking them in RME.

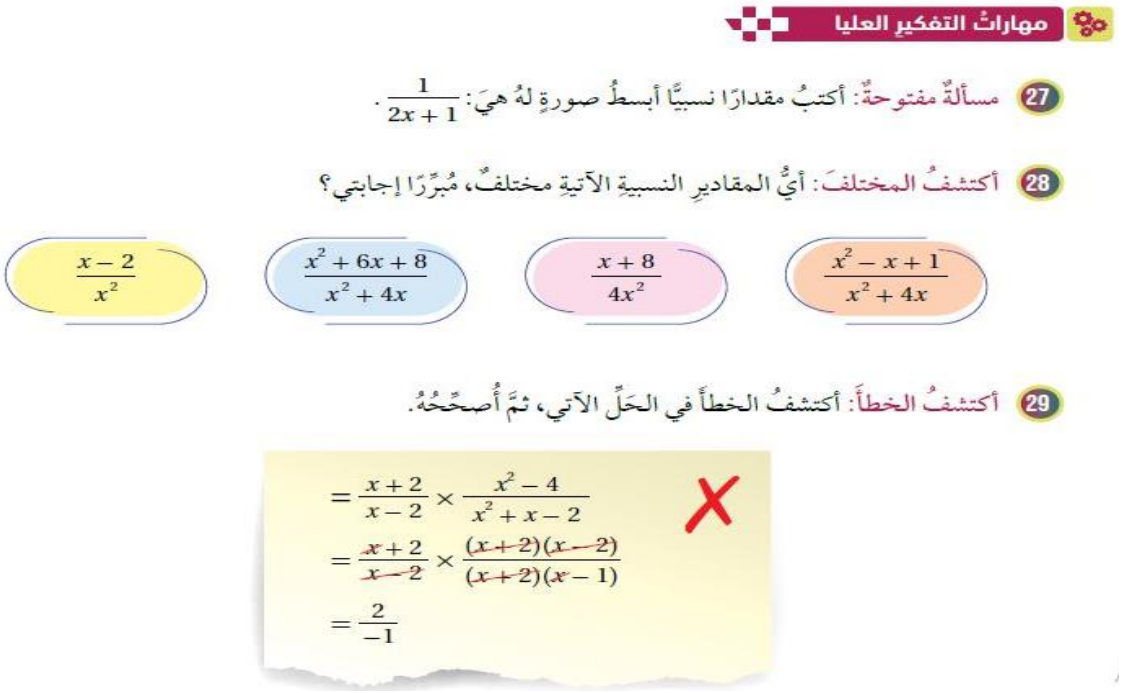

Figure 3. Example of Product Thinking Skills and Linking Them in RME

The previous example in Figure 3 shows an application to link productive mathematical thinking skills to the RME. A group of questions was asked, such as open-ended questions, error-finding questions,

and difference-finding questions. The student must use higher-order thinking skills (creative thinking, critical thinking) in answering the mentioned questions. Question 28 in Figure 3 requests finding the error if the student simplifies $= \frac{x+2}{x-2} \times \frac{x^2-4}{x^2+x-2}$

$$= \frac{x+2}{x-2} \times \frac{(x-2)(x+2)}{(x+2)(x-1)}$$

$$= \frac{x+2}{x-2} \times \frac{(x-2)(x+2)}{(x+2)(x-1)}$$

$$= \frac{2}{-1}$$

The educational situations included in RME and its principles make students rely on their previous experiences. RME requires students to self-learn by understanding mathematical contexts and discovering the knowledge to be acquired. It also urges students to demonstrate their mental abilities and capabilities individually or collectively during interaction with mathematics teachers or their colleagues. Figure 4 shows an example from a mathematics curriculum illustrating student-based learning by using RME.

أتحقَّقُ منْ فهمي

وقتٌ: في مـا يأتي الزمنُ (مُقرَّبًـا إلى أقربِ دقيقةٍ) الذي تسـتغرقُهُ **30** طالبـةً للوصولِ إلى المدرسةِ:

6	18	29	55	7	34	28	56	33	4
2	41	33	23	7	43	26	53	4	41
32	46	16	17	3	26	17	47	22	17

a) أُمثِّلُ البياناتِ باستعمالِ مُدرَّجٍ تكراريٍّ ذي فئاتٍ مُتساويةِ الطولِ.

b) أكتبُ وصفًا للبياناتِ.

Figure 4. An Example from a Mathematics Curriculum Illustrating Student-Based Learning by using RME

Time: Below is the time (nearest minute) that it takes 30 students to reach school.

a) Represent the data using a histogram of equal lengths.

b) Write a report on the data

The previous example in Figure 4 shows an application to the role of the RME in student-based learning. The question in the example shows the data for the time it takes 30 students to get to school, rounded up to minutes. The student must represent this data using a histogram, and the student must describe this data in mathematical language.

4.2. Are There Statistically Significant Differences (α = 0.05) in the Role of RME in Mathematics Education Depending on the Gender Variable and the Academic Qualifications of Mathematics Teachers?

The study variables, gender and the academic credentials of math teachers, may be responsible for the lack of effect since they did not contribute to variations in the use of realistic mathematics in math instruction. This indicates that all math teachers concur that actual math plays a significant role in

instruction. By using its philosophy to help pupils develop mathematical concepts and mathematical thinking abilities, math teachers feel that realistic mathematics is vital and essential to education.

Due to the significance of mathematics in Jordan's academic stages, the higher diploma and master's programs include educational courses that focus on modern teaching methods and their efficacy in teaching mathematics. As a result, the academic qualification obtained by math teachers emphasizes the importance of applying effective and advanced teaching strategies. Additionally, Mariana et al. (2020) attest to primary school teachers' trust in their comprehension of RME and how to implement it in their best practices, as well as their knowledge of its applicability.

5. CONCLUSIONS

The study's findings revealed the following conclusions:

1. By implementing a realistic mathematics approach and developing teacher preparation programs that incorporate a variety of realistic teaching methodologies, the study's findings assist math teachers in improving their methods. The results may also assist curriculum designers in implementing tactics that enhance students' real-world experiences and relate mathematics to their everyday lives.
2. The RME has a significant role in mathematical education.
3. The main functions of RME in math instruction are:
   a. Giving students a thorough understanding and useful mathematical knowledge.
   b. Developing critical and creative thinking abilities through practical mathematical exercises.
   c. Improving mathematics teaching through student-based learning
4. Examine how RME affects student achievement over the long run.
5. Investigate how RME is applied in various grade levels or cultural contexts, or assess pre-service teachers' preparedness to apply RME in the classroom.

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REFERENCES

Arniansyah, M. (2015). Improving learning achievement through realistic mathematics education (RME) model in thematic learning in grade 4 students of primary schools (Master's thesis, Lampung University). https://digilib.unila.ac.id/7377/2/ABSTRACT.pdf

Arsaythamby, A., Ruzlan M., & Herwati, A. (2015). Effect of realistic mathematics education approach among pubic secondary school students in Riau, Indonesia. *Australian Journal of Basic and Applied Sciences, 9*(28), 131-135. https://www.ajbasweb.com/old/ajbas/2015/Special%20IPN%20HCM%20Aug/131-135.pdf

Carman, J., Zint, M., & Ibanez, I. (2017). Assessing student interest and desire to learn more about climate change effects on forests in middle school: An intervention-based path model. *Electronic Journal of Science of Education, 21*(5), 14-34. https://ejrsme.icrsme.com/article/view/17470

Da, N. T. (2022). Designing a teaching model based on the realistic mathematics education (RME) approach and its application in teaching calculus. *Journal of Mathematics and Science Teacher, 2*(1), em006. https://doi.org/10.29333/mathsciteacher/11918

Dinglasan, J. L., Caraan, D. C., & Ching, D. A. (2023). Effectiveness of realistic mathematics education approach on problem-solving skills of students. *International Journal of Educational Management and Development Studies, 4*(2), 64-87. https://doi.org/10.53378/352980

Effandi, Z. & Muzakkir, S. (2017). The effect of realistic mathematics education approach on students' achievement and attitudes towards mathematics. *Mathematics Education Trends and Research, 1*, 32-40. https://doi.org/10.5899/2017/metr-00093

Heuvel-Panhuizen, M. V., & Drijvers, P. (2020). Realistic mathematics education. In S. Lerman (Ed.), *Encyclopedia of mathematics education* (2nd Ed.). Springer. https://doi.org/10.1007/978-3-030-15789-0_170

Hidayat, R. & Iksan, Z. (2015). The effect of realistic mathematic education on students' conceptual understanding of linear programming. *Creative Education, 6,* 2438-2445. http://dx.doi.org/10.4236/ce.2015.622251

Isnaintri, E., Syamsuri, S., Nindiasari, H., & Yuhana, Y. (2024). The effect of realistic mathematics education (RME) approach on Indonesian students' mathematical ability: a meta-analysis study.*Unnes Journal of Mathematics Education, 13*(1), 66-80. https://doi.org/10.15294/p8ra2p86

Juandi, D., Kusumah, Y. S., & Tamur, M. (2022). A meta-analysis of the last two decades of realistic mathematics education approaches. *International Journal of Instruction, 15*(1), 381-400. https://doi.org/10.29333/iji.2022.15122a

Karaca, S. & Ozkaya, A. (2017). The effects of realistic mathematics education on students' math self reports in fifth grades mathematics course. *International Journal of Curriculum and Instruction, 9*(1), 81–103. https://ijci.globets.org/index.php/IJCI/article/view/56

Kizito, R. (2012). Realistic mathematics education (RME) as an instruction design perspective for introducing the relationship between the derivative and integral via distance education (Dissertation, University of Stellenbosch. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=40df2e685ca441641a7de5b6548fc39f7ad95a1d

Laurens, T., Batlolona, F. A., Batlolona, J. R., & Leasa, M. (2018). How does realistic mathematics education (RME) improve students' mathematics cognitive achievement?. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(2), 569-578. https://doi.org/10.12973/ejmste/76959

Mahendra, R., Slamet, I., & Budiyono. (2017). Problem posing with realistic mathematics education approach in geometry learning. *Journal of Physics: Conference Series, 895,* 012046. https://doi.org/10.1088/1742-6596/895/1/012046

Mariana, N., Sholihah, S., Riski, R., Rahmawati, I., Wiryanto, W., Indrawati, W. & Budiyono, B. (2020). In-service teachers' perception on implementing realistic mathematics education approach in their best practices. *Journal of Physics: Conference Series, 1987,* 012022. https://doi.org/10.1088/1742-6596/1987/1/012022

Nguyen, G. T. C., & Pham, C. T. H. (2023). An empirical study of factors influencing primary school teachers' long-term commitment to realistic mathematics education. *Journal on Mathematics Education, 14*(1), 1-18. http://doi.org/10.22342/jme.v14i1.pp1-18

Nugraheni, L. & Marsigit, M. (2021). Realistic mathematics education: An approach to improve problem solving ability in primary school. *Journal of Education and Learning, 15*(4), 511-518. https://doi.org/10.11591/edulearn.v15i4.19354

Nurmasari, L., Budiyono, Nurkamto, J., & Ramli, M. (2024). Realistic Mathematics Engineering for improving elementary school students' mathematical literacy. *Journal on Mathematics Education, 15*(1), 1–26. https://doi.org/10.22342/jme.v15i1.pp1-26

Papadakis, S., Kalogiannakis, M., & Zaranis, N. (2017). Improving mathematics teaching in kindergarten with realistic mathematical education. *Early Childhood Education Journal, 45*, 369-378. https://doi.org/10.1007/s10643-015-0768-4

Paul, C., Zhao, Q., & Visnovska, J. (2008). Learning from and adapting the theory of realistic mathematics education. *Education Didactique, 2*(1), 105- 124. https://doi.org/10.4000/educationdidactique.276

Peek, F. (2016). The Intertwinement of Activity and Artifacts in Realistic Mathematics Education, NCTM Research conference, April 11-13, San Francisco. https://nctm.confex.com/nctm/2016RP/webprogram/meeting.html

Saleh, M., Prahmana, R., Isa, M., & Murni, M. (2018). Improving the reasoning ability to elementary school student through the Indonesian realistic mathematics education. *Journal on Mathematics Education, 9*(1), 41-54. https://doi.org/10.22342/jme.9.1.5049.41-54

Sulawi, L., & Alshehrie, S. (2023). Teachers' perceptions towards applying the realistic mathematics strategy in teaching mathematics at the high school. *Journal of Mathematics Education, 26*(7), 74-110. https://doi.org/10.21608/armin.2023.335529

Van den Heuvel- Panhuizen, M. & Drijvers, P. (2014). Realistic mathematics education. In S. Lerman (Ed.), *Encyclopedia of mathematics education* (pp. 521-525). http://doi.org/10.1007/978-94-007-4978-8

Yuanita, P., Zulnaidi, H., & Zakaria, E. (2018). The effectiveness of realistic mathematics education approach: The role of mathematical representation as mediator between mathematical belief and problem solving. *PLOS One, 13*(9), e0204847. https://doi.org/10.1371/journal.pone.0204847

Zubainur, C., Veloo, A., & Khalid, R. (2015). The effect of using Indonesian realistic mathematics education (PMRI) approach on the mathematics achievement amongst primary school students. *AIP Conference Proceedings, 1660,* 050077. https://doi.org/10.1063/1.4915710