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Impact of Teaching Approach Used and Authentic Assessment on Students' Mathematics Performance

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Overview

The purpose of the study was to examine the effects of educational approaches and real assessments on student mathematics performance after ascertaining students' historical skills. The method used in this study is an experimental method with a 2x2 factorial design. The sample for this study is Tomohon SD Class V students, and random sampling determines that 80 students will select the sample. After ascertaining students' historical proficiency, the study found that (1) students taught mathematics with a realistic approach performed better than those taught with a traditional approach, and (2) using assessment. This indicates that students who have (3) there is an interaction effect between teaching approaches and assessment of mathematics achievement; (4) realistic mathematics teaching. (5) for students in the paper-and-pencil group, the performance of the mathematics approach using realistic mathematics teaching was conventionally lower than that of the paper-and-pencil group; (6) according to group student portfolio assessments, mathematics performance using realistic mathematics instruction is higher than the traditional approach; (7) group mathematics assessments of students using the traditional approach Portfolio performance was lower than using traditional paper and pencil. Based on the knowledge of mathematics education in elementary schools, realistic mathematics education using test portfolios should be utilized.

Keywords: *Pedagogical Approach, Authentic Assessment, Student, Performance in Mathematics.*

1. INTRODUCTION

The study of mathematics: (1) as a means of thinking clearly and logically, (2) as a means of solving everyday problems, and (3) as a means of recognizing patterns in relationships and generalizing experience. (4) Creativity as a means of capacity building, and (5) as a means of raising awareness of cultural development (Abdurrahman, 2003: 253). Therefore, it is very important that mathematics is taught from elementary school so that it can help solve life's problems.

The objectives of mathematics education in elementary schools are to: (1) train methods of thinking and reasoning to draw conclusions, and (2) develop imagination, intuition, and discovery through diverse and original thinking, curiosity, and anticipation. The purpose is to develop creative activities, including to develop and test guesses.) Develop problem-solving skills and (4) develop the ability to convey information and convey ideas through oral speech, notes, charts and maps. (Priyono, 2011: 146). The problem of teaching mathematics in primary school is interesting to discuss given that it has important uses in developing ideas and conditions for learning other sciences, but it remains difficult for teachers to teach easily. It's hard and math is hard to teach.

Encourage elementary school students to accept it fully (Abdurrahman, 2003: 253). The

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government has made several efforts both centrally and at the level

Areas to improve the quality of education include improving thcurriculum, but the quality of education falls far short of expectations. Furthermore, as a result of performance analysis, *Trends in International Mathematics and Science* what leung did *of*

Hong Kong University Although Indonesia spends more time in school, the academic level of students is low because most of the math problems created in the classroom are expressed in languages and mathematical symbols that are not relevant to daily life and education. Is shown. Feeling lazy and afraid to study mathematics (Suruddin, 2010: 39). Abdurrahman (2003: 23) says the same. Among the various areas of learning taught in schools, mathematics is considered the most difficult for both non-disabled and especially disabled students, difficult.

Until now, mathematics learning has been dominated by traditional approaches: lectures, questions and answers, assignments, teacher-led learning, and little student involvement. Traditional Learning Mathematics Leads

This encourages students to follow the steps and understand mathematics without reasoning. Additionally, the lack of interaction between students and teachers during the teaching and learning process makes it difficult for students to apply mathematics to real-life situations. Even when we learn mathematics in elementary school, the emphasis is on

The relationship between mathematical concepts and children's everyday experiences. In addition, the mathematical concepts that children already have must be reapplied to their daily lives and other areas.

New breakthroughs in mathematics learning, such as the use of approximations, should be explored to improve students' understanding of mathematics and minimize negative perceptions of mathematics.

A learning model that enables students to learn mathematics more meaningfully. Approximation *Realistic Mathematics Education (RME)* In Indonesia, known as Indonesian Realistic Mathematics Education (PMR) I, it teaches mathematics using experiential, contextual problems that should be realistic for students.

Freudenthal believed that mathematics should be related to reality and that mathematics is a human activity (Gravemeijer, 1994: 4). This means that mathematics should be familiar to children and relevant to their daily lives. Mathematics as human

Activity means that people should be given the opportunity to reinvent mathematical ideas and concepts under adult guidance. This engagement is done by exploring different real-world situations and problems, but also by what the student can imagine (Soedjadi, 2001: 2). This is a principle of reinvention inspired by various informal solution procedures in mathematical concepts (Zainuric, 2007:2). Freudenthal believes students shouldn't be seen as 6-year-olds

Passive *ready-made math recipient* (A ready-to-use math passive receiver). According to him, education should direct students to use different situations (contexts) experienced as meaningful, so that they become sources of learning *realistic math education* essentially, it's about using the reality and environment that students understand to speed up the math learning process so they can get a better math education than before. In general, the process of learning mathematics is used in schools.

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The traditional learning model: lectures, questions and answers, assignments, and teacher-led learning with little student involvement. According to (Yuwono, 2001: 2), traditional mathematics learning requires students to approach mathematics procedurally and to understand mathematics in a straightforward manner, as well as the interaction between students and teachers in the process of teaching and learning. Is very poor.

The assessment is specific to the learning activity and the assessment should:

Teachers and students are responsible for success. Real tests are also called alternative tests. A full-fledged assessment can be done in a variety of ways, including portfolios and written exams.

Portfolio evaluation is essentially an evaluation of an individual student's performance on a particular subject over a particular period of time. At the end of the period, assignments are collected, assessed by teachers, As such, portfolios can show a student's progress in learning through their work. A written test is a written evaluation in which questions and answers are given to students in writing. Therefore, the selection of learning and assessment approaches appropriate to student characteristics and fields of study that may affect learning outcomes needs to be evidenced in research.

The overall aim of this study was to determine the effect of using a formal learning and assessment approach on mathematics learning outcomes after adjusting for students' initial competencies.

METHOD

The method used in this study is an experimental method using a 2x2 factorial design with a full-fledged learning and evaluation approach. The dependent variable is the result of:

I am studying mathematics. The treatment variable is (1) an approximation *realistic math education. C*onventional approach, (2) portfolio evaluation and written test evaluation, and (3) initial numerical calculations as covariates.

Table 1: Study Design

Genuine rating (B)	Learning approach (A)	
	RME(A1)	Conventional product (A2)
Portfolio review (B1)	(X,)11k k = 1 2,…, or11a1B1	(X,)21k k = 1,2,…,n12 a2B1
written Test review (B2)	(X,)12k k = 1,2,….,n21 a1B2	(X,)22k k = 1,2,…, or22 a2B2

Measurement of samples using this technique *simple random sampling.* That is, a method of using random to draw samples from members of a population, regardless of the level of population membership. The math learning outcome tool was validated by a 28-question panelist who recommended 25 questions based on the Aiken Validity Index calculation, yielding a confidence factor (Hyot) of 0.96. It was then tested on 90 students who had not

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attended a therapy class and given a reliability rating. The coefficient (Cronbach's alpha) is 0.91.

Data analysis techniques used in this study include: descriptive analysis. The test analysis requirements (including normality test, homogeneity test, linearity test, regression effect significance test, and regression linear alignment test) require that they are all tested and used to test the proposed hypotheses. Applied inferential analysis and possible use of inferential analysis are stated. Use analysis of covariance (ANKOVA). Esult in testing the hypothesis in this study, we use. The following table is produced from the analysis of covariance technique (ANKOVA).

Table 2: Summary of ANKOVA results

F table Cause of dispersion JK db RJK F count α = 0.05				
X Kovaliabele	3313.695	1	3313.695 1030.354	
Inter A	229.112	1	229.112 71.240	3,97
Room B	18.655	1	18.655 5.800	
A*B interaction	78.997	1	78.997 24.563	
confusion total savings	241.205 4381.950	75 79	3216	

A. R-squared = .922 (adjusted R-squared = .918)

Hypothesis test analysis result, F value in row A of Table 2_{count}= greater than 71,240 $F_{table\ (0.05;\ 1.75)}$ = 3.97. So oh0refused.

This means that there are differences in mathematics learning outcomes among groups of students who have undergone this approach *realistic math education* a group of students were given the conventional approach after adjusting the initial skills of the students. In a group of students approached *RME*. The mean corrected mathematics performance was 84.125, while the group of students who received the conventional learning approach had a mean corrected mathematics performance of 81.43.

These calculations are the result of learning mathematics with a group of students considering the following approaches: *RME* This result was higher than the mathematics learning outcomes of the group of students who received the conventional learning approach after adjusting for the students' initial skills.

The results of the hypothesis test analysis in row B of Table 2 show that: $H._0$ Rejected based on F test with F value $_{count}$= 5.800. Nilai F $_{count}$ greater than f $_{table\ (0.05;\ 1.75)}$ = 3.97. This means that the results will differ. Learning mathematics between a group of students who received a portfolio assessment and a group of students who received a written test assessment after adjusting for initial skills. Within the group

The average adjusted mathematics learning outcome for portfolio-assessed students was 84.1. On the other hand, the group of students who were tutored through written test assessment corrected their math learning on average. Result of 81.45. The calculations showed that, after correcting for the students' initial ability, the portfolio-tested group performed better in mathematics learning than the written-tested group.

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The results of the A*B line test analysis in Table 2 are H_0 Rejected based on F-test statistic using F-value $_{count}$= 24.56, greater than F $_{table\ (0,05;\ 1;75)}$ = 3.97. This means that there is an interaction effect between learning approaches (A) and formal testing (B) on mathematics learning outcomes after controlling for students' initial ability.

RESULT

Hypothesis test analysis for $A_1B_1$and$_2B_1$Indicates: H_0 t-test statistic, rejection based on t-value $_{count}$= greater than 10.74 t $_{table\ (0.05;\ 75)}$ = 1.66. This means that in the group of students who received portfolio assessment, there were differences in mathematics learning outcomes between the groups of students who received this approach *realistic math education.* The traditional approach after mastering the student's initial skills. Portfolio assessment evaluated the mathematics learning outcomes of a group of students taught this approach *RME* The adjusted mean is 88.05. On the other hand, the group of students who took the traditional approach had a final mathematics goal of a modified mean score of 80.15. We calculated that, in portfolio assessment, the mathematics learning outcomes of student groups taught according to this approach were: *RME,* higher than the group of students who received

After controlling the initial skills, the conventional approach. Hypothesis Test Analysis Results for $A_1B_2$and$_2B_2$found to be h_o Rejected based on t-test statistics. T-value $_{count}$= greater than 2.6 t $^{table\ (0.05;\ 75)}$ = 1.66. This means that there are differences in mathematics learning outcomes among groups of students taught this way. *RME* It is assessed by a written examination by a group of students taught according to the traditional approach and after confirming the students' initial skills. The math performance of a group of students who have undergone this approach will be used to assess the written exam. *RME* has an adjusted mean of 80.2, while the group of students who received the traditional approach has an adjusted mean of 82.7 for mathematics learning outcomes. The results of the calculations show that grades on written tests are influenced by mathematics performance for a group of students taught in this way. *RME,* lower than the group of students taught with the conventional approach.

Hypothesis test analysis result, A_1B1and$_1B_2$found that H_0Rejected based on t-test statistics. T-value c_{ount}= greater than 5.82 t $_{table\ (0.05;\ 75)}$ = 1.66. For a group of students taught 12, this wth approach *RME.* There is a difference in students' mathematics learning outcomes between the portfolio assessment group and the written exam assessment after adjusting for students' initial skills. For student groups to get opinions *RME,* the mathematics goal of the student who received the portfolio

The adjusted mean of ratings was 88.05. On the other hand, the group of students evaluated on the written test scored an average of 80.2 points in mathematics learning. So for the group of students who take this approach, we can conclude that: *RME,* after adjusting for students' initial math skills, the group of portfolio-assessed students had higher mathematics learning outcomes than the group of written-test-assessed students.

Result of verifying hypothesis $A_2B_1$and$_2B_2$indicates that H_o was rejected based on the t-test statistic. The value of t $_{count}$ = 2.29 is greater than t $_{table\ (0.05;\ 75}$) = 1.66. Therefore, to conclude that there were differences in student learning outcomes in mathematics in the group of students who underwent conventional learning approaches between the group of students who received portfolio assessment and the group of students who underwent written examination assessment. I can. After controlling the student's initial skills. The learning outcome for the group of students who received the traditional approach was mathematics.

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The adjusted mean for the portfolio-assessed student group was 80.15. On the other hand, the group of students assessed on the written test scored an average of 82.7 in mathematics. Of t can be concluded that in the group of students who received the conventional approach, after adjusting for the students' initial math skills, the learning outcomes of the portfolio-assessed students were lower than the group of students who received the written-test assessment. Can.

DISCUSSION

Beginning、Mathematics Goals, Groups of Students Taught in That Approach *Realistic Mathematics Education (RME)* after adjusting for students' initial skills, mathematics learning outcomes were higher than those of student groups taught according to conventional learning approaches. Approximation *realistic math education* Whether PMRI is an approach that guides students to build their own concepts and understand mathematical concepts through prior knowledge relevant to their daily lives, discovering these concepts on their own will help students learn is expected to be meaningful (Ratu IIma, 2011: 235)).

The results of Saleh Haji (2011: 62) and Narole (2008: 145) are *realistic math education* better than students taught at

In general (conventional) approaches, learning by realistic mathematical approaches can be effective because it can activate students and reduce teacher dominance, and because teachers have better learning management skills. It is possible. Second, after adjusting for students' initial ability, the mathematics learning outcomes of the group of students who received the portfolio assessment were higher than those of the group of students who received the written test assessment. According to Suardana (2008: 125), portfolio assessment can be interpreted as a collection of student work or documents produced during the learning process. Pranata (2004: 67) argues that portfolio assessment can assess students as dynamic and active individuals.

Building knowledge based on experience. Moreover, Haribowo (2000: 25) argues that portfolio valuation can be adapted to local needs and circumstances.

Third, there is a significant interaction effect between learning approaches and formal assessments of mathematics learning outcomes after controlling for students' initial skills. According to Nurgiyantoro (2008: 252), authentic assessment emphasizes process and learning outcome assessments so that not only assessment of the final product but also all student presentations in the learning sequence can be objectively assessed. Increase. Widhiarso (2004: 23) also argues that the goal of authentic assessment is to measure different skills in different situations. It reflects real-world situations in which these skills are used.

Fourth, for a group of students taught with a learning approach *Realistic Mathematics Education (RME)*, the mathematics learning result of the group of students who took the portfolio test is Mathatics goals for a group of students assessed on a written test. This is evident in a study (Purwanto, 2005; 130), which states: Learning with portfolios improves learning outcomes and receives positive feedback from students, teachers and parents. This makes it easier for students to answer questions and make them easier to understand and work with. To achieve better results. Number one. Including all completed assignments in a portfolio also makes it easier for students to learn because their lesson notes are never lost.

On the other hand, according to Suherman (2011: 35), portfolio assessment can assess a student's learning process and achievements, so different modes of assessment can be

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performed using this assessment system. A math portfolio provided perspective to the thinking of a fourth grader at Eastlake School in San Diego, California (Ferguson, 1994:1).

Fifth, the study found that learning mathematics with a group of students who: Take the Assessment Test and Get Closer *RME* This was lower than the mathematics learning outcomes of a group of students who underwent a traditional learning approach with written assessment.

This is reinforced by the findings of Narole (2008: 140) who argue that: Hands-on learning gives students a clear, practical understanding of the relationship between mathematics and everyday life, and the general use of mathematics for people. By the way, it is a field that students build and develop themselves. Problems and problem solving need not be isolated or the same between one person and another. Also, learning mathematics requires going through the process and trying to find math concepts on your own with the help of others. *RME* Students are trained independently to acquire knowledge.

Sixth, for the portfolio-assessed groups, the outcomes of students' mathematics learning across groups of portfolio-assessed students were

Teaching using a learning approach *Realistic Mathematics Education (RME)* after adjusting for the students' initial skills, it was higher than the group of students taught with conventional learning approaches. This is also reinforced by the findings of Hasanah (2006: 32).

Students with a realistic math education outperform those with a conventional education. Similarly, a study by Joubert and Andrews (2010: 77) stated that: Students who use the RME approach achieve higher or better learning outcomes. The use or application of portfolio assessment has a positive impact on learning (Haribowo, 2000: 23).

Seventh, the mathematics learning outcomes of a group of students taught according to conventional approaches and assessed by portfolios were compared with the mathematics learning outcomes of groups of students taught according to conventional approaches and assessed by written tests after controlling for initial skills. Lower than Ferguson's findings, on the other hand, suggest that math portfolios provided perspective on the thinking of fourth-graders at Eastlake School in San Diego, California. Suryadi (2007: 12) also says something similar.

Traditional learning is characterized by unilateral instruction under teacher control, brief instruction on a single subject, discrete activities, the teacher as a source of knowledge, grouping by ability, and assessment of subject proficiency. You can in conclusion Research results are the result of learning mathematics in a group of supervised students.

Approach *realistic math education* higher than a group of students taught with a conventional approach after adjusting for the initial proficiency of the students. After adjusting for students' initial ability, the group of students who received the portfolio assessment had higher mathematics learning outcomes than the group of students who received the written test assessment. There are trade-offs between learning approaches and full-scale assessment of mathematics learning outcomes after controlling for students' initial competencies. A group of students taught this approach *realistic math education*, after adjusting for initial skills, the mathematics learning outcomes of students assessed by portfolios were higher than the group of students assessed by written tests. Mathematics Learning Outcomes, Approaches of Groups of Students Assessed on Written Tests *RME* After controlling the initial power, it will be lower than traditional approaches student. A group of portfolio-assessed students were taught

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mathematics learning outcomes through a learning approach *realistic math education* Higher than what can be taught with traditional approaches after adjusting for the student's initial skills. The mathematics learning outcomes of the student group taught according to the conventional approach and assessed by portfolio were lower than the learning outcomes obtained by the conventional approach and assessed by written examination after initial skill correction.

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