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Development of Cheerful Ludo Math Integrated With Tgt Model for Solving Fifth Grade Mathematical Story Problems

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Abstract: The purpose of this research is to develop a ludo media called cheerful math ludo (Domaria), which is integrated with the TGT model to solve fifth-grade math story problems based on the material of the volume of space. The type of research used is R&D with the Borg and Gall model. The stages in this research are analyzing problems, collecting data, making product designs, design validation, design revisions, small group trials, product revisions, and large group trials. Based on validation from media experts of 91.7% (very feasible), material experts of 91.7% (very feasible), and language experts of 81.3% (very achievable), as well as the results of teacher and student responses of 100% (very feasible), it shows that Domaria media is suitable for use. This can be seen from the results of the paired T-test in small groups with a Sig value. (2-tailed) 0.000, which means that the average post-test value has increased when compared to the pre-test value. Then, the N-Gain test in the small group obtained a result of 0.627, which means that it is effective in the medium category. The same thing happened in the paired T-test test in the large group, which showed a sig value. (2-tailed) 0.000, which means that the average post-test value increases from the previous pre-test average. The large group N-Gain test showed a value of 0.699, which was said to be effective in the medium category. Thus, Domaria media integrated with the TGT model is proven to be effective for teaching and learning.

Keywords: learning media, ludo, TGT model, mathematics.

▪ INTRODUCTION

Education is one of the things that is very important and cannot be separated from individual life. Education is an activity carried out by individuals to grow their potential in order to obtain better results or achievement (Kurniawan et al., 2022). Education is any activity that can create an experience for individuals (Almonacid-Fierro et al., 2022). Therefore, the learning process must be interactive, fun, and challenging.

Teacher-centered learning should be changed to student-centered learning to create interactive, fun, and challenging learning. The goal of student-centered learning is to bring students to a level of competence that makes them develop (Holmes & Tuomi, 2022; Tzenios, 2022). So, the teacher's role is no longer the main source of information in learning; instead, it is the facilitator. (Dada et al., 2022). In the implementation of learning, students can be trained to find new ideas, facts, and values needed for life through various learning resources so as to create meaningful learning (Polman et al., 2021).

In education in Indonesia, there are various subjects that students must study from elementary school to university level. Of the many compulsory subjects in elementary school, one of them is mathematics. Math learning in elementary schools is usually done in the classroom. The scope of mathematics material that must be learned is very broad, requiring teachers to determine effective and efficient ways of delivering material so that students can easily accept it.

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The number of students' assumptions about math subjects that are difficult and frightening from the start can result in low math skills in Indonesia. This is evidenced by the PISA (Program for International Students Assessment) survey. The PISA survey in 2022 showed that Indonesia's mathematics skills were still below the average of the Organization for Economic Cooperation and Development (OECD). Based on the survey, only 18% of students reached level 2 math proficiency, while the average in OECD countries is 69% (OECD, 2023). Based on this data, it can be concluded that the ability of students in Indonesia related to mathematics is quite low when compared to other countries.

The effectiveness and meaningfulness of mathematics learning can be created from the learning process carried out by a teacher (Bang et al., 2023; Mainali, 2021). If the teacher can create an interactive and fun learning atmosphere, it will create more effective and meaningful mathematics learning. Through this interactive element, students will receive information actively, not just passive information in learning. Choosing the right learning model and media is an important part of learning. The learning model is an entire sequence of sequential and systematic learning so that it can help students to learn more actively and improve their learning outcomes (Yuliana et al., 2022). Meanwhile, learning media is a means that can be implemented to support learning and allow it to run optimally (Widodo & Wahyudin, 2018). Therefore, models and media both have an essential role in achieving a learning goal.

However, in reality, it is still often found that teachers do not use the right learning model and conventional learning media. Many teachers focus on one learning model and have not tried to apply innovative learning models. In addition, many teachers deliver material without using props or learning media. A similar phenomenon was also found at SDN Karangayu. Based on information data obtained from teachers and students of grade V SDN Karangayu, teachers usually only use lecture and discussion learning models when teaching mathematics. In addition, teachers also rarely use learning media to explain the material. The absence of media in learning results in students not being interested and easily bored in participating in math learning. In addition, the absence of innovative learning models and learning media causes students to have difficulty in receiving material delivered by the teacher. Furthermore, this will have an impact on students' limited ability to solve more complex math problems, for example, in solving math story problems.

In addition, there are internal factors (from within the individual), such as students' limitations in memorizing multiplication and division. This limitation makes students find it increasingly difficult to work on more complex math problems, one of which is solving math story problems. Math story problems have an important role in students' daily lives because these problems emphasize problems that are in accordance with everyday life. In addition, story problems can be used as an evaluation to measure students' understanding of the basic concepts of mathematics that have been learned. This problem is reinforced by the mathematics scores of grade V students at SDN Karangayu, which are below the KKTP, which is below 75. This is evidenced by data from the end-of-semester summative scores (SAS) of grade V students in mathematics at SDN Karangayu, which shows that only 42.8% of students have reached KKTP, while the remaining 57.2% have not reached KKTP.

The end-of-semester summative data shows that most students have low mathematics learning outcomes. So, efforts are needed to change the implementation of mathematics learning by teachers so that student scores increase. One of the urgencies that must be improved to support good learning outcomes in mathematics is related to solving math story problems. Given this, the researcher wants to improve mathematics learning by using concrete learning media and innovative learning models, namely by using ludo learning media in the team games tournament (TGT) model.

Ludo learning media was chosen by researchers as a concrete learning media applied in learning mathematics. The selection of concrete learning media is expected not to complicate the application due to the limited technology available at school. In addition, this ludo media was chosen because a game can attract students' interest and also create competence between students, which can unknowingly improve their learning outcomes (Barbieri et al., 2021; Byusa et al., 2022; Lange et al., 2021; Liu et al., 2020). Play activities are activities that are favored by students, especially at the elementary school level (Castillo et al., 2024; Karakoç et al., 2022; Russo et al., 2020). Play activities can be carried out by students without coercion, provide joy, give freedom, and hone certain skills and abilities of children so that they can express themselves through play activities. Previous research also supports the use of ludo-learning media to improve students' cognitive abilities (Muhammadiyah & Hamka, 2024). This increase is evidenced by the achievement of the success criteria of more than 80% of students who score above the KKM. This increase is evidenced by the achievement of the success criteria of more than 80% of students who score above the KKM. In other studies also show that educational games using ludo equipped with question cards can improve students' understanding of the concept of IPAS material (Rizkita & Djukri, 2020).

Furthermore, researchers chose the TGT learning model to be applied in learning mathematics. TGT is a learning model that includes learning activities in groups consisting of heterogeneous members based on their achievements to carry out games and matches in learning (Astuti et al., 2022; Slavin, 1988). TGT is a cooperative learning model that is considered to have a good effect on students' cognitive improvement as well as healthy competitiveness (Klinmalee & Charoenboon, 2022; Korucu & Seker, 2020; Yapatang & Polyiem, 2022). In addition, TGT can also improve student collaboration to work in their groups (Promwongsai & Poonputta, 2023; Wongsaming et al., 2023). This is supported by previous research which states that TGT has an effect in significantly improving students' cognition in Islamic religious subjects (Nurhidayat et al., 2024). This proves the change in the average student score, which is getting higher from before and after applying the TGT model. Based on several considerations, researchers chose TGT as a learning model because TGT is a game-based learning model so that it will be suitable when combined with educational learning such as the math ludo game. The combination of learning models and media, both of which are based on educational games, will help improve student learning outcomes.

In addition, this research also has several benefits, which are categorized into two categories, namely theoretical benefits and practical benefits. The theoretical benefit of this research is that it provides knowledge related to the development of Domaria media in the TGT model to solve math story problems. Then, the hope can contribute to education, especially in the development of media and learning models, and can be a reference or support material for further research. The practical benefits for teachers

include the provision of knowledge and experience about other innovative media and models so as to improve teacher skills in learning activities. Furthermore, it is useful for students to improve their ability to solve math story problems. After that, for schools, it can contribute to the school in order to improve cognitive aspects of mathematics learning. Then for, the researchers themselves can provide new knowledge and insights into the feasibility and effectiveness of Domaria media.

▪ METHOD

Participants

The population used in the study were fifth grade students of SDN Karangayu. Meanwhile, the technique used to select research subjects is non-probability sampling technique. This technique is a sampling technique used by not providing equal opportunities for each element to be selected as a sample (Sugiyono, 2021: 151). There are three subjects in this study, including the test subjects, small group trials, and large group trials.

The research subjects used to test the questions were all students in grades VA and VB at SDN Karangayu 02, totaling 42 students. Then the subjects in the small group were taken using purposive sampling technique, which is a sample selection technique using certain considerations. The subjects selected for this small group trial were 12 fifth grade students of SDN Karangayu 01 who were taken based on three categories, namely high achievement, medium achievement, and low achievement. Sampling with these three categories aims to determine whether the product developed is effective when used by all students with different cognitive abilities. While the research subjects in the large group trial used all fifth grade students of SDN Karangayu 03, namely 31 students.

Research Design and Procedure

The type of research implemented in this study is R&D. Sugiyono (2021: 752) explains that R&D is research that has the aim of creating a product. The purpose of this research is to develop, test the feasibility level, and test the effectiveness of Domaria media integrated in the TGT model to solve math story problems in class V SDN Karangayu on the material of Volume of Spaces.

The development applied in this research is a modified Borg and Gall model. The research stages carried out are analyzing potential problems, collecting data, designing product designs, conducting design validation, revising designs, carrying out product trials in small groups, revising products, and carrying out large group usage trials so as to obtain the final product.

At the problem analysis stage, namely conducting observations, interviews, and documentation to find problems that exist in the research location. The second stage is collecting data, namely through a questionnaire of teacher and student needs. The third stage, namely designing the product by considering the needs of teachers and students who have been given through the needs questionnaire. The fourth stage is to conduct design validation to media, material, and language validators. This design validation aims to ensure that the product is suitable for application in learning when viewed in terms of the product itself, the material in the product, and the language used in the product. After conducting product validation, revisions are made according to the suggestions and input of the validator experts. The next stage will be carried out product trials in small groups totaling 12 fifth grade students of SDN Karangayu 01. Then from the product trials in

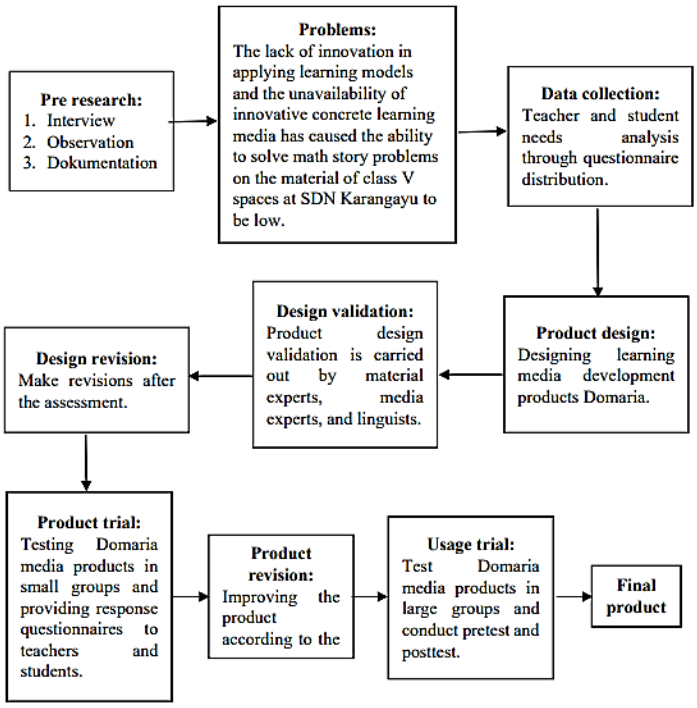

Figure 1. Modified stages of the Borg and Gall R&D model

small groups, it is analyzed whether there is still something that needs to be improved from the application of learning. The last stage is the large group usage trial. From the small group and large group trials, it can be seen whether the product developed is effective or not if applied in learning.

Instrument

There are two types of data used in this research. First, quantitative data includes a list of final semester summative scores (SAS) of grade V students in mathematics subjects, pretest scores, posttest scores, and assessments from validator experts. Second, qualitative data were obtained from observations, interviews, teacher and student needs questionnaires, and documentation. The sources of data in this study were fifth grade teachers of SDN Karangayu, fifth grade students of SDN Karangayu, media validators, material validators, language validators, and the researchers themselves.

There are two data collection techniques used. First, the test technique, in this study includes pretest and posttest given to students before and after treatment which amounted to 24 description questions that have been tested previously and have been declared valid and reliable. This description question has a different level of difficulty but has the same indicator, namely for solving story problems related to the volume of space.

Second, non-test techniques were carried out in the form of interviews, observations, and documentation. First, the interview with the fifth grade teacher of SDN Karangayu was conducted by asking 23 questions related to mathematics learning conducted in the fifth grade of SDN Karangayu. Then, the activity of spreading the questionnaire of the needs of teachers and students related to Domaria media was carried out by giving 9 questions in the questionnaire. Furthermore, the activity of providing

Domaria product validation questionnaires to expert validators consists of three aspects, each aspect of which consists of four questions. Finally, there is a response questionnaire given to teachers and students. This questionnaire consists of 15 questions related to the satisfaction of teachers and students in implementing the developed product. All questionnaires used in collecting this data have been confirmed valid and reliable.

Data Analysis

This study used two data analysis techniques. First, the initial data analysis technique is using normality and homogeneity tests. This test is used to check whether the population used is normally distributed and homogeneous (the same). Furthermore, to determine whether or not the media developed is feasible, using data analysis techniques in the form of a questionnaire that will be filled in by validators. The value obtained from the experts' assessment can be used to determine whether or not the media developed is feasible.

Then to conclude whether the product developed has an effect or not on learning mathematics can use a paired t-test. To calculate the paired t-test test is done by doing a pre-test first before treatment and a post-test after treatment. After obtaining the pre-test and post-test values, they can then be tested using the help of the SPSS version 25 application. This paired t-test uses a 5% significance level. When the test has been carried out, the average pre-test and post-test can be seen. If the post-test value is higher than the pre-test value, it can be concluded that there is a difference before and after treatment. To find out whether the average difference is significant or not, it is necessary to read the results in the paired t-test table that has been done in the sig section. Decision making on this paired t-test is if sig (2-tailed) <0.05 then there is a relationship between pre-test and post-test. Conversely, if sig (2-tailed) > 0.05 then there is no relationship between pre-test and post-test.

Then to test the level of effectiveness of the product developed using the N-Gain test with the help of the SPSS version 25 application. This test is carried out by calculating the difference in pre-test and post-test scores and then comparing it with the ideal score minus the pre-test score. After obtaining the N-Gain value, the score acquisition category can be determined using three categories: high with $G > 0.7$); medium with $0.3 < G < 0.7$; low with $G < 0.3$ (Hake, 1999). Meanwhile, the effectiveness of the product can be seen from four N-Gain categories in the form of percentages: effective if $G > 76\%$, moderately effective if $56\% < G < 75\%$, less effective if $40\% < G < 55\%$, and ineffective if $G < 40\%$.

▪ RESULT AND DISSCUSSION

Problem Analysis

The stages of research that have been carried out in class V SDN Karangayu in Mathematics are adjusted to the Borg & Gall theory. The first stage was identification to find problems experienced in classroom learning. The problems found from interviews and observations are the lack of innovation in applying learning models and the unavailability of interactive concrete learning media. The tendency of teachers to use the usual lecture and question and answer learning model with students. In fact, it is not uncommon for teachers to only use the package book given from school when teaching Mathematics. In addition, teachers also do not provide students with a variety of reference exercises, especially for HOTS questions. This then makes students feel afraid and think

that Mathematics is a difficult subject. Then further, students have difficulty when working on math story problems, especially with problems with high difficulty levels.

Collecting Data

The second stage, collecting data by analyzing the needs of teachers and students through distributing questionnaires. This analysis was used to find out the needs of fifth grade teachers and students at SDN Karangayu in understanding the volume of space material. At this stage, researchers distributed questionnaires to teachers and fifth grade students of SDN Karangayu. Based on the problems and needs questionnaires that have been collected, it makes the need for an innovative learning media and model that can improve the ability to solve math story problems for grade V students.

Media Design

After obtaining data from observation activities, conducting interviews, and distributing questionnaires, researchers conducted the third stage. The third stage is to make Domaria media design according to the data that has been obtained. Based on this data, the material to be developed is the Volume of Spaces.

This stage of making Domaria media design requires the help of CorelDraw and Canva applications. Some of the designs needed for Domaria media include ludo board designs, guidebooks, question cards, and answer key books. This Domaria board is designed using the CorelDraw application then printed and attached to a board made of wood and can be folded so that it is easy to carry around. Domaria media that has been developed can be accessed through the link https://bit.ly/MediaDomaria.

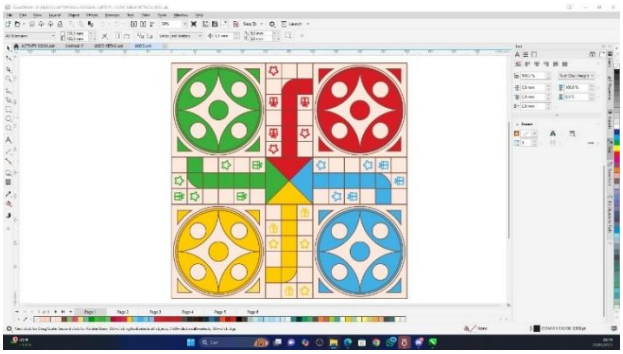

Figure 2. Making the ludo board

The development carried out is not only in the form of the ludo board, but also in its content. In this ludo board, there will be question cards consisting of cognitive aspects C3, C4, C5, and C6. The questions on this card are related to the volume material of cubes, blocks, prisms, and tubes.

Media development continued with the making of the answer key book. This answer key book contains a discussion of working on the questions on the Domaria card. This book was made to make it easier for teachers to check student answers during the competition.

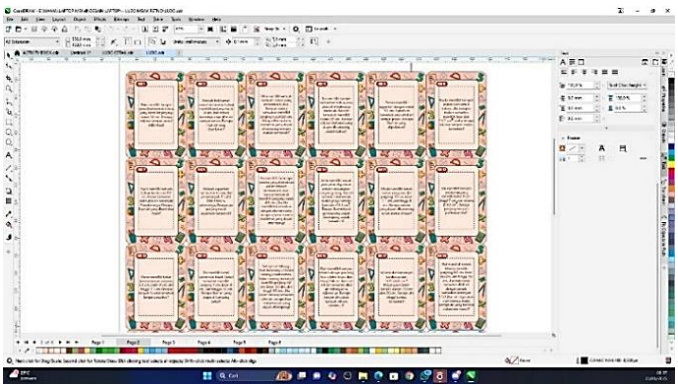

Figure 3. Making problem cards

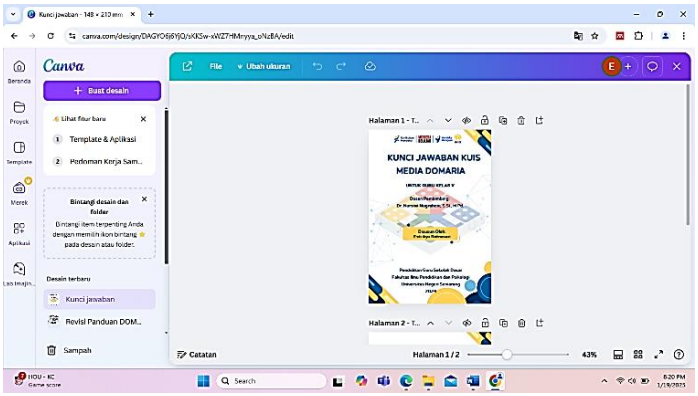

Figure 4. Making the answer key book

This media development is also equipped with a guidebook that can make it easier for teachers and students to understand all the provisions related to the use of media.

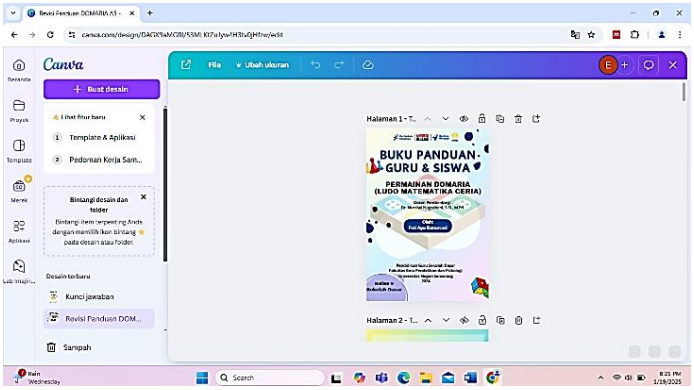

Figure 5. Making a guidebook

Media Validation

After the media development process was completed, the fourth stage was to validate Domaria media to several expert validators, namely media validators, material validators, and language validators. The assessment by these experts was given through a validation test sheet. This validation test sheet consists of 3 aspects of assessment consisting of 4 questions for each aspect. The material validation test on the visual

appearance design aspect scored 87.5%, the media presentation aspect 93.75%, and the physical form aspect 93.75%. So that an average value of 91.7% is obtained, which means that it is very feasible to be applied in learning. Then, the media expert also stated that Domaria media was feasible to be tested without any revisions.

After that, the material validation test was carried out to ascertain whether the material presented in the media was feasible or not. The assessment obtained from the material expert, namely in terms of the suitability of the competencies to be achieved, received a score of 93.75%, the aspect of the suitability of the material and questions was 87.5%, and the presentation aspect was 93.75%. Thus, the material validator gets an average of 91.7%, which means that it is very feasible to be applied in learning. In addition, the material validator also stated that Domaria media was feasible to be tested with some revisions. The following are some things that must be corrected according to the suggestions from the material validator:

Table 1. Problem card improvements after the material expert validation test

Things Improve	Before Validation	After Validation Test
Change the context of the problem to be realistic.	A water reservoir will hold 15 liters of water. If the radius of the reservoir is 27 cm, what is the height of the reservoir?	A water reservoir will hold 1,000 liters of water. If the radius of the reservoir is 40 cm, what is the height of the reservoir?
	Diki has a glass with a radius of 4 cm and a height of 5 cm. If the glass is filled with water, then 50 cm^3 of water is drunk. How much water is left in the glass?	Diki has a glass with a radius of 4 cm and a height of 15 cm. If the glass is filled with full water, then Diki drinks 250 cm^3 of water in the glass. How much water is left in the glass?

Last, language validation was carried out by linguists. The assessment from linguists from the aspect of sentence effectiveness received a score of 75%, the aspect of language rules was 75%, and the communicative aspect was 93.75%. Thus, the linguists obtained an average score of 81.3%, which means that it is very feasible to be applied in learning. However, before being applied in learning, there were several revisions from linguists. The first revision is related to the consistency of the font type used in the guidebook. Initially using different font types, then changed to use one font type, namely noto sans. Another revision lies in the provision of italic effects on the use of foreign languages. In some parts initially there was no italic effect, then revised by giving italic effects, for example in the words homebase and ice breaking.

Small Group Trial

After the developed media has been declared feasible, it can be continued to the next stage. The next stage is to conduct a usage trial to a small group. This trial is intended to obtain information related to student responses to the products developed. Respondents of the small group trial were conducted in class V SDN Karangayu 03 with a total of 12 students. According to (Sugiyono, 2021), in determining small class respondents, you can use purposive sampling technique. This technique is sampling with regard to certain

aspects. Based on this, researchers chose students based on their cognitive aspects, namely four students with high cognitive abilities, four students with moderate cognitive abilities, and four students with low cognitive abilities.

There were three stages of implementation in this small group. The first stage, students work on pre-test questions. This was done to determine the initial ability of students in solving math story problems on the material of Volume of Spaces before using Domaria media. The second stage is the learning process using Domaria media integrated in the team games tournament model. The learning that is done is based on the syntax of TGT according to Slavin, namely class presentation, group learning, games, matches, and group awards.

In the class presentation, the teacher explains the material related to the volume of space. In the next step, students will be divided into groups with members who have heterogeneous abilities. Next, students will enter the game stage in the form of working on problems with an easy level. After that, at the competition stage students will be introduced to Domaria media. The use of Domaria media has almost the same game rules as ludo in general. The difference lies in the game being played in groups and there are question cards in this media. In this media there are two question cards, namely gift cards and challenge cards. Students will get a score of 1 if they successfully answer the questions on each card, get a score of 0 if they don't answer, and will get a score of -1 if they answer incorrectly. At the end of the lesson, the teacher will accumulate the scores obtained by each group in the game and match stages. The group with the highest total points will be awarded a certificate by the teacher.

The third research stage is that students are given post-test questions and response questionnaires after carrying out learning using Domaria media integrated in the team games tournament model. The following is a graph of the increase in pre-test and post-test scores of each student in small groups.

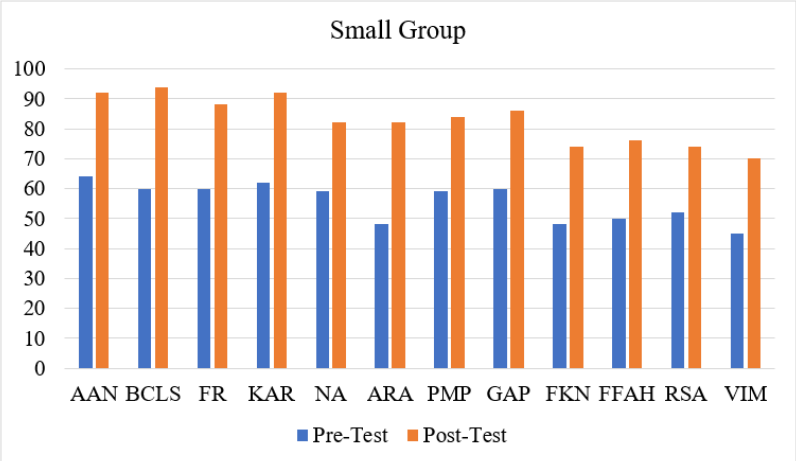

Figure 6. Small group pre-test and post-test values

After getting the pre-test and post-test scores in the small group, we conducted a paired T-test and N-Gain test. The paired sample T-test was conducted to determine whether Domaria media combined with the TGT model can have an effect on solving math story problems. Based on the paired sample test using the help of the SPSS version

25 application, the results obtained an average increase of 27.25 with a sig (2-tailed) of 0.000 or it can be said that 0.000 <0.05. Thus, there is an influence in the form of an increase in the average post-test value from the previous pre-test value.

This is reinforced by the effect size test (Cohen's d). The result of this test is obtained from the average divided by the standard deviation, which is 3.75. This shows that the treatment carried out has great effectiveness in improving student learning. (Cohen, L., Manion, L., & Morrison, 2007). Furthermore, the N-Gain test was conducted to check the effectiveness of using Domaria media integrated in the TGT model. Below is the N-Gain test on small groups.

Table 2. Small group N-Gain

	N	Minimum	Maximum	Mean	Std.Deviation
N-Gain	12	.45	.85	.6271	.13344
N-Gain (Persen)	12.00	45.00	85.00	62.71	13.344

Based on the table, the average N-Gain is 0.6271 or 62.71%. Thus, when referring to the N-Gain effectiveness standard, it is included in the medium category or is quite effective. Thus, Domaria media integrated with the TGT model can be used to help improve students' academic abilities because this media and model contain elements of competition in it that can spur students' enthusiasm to excel from other friends. This finding is in line with the conclusion of (Karakoç et al., 2022) which states that game-based learning has a positive impact on students' academic achievement. Meanwhile (Wongsaming et al., 2023) also said that students who received TGT teaching had higher math skills compared to students who received teaching with conventional models. The following is the presentation of N-Gain from each cognitive level in the small group.

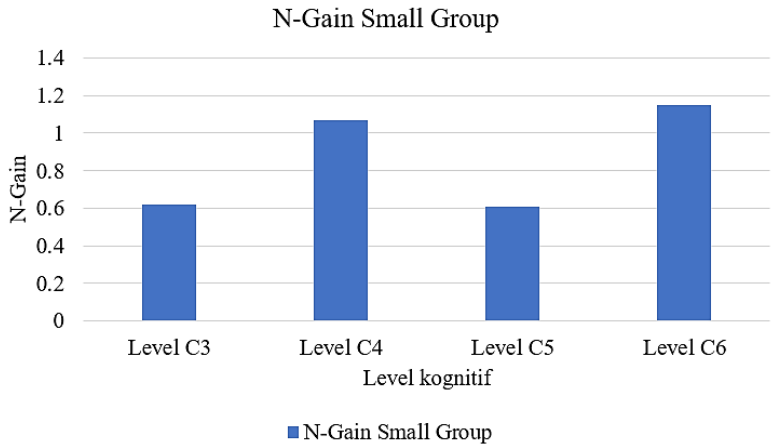

Figure 7. N-Gain of small group

Based on the graph, it shows that the C3 level question indicator obtained an N-Gain score of 0.62, C4 level of 1.07, C5 level obtained a score of 0.61, and C6 level obtained a score of 1.15. These results show that students have more difficulty at the C3 and C5 levels compared to the C4 and C6 levels. The low N-Gain value at level C3 is likely due to students still adapting to the application of formulas in solving math story

problems. Meanwhile, the low score at the C5 level is due to the lack of students' ability to evaluate the correctness of the answers to the problems presented.

The application of Domaria media integrated in TGT provides different challenges for students. They will be encouraged to pay attention to the teacher's explanation in order to answer questions during the game and competition. This is done to win the title of the best champion in their class.

Furthermore, the questionnaire results of student and teacher responses to Domaria media in the TGT model consisting of 15 questions in small groups received a percentage of 100% on each question. Thus, Domaria learning media in the TGT model is considered very feasible to be applied in the process of teaching and learning Mathematics of Volume of Spaces.

Large Group Usage Test

In the next stage, Domaria media that has been tested in small groups is then tested in large groups. The use trial in the large group was conducted with a sample of 31 fifth grade students of SDN Karangayu 03.

The implementation in this large group was the same as in the small group, namely there were three stages. The first stage, students work on pre-test questions. This was done to determine the initial ability of students in solving math story problems on the material of Volume of Spaces before using Domaria media. The second stage is the learning process using Domaria media integrated in the team games tournament model. The learning that was conducted was based on the syntax of TGT according to Slavin.

In the class presentation, the teacher explains the material related to the volume of the space. The next step, students will be divided into groups with members who have heterogeneous cognitive abilities. Next, students will enter the game stage, namely working on questions with an easy level. After that, at the competition stage students will be introduced to Domaria media. The use of Domaria media has almost the same game rules as ludo in general. The difference lies in the game being played in groups and there are question cards in this media. In this media there are two question cards, namely gift cards and challenge cards. Students will get a score of 1 if they successfully answer the questions on each card, get a score of 0 if they don't answer, and will get a score of -1 if they answer incorrectly. At the end of the lesson, the teacher will accumulate the scores obtained by each group in the game and match stages. The group with the highest total points will be awarded a certificate by the teacher.

The third research stage is that students are given post-test questions and response questionnaires after carrying out learning using Domaria media integrated in the TGT model. The following is a graph of the increase in pre-test and post-test scores of each student in a large group.

After obtaining pre-test and post-test scores in the large group, paired T-test and N-Gain test were conducted. The paired sample T-test was conducted to determine whether Domaria media combined with the TGT model can have an influence in solving math story problems. Based on the paired sample test using the help of the SPSS version 25 application, the results obtained an average increase of 38.25 with sig (2-tailed) of 0.000 or it can be said that 0.000 <0.05. This means that there is an effect in the form of an increase in the average post-test value from the previous pre-test value.

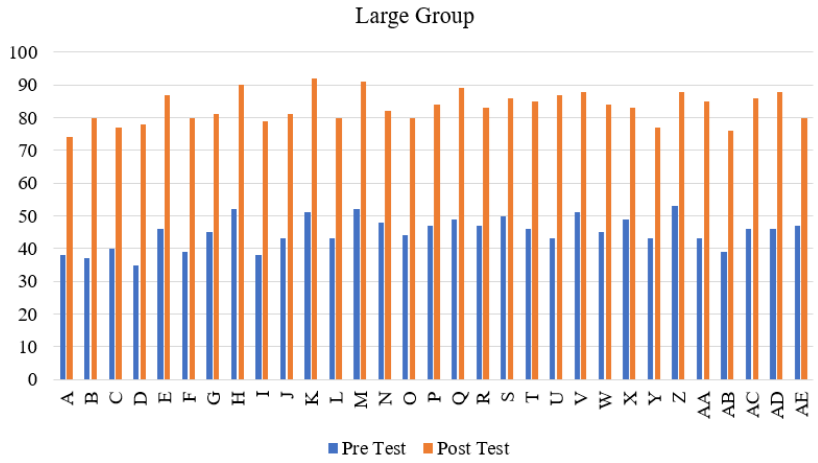

Figure 8. Large group pre-test and post-test values

This is reinforced by the results of the effect size test (Cohen's d). The results of this test are obtained from the average divided by the standard deviation, which is obtained as a result of 8.04. This means that the treatment carried out has a large effect or influence on student learning outcomes in large groups (Cohen, L., Manion, L., & Morrison, 2007).

Furthermore, the N-Gain test was conducted to check the effectiveness of using Domaria media integrated in the TGT model. Below is the N-Gain test in the large group.

Table 3. Large group N-Gain

	N	Minimum	Maximum	Mean	Std.Deviation
N-Gain	31	.58	.84	.6992	.06683
N-Gain (Persen)	31.00	58.00	84.00	69.92	66.83

Based on the N-Gain table above, the average N-Gain is 0.6992 or 69.92%. Thus, when referring to the N-Gain effectiveness standard, it is included in the medium or moderately effective category. Therefore, Domaria media integrated with the TGT model is suitable for use to help improve students' academic abilities because this media and model contain elements of competition in it which can spur students' enthusiasm to excel from other friends. This finding is in line with the conclusion of (Karakoç et al., 2022) which states that game-based learning has a positive impact on students' academic achievement. Meanwhile (Wongsaming et al., 2023) also said that students who received TGT teaching had higher math skills compared to students who received teaching with conventional models. The following is the presentation of N-Gain from each cognitive level in the large group.

Based on the graph, it shows that the C3 level question indicator obtained an N-Gain score of 1.53, the C4 level of 1.31, the C5 level obtained a score of 1.05, and the C6 level obtained a score of 1.03. These results show that students are quite difficult in solving math story problems at the C5 and C6 levels compared to the C3 level and C4 level. The low N-Gain value at level C5 is due to the lack of students' ability to evaluate the correctness of the answers to the problems presented. While at the C6 level due to the

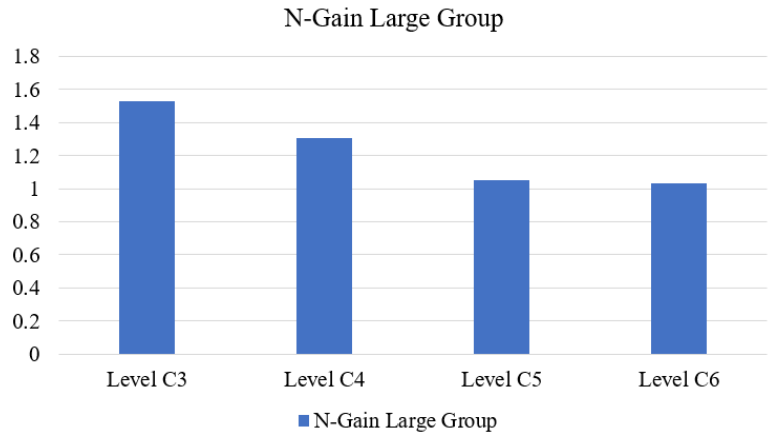

Figure 9. Large group N-Gain

lack of understanding of students in providing alternative solutions to the problems in the problem.

The challenge in applying Domaria media integrated in TGT in this large group is conditioning the class to remain calm. This was due to the limited classroom space that made it difficult to mobilize students during the competition. However, this can be overcome by asking students to come forward to the front of the class in order based on their participant number. Students who come forward to the front of the class are carried out in turn and those who have not had their turn to compete at the competition table can sit in their respective seats.

Furthermore, the questionnaire results of student and teacher responses to Domaria media in the TGT model consisting of 15 questions in this large group also received a percentage of 100% on each question. Thus, Domaria learning media in the TGT model is considered very feasible to be implemented in the Mathematics learning process on the material of Volume of Spatial Buildings in Class V.

▪ CONCLUSION

The cheerful math ludo media (Domaria) about the Volume of Spaces integrated into the TGT learning model is a media that is suitable for use in improving the ability to solve math story problems for grade V students. This is based on the media validation test to several validator experts, including media validators getting a score of 91.7%, material validators getting a score of 91.7%, language validators getting a score of 81.3%, and the results of teacher and student responses getting a score of 100%. Furthermore, it can be seen from the small group that obtained paired T-test results with a Sig value. (2-tailed) 0.000, which shows that the average post-test increased from the previous average pre-test. Then, the results of the small group N-Gain test were 0.627 (medium category). While the results of the paired T-test in the large group also showed a sig value. (2-tailed) 0.000 which shows that the post-test average has increased from the previous pre-test average. The result of the large group N-Gain test is 0.699 which is categorized as moderate. So, it can be said that Domaria media integrated in the TGT model is effective to be applied in learning Mathematics material on Volume of Class V Spaces.

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