Journal of Teaching and Learning Mathematics

Manuscript templates of JTLM (pp. 137-141)
https://ejournal.umm.ac.id/index.php/jtlm

Application of Zathura mathematics media to improve critical thinking ability

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ARQICLE INFO.

Keywords:
Critical *Thinking*;
Instructional Media;
Zathura Games

Abstract

This study aims to increase students' critical thinking ability through applying Zathura Mathematics media. This research is quantitative research with an experimental approach. The research was conducted at the MTs Mathla'ul Anwar Rawa Selapan school with samples from classes VII B and VII C. The data collection instrument was a validation sheet—assessment, sheet posttest, and documentation. The average value of the results Study or the mean is 47.68 and 57.59. Therefore, descriptive statistics can conclude that there is a difference between learning using Zathura Mathematics media and not using media. Sig value. (2-tailed) of 0.086 > 0.05, it is concluded that H0 is accepted and H1 is rejected, which means there is no significant difference between learning using Zathura Mathematics media and learning not using media. This research concludes that there is no significant difference between learning and using Zathura Mathematics media and learning without media. External variables may influence the research results but cannot be controlled by the researcher. However, descriptive statistics can conclude that there is a difference between learning using Zathura Mathematics media and not using media. With the results of this research, it can be said that there is an influence on the use of learning media. Zathura Mathematics can improve students' critical thinking abilities.

To quote this article: *Reihani et al. (2024). How valid is AR-enabled e-module development in a Palembang wardrobe context? Journal of Teaching and Learning Mathematics, 1(2), 137-146. https://doi.org/10.22219/jtlm.v1i2.31626*

1 Introduction

Mathematics is one of the subjects taught at all levels of formal education in Indonesia. Mathematics is a science that includes intelligence in calculating and accuracy in answering. However, for several factors, mathematics is one of the subjects that students do not like. Many students do not understand the subject matter due to the learning methods and limited media used by teachers who are less effective in carrying out learning in class, so mathematics becomes a subject that is considered difficult and even considered the most frightening by students. The results of interviews with teachers at schools found that there were still students who had difficulty learning mathematics subjects, less attractive teaching materials, students who were lazy when reading, and limited use of learning media.

A tool or resource used to assist in the mathematics learning process is known as mathematics learning media. Although learning media can increase students' understanding and involvement in mathematics, problems often arise in its application. Differences in levels of technology skills and mathematical understanding among students can be problematic. Using mathematics learning media can be an excellent solution to overcome the problem of boredom in class. Students who quickly get bored learning mathematics may face challenges in maintaining attention to the material taught using conventional methods (Ulfa

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ISSN: 3025-745X

Sadina Mukarima et al., 2024). Improper use of learning media can reduce learning effectiveness, result in low understanding of the material, and reduce students' interest in learning. For this reason, it is necessary to use more exciting teaching aids to increase students' understanding of the material and interest in mathematics.

Several researchers have developed Board media Games Zathura Mathematics and proved the positive impact of using this media, including research conducted by Anggreiny and Bambang (2018), and Wahyuningsih and Danang (2019). These two studies conclude that the media board game Zathura Mathematics is valid, practical, and effective as a learning medium, especially in mathematics. Media *Board Games Zathura Mathematics* can help students directly experience the learning process, so it can help improve learning difficulties to results Study students.

Thinking ability constitutes a component of the ability to think level carry-on, allowing somebody to identify challenges, formulate relevant ideas, and address problems according to their beliefs. Various element evaluation covers the ability to think critically and falls into the ability to understand, analyze, evaluate, and retrieve decisions to solve a problem. To enhance the ability to think critically, students are very dependent on the crucial role of the educational process involving the application of appropriate learning methods. Achievement is associated with a high level of critical thinking ability in students, which is better the ability to filter information according to expectations. Thus, learning methods to improve students' critical thinking abilities are crucial (Hamdani and Karyanto, 2019).

Based on the matter, the researcher will apply media *Board Games Zathura Mathematics,* which can help students learn. Media *Board Games Zathura Mathematics* can also be used as a tool to develop learning based on aspect validity, practicality, and effectiveness, especially for learning mathematics on plane figures, as well as a means of training for students and can used by educators to improve students' ability to think critically.

2 Method

This research method uses a quantitative approach. The type of research method used is a quantitative experimental research method. The experimental method is an approach used to investigate the impact of a particular treatment on other variables in situations that can be controlled (Syafira, 2023).

MTs students Mathla'ul Anwar Rawa Selapan class VII. One class was chosen as the initial trial class, namely class VII A, class VII B as the control class and class VII C as the experimental class. The sampling technique applied in this research is *Cluster Random Sampling*.

Research instruments include learning instruments and data collection instruments. They are learning instruments in teaching modules, and Zathura is *learning media mathematics.* The data collection instruments were validation sheets, *post-test question sheets* and documentation.

The instrument has been validated with *Person Correlation* and has a positive value. Then, it can be concluded that each question item is valid. Then, the reliability test uses *Cronbach's formula Alpha* of 0.342 so the instrument can be dependable.

By comparing the control and experimental classes, the control class received learning instructions as usual, while the experimental class received special treatment with the application of *Zathura media Mathematics.* Then, both groups were given a posttest. The data analysis technique used is the *Independent Samples T-Test* using IBM SPSS version 21 *for software Windows* 2016.

3 Results and Discussion

In this research, data analysis will be carried out using the *Independent Sample T-test.* The test was used to assess whether there were significant differences in critical thinking abilities between groups of students who used Zathura media mathematics and groups of students who did not use Zathura media mathematics. Independent Sample T-test was conducted on post-test data from the experimental and control groups.

Group Statistics

	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Hasil Belajar Matematika	Kelas VII B	28	47,68	21,794	4,119
	Kelas VII C	27	57,59	20,209	3,889

Based on the "*Group Statistics"* output, it is known that the total number of learning outcomes data for class VII B is 28 students, while for class VII C, it is 27 students. The average value of learning outcomes or mean in class VII B is 47.68, while in class VII C, it is 57.59. Thus, descriptive statistics can conclude that there are differences between learning using *Zathura media mathematics* and not using media.

Based on the output *Independent Samples T-Test* in the "*Equal" section, variances assumed "* known Sig value. (2-tailed) is 0.086 > 0.05. Thus, it can be concluded that there is no significant difference between learning using *Zathura media mathematics* and learning not using media.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Belajar Matematika	Equal variances assumed	,262	,611	-1,748	53	,086	-9,914	5,673	-21,292	1,464
	Equal variances not assumed			-1,750	52,922	,086	-9,914	5,665	-21,276	1,448

3.1 Critical Thinking Ability

Think critical is the ability to memorize information and apply and manage the material studied in the context of a new situation. Critical thinking is a process that uses reasoning logically and systematically, involving collecting information or data to understand a problem and then choosing appropriate action to resolve or overcome the situation (Kurniawati and Arta, 2020). Critical thinking ability is the skill to collect and analyze diverse information by taking advantage of a person's knowledge to formulate a conclusion. Thinking ability is the skill to think at levels possible for an individual to recognize problems and develop ideas consistent with beliefs to finish problems (Prayitno BA and Karyanto, 2019). From the definitions, the ability to think critically is a method that uses incoming reasoning sense to know problems and find ideas as the solution.

3.2 Instructional Media *Zathura Mathematics*

As elements in context learning, media should become an inseparable and necessary part of harmony with the learning process. The final stage in choosing the application of media in learning is implementation from the media, which makes it possible for students to interact with the selected media. Learning media is an instrument or means of learning used by teachers as the intermediary to facilitate the learning process in the classroom and improve the effective verbal interaction between teachers and students (Novianti, Luthfi and Arsyi, 2022).

Zathura involves games four players and, in essence, gives rise to a series that is a challenge overcome during the game. Successful participants finish every challenge correctly to advance movement pawns in the game. By principle, the game *Zathura* will be implemented in this research has almost the same rules identical to the rules a game contained in the film "*Zathura*". It is a challenge manifested as obstacle animation if it is in a movie. Then, a challenge will appear as a designed math problem in this research. Thus, these math problems presented interestingly are expected to increase students' thinking ability.

Making rules and guidelines play has been structured with adjustments in order to be able to be well understood. Thus, players will not feel Confused when using this media. Each member has a personal obligation to participate in a group game. After compiling the rules and guidelines for play, the next step is to elaborate on a tool that will used in the *Zathura Mathematics Board Game,* such as track game *Zathura,* card question, card awards, card punishment, and pawns. Path design *Zathura is* taken from the general concept of the game *Zathura* with themes outside space; however, it is modified with pawns and consists of 40 stairs from the starting point to the *finish* line. *Question* card: there are 40 questions. Cards' questions cover questions and points, with questions placed at the top and information points (steps) earned by answering in a correct way located at the bottom. Composed of 15 reward cards with four categories: 1) assistance answer, 2) take a card more questions, 3) exchange card questions, and 4) move forward 1 step. Next, the punishment card consists of 15 cards with four categories: 1) return to start, 2) do not participate in one rotation, 3) take two steps back, 4) do five push-ups. In the *Zathura Mathematics* Board Game learning media, four pawns are used. Colors are selected randomly to make distinguish one pawn from another easier.

Figure 1. Learning Using Zathura Mathematics Media

Besides the fourth equipment, there are several tool additions like sheet instruction containing prologue, components games, hints play, guide use card reward and punishment, and answer key. Making key answers aims to make things easier for players by checking the players' answers (Wahyuningsih and Danang, 2019). In the learning process, the way to use this game is even more so formerly shared among students in the class inside several groups. After all, they got respective groups, then lined up by his group. Then, determine the first player.

Furthermore, the first player of each group starts the game with a way to take card *questions.* If the answer is correct, the player is recommended to take reward cards, and the player's step proceeds according to the points obtained on the question card. If the wrong answer is given, then the player still places and takes a card punishment. Then, do what is stated on card *punishment.* Then the game is next by players until finished. The winner is the player who reaches the *finish* line fastest.

The Zathura Mathematics game can improve students' critical thinking skills because it involves various elements that require analysis, evaluation and logical problem-solving. The following are several reasons why this game can improve critical thinking skills: 1) Mathematical challenges: This game presents challenges that trigger students to think critically to solve problems by applying the mathematical concepts they have learned and finding solutions. 2) Strategy choice teaches students to consider all options, plan their steps, and choose an effective strategy. 3) Risk evaluation teaches students to consider the risks of each of their actions and weigh their decisions carefully so that mistakes do not occur. 4) Collaboration and communication: this game requires communication between players in groups to discuss and work together to find optimal solutions to solve problems.

Thus, the Zathura Mathematics game effectively builds and improves students' critical thinking abilities through a fun and interactive gaming experience.

4 Conclusion

There is no significant difference between learning using Zathura media mathematics and learning not using media. However, from descriptive statistics, it can be concluded that there are differences between learning using Zathura media mathematics and not using media. External variables may be included in the results of this research. It can be said that Zathura's learning media has an influence. Mathematics can improve students' ability to think critically. Therefore, this learning media can be used in the learning process because this learning media has been proven to improve students' ability to think critically.

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