

DEVELOPMENT OF DIGITAL MEDIA AND *LUDO EKSPONEN* TO IMPROVE LEARNING OUTCOMES OF GRADE IX JUNIOR HIGH SCHOOL STUDENTS

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Abstract:

This study aims to analyze the use of digital media and *Ludo Eksponen* which has been developed using the ADDIE model in *Team Games Tournament* (TGT) type cooperative learning. Furthermore, at the stage of implementation and evaluation of the media, it was seen its effectiveness on mathematics learning outcomes, for junior high school students in class IX on the square number and square root material. The subjects of this study were 30 students at one of The Al-Amien Junior High Schools in Sumenep Regency. The data collection technique used direct observation and giving *pretests* and *pot-tests* to research subjects. As a result, there was an increase in the average value between the *pretest* and *post-test* results, which was 7.54 and 53.65, respectively. By using a *Paired Test sample t-test*. Based on the results of the study, it can be concluded that the use of digital media and *Ludo Eksponen* as manual media in cooperative learning type *Team Games Tournament* (TGT) was quite effective in improving student learning outcomes on the square number and square root.

Keywords: *Learning Media, Cooperative TGT type, Learning Outcomes, square number, square root.*

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INTRODUCTION

The benefits of technological developments for human life are deeply felt, one of which is in the field of education. The integration of technology in the learning process in the classroom is very important because it can foster the ability to think critically and logically in students (Yi, 2016). The use of technology in the teaching and learning process in the classroom will help students in learning with the teacher acting as a facilitator (Yi, 2016). The enormous challenge made by teachers is to balance mental tools, paper-pencil and digital both in terms of



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teaching and learning and assessment of activities in the classroom. using mathematical concepts that are difficult for students to understand (oglar Prieto, 2014).

According to Salim and Tiawa (Salim, 2015) Learning to use technology is a change in the learning process of immigrating from teacher orientation to students. Learning mathematics using animation can influence students in creative ways of thinking to build mathematical concepts. One of the technologies that can be used in mathematics learning in the classroom is digital media. Digital media can be used to make it difficult in the process of learning mathematics in the classroom which can create learners who provide students. This is because many students complain about mathematics as a very scary scourge, not even a few students who don't like mathematics (Anam, 2021).

The results of Naz and Akbar's research (Naz, 2018) state that "*Teaching and learning are considered complex processes, influenced by different multiple factors, including use of media or instructional aids, which results from the active involvement of learners and makes teaching more interactive*". Teaching and learning are considered complex processes, influenced by a variety of factors, including the use of media or tools in learning that result in the active involvement of learners in making teaching more interactive. Therefore, efforts must be made by educators by creating innovative and creative learning media so that students can be actively interested in the coaching process of mathematics studies in the classroom and consider mathematics to be a fun learning and easier to understand mathematics (Kurniawan et al., 2019).

The use of digital media as an auxiliary medium in the learning process as a support for technology, there are also traditional media such as *Ludo Eksponen* that can attract students to learn mathematics. *Ludo Eksponen* media is familiar to students so that it is used as a math-based game, then made as interesting as possible with modifications to the ludo board replaced containing questions mathematics is filled with funny pictures so that classroom learning becomes fun and not boring. The media expected that students can actively participate in mathematics learning. The participation in question is that students play directly in this *Ludo Eksponen* and the teacher is not the center of attention so there is feedback between students to students and students to teachers as well.

Ludo Eksponen is a game that uses a game board, dice and pawns where in this game it takes four players who run the pawn with the help of their groupmates s when you get a question every time you shake the dice. The winner in this game is the player who first finished at Home. Through this Ludo Exponen game, students are asked to work together in solving each question and strive to become winners in this game. This is related to the Team Games Tournament (TGT) type of Cooperative learning model. Several related studies have previously revealed that the Team Games Tournament (TGT) type Cooperative Model in the defense of mathematics with technological media and manual media can improve student learning outcomes. According to (Khotimah. H, 2016) said that mathematics learning with the use of learning media can improve students' cognitive abilities, physical development, on emotional development and can improve positive character in students. According to (Amkas, 2017) said that the use of learning media with a cooperative model of the Team Games Tournament (TGT) type is

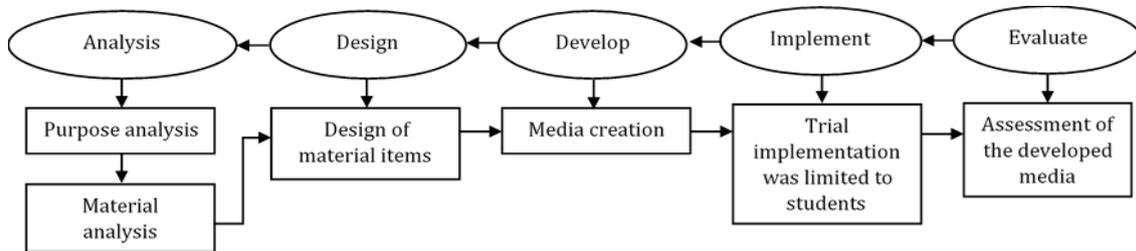
effectively used to improve student learning outcomes. Meanwhile, the research conducted by (Salam, 2015) shows that the TGT model using technology-based media can improve student learning outcomes and increase positive attitudes after using these media (Hasiru, 2021).

RESEARCH METHODS

This research is development research that refers to the ADDIE development model developed by (Richardson, P. S., Jain, A. K., & Dick, 1996) including *Analysis, Design, Development, Implementation, and Evaluation*. The stages of research that have been carried out are:

- 1) *Analysis stage* (purpose analysis and material analysis)
The activities carried out before starting development are the analysis of goals and the analysis of the material. The purpose of developing this learning media is to support understanding and can improve student learning outcomes, especially among junior high school students. The material used is a ranked number and a root that feeds the material at the high school level.
- 2) *Design stage* (design of material items)
This stage is used in the process of designing the items that will be presented in the learning media. In this study, there were two media developed, namely digital media and manual media. So that making the design of the material items needs to be distinguished in the two media. Digital media is designed as a learning medium that helps in understanding the square number and square root material. Meanwhile, the media manual is a game to find out students' mastery related to the material of rank and roots. In addition, it also collects materials needed in the development of the media.
- 3) *Development stage* (media creation)
The creation of learning media is carried out differently and uses different devices. The creation of digital media in this study used *Microsoft Visual Basic Applications* (VBA) applications using animated displays with an Indonesian theme and then published with *Adobe Flash software*. Meanwhile, the manual media using the *CorelDRAW* application is then printed in the form of a board sized **58cm × 58cm**. Digital media and manuals that have been developed, are then consulted and validated by media experts, namely learning media expert lecturers.
- 4) *Implementation stage* (trial implementation was limited to students)
The *implementation* stage uses cooperative learning with *the Team Games Tournament* (TGT) model for 30 class IX A students at Al-Amien Junior High School, Sumenep Regency. Before carrying out the implementation, students are given a *pretest* first to find out the initial learning outcomes of students, then given the implementation of learning media using digital media and manual media which is named *Ludo Eksponen*.
- 5) *Evaluation stage* (assessment of the developed media)
After being given cooperative learning with digital media assistance and manuals, students are given a *post-test* to see changes and improvements in student learning outcomes as the last stage (evaluation) of the theory development of ADDIE.

The development of learning media was completed, then data analysis was carried out. Mainly in the comparative data of the average values obtained during the *pre-test* and *post-test*, using quantitative statistics 16.0 with the *Paired-Samples T-test*.



Picture 1. Research flow in the ADDIE model

RESULTS AND DISCUSSIONS

Research Result

Analysis Stage

Analysis of the objectives and material is carried out by direct observation. The results of the observations found that there was a statement from one of the teachers and students who stated that there was difficult material at the high school level, namely in the square number and square root material. These results are corroborated by the results of research by Rusdianti et al. that there are often mistakes in performing square number and square root operations (Rusdianti & Eka Kususma Hindrasti, 2022).

Design and Development stage

The following is shown the design which is then made as a learning medium on digital and manual-based rank and root material.

1) Digital learning media

The display on digital media consists of Material, Practice questions and Quizzes. The material button consists of the material of the concept of rank and the properties of square number and square root. The concept of rank given contains apperceptions so that students can more easily find out about the concept of square number. Meanwhile, in the traits of rank and root, there are nine traits of square number and square root that students can use to learn and find out more about their traits.



Picture 1. Main Menu View

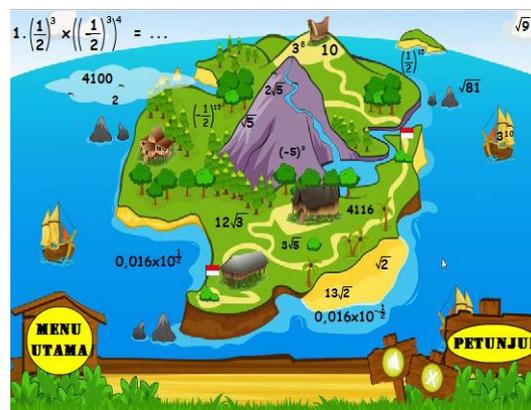


Picture 2. Material Menu

Furthermore, on the Practice Questions button, there are two options, namely Easy Questions and Expert Questions. The details of the easy questions consist of several practice questions that have a lower level of difficulty compared to the Expert Questions. The last display is a Quiz that contains a question in the upper left corner and students are asked to answer the question by clicking on one of the answers that appear on the screen. Some of these buttons aim to foster students' curiosity more deeply through the discovery process of the material being studied, such as previous research which stated that learning media with the discovery method can improve students' understanding (Darmawan, 2019).



Picture 3. Question Practice



Picture 4. Quiz Display

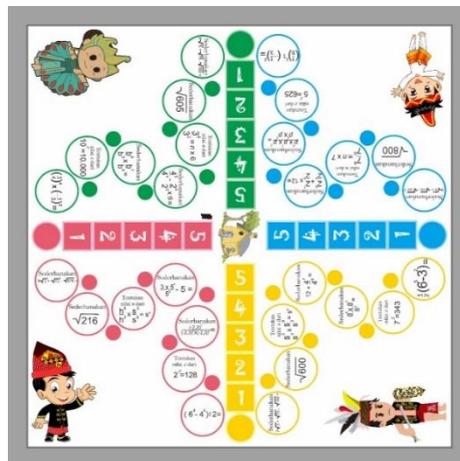
2) *Ludo Eksponen* as manual learning media

This manual learning medium is named *Ludo Eksponen*. This media is inspired by a traditional game, namely the game of ludo, wherein on the game board there are boxes that each player must pass through. And then some boxes match their respective colors to the Home. Alvi and Ahmed (Amkas, 2017) stated that ludo games are traditional games played by 2 to 4 players. In the Ludo game, the players have to set a strategy to race to run four pawns by using the dice value to achieve the goal to win the game.

The learning media on *Ludo Eksponen* is designed using the CorelDRAW application and then printed on a game board measuring 58 cm × 58 cm. Dice and

pawns are required to play the Ludo Board. The number of dice that comes out will place the position of the pawn on the game Board. On the game board, some questions must be answered by the student, if the student fails to answer a question then the student is asked to take three steps back, the student who successfully answered then the pawn can occupy the circle of the question. Then the students who manage to get to the number boxes to Home will be given a question card containing expert-type questions that must be answered by students. This learning media is also equipped with the answer key to each question.

Ludo Exponen manual media is given after the provision of digital media which aims to find out students' mastery of the material of rank and roots. Here is what the manual learning media looks like.



Picture 5. Ludo Eksponen

Implementation stage

The application of learning media that has been developed is carried out at this stage. Of course, the implementation of the application of these media is through cooperative learning of the *Team Games Tournament* (TGT) type. Cooperative learning is a learning model in which students learn and work in small heterogeneous groups of 4-6 students in the classroom (Anggraini, 2018). The Teams Games Tournament (TGT) learning model is one type or model of cooperative learning that is often and easy to implement. The TGT model involves the activities of all students regardless of status and then the role of students as peer tutors and contains elements of play (Anggraini, 2018). TGT is one of the cooperative learning where the learning process takes place in groups with peer facilitators who can make students active because they use the academic tournament system. Learning activities with the *Ludo Exponen* game designed in the TGT model learning allow students to learn to enjoy and be motivated in doing the given questions to foster a sense of responsibility, and cooperation in the game, as well as healthy competition and learning engagement. Before applying these learnings, researchers provide *pretests* to determine students' initial learning outcomes (Kamin, 2020).

Evaluation Stage

Learning media that have been applied are then evaluated and analyzed. The analysis was carried out using quantitative statistics of SPSS 16.0 by comparing the average values obtained at the *time of pretest* and *post-test*, because the samples were bound to each other, the statistical analysis used the *Paired-Samples T-test*. The result is as follows.

Table 1. The result of Paired-Samples T-test

		Paired Samples Statistics			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Student pretest score	7.5497	30	14.84563	2.71043
	Student posttest scores	53.6553	30	19.87393	3.62847

In the results above the average value of the pre-test and after being given learning using ICT media and supported by the ludo exponent manual media, there was an increase in the average post-test score. Quantitative statistical calculations can be written as follows.

$$H_0 = \mu_{pre} = \mu_{post}$$

$$H_1 = \mu_{pre} < \mu_{post}$$

The research hypothesis in H_1 .
 Using the Left-Party Test.
 The SPSS results are as follows.
 t. value $-13,033$

$$\alpha = 0,05$$

$$\frac{1}{2} sig(2 - tailed) < \alpha$$

Because using the Left Party Test, the value of t.count < 0 and $\frac{1}{2} sig(2 - tailed) < \alpha$ then rejected H_0 so that it is H_1 accepted.

Table 2. The result of Paired Samples Test

		Paired Samples Test							
		Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	student pretest score								
	- student posttest score	-4.6106	19.3757	3.5375	-53.3407	-38.8707	-13.033	29	0.000

Discussion

After calculations were carried out using statistical tests, it was found that by using digital media and supported by the ludo exponent of manual media, student learning outcomes increased. This is supported by analysis carried out on students' answers to each question in the pre-test and post-test. The questions in the *pre-test* and post-test use the same question weight. In question number 1 in *the pre-test*, there are only 3,33% of students can describe what rank is, and 96.67% of students are wrong in describing rank. Meanwhile, in *the post-test*, there were 88.33% of students were able to describe the rank correctly. The remaining 11.67% of students are still mistaken. Furthermore, in question number 2, it is ordered to write down one of the traits of rank. The answer students for the pre-test, there were 23.33% of students could write down one trait on the rank correctly, and the remaining 76.67% of students could not write down the trait on the rank. Most of their mistakes are writing down the nature of the rank by using words such as the nature of the rank is always with the rank, a number that is many times over, and incorrectly using the operation. While in the *post-test* there were 73.33% of students could answer correctly the question in number 2, even 22.72% could answer more than one trait at the rank, and the remaining 26.67% were still wrong in answering this question. Then question number 3, request to do the ranked number operation, in the pretest, there are only 20% of students can solve this problem and 80% of students are wrong in solving this problem. Most students solve it by summing it first and then multiplying it. While the regulations for the addition and multiplication operations should take precedence over the multiplication operations. After being explained through the learning process using media, finally, the results on the *post-test* for question number 3 produced better results, namely 83.33% of students were correct in solving the questions, and the remaining 16.67% of students were still mistaken in solving this problem.

Furthermore, in questions number 4 and 5 *pretests*, all students were wrong in doing this question. This question requires knowledge of the traits of rank, so many students do not do this question. Meanwhile, in the post-test for

these two questions, there was an increase but only in a few students. For question number 4, there are 10% of students are trying to complete but are still not fully correct. And for question number 5, there are 6.67% of students are correct in solving this problem. Then question number 6 *pretest*, there are only 3.33% of students can solve this problem, and the remaining 96.67% of students are still wrong. Most of the students do not do this problem because it requires analysis first. Meanwhile, in the *post-test*, there was an increase, namely that 56.67% of students could complete this analysis problem, and the remaining 43.33% of students were still mistaken in completing it.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the analysis and discussion, it can be concluded that digital learning media and the Ludo Exponen manual are effective in improving learning outcomes in rank and root materials. This can be seen from the results of the analysis of the average *pretest* and *post-test* of students who have increased, and the description of the results on each *pretest* and *post-test* question that has increased. This shows that learning using learning media can improve students' understanding, and is easier to understand on material that tends to be difficult than without learning media (Saputra et al., 2018).

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