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EFFECTIVENESS OF JIGSAW TYPE LEARNING MODEL ON MATHEMATICS LEARNING OUTCOMES

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Abstrak

This study aims to evaluate the effectiveness of implementing the Jigsaw learning model in improving mathematics learning outcomes among fourth-grade students at SD Negeri 2 Kuanyar. The study involved 21 students as subjects, employing a quantitative approach with a one-group pre-test and post-test design. Data collection was conducted using learning outcome tests in each learning cycle. The results indicate that the use of the Jigsaw model significantly positively impacts students' learning outcomes. Data analysis using this method shows a mean value of -29.523, with a standard deviation of 9.47428 and a standard error mean of 2.06746. Furthermore, the obtained t-value is -14.280, with a two-tailed significance of 0.000. Since the significance value is smaller than 0.05 (0.000 < 0.05), this indicates a significant effect of the learning model on students' learning outcomes. The Jigsaw learning model plays a crucial role in enhancing students' attention and interest during the learning process. This model encourages students to be more confident, responsible, and actively engaged in problem-solving within their groups, making it effective in improving the mathematics learning outcomes of fourth-grade students at SD Negeri 2 Kuanyar.

Keywords Jigsaw Learning, Media, Mathematics,

INTRODUCTION

Education quality is the key to improving human resource (HR) quality in various aspects of life. Quality education not only provides knowledge and skills, but also shapes character, creativity, and critical thinking abilities in individuals. This enables a person to contribute more effectively to social, economic, and cultural development (Nasrudin, 2020).

Education plays a primary role in helping students develop various aspects of themselves, including potential, skills, and character, so that they can become better individuals for themselves and their environment. As a conscious process, education allows humans to develop their abilities through directed learning (Fitrianingtyas & Radia, 2017). At the elementary school level, education plays a crucial role as this period is important in the development of a child's potential. Elementary school also serves as the initial foundation that shapes a child's learning abilities for further education levels. Children at this age are more sensitive to absorbing knowledge, so the right approach is needed to ensure their learning development proceeds optimally. Therefore, quality and appropriate learning processes are required (Kosilah & Septian, 2020).

One subject that encourages students to be active in the learning process is mathematics. The goal of mathematics education is to help students develop critical thinking skills and problem-solving abilities. However, for teachers, optimizing student participation in learning is often a challenge. In practice, classroom learning tends to be dominated by the teacher as the main focus and source of information, while students often take a passive role as listeners or followers (Lokawati, 2020).

Mathematics is a subject that encompasses various life needs, one of which is an educational tool (Ammy et al., 2020; Rulyansah et al., 2022). As an educational tool, mathematics plays a role in human activities obtained from the thinking process, which is not derived from experimental results (Cheung et al., 2021; Narayani, 2019). Mathematics is used to train thinking and reasoning skills to solve real-life problems (Biassari et al., 2021). The mathematics learning process in the classroom should reflect a process that aims to enhance critical thinking abilities and problem-solving in daily life (Bayuni, 2021; Kusumaningrum et al., 2022).

Furthermore, the creation of a learning environment that demands dialogic interaction between teachers and students, as well as among students in a democratic learning climate, is essential by giving emphasis to the role of activity or collaborative mathematical participation among students, with the teacher acting as a motivator (Rahayu et al., 2022; Sulhan, 2020). Learning

is an effort to teach students. Both teachers and students have an equal role in creating a conducive and interactive learning process.

However, in practice, the learning process does not provide opportunities for students to improve their thinking and argumentation skills (Chiu et al., 2016; Ruhama et al., 2021). The teacher's role in the learning process is significant because the learning environment created by the teacher does not align with the objectives of mathematics education, resulting in a monotonous and less interactive approach to learning mathematics (Hapsari et al., 2021; Jannah et al., 2021).

Being a teacher means having the ability to choose and apply the right teaching model for students. However, many educators still use traditional teaching methods, especially in mathematics instruction (Qomariyah et al, 2023). This method often makes the teacher the center of learning, which can be less effective considering the abstract nature of mathematics. Understanding mathematical concepts requires high-level thinking skills, so an improper approach can result in poor student learning outcomes. Furthermore, student success is also influenced by other factors that are often overlooked, such as: (1) intrinsic motivation, (2) a supportive learning environment, and (3) the use of appropriate teaching models by educators in delivering material.

According to Trianto (in A. Octavia, 2020), a learning model is a design that serves as a guide in implementing classroom or tutorial learning. Referring to this definition, it can be concluded that choosing the appropriate learning model is a key factor in achieving learning objectives effectively.

The learning model applied by the teacher plays an important role in determining student learning success. Choosing the right model can create a conducive learning environment, motivate students to be more active, and participate in the learning process. This view is in line with Hestining Ardiyanti (2022), who states that certain learning models can encourage student interaction, especially when they learn in small groups. This approach not only helps students understand the material better but also develops collaboration skills and strengthens relationships among group members. Thus, choosing the right learning model becomes one of the main keys to achieving optimal learning outcomes.

In addition, group learning provides opportunities for students to support and encourage each other. Social support from group members can increase learning motivation, especially for students who struggle to understand the material individually. In a positive learning atmosphere, students are not only oriented toward competition to achieve the highest grades but also develop a helping attitude to achieve common learning goals. This process creates an inclusive learning

environment, where every student feels valued and motivated to contribute according to their abilities.

Another benefit of group-based learning models is the improvement of students' abilities in completing tasks assigned by the teacher. In groups, students work together to understand the material taught through discussion and knowledge-sharing. This approach allows group members to help each other, especially for students who have difficulty understanding certain concepts. Such a collaborative process not only enhances learning effectiveness but also encourages better learning outcomes. With constructive interactions, every student has the opportunity to contribute and gain a deeper understanding of the material being studied (Zulhafizh, 2022).

Learning outcomes are one of the main indicators used to assess the success of the learning process. As stated by Riinawati (2021), learning outcomes can be defined as the skills, whether in the form of knowledge, technical skills, or attitudes, that students acquire after participating in a learning activity. These outcomes serve as a measure of achieving the learning objectives that were previously designed, encompassing various domains such as cognitive, affective, and psychomotoric.

Furthermore, according to Aji Prasetyo (2023), learning outcomes are influenced by the assessment process conducted by the teacher. This assessment aims to evaluate how well students understand and are able to apply the material taught. The evaluation methods used can include tests, observations, or specific tasks that assess various student abilities. Factors such as motivation, individual abilities, and the learning environment also affect learning outcomes, so every student has different results based on their characteristics and learning processes.

The differences in learning outcomes among students reflect individual diversity in their ability to absorb and apply the material. This variation shows that learning outcomes are dynamic and depend on many factors, both internal and external, that influence the learning process. This underscores the importance of an adaptive approach to learning to optimally support the success of each student.

Based on these views, learning outcomes can be understood as the achievements obtained by students after undergoing the learning process. These achievements not only reflect how well students understand the lesson material but also indicate the progress made during the learning process. Therefore, learning outcomes not only serve as a benchmark for student success but also as an indication of individual progress in learning (Hadaina & Astawan, 2021).

The results of observation and documentation conducted on the fourth-grade students of SD 2 Kuanyar indicate that the students' math learning outcomes are still below the Minimum Completion Criteria (KKM), which is 65. This is due to the use of the lecture method, which tends to be one-directional, thus the students' understanding of the material is not optimal. To improve learning outcomes, a more effective learning approach is needed, one of which is the use of appropriate learning media, as stated by Afifah and Widiyono (2022).

One method that can be used to improve student understanding is the Jigsaw learning model. According to Slavin, as explained by Darmawan Harefa et al. (2022), Jigsaw is a form of cooperative learning known as the Collaborative Learning approach. In this method, students work in small groups, where each member is responsible for studying and explaining a particular part of the material to other group members. This process encourages active interaction, shared responsibility, and effective collaboration, ultimately aiming to improve the learning outcomes of all group members. This model provides an opportunity for students to share ideas, experiences, and skills, making learning more dynamic and comprehensive.

The strength of the Jigsaw learning model lies in its ability to encourage students to understand the material in greater depth. Not only are students asked to master their own material, but they are also tasked with helping their groupmates understand the entire material. This approach creates a more collaborative learning atmosphere, where students support each other in building shared understanding. As a result, the Jigsaw model plays a role in increasing students' social and academic responsibility because they realize that the success of the group depends on each individual's understanding.

Moreover, this model provides opportunities for students to be more active in expressing their opinions and participating in group discussions. Every member is encouraged to share their views on the material being studied, which strengthens critical thinking and communication skills. Unlike traditional learning, which is often passive, the Jigsaw model requires students to be more involved in the learning process, process information independently, and provide feedback to their groupmates. This process not only helps deepen material understanding but also sharpens students' social skills such as listening, speaking, and collaborating.

Overall, the Jigsaw learning model creates an active and interactive learning environment. This method motivates students to become more engaged in learning, as they play an important role in the success of the group. By fostering cooperation, responsibility, and good communication

among students, this model has proven effective in improving learning outcomes and student involvement in the educational process (Rosyidah, 2016). Based on the above explanation, the researcher is interested in conducting an experimental study titled The Effectiveness of the Jigsaw Learning Model on Mathematics Learning Outcomes for Fourth-Grade Students at SD Negeri 2 Kuanyar.

METODE

This study uses a quantitative method with a one-group pre-test and post-test design, involving 21 fourth-grade students from SDN 2 Kuanyar, consisting of 12 male students and 9 female students. The research process takes place in two cycles, following four stages: planning, implementation, observation, and reflection, in accordance with the procedures described by Arikunto (2018). To obtain more comprehensive data, the researcher also uses tests as an observation tool. This test serves to measure students' behavior in the cognitive domain, as explained by Ngalimun (Kurniawan et al., 2022), with multiple-choice or essay questions that provide a more comprehensive picture of students' understanding of the material.

Data analysis involves both quantitative and qualitative approaches. Quantitative analysis is used to measure individual and classical achievement, while qualitative analysis is performed descriptively through data reduction, data explanation, and conclusion drawing. The success of this study is measured based on classical completeness reaching 75%, while individual completeness is at least 65%, in accordance with the KKM standard set. As stated by Aguspriyadi (2022), the effectiveness of learning can be seen from significant learning outcomes after the learning process, with a minimum completeness of 75.

FINDINGS AND DSICUCCION

Findings

1. Pre Test

This classroom action research began with observations and interviews with the fourth-grade students of SDN 2 Kuanyar. Based on the findings from the observations and interviews, it was revealed that the teaching model and media used by the teacher were neither engaging nor innovative. As a result, some students felt bored and were not focused during the learning process, and some even engaged in conversations with their seatmates. This situation led to a decline in

students' learning outcomes, which was clearly reflected in the results of the Midterm Exam (UTS) for the fourth grade. The average student score was only 57.14, while the Minimum Completion Criteria (KKM) is 65. Only 33.33% of the students managed to meet the KKM, meaning that only 7 out of 21 students achieved the standard, while the remaining 14 students did not meet the required standard.

Tabel 1. Rekapitulasi Hasil Pre Test

Komponen	Nilai
Maximum Score	90
Minimum Score	35
Total	1200
Mean	57,14
Students who passed	7
Students who did not pass	14
Presentage	33,33

2. Post Test

The post-test was conducted on May 16, 2024, after implementing the Jigsaw learning method in the fourth-grade class. The post-test was administered using 10 multiple-choice questions designed to assess students' understanding of the material that had been taught. The results of the post-test can be seen in the following table (please insert the post-test results table according to the available data). This table will present the average score and the distribution of students' scores after the implementation of the learning method.

Tabel 2. Rekapitulasi Hasil Pre Test

Komponen	Nilai
Maximum Score	100
Minimum Score	70
Total	1820
Average	86,66
Complete Students	21
Incomplete Students	0
Presented	100

Based on the data presented in Table 2, the pre-test results indicate that the students' classical completeness level reached 100%, which suggests that most students have met the established Minimum Mastery Criteria (KKM). Out of the total students who took the pre-test, 21 students successfully achieved or exceeded the KKM, reflecting a good mastery of the material by the majority

of students. However, although the classical completeness level reached 100% in the pre-test, it is essential to further analyze how students' understanding improved after the implementation of the Jigsaw learning model. A comparison between the pre-test and post-test results will provide a clearer picture of the effectiveness of the method used in enhancing students' learning outcomes.

Based on the post-test results presented in Table 3, there was an increase in the students' average scores after participating in the learning process using the Jigsaw model. This improvement indicates that the applied method successfully reinforced students' understanding of the taught material. Furthermore, the distribution of students' scores also shows that the majority obtained higher scores compared to the pre-test, indicating an improvement in the quality of learning.

Apart from academic results, the implementation of the Jigsaw learning model also had a positive impact on students' engagement and participation in the learning process. During the lessons, students were more active in discussions, exchanging information, and collaborating within their groups. This aligns with the findings of Harefa et al. (2022), who stated that cooperative learning models such as Jigsaw can enhance students' social interactions while deepening their understanding of the subject matter.

3. Uji *Paired Sample T-test*

The Paired Sample T-test is used to compare two related data sets, namely the data collected before and after the treatment. According to Ghozali (2018), this method aims to assess the effectiveness of the treatment by measuring whether there is a significant difference between the mean before and after the treatment is applied. This test is conducted using IBM SPSS Statistics version 25, with a significance level set at 0.05 (α = 5%). Through this test, researchers can determine whether there is a significant change in the tested data, indicating the success or failure of the given treatment. The output of the Paired Sample T-test is explained as follows:

Tabel 3. Hasil Uji *Paired Sample T-test*

Paired Samples Test								
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	f	Sig (2-tailed)
				Lower	Upper			
PRE-Test – POST-Test	-29.523	9.47428	2.06746	-33.8364	-25.2111	-14.280	20	,000

Sumber: Output SPSS 2024

Based on the analysis obtained from Table 3, the test results using the paired sample t-test method show a mean value of -29.523, with a standard deviation of 9.47428 and a standard error mean of 2.06746. Furthermore, the obtained t-value is -14.280, with a two-tailed significance of 0.000.

Since the significance value is smaller than 0.05 (0.000 < 0.05), it can be concluded that there is a significant difference in students' learning outcomes, indicating an improvement after the implementation of the Jigsaw learning model.

Discussion

Salsabila (2023) revealed that the implementation of learning models plays a crucial role in enhancing students' attention and engagement during the teaching and learning process. Research conducted by Heriwan (2020) also proved that the Jigsaw model significantly contributes to improving learning outcomes, as this model encourages students' confidence, responsibility, and ability to solve problems collaboratively within a group. Prihatmojo (2020) added that the strength of this model lies in its ability to actively engage students in the learning process, making them more directly involved.

In addition to implementing learning models, the use of innovative media is also an important factor in improving learning outcomes. Ardiyanti (2022) stated that creative learning media can reduce students' boredom and fatigue, which often become obstacles in the learning process. Aliyah (2022) added that Jigsaw media is highly effective in capturing students' attention and boosting their enthusiasm for learning.

From another perspective, Diantoro (2020) mentioned that learning outcomes can be improved by using the right combination of learning models and media, allowing students to understand the material more deeply. Aguspriyadi (2022) also emphasized that the effectiveness of learning can be measured by achieving significant results, with a minimum mastery criterion of 75%. Based on this, this study can be considered successful, as students' learning outcomes reached 80.95%, surpassing the established minimum mastery criteria.

Jigsaw media has proven to be highly effective in capturing students' attention and increasing their enthusiasm for learning by transforming a passive classroom atmosphere into a more dynamic and interactive one. By dividing students into small groups to study specific sections of the material, this model motivates them to collaborate, share knowledge, and actively participate in discussions. This not only helps improve their understanding of the material but also strengthens their social skills, such as communication and teamwork.

Furthermore, the use of Jigsaw media fosters a sense of responsibility among group members, as each student plays a crucial role in the overall success of the group (Ardiyanti, 2022). This has a positive impact on increasing motivation, as students feel more engaged in the learning

process. With an enjoyable and collaborative environment, Jigsaw media can break the monotony often found in conventional learning, making students more eager to learn.

The use of this media also supports the development of students' cognitive, affective, and psychomotor skills, which are essential for comprehensive learning. Research conducted by Aliyah (2022) revealed that this model is highly effective in overcoming student boredom, which often hinders the learning process. Thus, Jigsaw media not only enhances students' enthusiasm for learning but also helps them achieve better outcomes in understanding and applying the lesson material.

Jigsaw media also encourages more meaningful learning, as students do not just passively receive information but actively build understanding through interaction and discussion with their group members. This aligns with Prihatmojo (2020), who stated that learning that actively involves students can improve critical and analytical thinking skills. By integrating individual and collaborative tasks, this model provides students with opportunities to hone their problem-solving skills and connect learned concepts to real-life situations.

Furthermore, research by Diantoro (2020) confirmed that the Jigsaw model is effective in enhancing students' academic success, mainly because this approach promotes cooperative and supportive learning. When students are responsible for mastering specific material and explaining it to their group members, they tend to be more motivated to understand the subject matter in depth. This process not only improves cognitive learning outcomes but also trains students' communication and interpersonal skills.

The effectiveness of the Jigsaw model in improving learning outcomes is also influenced by the teacher's role as a facilitator. According to Aguspriyadi (2022), the success of implementing innovative learning models like Jigsaw heavily depends on the teacher's ability to manage the classroom and provide clear guidance. Teachers must ensure that every group member understands their responsibilities and can contribute optimally to group discussions. Additionally, teachers should provide constructive feedback to help students refine their understanding.

In the context of this study, the implementation of the Jigsaw model has proven to be successful in improving the learning outcomes of fourth-grade students at SD Negeri 2 Kuanyar. The increase in learning outcomes from 57.14 in Cycle I to 86.66 in Cycle II indicates that this model can overcome various obstacles present in conventional learning. Additionally, the rise in students' active participation in group discussions and their willingness to help each other demonstrates that

the Jigsaw model can create a more inclusive and collaborative learning environment.

As a practical implication, educators are encouraged to utilize the Jigsaw model across various subjects to create a more engaging and dynamic learning atmosphere. Furthermore, the use of creative and innovative learning media, such as Jigsaw, can help address student boredom and enhance their motivation to learn. Thus, it is expected that students' learning outcomes will continue to improve, not only in terms of academic achievement but also in mastering social and critical thinking skills that will be beneficial in the future.

CONSLUSION

Based on the results of the research conducted, it can be concluded that the implementation of the Jigsaw learning model has significantly improved the learning outcomes of fourth-grade students at SD Negeri 2 Kuanyar. This is reflected in the increase in learning mastery, which previously reached only 57.14 in the pre-test and increased to 86.66 in the post-test. These figures indicate that the Jigsaw model enhances student participation in learning activities, encourages collaboration among students, and facilitates better understanding of the material.

Based on these findings, it is recommended that teachers continue to utilize and develop the Jigsaw model in classroom learning, especially for subjects that require active engagement and in-depth understanding. Additionally, variations in the implementation of this model should be further enhanced to make learning more engaging and suited to different student characteristics. Schools are also encouraged to support the use of other innovative learning models to comprehensively improve student learning outcomes. Further research should involve a broader range of subjects or be conducted at different educational levels to obtain more comprehensive and generalizable findings.

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