DOI: https://doi.org/10.33487/edumaspul.v8i1

EDUMASPUL JURNAL PENDIDIKAN

Vol 08 No. 02 (2024) page 2863-2870

p-ISSN 2548-8201 | e-ISSN 2580-0469
https://ummaspul.e-journal.id/maspuljr/

The Effectiveness of Using Realistic Mathematic Education and Problem Posing Approach on Increasing the Ability to Solve Fraction Story Questions for Grade IV of SDIT Annur, Central Cikarang District, Bekasi Regency

Cepy Kurniawan[1], Maximus Gorky Sembiring[2], Juhana[3]

Universitas Terbuka[1,2,3]

kurniawancepy@gmail.com[1], gorky@ecampus.ut.ac.id[2], juhana@ecampus.ut.ac.id[3]

***Receive:* 10/08/2024**	***Accepted:* 24/08/2024**	***Published:* 01/10/2024**

Abstrak

Penelitian ini bertujuan untuk mengetahui perbedaan efektifitas metode pembelajaran *realistic mathematic education* dan metode pembelajaran *problem posing* ditinjau dari kemampuan menyelesaikan soal cerita pecahan siswa kelas IV. Teknik pengambilan sampel dilakukan dengan cara *simple random sampling*. Populasinya seluruh siswa kelas IV SDIT Annur Kecamatan Cikarang Pusat Kabupaten Bekasi tahun pelajaran 2023/2024. Jenis penelitian ini adalah eksperimen semu. Penelitian ini menggunakan 2 kelas sampel yang dipilih secara *random sampling* yaitu kelas eksperimen dengan pendekatan pembelajaran RME dan kelas kontrol dengan pendekatan PP. Instrumen yang digunakan dalam mengumpulkan data dalam penelitian ini adalah lembar observasi dan tes. Pengumpulan data dilakukan dengan cara observasi, tes dan dokumentasi. Analisis data dilakukan dengan deskriptif kuantitatif. Hasil penelitian menunjukkan bahwa nilai *paired t-test* pada kelompok intervensi menunjukkan *P-value* = 0.000, artinya pendekatan pembelajaran RME meningkatkan kemampuan menyelesaikan soal cerita pecahan. *T-test 2 sampel bebas P-value* = 0,000, dengan *mean* pada kelompok intervensi 90,7500 dan kelompok kontrol 72,0000. Dengan demikian pendekatan RME lebih efektif daripada PP dalam meningkatkan kemampuan menyelesaikan soal cerita pecahan.

Kata Kunci: *Realistic Mathematic Education*, *Problem Posing*, Matematika di SD, Soal Cerita Pecahan

Abstract

This research aims to determine differences in the effectiveness of realistic mathematic education (RME) and problem posing (PP) approach viewed from the ability to solve fraction story questions for grade IV students. The sampling technique is carried out by: simple random sampling. The population is all grade IV students of SDIT Annur, Central Cikarang District, Bekasi Regency, academic year of 2023/2024. This type of research is a quasi-experiment which uses 2 randomly selected sample classes namely the experimental class with the RME learning approach and the control class with the PP approach. The instruments used in collecting data in this research are an observation sheet and tests. Data collection is carried out by means of observation, tests and documentation. Data analysis was carried out using quantitative descriptive. The research results show that the paired t-test value in the intervention group showed P-value = 0.000, meaning that the RME approach increases the ability to solve fraction story problems. T-test 2 free sample P-value = 0.000, with mean in the intervention group 90.7500 and the control group 72.0000. Thus, the RME approach is more effective than PP in improving the ability to solve fraction story problems.

Keywords: Realistic Mathematic Education, Problem Posing, Mathematics in Elementary School, Fraction Story Problems

INTRODUCTION

Mathematics learning outcomes for students at SDIT Annur Central Cikarang District. Bekasi, are mostly below the Minimum Completeness Criteria (KKM) value. From the results of the observations, there are several problems that occur, namely: (1) Lack of feedback from students when mathematics learning takes place, even though the teacher has provided opportunities for questions and answers and to express opinions to each other, in other words students are difficult to be engaged in communicating the problems. (2) Many students find it difficult when fraction problems are changed to story problems. (3) There are still many students who do not understand the content and meaning of the mathematics story questions given. (4) Many students cannot work on questions that are slightly different from the examples given. To overcome this problem in this research, the researchers use several learning approaches, namely Realistic Mathematic Education (RME) and Problem Posing (PP) approach.

The RME approach is a mathematics learning theory that was first discovered in the Netherlands as an effort to improve mathematics education, in a project called "*Wiskobas*" which was initiated by Wiidelfeld and Gofree in 1968. Then in the early 1970s it was developed by Freudenthal. This approach has been proven to increase students' understanding and motivation to learn (de Lange, 1987; Freudenthal, 1981; Gravemeijer, 1994; Streefland, 1991). The RME philosophy is very strongly influenced by the concept of Freudenthal (1991) who says that mathematics as a human activity. Bakker (2010) also states that RME has the very basic principle that it becomes meaningful learning for students.

RME has characteristics that are close and relevant to the daily activities carried out by students themselves so that this enables students to see mathematics that comes from everyday life.

Treffers and Freudenthal's opinion which also describes RME is:

> In broad terms, these can be described as follows: in horizontal mathematization, the student comes up with mathematical tools to help organize and solve a problem located in a real life situation. Vertical mathematization, on the other hand, is the process of a variety of reorganizations and operations within the mathematical system itself.

The development of horizontal mathematization is related to the search for patterns and relationships starting from realistic problems, trying to describe them using self-made language and symbols, while vertical mathematization is related to modeling, symbolization, schematization and definition which also starts with realistic problems and over time can be find a way that can be used to solve similar problems without using the help of realistic problems.

Horizontal and vertical mathematization processes are needed to rediscover mathematical concepts based on problem solving. Further decomposition is explained through the following stages:

1. Students are given realistic problems and begin to develop their thinking to find solutions to the problems given.
2. Students solve problems using mathematical models (tables, graphs, pictures, equations). Solutions at this stage can be informal or formal.
3. Through the guidance of the teacher as a facilitator, students find formal mathematics to solve the problems given. If students have not found it, they are given another realistic problem.
4. After students construct formal mathematical knowledge, students are asked to apply it both in mathematics and in other fields.

The second learning approach is PP. Gita (1999: 23) argues that PP is the formulation of mathematical problems by students from available situations, either before, during, or after solving the problem. Suharta (2001, p. 2) states that several terms are used as equivalent to the term PP, such as problem posing, question posing, question formation, question construction and questions produced by students.

Furthermore, Silver and Cai (1996, p. 294-309) stated that the term PP is used to refer to two meanings, namely: 1) developing a new problem and 2) reformulating a given problem. Furthermore, Suryanto (1998) uses the term question formation as an equivalent to the term PP. The word question can also be interpreted as problems. Silver and Cai (1996b, p.292), stated that in the mathematics education literature PP has three meanings. First, PP is the formulation of a simple problem/question or reformulation of an existing problem in several ways in order to solve a complex problem so that it can be resolved. This understanding is one of the steps in preparing a problem solving plan. Second, PP is a problem formulation related to the requirements of the problem that has been solved, in the context of searching for alternative solutions that are still relevant. This second meaning is related to the review

steps in the completion stages recommended by Polya. Third, PP is formulating or proposing a problem/question from the available situation, whether done before, during, or after solving a problem. In connection with the meaning of PP, whether carried out before, during, or after problem solving, Silver & Cai (1996b, p. 521) state that the term PP is generally used in three forms of mathematical cognitive activity, namely: 1) before proposing a solution, namely a problem development the beginning of a given stimulus situation; 2) in proposing solutions, namely reformulating the problem so that it is easy to solve; and 3) after proposing a solution, namely modifying the objectives or conditions of a problem that has been solved to formulate a new problem. This first form will be carried out in this research. Considering that the second and third forms are more into part of problem solving than PP.

Based on the understanding of the statements above, it can be concluded that what is meant by PP is posing a problem or formulating a question regarding a given situation or task, either before, during, or after solving the problem.

Sutawidjaja (2014) believes that the PP approach is an attempt to structure or formulate problems from a given situation. The first step that must be taken is that teachers must provide sufficient knowledge about the competencies to be achieved. This step can be through observation, question and answer, discussion and providing examples of how to formulate a problem from a given situation and how to solve it in various ways. From this knowledge, students are asked to formulate a problem from a given situation and then solve it themselves.

These two learning approaches not only touch students' cognitive aspects, but also touch students' affective aspects which play an important role in the teaching and learning process. Researchers used both approaches on the subject of fraction story problems, especially in fourth grade elementary school. Fraction material is material that students often encounter in everyday life problems. So students need to master this lesson about fraction story problems to support their daily lives.

Based on the background of the problem stated above, the problem in this research is formulated as follows:

1. Is the RME learning approach to mathematics learning effective in improving the ability of fourth grade elementary school students to solve fraction word problems?
2. Is the PP learning approach to mathematics learning effective in improving the ability of fourth grade elementary school students to solve fraction word problems?
3. Which approach is more effective, RME or PP, in improving the ability of fourth grade elementary school students to solve fraction word problems?

In general, this research aims to determine the effectiveness of using the RME learning approach and PP learning approach to increase the ability to solve fraction story problems for grade IV of SDIT Annur, Central Cikarang District, Bekasi. Specifically, this research aims to:

1. Analyze the effectiveness of the RME learning approach in improving the ability of fourth grade elementary school students to solve fraction word problems.
2. Analyze the effectiveness of the PP learning approach in improving the ability of fourth grade elementary school students to solve fraction word problems.
3. Analyze which learning approach is more effective, RME or PP in improving the ability of fourth grade elementary school students in solving fraction word problems.

It is hoped that this research will provide input for all parties in the educational environment, especially for teachers who have similar problems in their school environment.

The uses of this research are:

1. Theoretically
   a. The results of the research can be used as a reference in efforts to improve the ability of fourth grade elementary school students in solving fraction word problems.
   b. This research report can be used as a reference for conducting a study on the use of the RME or PP approach to increase the ability of fourth grade elementary school students in solving fraction word problems.
2. Practically
   a. For teachers, it is hoped that they can determine and apply learning approaches that are appropriate to students' stages of thinking and the material being taught, resulting in learning activities (instructional activities) can take place effectively and efficiently in facilitating students to achieve the expected learning goals.
   b. Students are expected to be able to develop and work on mathematical modeling which requires thinking and reasoning skills, related to solving fraction word problems.
   c. For schools, implementing the RME or PP

approach can be a consideration to facilitate teachers in carrying out the learning process, especially to determine student success.

School mathematics is mathematics taught in schools, namely mathematics taught in primary education and secondary education. Suherman (2001) states that school mathematics consists of sections of mathematics chosen to develop abilities and shape individuals and is guided by science and technology. This shows that school mathematics still has the characteristics of mathematics, namely abstract event objects and a consistent deductive thinking pattern.

According to Ebbutt and Straker (1995) stated that school mathematics defined as activities or activities of students finding patterns, carrying out investigations, solving problems and communicating the results; thus its nature is more concrete. In the same vein, according to Freudenthal (1991), mathematics is a human activity and must be linked to reality.

Knowledge Domain, having factual and conceptual knowledge in science, technology, arts, culture, humanities, with insight into pride, statehood and civilization regarding phenomena and events in the home, school and playground environment.

The concept of learning according to Corey (1986) is a process in which a person's environment is deliberately managed to enable him to participate in certain behavior in special conditions or produce responses to certain situations. Learning is a special subset of education.

The learning environment should be managed well because learning has an important role in education. In line with the opinion of Sagala (2010, p.61) that learning is teaching students to use educational principles and learning theories which are the main determinants of educational success.

Realistic mathematics education or RME is an approach to learning mathematics that places mathematical problems in everyday life, making it easier for students to receive the material and providing direct experience with their own experiences. Realistic problems are used as a source for the emergence of formal mathematical concepts or knowledge, where students are taught how to think about solving problems, looking for problems, and organizing the main problem.

RME was first developed by Freudenthal in 1971 at Utrecht University in the Netherlands. According to Freudenthal (1971), learning mathematics is an activity, so the mathematics class is not a place to transfer mathematics from teachers to students, but rather a place where students rediscover mathematical ideas and concepts through exploring real problems.

According to Hadi (2005, p.19), RME is used as a starting point for developing mathematical ideas and concepts. Further explanation is that realistic mathematics learning starts from children's lives, which can be easily understood by children, is real and within reach of their imagination, and can be imagined so that it is easy for them to find possible solutions using the mathematical abilities they already have.

According to Aisyah (2007), RME is an approach to learning mathematics that was developed to bring mathematics closer to students. Real problems from everyday life appear as the starting point for learning mathematics. The use of realistic problems aims to show that mathematics is actually close to students' daily lives.

According to Rahayu (2010, p.15) states that RME is an approach to mathematics learning that emphasizes reality and the environment as the starting point of learning.

According to Maulana (2009) states that the characteristics of the RME approach include: 1) phenomenological exploration or use context; 2) the use models or bridging by vertical instrument; 3) the use of student own production and construction of student contribution; 4) the interactive character of teaching process or interactivity; and 5) intertwining or various learning strand. These characteristics are expected to emerge in the learning process, so that students' connection and communication abilities can improve. The RME stages that will be used in this research are the result of modifications to the RME principles. The stages that students go through include the contextual problem giving stage, where students are given problems related to the context of everyday life, then, students are invited to find solutions to these problems using simple models or media (model use stage). In the next stage, students are given a similar problem, then students are required to be able to produce a formula and use the formula to solve the given problem. In RME research, students are required to be confident in expressing opinions, because students will go through interactive stages (group discussions) and presentations (general discussions). Apart from that, students are also given the opportunity to go through the intertwining stages, where students learn to relate mathematical ideas/concepts being studied with other ideas/concepts.

According to Gravemeijer (1990: 90), there

are three principles in RME, namely as follows:

1) Guided Reinvention dan Progressive Mathematization. Through the topics presented, students must be given the opportunity to experience for themselves the same as mathematical concepts are discovered.
2) Didactical Phenomenology. Mathematical topics are presented based on two considerations, namely their application and contribution to the development of further mathematical concepts.
3) Self-Developed Models. The role of self-developed models is a bridge for students from real situations to concrete situations or from informal mathematics to formal forms, meaning that students create their own problems in solving.
4) Problem posing learning approach is a learning approach with the aim of activating students to think critically by provoking students to find problems based on topics given so that it challenges and motivates students to complete it. The PP learning approach was first developed by a Brazilian education expert, namely Paulo Freire, in 1970 as outlined in the book "Pedagogy of the Oppressed". As a learning strategy, PP involves three basic skills, namely, listening, dialogue, and actions.
5) According to Shoimin (2014, p.133), PP is a learning model that requires students to compose their own questions or break down a problem into simpler questions. Apart from students composing questions, students must also be able to solve questions that have been created with divergent answers.
6) According to Suryosubroto (2009, p.203), PP is learning that can motivate students to think critically as well as dialogically, creatively and interactively which is expressed in the form of questions, the answers to these questions are then sought both individually and in groups.
7) Sholihah (2018) believes that story questions are sentence descriptions expressed in the form of a story or a series of words that describe a question that must be solved regarding daily life problems or other problems. Raharjo and Astuti (2011) argue that word problems are questions related to our daily lives which are used to solve them using mathematical sentences containing arithmetic, number and relation operations. Apart from that, story problems are also one of the problems that use a problem solving approach

Relevant research is needed to determine the position and differences of this research compared to previous research. Research conducted by Satrio Wicaksono Sudarman (2013) Experimentation of RME Learning with Problem Solving and RME with PP seen from the creativity of grade VIII State Middle School Students in Surakarta for the Academic Year of 2012/2013. The research results show: (1) the RME learning model with problem solving produces better learning achievement compared to the RME learning model with PP and conventional. The RME learning model with PP has better learning achievements than conventional learning, (2) students in the high creativity category have better learning achievements than those in the medium and low creativity categories. The medium creativity category has better learning achievement than the low creativity category, (3) students who are subjected to the RME learning model with problem solving, the high creativity category has better mathematics learning achievement than the medium and low creativity categories and students who have the medium creativity category have the same good mathematics learning achievement as the low creativity category. Students who were subjected to the RME learning model with PP and conventional, had the same good mathematics learning achievement for each creativity category, (4) students with the high creativity category, the RME learning model with problem solving is better than the RME learning model with PP and the conventional learning model and the RME learning model with PP produces mathematics learning achievements that are as good as the conventional learning model. Students who have moderate and low creativity have the same good achievement in learning mathematics in each learning model. The similarity with the research conducted by researchers is to measure the effectiveness of the learning model used, namely realistic and PP. The difference is the place of research.

METHOD

This research refers to a quantitative research approach. Meanwhile, this research method and design uses quasi-experimental design which using the models of nonequivalent control group design. This research was carried out at SDIT Annur, Central Cikarang District, Bekasi in grade IV during second semester of the 2023-2024 academic year. The research was conducted at the end of February-April. The populations of this study are all students at SDIT Annur, Central Cikarang District, Bekasi, while the population reached is all fourth grade students at SDIT Annur, Central Cikarang District, Bekasi for the 2023-2024 academic year with a total of 96 students, consisting of four classes. The sample in

this study consisted of 48 students with the following details: class 4A as a control class with 24 students and class 4C as an experimental class with 24 students. The variables in this research consist of independent variables, namely the RME learning approach in the experimental class, and the PP learning approach in the control class. The dependent variable in this research is the ability to solve story problems. The instruments in this research are in the form of lesson plans, worksheets, observation sheets, and tests on the ability to complete fraction story problems. The data collection procedures are the test method and observation method. The data analysis method used is the SPSS version 24 application.

RESULTS AND DISCUSSION

In the experimental group, the pretest and posttest results were tested using the paired sample T test and obtained a P-value = 0.000. These results indicate that H0 is rejected, and it is concluded that learning outcomes after using the RME learning approach are better than before using the RME learning approach. With an average after treatment of 88.1667 and before treatment of 66.1667, it shows that after using RME the results of learning to do fraction story problems were better than before. In the control group, the pretest and posttest results were compared and obtained P-value = 0.00. These results illustrate that H0 is rejected, and it is concluded that the PP learning approach provides better learning outcomes in solving story problems than before the PP learning approach was given. With an average pretest of 61.8333 and posttest of 81.4167, it illustrates that the difference between before and after is not too big, but still shows an improvement in results from before.

To analyze whether the RME learning approach is more effective than the PP learning approach, the difference in scores in the experimental group and the control group was tested using the 2 Independent Samples T-Test. Of the 24 students who were experimental class research subjects using RME, the highest (maximum) score of the post-test was 100 with an average of 98.3333, while in the control class which used PP the highest posttest score was 100 with an average of 97.6250, so it can be concluded that the ability to solve story problems of students in the experimental class which used RME increased in the very good category, and the minimum completeness criteria have also been achieved, and are said to be “complete”.

To see the difference, if the significance is >0.05 then the assumption is that the variances are the same, and vice versa, if the significance is ≤0.05 then the variances are not the same. Judging from the F value, it shows that the P-value = 1.845 > α 0.05, so it can be said that the variance of the two groups is the same.

Using the 2 Independent Sample T-Test (2 Independent Sample T-Test) shows the P-value = 0.000. The result is < a 0.05, so H0 is rejected and H1 is accepted, so it can be concluded that: There is a difference in the test scores for the ability to solve fraction story problems for class IV taught with RME and class IV taught with PP, or in other words that: RME is significant in an effort to improve the ability to solve class IV fraction story problems. In the experimental group with average RME = 90.7500 while those using PP = 50.7083, this shows that RME is better and more effectively applied in solving class IV fraction word problems than PP.

From the results of the analysis above, it can be concluded that: the effectiveness of RME is more significant and more effective than PP in an effort to increase the ability to solve class IV fraction story problems.

Based on the Paired Sample Test, the results show p = 0.000 < a 0.05 so that H0 is rejected and H1 is accepted. These results show that there is a significant difference between the pretest and posttest scores on the ability to solve fraction word problems for experimental class students before and after using RME. Meanwhile, based on Paired Samples Statistics, the average pretest score in the experimental class was 54.1250 and posttest 90.7500, so it can be concluded that after using RME, the ability to solve story questions for experimental class students was better than before.

The ability to solve fraction word problems for the control class using the PP learning approach was analyzed using a paired sample t-test, which showed the results p = 0.000 < a 0.05 so that H0 was rejected and H1 was accepted. These results indicate that there is a difference between the pretest and posttest scores on the ability to solve fraction word problems using the PP learning approach for control class students, while the average pretest score in the control class is 50.7083 and the average posttest score is 72.0000. Although the post-test average value is not having too big difference from the pretest score, but the PP learning approach provides improved results compared to the previous one. The PP learning approach can help students develop confidence and liking for mathematics, because students try out mathematical ideas to understand the problem they are working on and can improve their performance in solving mathematical problems.

Based on the t-test of 2 independent samples (2 Independent samples t-test) shows P value = 0.000. The result is < a 0.05, so H0 is rejected and H1 is accepted, so it can be concluded that: There is a difference in the test scores for the ability to solve fraction story problems for grade IV taught with RME and grade IV taught with PP, or in other words that: RME is significant in an effort to improve the ability to solve grade IV fraction story problems.

In the experimental group with an average RME = 90.7500 while the control group used PP 50.7083, this shows that RME is better and more effectively applied in solving grade IV fraction word problems than PP, this explanation is in accordance with the results of statistical tests Paired Samples Statistics as follows:

Table 1
Paired Samples Statistics

Tes	Mean	N	Std. Deviation	Std. Error Mean
P. Exp	54,1250	24	13,41094	2,73750
P. Exp	90,7500	24	7,20054	1,46980
P. Cont	50,7083	24	8,76990	1,79015
P. Cont	72,0000	24	6,85248	1,39876

CLOSING

Based on theoretical studies and supported by analysis of research results and referring to the problem formulation described in the previous chapter, several things can be concluded as follows:

There was a change in the ability to solve fraction word problems in fourth grade students before and after using RME. This is shown by the average student posttest score being higher than the average students' pre-test score. This means that using the RME learning approach can make the results of fraction story problems better, because RME is a learning theory that starts from real things. Students are required to be able to solve contextual problems related to everyday life. In the completion process, students try in their own way, using language and symbols according to their level of knowledge, so that the results will be better understood and remembered by students longer. Apart from that, students also become more active in discussing with other students, asking and responding to questions, so that interactions between students and teachers or students and students can run as expected.

There was a change in the ability to solve fraction word problems in grade IV students before and after using PP. This is shown by the average student posttest score being higher than the average score student pretest average. This means that using the PP learning approach can make the results of fraction story problems better, because PP is a learning theory that emphasizes students forming/asking questions based on the information or situation provided. The PP learning approach can help students develop confidence and liking for mathematics, because students' mathematical ideas are tried out to understand the problem they are working on and can improve their performance in solving mathematical problems.

The RME learning approach to the main material of fractions produces better ability to solve word problems compared to using the PP learning approach. This is shown by the average score of students who use the RME learning approach which is higher than the PP learning approach. This means that RME is more significant in improving the ability to solve grade IV fraction story problems, indicating that RME is better and more effectively applied in solving grade IV fraction word problems than using PP.

REFERENCE LIST

References

Aisyah, N. (2007). *Development of Elementary Mathematics Learning*. Director General of Higher Education, Ministry of National Education.

Arikunto, S. (2002). *Research Methodology A Proposal Approach*. PT. Rineka Cipta.

Arikunto, S. (2010).*Research Procedures A Practical Approach*. PT Rineka Cipta.

Bakker, A.B. and Leiter, M.P. (2010). *Work Engagement: A Handbook of Essential Theory* and *Research*. Psychology Press.

Billstein, L. and Lot. (1993). *A Problem Solving Approach to Mathematics for Elementary* School *Teachers.* Addison-Wesley.

Carrol, J. B. (1981). *A Model of School Learning*. Cambridge University Press.

Corey, G. (1986). *Theory and Practice of Counseling and Psychotherapy*. Brooks/Cole Publishing Company.

Ministry of Education. (2006). *Education Unit Level Curriculum*. Department of National Education.

Ministry of Education. (2006). *Education Unit Level Curriculum (KTSP) for Schools* Base/*WE*.

Department of National Education.

Ministry of Education. (2006). *Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System*. Center for Educational Data and Information Research and Development Department of National Education.

Ministry of Education. (2009). *Education Unit Level Curriculum*. Department of National Education.

Ebbutt, S. and Straker, A. (1995). *Children and Mathematics: A Handbook for Teacher*. Collins Educational.

Ebbutt, S. and Straker, A. (1995). *Mathematics in Primary Schools Part I: Children and Mathematics*. Collins Educational Publisher Ltd.

Freudenthal, H. (1971). *Educational Studies in Mathematics*, 3 (3/4), 413-435.

Freudenthal, H. (1991). *Revisting Mathematics Education*. Kluwer.

Gita, N. (1999). Development of problem posing strategies in mathematics learning in high school. *Aneka Widya STKIP Singaraja, Vol.1, No. 1/2004*.

Gravemeijer. (1994). *Developing Realistic Mathematics Education*. Freudenthal Institute.

Hadi, S. (2005). *Realistic Mathematics Education and Its Implementation*. Tulips.

Hamalik, O. (2001). *Psychology of Learning and Teaching*. Sinar Baru Algensindo.

Hidden, and Speer. (2001). *Today is Mathematics*. Macmillan Publishing.

Hobri. (2009). *Model-model Pembelajaran Inovatif*. Center of Society Studies Jember.

Huda, M. (2013). *Teaching and Learning Models*. Student Library.

Kartadinata, Sunaryo and Dantes, N. (1996). *Foundations of Elementary School Education*. Department of Education and Culture, Director General of Higher Education, Primary School Teacher Education Development Project.

Margono. (2007). *Educational Research Methods*. Rineka Cipta.

Marsigit. (2013). *Challenges and Expectations of the 2013 Curriculum for Mathematics Education. Paper presented at the National Seminar on Mathematics and Mathematics Education*. PGRI University Yogyakarta.

Maulana. (2009). *Learning Models in Elementary Schools*. Indonesian University of Education Sumedang Campus.

Miarso, Y. (2004). *Sowing Educational Technology Seeds*. Kencana.

Muhsetyo, G. et al. (2007). *Elementary Mathematics Learning*. Open University.

Mulyasa, E. (2012). *PAUD Management*. Rosdakarya Youth.

Noyes, A. (2007). *Rethinking School Mathematics*. Paul Chapmen Publishing.

Minister of National Education Regulation no. 41 of 2007 concerning Process Standards for Primary and Secondary Education Units.

Purwanto. (2018). *Techniques for Preparing Validity and Reliability Test Instruments for Sharia Economic Research (1nd ed.)*. Staial Press.

Rahardjo, M. and Waluyati, A. (2011). *Learning Story Problems on Mixed Counting Operations in Elementary Schools.* Ministry of National Education.

Rahayu, Tika. (2010). *RME Approach to Improving Mathematics Learning Achievement of Grade 2 Students at SDN Penaruban I Purbalingga*. Yogyakarta State University Postgraduate School Thesis.

Rahmania, L. and Rahmawati A. (2016). Analysis of student errors in solving story problems on linear equations with one variable, *Vol 2, 165-174.*

Riadi, M. (2017). *Problem Posing Learning Model.* Downloaded January 23, 2024, from the World Wide Web site: https://www.kajianpustaka.com/2023/11/model-pembelajaran-pengajuan-problem-problem-posing.html.

Riadi, M. (2017). *Realistic Mathematics Education (RME) Learning*. Downloaded January 23, 2024, from the World Wide Web site: https://www.kajianpustaka.com/2024/10/pembelajaran-realistic-mathematics education.html.

Sagala, S. (2010). *Concept and Meaning of Learning*. Alphabeta.

Shoimin, A. (2014). *68 Innovative Learning Models in the 2013 Curriculum*. Ar Ruzz Media.

Sholihah, M. (2018). *Analysis of Student Errors in Solving Class VII Mathematics Story Problems MTS UIN-SU Laboratory 2017/2018*. Postgraduate School Thesis, North Sumatra State Islamic University.

Silver, E. and Cai, J. (1996). An analysis of arithmetic problem posing by middle school students. *Journal for Research in Mathematics Education, Vol. 27, N.5,*

November 1996, pp. 521-539.

Silver, E. and Cai, J. (1996a). An analysis of arithmetic problem posing by middle school students. *Journal for Research in Mathematics Education, Vol. 27.*

Silver, E. and Cai, J. (1996b). Problem posing mathematical problem: an explorary study. *Journal for Research in Mathematics Education, Vol. 27.*

Sudjana, Nana. (1991). *Learning Theories for Teaching*. FEUI.

Sugiyono. (2010). *Quantitative Qualitative and R and D Research Methods*. Alphabeta.

Sugondo, G. (1993). *The Relationship between the Ability to Solve Story Problems, Calculation Problems, and Attitudes towards Mathematics Lessons with Problem Solving Ability*. FPS IKIP Malang.

Suherman, E. (2001). *Contemporary Mathematics Learning*. JICA.

Suharta, I G. P. (2001). *Improving Mathematical Problem Solving Through Integrating Problem Posing*. Aneka Widya IKIP Singaraja No. 4 years XXXIV.

Sukmadinata, N. S. (2010). *Educational Research Methods*. Rosdakarya Youth.

Supardi. (2013). *Effective Schools, Basic Concepts and Practices*. Rajawali Press.

Suryanto. (1998). *Problem Posing in Mathematics Learning*. IKIP Malang.

Suryosubroto. (2009). *Teaching and Learning Process in Schools*. Rhineka Cipta.

Sutawidjaja, A. and Afgani, J. (2014). *Mathematics Learning*. Open University.

Suyatno. (2009). *Exploring Innovative Learning*. Masmedia Buana Pusaka.

Tarigan, D. 2006. *Realistic Mathematics Learning*. Department of National Education.

Thobroni, M. and Mustofa, A. (2012). *Learning and Learning*. Ar-Ruzz Media.

Trianto. (2010). *Designing an Innovative-Progressive Learning Model*. Kencana.

Troutman A.P. and Lichtenberg, B.K. (1991). *Mathematics A Goood Beginning, Strategies for Teaching Children*. Brooks/Cole Publishing Company

Upu, H. (2003). *Problem Posing and Problem Solving in Mathematics Learning*. Ramadhan Library.

Vygotsky, L.S. (1978) *Mind in Society*. Harvard University Press.

Walle, J.A.V.D. (2008). *Mathematics Elementary and Middle Schools Volume 1.* Erlangga.

Yamin, M. (2013). *Strategies and Methods in Learning Models*. GP Press Group.

Yuwono, I. (2001).*Down to Earth Mathematics Learning*. FMIPA UN Malang.

Zulkifli. (2003). *Application of the Problem Posing Approach in Learning the Main Topic of the Pythagorean Theorem in Class II of SLTP Negeri 22 Surabaya*. UNESA Postgraduate School Thesis.