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THE APPLICATION OF INDONESIAN REALISTIC MATHEMATICS EDUCATION (PMRI) TO LEARNING OUTCOMES AND ZISWAF LEARNING ACTIVITIES IN CLASS VIII MADRASAH TSANAWIYAH NEGERI (MTSN) 2 PONTIANAK CITY

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Abstract

This study aims to analyze the extent of improvement in student learning outcomes through instruction that does not apply Indonesian Realistic Mathematics Education (PMRI) on ZISWAF material, the significance of learning outcome improvement through PMRI-based learning, the differences between both approaches, and the level of student activity in participating in PMRI-based learning in class VIII of Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City. The research employed a quantitative approach with a True Experimental design, specifically using the Randomized Pretest-Posttest Control Group Design. Data were collected through indirect communication techniques using a learning activity questionnaire and through measurement techniques involving essay tests on ZISWAF material. The research sample consisted of students from classes VIII A and VIII B, selected randomly. The findings indicate that students' learning outcomes after receiving non-PMRI-based instruction showed improvement compared to their pretest scores. Furthermore, students who were taught using the PMRI approach exhibited significantly better learning outcomes than before treatment. A comparison between both groups revealed that students who received PMRI-based learning achieved higher posttest scores than those who did not. Additionally, as many as 24 students (67%) demonstrated high to moderate levels of learning activity during PMRI-based ZISWAF instruction. The implementation of PMRI in teaching ZISWAF significantly enhances both cognitive outcomes and student engagement. These findings support the integration of contextual and realistic mathematics learning in Islamic education to foster deeper understanding and active learning behavior.

Keywords: PMRI, ZISWAF, learning outcomes, student activity, experimental design

A. Introduction

The integration of Islamic values into science education has become an essential strategy to provide students with holistic understanding and meaningful learning experiences. Rather than compartmentalizing knowledge domains, integrated learning models enable learners to perceive the interrelation among disciplines and apply them in everyday life (Iman et al., 2015). For example, the integration of Islamic values with science not only reinforces students' belief in divine creation but also underscores science as a means to fulfill human needs ethically and sustainably (Tahir, 2021). Mathematics, as one of the core subjects in formal education, has significant potential to be contextualized with Qur'anic values, thereby fostering both cognitive and spiritual development in students (Muqoddarah & Malasari, 2023) .

Mathematics plays a central role in developing logical, critical, systematic, and creative thinking skills, which are essential across academic levels and life contexts. As stipulated in the Indonesian Ministerial Regulation No. 22 of 2006, mathematics education aims to equip students with abilities for problem-solving, reasoning, and communication. These competencies are further expected to shape positive character traits such as discipline, accuracy, honesty, perseverance, and self-confidence (Fathani, 2009). However, studies indicate that students often exhibit negative attitudes toward mathematics due to its abstract nature and the dominance of traditional, mechanistic instructional methods (Ruseffendi, 1982) . This disconnect results in students struggling to apply mathematical concepts to real-world problems (Suraji et al., 2018).

Data from the Program for International Student Assessment (PISA) 2018 reveals Indonesia's poor performance in mathematics, ranking 72nd out of 78 countries, signaling an urgent need for pedagogical innovation (OECD, 2019). One of the major causes of this underperformance is the prevalent emphasis on rote learning and formulaic application, which fails to cultivate conceptual understanding or real-life relevance. In response to these challenges (Saleh et al., 2018), the Indonesian mathematics education community has promoted the adoption of Indonesian Realistic Mathematics Education (PMRI), (Ridha, 2021) adapted from the Realistic Mathematics Education (RME) model. PMRI emphasizes contextual and meaningful learning experiences, encouraging students to rediscover mathematical concepts through guided reinvention, didactical phenomenology, and model mediation (Ridha, 2021). This reformative approach shifts the teacher's role from knowledge transmitter to facilitator, promoting deeper understanding and problem-solving skills among learners.

Moreover, the relevance of mathematics education to Islamic Education (PAI) becomes particularly evident in teaching zakat, infaq, shadaqah, and waqf (ZISWAF). These topics, while rooted in religious obligations, demand mathematical literacy to comprehend calculations, proportions, and financial planning. Yet, observations indicate that students struggle with understanding zakat concepts due to the abstract delivery methods and lack of integration with concrete mathematical skills (Rosmini, 2021; Sampurna, 2022) . Without innovative pedagogical designs, students fail to grasp both the quantitative and spiritual dimensions of zakat (Abdullah, 2015).

This study is motivated by the need to bridge the gap between mathematics and Islamic values in classroom practice. By integrating PMRI principles with Qur'anic perspectives in teaching zakat, this research seeks to enhance students' conceptual understanding and character development. In doing so, the study contributes to the discourse on interdisciplinary and value-based learning, offering a contextual framework for Islamic elementary education in Indonesia.

B. Methods

The approach in the research used is quantitative research with the type of experimental research, namely research that can properly test hypotheses regarding causal relationships (cause and effect). Experimental research is a systematic method to build relationships that contain causal effect relationships. Experimental research methods are used to look for the effect of certain treatments on others under controlled conditions. The reason for choosing the experimental method in this study was to see the application of Indonesian Realistic Mathematics Education (PMRI) on learning outcomes and ZISWAF learning activities in class VIII of Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City.

The experimental design in this study is True Experimental. True Experimental is research that can control all external variables that affect the course of the experiment, the main feature is that the samples used in the experimental and control groups are taken randomly from a certain population. In this research design there are two groups selected randomly, namely the experimental group and the control group of the two groups given a pretest which is used to determine the initial ability of students, then the experimental group is given special treatment (treatment), namely the application of Indonesian realistic mathematics education (PMRI) while the control group is not given special treatment (ordinary learning). Then both experimental and control groups were given a posttest. Then it can only be known whether the application of Indonesian realistic mathematics education (PMRI) learning outcomes and student learning activities are better or not. This study used a Randomized Pretest-Posttest Control Group Design.

This research uses a quantitative research approach. Quantitative research is defined as a research method based on the philosophy of positivism (Johnson & Christensen, 2017). A quantitative approach is an approach that emphasizes its analysis on numerical data (numbers) processed by statistical methods. In this case by using the correlation of the independent variable and the dependent variable (Sugiyono, 2019). Meanwhile, to facilitate data processing, researchers use SPSS analysis to test the research hypothesis. The data that will be studied quantitatively are data about the application of Indonesian Realistic Mathematics Education (PMRI) to learning outcomes and ZISWAF learning activities in class VIII of Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City.

The method in this study is an indirect communication technique is a way of collecting data not directly facing the research subject but by intermediary tools. In this research technique, the researcher uses a learning activity questionnaire, measurement is carried out to see the learning outcomes of students in ZISWAF material (Sampurna, 2022), the measurement technique in question is giving an essay-shaped question test. In calculating the test results using measurement by giving a score to each item that is answered correctly

in accordance with the scoring guidelines and answer key. Furthermore, this research instrument, namely the questionnaire of students' learning activities, is a data collection technique used to determine the level of students' learning activities in certain subjects, the learning outcomes test is used to measure learning outcomes in ZISWAF learning with the PMRI approach for class VIII students of Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City. The test includes questions related to ZISWAF which are designed in accordance with the learning outcome test indicators, and the learner response questionnaire is used to measure the learning activities of students towards ZISWAF learning with the PMRI approach. The questionnaire included questions about whether students felt more interested and motivated in learning ZISWAF with the PMRI approach.

Data processing and analysis techniques carried out in this study analyzed descriptively quantitative data obtained from the results of distributing learning activity questionnaires to measure students' learning activities, as well as learning outcomes tests to measure students' cognitive abilities in ZISWAF learning.

C. Results and discussion

Hypothesis Test of Control Class

Control class *pretest* and *posttest* data can be seen in the table

Table 1. Control Class Grade Data

Value	Lowest Score	Highest Score	$\bar{X}$	S
Pretest	50	76	70,53	7,50
Posttest	50	100	83,58	15,77

The results of the normality test of the *pretest* and *posttest* of the control class with the SPSS Shapiro-Wilk Test are shown in table 2 below.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest1	.244	36	.000	.745	36	.000
posttest1	.271	36	.000	.785	36	.000

a. *Lilliefors Significance Correction*

In table 2, it is known that the df (degree of freedom) value for the *pretest* and *posttest* scores is 36. So that means the number of data samples for each *pretest* and *posttest* group is less than 50. So that the use of the *Shapiro Wilk* Technique to detect data normality in this study is said to be appropriate.

Based on the output results in table 2, it is known that the Sig. value for the control class *pretest* value is 0.000 and the Sig value for the control class *posttest* value is 0.000. Because the Sig. value of *pretest* and *posttest* values <0.05, as the basis for decision making in the *Shapiro Wilk* normality test, it can be concluded that the data on student learning outcomes for the *pretest* and *posttest* scores of the control class are not normally distributed.

Because the normality test results of the *pretest* and *posttest* scores of the control class were not normally distributed, the hypothesis test used was the Wilcoxon test. The hypothesis is as follows: H_0: there is no difference in the average learning outcomes of students between before and after being given learning that has not applied PMRI on

ZISWAF material. H_a: there is a difference in the average learning outcomes of students between before and after being given learning that has not applied PMRI on ZISWAF material. The results of the *pretest* and *posttest* hypothesis testing of the control class with the Wilcoxon SPSS Test are shown in table 3 below.

Table 4.3. Test Statistics[b]

	posttest1 - pretest1
Z	-4.803[a]
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.
b. Wilcoxon Signed Ranks Test

Based on the output in table 3, it is known that Asymp. Sig. (2-tailed) is 0.000. Because the value of 0.000 <0.05, it can be concluded that $H_0$is rejected and $H_a$is accepted. This means that there is a difference between the learning outcomes of students for the *pretest* and *posttest of* the control class. So it can be concluded that there is an average difference in student learning outcomes between before and after being given learning that has not applied PMRI on ZISWAF material in class VIII of Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City.

Experimental Class Hypothesis Test

The experimental class *pretest* and *posttest* data can be seen in table 4.

Table 4. Data of Experimental Class Values

Value	Lowest Score	Highest Score	$\bar{X}$	S
Pretest	40	95	74,03	11,82
Posttest	60	100	92,19	12,64

The results of the experimental class *pretest* and *posttest* normality test with the SPSS Shapiro-Wilk Test are shown in table 5 below.

Table 5. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest2	.394	36	.000	.743	36	.000
posttest2	.288	36	.000	.650	36	.000

a. Lilliefors Significance Correction

In table 5, it is known that the df (degree of freedom) value for the *pretest* and *posttest* scores is 36. So that means the number of data samples for each *pretest* and *posttest* group is less than 50. So that the use of the *Shapiro Wilk* Technique to detect data normality in this study is said to be appropriate.

Based on the output results in table 5, it is known that the Sig. value for the experimental class *pretest* value is 0.000 and the Sig value for the experimental class *posttest* value is 0.000. Because the Sig. value of *pretest* and *posttest* values <0.05, as the basis for decision making in the *Shapiro Wilk* normality test, it can be concluded that the data on student learning outcomes for the *pretest* and *posttest* scores of the experimental class are not normally distributed.

Because the results of the normality test of the *pretest* and *posttest* scores of the experimental class were not normally distributed, the hypothesis test used was the Wilcoxon test. The hypothesis is as follows: H_0: there is no difference in the average learning outcomes of students between before and after being given learning that applies PMRI on ZISWAF material. H_a: there is a difference in the average learning outcomes of students between before and after being given learning that applies PMRI to ZISWAF material.

The results of the experimental class *pretest* and *posttest* hypothesis testing with the SPSS Wilcoxon Test are shown in table 6 below.

Table 6. Test Statistics[b]

	posttest2 - pretest2
Z	-5.122[a]
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.
b. Wilcoxon Signed Ranks Test

Based on the output in table 6, it is known that Asymp. Sig. (2-tailed) is 0.000. Because the value of 0.000 <0.05, it can be concluded that $H_0$is rejected and $H_a$is accepted. This means that there is a difference between the learning outcomes of students for the *pretest* and *posttest of* the experimental class. So it can be concluded that there is an average difference in student learning outcomes between before and after being given learning that applies PMRI on ZISWAF material in class VIII of Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City.

Hypothesis Test Between Control and Experiment Classes

Discussion

During this research from learning to giving response questionnaires there were several students whose data were not processed because they did not participate in one of the research activities. There were 5 students who did not participate in the activity of giving response questionnaires and 1 student did not take the *posttest*. In the initial learning in the experimental class, students were still confused with ZISWAF learning using the PMRI approach and did not understand how to solve Islamic religion problems through a contextual approach to mathematics. Only a small number of students adjust while the rest just follow the material provided by the teacher. This is because ZISWAF learning using the PMRI approach is new to students and has never been obtained in previous Islamic Religious Education (PAI) learning (Ayatullah, 2020). In subsequent learning, students have better understood how to solve Islamic religion problems through a contestual approach to mathematics from the problems given even though the results are not optimal. This is because students need a lot of time to adjust to the learning approach that has been followed by students, while the time available is very limited so that students cannot be maximized in participating in learning.

Based on the test results, it was found that the percentage of students who scored ≥ 75 was86,11% . Because there are > 85%, namely from the number of students who get a score of≥ 7, it is said that classically students have achieved learning completeness. From the results of the learner response questionnaire for positive statements obtained a percentage

of$P(SS) + P(S) > P(STS) + P(TS)$ or$(74{,}71\% > 25{,}29\%)$ then the response of learners to the questionnaire statement of response to ZISWAF learning using the PMRI approach is positive. From the calculation of the activities of learners, the percentage of active learners is 88.33% and the percentage of passive learners is 11.67%. Because the percentage of active students is greater than the percentage of passive students, students are active in learning ZISWAF using the PMRI approach. Based on the results of the analysis of points 1, 2 and 3, it can be concluded that ZISWAF learning using the PMRI approach is said to be effective.

In this study, although the learning outcomes of students who took part in ZISWAF learning using the PMRI approach experienced classical completeness, this study also had weaknesses in the implementation of data collection. The weaknesses in this study are: (1) some students still experience difficulties in how to solve Islamic religion problems through a contextual approach to mathematics is because ZISWAF learning using the PMRI approach is new to students and has never been obtained in Islamic Religious Education (PAI) learning before (Ridha, 2021). (2) Although the test questions have been validated and measured the level of reliability, students still have difficulty solving them. (3) Although the time for giving treatment has been planned, but in its implementation the time is still lacking for researchers.

In general, the research aims to identify teacher difficulties in the ZISWAF learning process at VIII Madrasah Tsanawiyah Negeri (MTsN) 2 Pontianak City and how teachers overcome these difficulties. Based on the results of observations and interviews with teachers, there are several difficulties experienced by teachers during the ZISWAF learning process: (1) Lack of interest in learning from students in math lessons. (2) Students are lazy in memorizing formulas. (3) The difference between the learning system then and now. (4) Ineffective use of learning books for ZISWAF learning. (5) Teachers have difficulty developing the material in the book.

D. Conclusion

Based on data analysis of the results of research that has been done, the following conclusions are obtained: (1) Based on the four stages of PMRI learning carried out by the teacher, it is obtained that students can conclude about the material studied in two meetings related to ZISWAF learning in class. Teachers are able to direct students to draw conclusions even though there are still students who have not been able to draw conclusions properly, so that teachers fall into the category of good enough in the ZISWAF learning process in the classroom. Based on the results of working on problems 1 and 2, all pairs of groups work according to the directions in problems 1 and 2. (2) Based on the results of the analysis of learning completeness, activities and participant response questionnaires, it can be concluded that ZISWAF learning using the PMRI approach is said to be effective. (3) Some students still experience difficulties in how to solve Islamic religious problems through a contextual approach to mathematics is because learning ZISWAF using the PMRI approach is new to students and has never been obtained in Islamic Religious Education (PAI) learning before. Although the test questions have been validated and measured the level of reliability, students still have difficulty solving them. Although the time for giving treatment

has been planned, but in its implementation the time is still lacking for researchers.

G. Bibliography

Abdullah, N. et al. (2015). The effectiveness of zakat in alleviating poverty and inequalities A measurement using a newly developed technique. *Humanomics*, *31*(3). https://doi.org/Doi: 10.1108/H-02-2014-0016.

Ayatullah. (2020). Pembelajaran Pendidikan Agama Islam Dan Budi Pekerti Di Madrasah Aliyah Palapa Nusantara. *Jurnal Pendidikan Dan Sains*, *2*(2), 206–229.

Fathani, T. F. (2009). *Matematika itu mudah: Cara praktis dan aplikatif belajar matematika*. Grasindo.

Iman, Y., Asran, M., & Abdussamad. (2015). Penerapan Metode Demonstrasi Pembelajaran Matematika Untuk Meningkatkan Hasil Belajar Siswa Sekolah Dasar. *Jurnal Pendidikan Dan Pembelajaran Untan*, *4*(6), 1–12. https://jurnal.untan.ac.id/index.php/jpdpb/article/view/10431%0Ahttps://jurnal.untan.ac.id/index.php/jpdpb/article/viewFile/10431/10080

Johnson, R. B., & Christensen, L. (2017). Educational research: Quantitative, qualitative, and mixed approaches. In *SAGE Publications, Inc.*

Muqoddarah, I., & Malasari, A. (2023). Integrasi nilai-nilai Qur'ani dalam pembelajaran matematika: Studi pengembangan karakter melalui pendidikan integratif. *Jurnal Pendidikan Islam Integratif*, *5*(2), 115–128.

OECD. (2019). Mathematics performance (PISA). *(Indicator)*. https://doi.org/DOI: 10.1787/04711c74-en

Ridha, R. (2021). Implementasi PMRI dalam pembelajaran matematika untuk meningkatkan pemahaman konsep siswa. *Jurnal Pendidikan Matematika Indonesia*, *12*(1), 34–45.

Rosmini. (2021). Strategi pembelajaran zakat dalam Pendidikan Agama Islam. *Jurnal Tarbiyatuna*, *6*(1), 55–63.

Ruseffendi, E. T. (1982). *Pengantar kepada membantu guru mengembangkan kompetensinya dalam pengajaran matematika untuk meningkatkan CBSA*. Departemen Pendidikan dan Kebudayaan.

Saleh, M., Charitas, R., Prahmana, I., & Isa, M. (2018). Improving the Reasoning Ability of Elementary School Student Through the Indonesian Realistic. *Journal on Mathematics Education*, *9*(1), 41–54.

Sampurna, T. (2022). Analisis minat belajar siswa pada materi zakat: Studi kasus di sekolah dasar. *Jurnal Pendidikan Islam*, *8*(1), 44–52.

Sugiyono. (2019). *Metode Penelitian Kunatitatif Kualitatif dan R&D*. Alfabeta.

Suraji, S., Maimunah, M., & Saragih, S. (2018). Analisis Kemampuan Pemahaman Konsep Matematis dan Kemampuan Pemecahan Masalah Matematis Siswa SMP pada Materi Sistem Persamaan Linear Dua Variabel (SPLDV). *Suska Journal of Mathematics Education*, *4*(1), 9. https://doi.org/10.24014/sjme.v4i1.5057