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Effects of Realistic Mathematics Education and Experiential Learning Instructional approaches on Students' Problem Solving Ability and Academic Achievement in Geometry

Kevin S. Kwalat[1], Chika C. Ugwuanyi*[2], Sussan I. Ezeh[3], Nnenna K. UKa[3], Innocent O. Odo[2], Eunice N. Onah[2], Samuel O. Nneji[4], Anulika M. Okeke[2], Jane N. Chinweike[2] & Sunday Ogbu[5]

[1]Department of Science and Technology Education, University of Jos
[2]Department of Science Education, University of Nigeria, Nsukka
[3]Department of Science Education, College of Education,
Michael Okpara University of Agriculture Umudike, Abia - State.
[4]Department of Mathematics and Computer Science Education,
Enugu State University of Science and Technology, Agbani, Enugu State
[5]Enugu State College of Education (Technical), Enugu, Enugu State

Corresponding Author: chika.ugwuanyi@nn.edu.ng

Abstract

The study investigated the effects of Realistic Mathematics Education (RME) and Experiential Learning (EL) instructional approaches on students' problem solving ability and achievement in geometry in Mangu, Plateau State. Two research questions and two hypotheses guided the study. The design adopted for the study was quasi-experimental of pretest-posttest nonequivalent group design. The population consisted of one thousand and ninety (1090) senior secondary one (SS1) students of the public secondary schools in Mangu Local Government Area (LGA) of Plateau State, Nigeria. A sample of 115 participants was randomly selected using a multi-stage sampling procedure. The instrument, Geometry Achievement and Problem Solving Ability Test (GAPSAT) developed by the researcher along with Problem Solving ability score guideline adapted from Trianto (2008) cited in Fuadi, Minarni and Banjarnahor (2017) was used for data collection. The instrument was validated by three experts and the reliability indices of 0.762 and 0.961 were ascertained using Kudder-Richardson 20 (K-R_{20}) and Kendall's coefficient of concordance respectively. The data were analyzed using SPSS version 20. Specifically, the research questions were answered using mean and standard deviation while the hypotheses were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). The results revealed that both RME and EL approaches improve students' achievement and problem solving ability in geometry and that student taught using EL instructional approach had slightly higher mean achievement and mean problem solving ability scores than those taught using RME approach. It was recommended among others that teachers should be encouraged to use the two instructional approaches in teaching Mathematics.

Keywords: Experiential learning, Realistic Mathematics Education, Problem Solving Ability, Achievement, Geometry.

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Introduction

Mathematics is defined as a human effort in solving problems through the use of carefully defined symbols for communication. Kolawole (2004) viewed it as a human invention born out of human resolve to solve problems. It is believed that Mathematics reveal hidden patterns that enable us to understand the world around us. As a science, Mathematics plays an important role in everyday life. Indeed, Das (2019) acknowledged the contributions of Mathematics in the development of civilization and culture as well as other disciplines in the fields of Science, Technology, Engineering and Mathematics (STEM). This is because it provides tools for understanding disciplines in those fields. In recognition of the indispensability of Mathematics in the educational system, the Federal government of Nigeria through the National Policy on Education (FME, 2014) made it a compulsory subject at the primary and secondary levels of education. Wahyudi (2016) believed that Mathematics is compulsorily taught to students in order to equip them with logical, realistic, analytical, systematic, critical and creative thinking abilities that are necessary for solving problems in real life situations.

Problem solving is an integral aspect of Mathematics learning. Accordingly, Dossey (2017) viewed problem solving as the heart of Mathematics. Ergon (2020) recognized Mathematics and problem solving as two closely intertwined phenomena. Also, Suhandri et al. (2021) saw problem solving as indispensable for an individual's success and life in the 21st century. Thus, problem solving ability refers to the individual's ability to effectively develop a problem solving strategy or a model in addressing a given situation or problem in a field of study. Problem solving ability is associated with the ability to effectively deal with issues in everyday life (Munawar et al., 2018). It is manifested by the individual's ability to tackle a problem using a variety of strategies. A student with effective problem solving ability can be identified through their use of a variety of strategies in tackling problems, such a student must have a good arithmetic skills, high self-confidence, check answers for reasonableness and should be able to understand the problem and solve it critically and analytically (Bala & Shaafiu, 2016).

Unfortunately, students' problem solving ability in Mathematics is been reported to be low. The low level of students' ability in solving Mathematics problems is evidenced by a survey conducted by Trends in International Mathematics and Science Study (TIMSS) (Masturi et al., 2020). Also, a study by Dawngliani et al. (2020) reported a low level of Problem solving ability among Government Higher Secondary School students in Aizawl city. The problem solving ability of students in Mathematics plays an important role in their construction of mathematical concepts as well as their academic achievement (Pasrija & Kavita, 2015). This implies that, there is a positive relationship between problem solving ability and academic achievement of students in Mathematics.

Academic achievement is defined as the skills, knowledge and understanding acquired after instructions or training in a given field of study which is translated into examination or test scores. Bala and Shaafiu (2016) agreed that academic achievement can be determined by the

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level of success in completing and attaining a curriculum studies in the environment of schooling. The academic achievement of students in Mathematics has consistently been poor, posing a tremendous concern to stakeholders including parents, who invest a lot in the education of their children. This is clearly manifested by students' achievement in Mathematics at West African Senior Schools Certificate Examination (WASSCE) over the years as reported by Zalmon and Wonu (2017). However, the situation is worrisome in Mangu local government area (LGA) of Plateau state, considering the enormous agricultural activities in the locality and the huge deposit of tin, columbite and other solid minerals in the state, needed for industrialization in which adequate knowledge of Mathematics is required to effectively harness their potential for national development. The West African Examination Council (WAEC) Chief examiner's reports from 2016 to 2021 consistently revealed students' weaknesses in Mathematics, majorly in the area of geometry.

Geometry is a branch of Mathematics which deals with the measurement of the space taken up or occupied by an object. In other words, it studies the size, shape, position, angle and dimensions of an object. It is used in professions such as navigation, astronomy, surveying, architecture, building engineering, to mention but a few. In spite of the applications of geometry in solving problems in real life and government's intervention programmes to enhance its teaching and learning in secondary schools, Njoku and Okigbo (2020) observed that majority of WAEC candidates avoid questions drawn from geometry, which results in their poor achievement in Mathematics generally. This is because geometry constituted a major part of WAEC syllabus in Mathematics and the knowledge of geometry according to Zuya and Kwalat (2015), help in solving problems in other branches of Mathematics. Adetula (2015) and Salman as cited in Agah (2020) have identified methods of teaching as one major cause of students' poor academic achievement in Mathematics.

Based on the above-mentioned reasons, there is need to bridge the gap between research in Mathematics education and classroom practices through the adoption and implementation of child-centered instructional approaches. Examples of such child- centered instructional approaches that have not been adequately investigated in Mathematics education in Nigeria are; Realistic Mathematics Education (RME) and Experiential Learning (EL).

Realistic Mathematics Education (RME) is simply defined as a realistic approach to Mathematics education, whereby, students are given the opportunity to reinvent Mathematics themselves under the guidance of a more experience adult or a teacher. It emphasizes the use of context as a starting point in the instructional procedure. The process begins with the presentation and description of contextual problem by the teacher, solving the contextual problem by the students, comparing and discussing answers by the students in groups followed by conclusion with the teacher. The use of RME approach has proven effective in enhancing the achievement of students in Mathematics (Zakaria & Syamaun, 2017; Hough et al., 2017; Ozkaya & Yetim, 2017; Laurens et al., 2018). The approach also holds much promise in improving

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students' problem solving ability in Mathematics (Yuanita & Zakaria, 2013; Sirait & Azis, 2017; Fauzan et al., 2017; Yuanita et al., 2018; Ahmad et al., 2018; Hasbi et al., 2019; Haji et at., 2019; and Darto, 2021). Some of the above-mentioned authors utilized the variant forms of problem solving ability in their studies such as Mathematics connection, "Mathematical representation ability," "productive disposition" and "Mathematical communication".

Experiential learning (EL) on the other hand, is a process of acquiring knowledge by transforming experience. According to Kolb (1984), knowledge results from the combination of grasping and transforming experience. Kolb noted that grasping experience describes the process by which an individual takes in information while transforming experience has to do with how the individual interprets and act on the information they have received or taken in. To achieve effective classroom instruction in Mathematics using this instructional approach, it is generally concluded that the procedure follows a four-stage cycle, which involves; concrete experience, reflective observation, abstract conceptualization and active experimentation. Different scholars across diverse disciplines including Mathematics have found this instructional approach highly effective in enhancing the achievement of students (Nwoke, 2017; Agsalog, 2019; Tong et al., 2019; Ng'eno & Chesimet, 2020; and Adeniyi & Kuku, 2020). The instructional approach is also effective in improving the problem solving ability of students (Hulaikah et al., 2020; Fatmanisa et al., 2020; and Lestari, 2021)

The mathematical problem solving ability of students is observed to be low and students' achievement in Mathematics has consistently been poor and discouraging. The situation in Mangu LGA of Plateau state seems worrisome, considering the Agricultural activities and the rich solid minerals endowment of the locality that require the application of adequate knowledge of Mathematics to explore. In spite of the recommendations and advocacy by researchers for sensitization workshops, seminars, conferences on the use of child-centered (activity-based) instructional approaches, Mathematics instruction in Nigeria is still a typical characteristic of a teacher-centered approach, which only enables students to regurgitate information without applying the knowledge acquired. Thus, could the use of RME and EL approaches improve students' problem solving ability and achievement in geometry? The purpose of the study was to investigate the effects of Realistic Mathematics Education (RME) and Experiential Learning (EL) instructional approaches on students' problem solving ability and academic achievement in geometry. Specifically, the following research questions were addressed in this study;

1. What are the mean achievement scores of students taught geometry using Realistic Mathematics Education and those taught using Experiential Learning instructional approaches?
2. What is the mean problem solving ability score of students taught geometry using Realistic Mathematics Education and those taught using Experiential Learning approaches?

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Methodology

Research Design

The study employed a pretest - posttest nonequivalent group of quasi-experimental design. This is because the participants involved in the study were used in their intact classes or groups. There was no random assignment of subjects to the treatment groups. The symbolic representation of the quasi - experimental design used in the study is shown below.

Groups	Non randomization	Pre-test	treatments	Post-test
Experimental Group I	N_r	O_1	X_1	O_2
Experimental Group II	N_r	O_1	X_2	O_2

Figure 1: Symbolic Representation of the Quasi-experimental design adopted in the study (Adapted from Fraenkel, Wallen & Hyun, 2015).

Participants

The population of the study consisted of one thousand and ninety (1090) senior secondary one (SSI) students of the twenty-five (25) public secondary schools (PSS) in Mangu local government area (LGA) of Plateau state. The participants were SS1 students, randomly selected using a multi-stage sampling procedure from four public secondary schools (PSS) in Mangu LGA of Plateau state. The participants were 115 in number, consisting of 68 students in group 1 taught using EL instructional approach and 47 students in group 2 taught using RME instructional approach.

Instrument

The instrument used for data collection was tag, "Geometry Achievement and Problem Solving Ability Test (GAPSAT)". The GAPSAT consisted of twenty (20) multiple choice and six essay questions on mensuration and construction adapted from WAEC past questions in SS1 Mathematics curriculum. The study adapted another instrument by Trianto (2008), cited in Fuandi et al. (2017) for scoring students' problem solving ability in geometry. Four research assistants who were at least bachelor degree holders with a minimum of five years teaching experience were trained by the researcher. A training manual by Chesimet (2016) was adapted by the researcher in training the research assistants for one week. At the end of the training session, the research assistants were given the opportunity to demonstrate teaching of some geometry topics using RME and EL instructional approaches. The GAPSAT instrument was administered to the students before the intervention, and the scripts were collected, marked, scored and recorded as pre-test. The intervention lasted for five weeks, during which the students in each of the two groups were taught the same topics in geometry using EL and RME instructional approaches respectively. After the intervention, the students were again

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administered the GAPSAT instrument with the questions reshuffled, and scripts were collected, marked, scored and recorded as posttest.

Validity and Reliability Procedures

The instruments were validated by three experts; two in Mathematics education and one in Measurement and evaluation, all from the Department of Science Education, University of Nigeria Nsukka. A pilot test was conducted on fifty (50) SS1 students of a public secondary school located outside the population of the study. The scripts collected from students after the pilot study were marked, scored, recorded and the data obtained was used to establish the reliability indices of the instrument. The reliability of the GAPSAT instrument was ascertained using Kudder-Richardson 20 (K-R_{20}) and Kendall's coefficient of concordance at 0.762 and 0.961 respectively.

Data Analysis

The data were analyzed using Statistical Packages for Social Sciences (SPSS) version 20. Specifically, the research questions were answered using mean and standard deviation while the hypotheses were tested using analysis of covariance (ANCOVA). The ANCOVA was considered appropriate in order to create a statistically equivalent groups for trimming off the initial differences in pre-test mean scores so that the post-test scores were analyzed against equivalent pre-test scores.

Results

The result in Table 1 shows that students taught geometry using EL approach had mean achievement score of (M = 29.84, SD = 4.849) at the pre-test and mean achievement score of (M = 55.76, SD = 5.983) at the posttest, while students taught geometry using RME approach had mean achievement score of (M = 35.57, SD = 5.295) at the pre-test and mean achievement score of (M = 56.21, SD = 5.923) at the posttest. The adjusted mean scores of 56.243 and 55.521 for the EL and RME groups respectively imply that students taught geometry using EL approach had higher mean achievement score than those taught using RME approach.

Table 1: Geometry Achievement Mean Scores of Students in EL and RME Groups

		Pre-test		Posttest		Adjusted Mean
Group	N	Mean	Std. Dev.	Mean	Std. Dev.	
EL	68	29.84	4.849	55.76	5.983	56.243
RME	47	35.57	5.295	56.21	5.923	55.521

Result in Table 2 shows that, there is no significant difference in the mean achievement scores of students taught geometry using Realistic Mathematics Education (RME) and those taught using

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Experiential Learning (EL) approaches [F(1,112) = 0.317, p = 0.575 and η_P^2 = 0.003]. This is because the exact probability value of 0.575 was greater than the level of significance set at 0.05. Thus, the null hypothesis of no significant difference was not rejected.

Table 2: ANCOVA Results Comparing Geometry Achievement Scores between Students in EL and RME Groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	η_p^2
Corrected Model	124.906a	2	62.453	1.797	.171	.031
Intercept	6359.332	1	6359.332	182.966	.000	.620
Pre_Test	119.326	1	119.326	3.433	.067	.030
Groups	11.002	1	11.002	.317	.575	.003
Error	3892.781	112	34.757			
Total	363986.000	115				
Corrected Total	4017.687	114				

a. R Squared = .031 (Adjusted R Squared = .014), Partial Eta Squared = η_p^2

The result in Table 3 shows that students taught geometry using EL approach had mean problem solving ability score of (M = 14.29, SD = 4.617) at the pre-test and mean problem solving ability score of (M = 33.01, SD = 5.986) at the posttest, while students taught geometry using RME approach had mean problem solving ability score of (M = 20.43, SD = 4.880) at the pre-test and mean problem solving ability score of (M = 33.62, SD = 6.289) at the posttest. The adjusted mean scores of 34.038 and 32.137 for students in the EL and RME groups respectively imply that students taught geometry using EL approach had higher mean problem solving ability score than those taught using RME approach. Besides, the posttest standard deviation scores of 5.986 and 6.289 for students in the EL and RME groups respectively, indicate that the individual problem solving ability score of students in the RME group varied more from their group mean than those of the EL group.

Table 3: Geometry Problem Solving Ability Mean Scores of Students in EL and RME Groups

		PSA before		PSA after		Adjusted Mean
Group	N	Mean	Std. Dev.	Mean	Std. Dev.	
EL	68	14.29	4.617	33.01	5.986	34.038
RME	47	20.43	4.880	33.62	6.289	32.137

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Result in Table 4 shows that there was no significant difference in the mean problem solving ability scores of students taught geometry using RME approach and those taught using EL approach [F (1,112) = 2.094, p = 0.151 with effect size (η_p^2 = 0.018)]. This is because the exact probability value of 0.151 was greater than the level of significance set at 0.05. More so, the effect size of 0.018 implies that 1.8% changes in the posttest problem solving ability scores can be explained by the use of RME and EL approaches. There was a positive relationship between the pre-test problem solving ability (Pre-PSA) and posttest problem solving ability as indicated by the partial eta squared value of 0.100. This means that 10% of the variance in the posttest problem solving ability is accounted for by the pre-test problem solving ability (Pre_PSA). Thus, the null hypothesis of no significant difference is upheld.

Table 4: **ANCOVA Results Comparing Geometry Problem Solving Ability between Students in EL and RME groups**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	η_p^2
Corrected Model	430.771a	2	215.385	6.349	.002	.102
Intercept	5356.983	1	5356.983	157.915	.000	.585
Pre_PSA	420.689	1	420.689	12.401	.001	.100
Groups	71.033	1	71.033	2.094	.151	.018
Error	3799.403	112	33.923			
Total	131453.000	115				
Corrected Total	4230.174	114				

a. R Squared = .102 (Adjusted R Squared = .086), Partial Eta Squared = η_p^2

Discussion

The result of the study shows that both RME and EL instructional approaches have positive effect on students' achievement in geometry. This is evident by the improvement in the achievement scores of students after they were exposed to the two approaches. Students taught using EL approach had slightly higher posttest mean achievement score than those taught using RME approach although, there was no significant difference in the mean achievement scores of students taught using the two approaches. This is because both RME and EL approaches provide students with the opportunity to be creative in Mathematics by constructing their own meaningful solution to a given problem using several strategies. In RME, students' reinvent Mathematics and hence increase their understanding of concepts in geometry as they were given opportunity to experience a process similar to that by which the given geometry concept was invented. In EL approach, students' understanding of concepts in geometry was shaped through

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concrete experience, reflective observation, abstract conceptualization and active experimentation. These experiences results in improving students' achievement in geometry.

The above finding corroborates that of Agsalog (2019), Ng'eno and Chesimet (2020) who found that experiential learning approach had a significant effect on students' achievement in Mathematics. Agsalog (2019) added that experiential learning provides meaningful and significant learning experiences using the stages of the approach. The finding is also in agreement with Zakaria and Syamaun (2017); Hough et al. (2017) and Laurens et al. (2018) who found in their different studies a significant improvement in students' achievement when taught using RME approach. In fact, Hough et al. (2017) further discovered that RME has the potential to change classroom norms and encourage students to engage in discussion and meaning-making.

The outcome of the study also reveals that students' problem solving ability in geometry improved with the use of RME and EL instructional approaches. Considering the fact that students' problem solving ability was still low even after the intervention, students taught using EL approach had slightly higher posttest mean problem solving ability score than those taught using RME approach. The reason for the low problem solving ability of students might be due to the fact that the teachers were not emphatic enough in drawing their students' attention to the need to carefully provide a complete step by step solution to the given geometry problem based on George Polya's problem solving strategy. However, the difference in the mean problem solving ability scores of the students taught using RME and EL approaches was not significant. This finding is in agreement with Yuanita et al. (2018), and Ahmad et al. (2018) who discovered in their different studies a significant gain in the problem solving ability of students taught Mathematics using RME approach. The outcome also concurred with Hulaikah et al. (2020); Fatmanisa et al. (2020), and Lestari (2021) on their different submissions that, experiential learning helps in developing students' problem solving ability in Mathematics.

Conclusion

The use of Realistic Mathematics Education (RME) and Experiential Learning (EL) approaches enhanced senior secondary one (SSI) students' achievement in geometry. The students who were taught using EL approach acquired more achievement mean gain score than those taught using RME approach. Both RME and EL approaches improved students' problem solving ability in geometry. The students taught using EL approach had greater problem solving ability mean gain score than those taught using RME approach. Teacher education programmes should focus on preparing teachers to acquire appropriate skills in instruction such as problem solving and other child-centered methods or approaches like Realistic Mathematics Education (RME) and Experiential Learning (EL). This is in order to enhance achievement and problem solving ability of students in Mathematics. Mathematics problem solving ability is an important aspect of learning Mathematics and should therefore be included in the teaching and learning process and

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be tested in the national examinations. RME and EL approaches have proven effective in enhancing students' problem solving ability in Mathematics, therefore, teachers should be encouraged to use these approaches.

References

Adeniyi, S. O. & Kuku, O. O. (2020). Impact of gamification and experiential learning on achievement in mathematics among learners with hearing impairment in Lagos state, Nigeria. *African Journal of Educational Studies in Mathematics and Sciences*, *16(2)*, *51-67*.

Adetula, L. O. (2015). National mathematical centre-mathematical improvement project (NMC-MIP): a project transforming the mathematics performance of students. *International Journal of Contemporary Educational Research (IJCER), 2(2)*, *104-117*.

Agah, M. P. (2020). The relevance of mathematics education in the Nigerian contemporary society: Implications to secondary education. *Journal of Education, Society and Behavioral Science 33(5)*, *36-43*.

Agsalog, M. S. (2019). Experiential learning approach: its effects on the academic performance and motivation to learn physics of grade 10 students. *International Journal of Scientific and Research Publications*, *9(9)*, *844-850*.

Ahmad, M., Siregar, Y. P. & Siregar, N. A. (2018). The effectiveness of realistic mathematics learning model based on Mandailing culture in teaching of students' mathematical problem solving ability. *Advances in Social Science, Education and Humanities Research (ASSEHR), 285, 2nd International Conference on Mathematics and Mathematics Education 2018 (ICM2E 2018).*

Bala, P. & Shaafiu, K. Q. (2016). Academic achievement of secondary school students in relation to their problem solving ability and examination anxiety. *The international Journal of Indian Psychology*, *3(4)*, *138-154*.

Darto (2021). The effect of learning realistic mathematics education (RME) approach to improve students' mathematical communication. *Journal of Physics: Conference Series, 1776 (2021)*, *1-7.*

Dossey, J. A. (2017). Problem solving from a mathematical stand point. In. B. Csapo & J. Funke (Eds.), the nature of problem solving: using research to inspire 21st century learning (Ch. 4, pp. 59-72). Paris: OECD Publishing.

Ergen, Y. (2020). Does mathematics fool us? A study on fourth grade students' non-routine mathematics problem solving skills. *Issues in Educational Research*, *30(3)*, *845-865*

Fatmanisa, N. Amril, L. O. & Wulandari, R. W. (2020). The effect of experiential learning model in elementary school. *Indonesian Journal of Applied Research 1(1*), *40-50*.

Fatmasari, H. R., Waluya, S. B. & Sugianto (2021). Mathematical problem-solving ability based on self-efficacy in junior high school. *Journal of Physics: Conference Series 1918(2021*)

OPEN ACCESS © CINEFORUM

Fauzan, A., Musdi, E. & Yani, R. P. (2017). Influence of realistic mathematics education (RME) approach on students' mathematical representation ability. *Advances in Social Science, Education and Humanities Research 173*, 1st International Conference on Education Innovation.

Fuadi, I., Minarni, A. & Banjarnahor, H. (2017). Analysis of students' mathematical problem solving ability in IX grade at junior high school Ar-Rahman percut. *International Journal of Novel Research in Education and Learning, 4(2), 153-159*. Available at www.noveljournals.com

Haji, S., Yumiati & Zamzaili (2019). Improving students' productive disposition through realistic mathematics education with outdoor approach. *Journal of Research and Advances in Mathematics Education, 4(2), 101-111*.

Habsah, F. (2017). Developing teaching Material Based on Realistic Mathematics and oriented to the Mathematical Reasoning and mathematical Communication. *Jurnal Riset Pendidikan Matematika 4(1), 43-55.*

Hasbi, M., Lukito, A. & Sulaiman, R. (2019). The realistic mathematics learning approach improving the ability of the mathematical connection of junior high school students at al-islamiyah putat-tanggulangin sidoarjo. *International Journal of Innovation, Creativity and Change 5(3), 756-774.*

Hough, S., Solomon, Y., Dickinson, P. & Gough, S. (2017). Investigating the impact of a Realistic Mathematics Education approach on achievement and attitudes in post-16 GCSE resit classes.

Hulaikah, M., Degeng, I. N. S., Sulton, & Murwani, F. D. (2020). The effect of experiential learning and adversity quotient on problem solving ability. *International Journal of Instruction 13(1), 869-884*. https://doi.org/10.29333/iji.2020.13156a

Kolb, D. A. (1984). Experiential learning: Experience as a source of learning and development. Eaglewood and Cliffs N. J. USA: Prentice Hall

Laurens, T., Adolfina, F. B., Rafafy, J. B. & 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.*

Lestari, I. F. (2021). Experiential learning using STEM approach in improving students' problem solving ability. *International Conference on Mathematics and Science Education (ICMScE). Journal of Physics*: Conference Series 1806012005

Loc, N. P. & Tien, N. T. T. (2020). Approach to realistic mathematics education in teaching mathematics: A case of cosine theorem-Geometry 10. *International Journal of Scientific & Technology Research, 9(4), 1173-1178.*

Munawar, A., Suryana, S. & Supriatna, N. (2018). Self-efficacy and problem-solving ability of economics students in Indonesia. *Advances in social science, education and Humanities*

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Research (ASSEHR) 258 2nd International Conference on Research of Educational Administration and Management (ICREAM 2018).

Ng'eno, J. K. & Chesimet, M. C. (2020). Effects of experiential learning approach on students' performance in mathematical creativity dimensions in Kericho east sub-county, Kenya. *European Journal of Educational and Development Psychology 8(4), 42-51*.

Njoku, C. & Okigbo, E. C. (2020). Development and validation of geo-tan instructional software package for teaching geometry in senior secondary school. *Journal of Science Technology Mathematics and Engineering (JSTME) 3(2), 14-28*.

Nwoke, B. I. (2017). Enhancing secondary school students' achievement in geometry through experiential learning approach. *International Journal of Education, Development, Society and Technology, 5(4), 20-24*.

Ozkaya, A. & Yetim, K. (2017). The effects of realistic mathematics education on students' achievement and attitude in fifth grades mathematics course. *International Online Journal of Education and Teaching (IOJET), 4(2), 185-197*.

Sirait & Azis (2017). The Realistic Mathematics Education (RME) approach toward the ability of the mathematical connection of junior high school in Bukhari muslim medan. *American Journal of Educational Research 5(9), 984-989.*

Suhandri, Y. S., Kusumah, Turmudi & Juandi, D. (2021). Problem solving in mathematics and students' attitudes towards a humanistic approach. *Universal Journal of Educational Research, 9(5), 1064 - 1071.* DOI: 10.13189/ujer.2021.090519.

Tong, D. H., Loc, N. P., Uyen, B. P. and Cuong, P. H. (2020). Applying experiential learning to teaching the equation of a circle: a case study. *European Journal of Educational Research 9(1), 239-255*.

Wahyudi (2016). The development of RME model for the improvement of mathematics learning of primary teacher education program students of teacher training and education faculty of sebelas maret university in Kebunen. *Proceeding the 2nd International Conference on Teacher Training and Education Sebelas Maret University 2(1), 369-381*.

Yuanita, P. & Zakaria, E. (2013). The effects of realistic mathematics education on students' mathematics belief and problem solving ability at first grade of junior high school Pekanbaru. Repository University of Riau. http://repository.unri.ac.id/

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). https://doi.org/10.1371/journal.pone.0204847

Zakaria, E. & Syamaun, M. (2017). The effect of Realistic Mathematics Education approach on students' achievement and attitudes towards mathematics. *Mathematics Education Trends and Research 2017(1), 32-40.*

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Zuya, H. E. & Kwalat, S. K. (2015). Teacher's knowledge of students about geometry. *International Journal of Learning, Teaching and Educational Research, 13(3), 100-114*

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