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Developing of Inquiry-Based Interactive Edpuzzle Media to Improve Students' Mathematics Learning Outcomes

Ernawati*, Rangga Firdaus, Sugeng Sutiarso, Karwono
Email Coresponding*: spd.ernawati1980@gmail.com
Master of Educational Technology, FKIP, University of Lampung, Jl. Prof. Dr. Ir. Sumantri Brojonegoro No. 1, Gedung Meneng, Kec. Rajabasa, Bandar Lampung City

Abstract

Teaching materials and media are one of the important components in a learning process. The lack of teaching materials is one of the impacts of the teacher-centered learning process, so students do not have a culture of independent learning. This study aims to determine the effectiveness of the development of inquiry-based Edpuzzle interactive learning media. This research is a research and development study using a mixed approach (Mixed Method) which aims to determine the effectiveness of edpuzzle product development. By using the ADDIE model, analysis, design, development, implementation and evaluation of the development of a product. The sample of this study amounted to 30 students. The research technique uses an assessment instrument technique. And data analysis using quantitative data from pretest and posttest scores which are then tested using the N-Gain statistical formula. The effectiveness of the development of inquiry-based edpuzzel interactive media products in math number pattern material has a high level of effectiveness with 71.2% results with a very high level of effectiveness, and the Sig. (2-tailed) is 0.000

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Introduction

Education plays a major role in the process of developing human resources. Improving the quality of education is a process that cannot be separated from the process of improving the quality of human resources itself. Education is the main key to the success of a nation in competing at the global level. The importance of education is a process of transferring information and values. As long as this process occurs, there will be changes in reasoning and attitude taking towards better things. The purpose of national education contained in Law No. 20 of 2003 is to develop the potential of students to become human beings who are faithful and devoted to God Almighty; noble, healthy, knowledgeable, capable, creative, independent and become democratic and responsible citizens (Program et al., 2015).

In essence, teaching and learning activities are a communication process. The communication process (message delivery process) must be created or realized through the delivery and exchange of messages or information by each teacher and learner. Learners as raw input and education subjects have individual characteristics that need to be understood by educators, including learners are individuals who have unique physical and psychological potential, so they are unique people, learners as developing individuals, individuals who need individual guidance and humane treatment, and individuals who have the ability to be independent (Yudasmara & Purnami, 2010).

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In general, learning activities are only oriented towards the delivery of material by the teacher without involving students. Classical learning does not provide opportunities for students to build their own knowledge. Menekse, et al stated "constructive activities are expected to enhance learning better than do active activities because constructive activities allow students to generate new knowledge and repair old knowledge". This opinion means that activities that build student knowledge can create better and more meaningful learning. Activity is needed in the learning process to build students' knowledge. Sardiman argues that student learning activities include interconnected physical and mental activities. These two activities affect the learning outcomes obtained by students. This is in accordance with the opinion of Ayaz and Sekerci who stated "constructivist learning approach which uses a different view in learning activities, has an important contribution on the academic achievement of students and on the durability of the information learned". This opinion means that learning to build student knowledge can improve student achievement and understanding of the information learned (Indrastuti et al., 2017).

Student learning outcomes are achievements that students achieve academically through exams and assignments, actively asking and answering questions that support the acquisition of these learning outcomes. In academic circles, the thought often arises that the success of education is not determined by the student's grades listed on the report card or on the diploma, but for the measure of success in the cognitive field can be known through the learning outcomes of a student. According to Syaiful Bahri Djamarah and Aswan Zain in Supardi (2012), to determine indicators of learning success can be seen from "student absorption and behavior that appears to students. The intended learning outcome is the achievement of learning achievements achieved by students with predetermined criteria, or values ". Meanwhile, according to Nana Sudjana, the cognitive domain deals with intellectual learning outcomes consisting of six aspects, namely knowledge or memory, understanding, application, analysis, synthesis and evaluation. This domain emphasizes more on the ability to think logically and rationally (Dakhi & South, 2020).

Initial observations at SMP N 1 Padangratu found that the learning outcomes of class VIII students in Mathematics subjects had decreased significantly. Based on the results of the Mathematics Midterm Examination of 28 students in class VIII, they had difficulty in receiving learning messages carried out by educators, as well as a lack of interest and motivation of students. Factors in the decline in student learning outcomes, based on the results of interviews conducted with Mathematics teachers and students, it is known that:

"The learning process of Mathematics tends not to be varied, conventional methods are the main methods given by educators to students, the lack of learning media is also the main cause in the learning process of Mathematics. (interview with Mathematics subject teacher". July 5, 2022 at 13.40Wib).

Furthermore, interviews conducted with students, it is known:

"Learning mathematics at SMP Negeri 1 Padangratu Lampung Tengah, tends to be monotonous and uninteresting, the lack of creativity and innovation from educators causes student learning outcomes to decline, the learning process in the classroom still uses conventional models such as listening and taking notes without any intermediary media as a means of learning, which causes student learning outcomes to decline". (interview with students ". July 6, 2022 at 11.10Wib).

Acording to Ali, the formal teaching and learning process in schools occurs through interactions between various teaching components. These components can be grouped into three main categories, namely: (1) teachers, (2) content or subject matter and (3) students. The

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interaction between the three main components involves facilities and infrastructure such as methods, media, and the arrangement of the learning environment, so as to create a teaching and learning situation that allows the achievement of previously planned goals. Thus, teachers who play a central role in the teaching and learning process, at least carry out three main tasks, namely planning, implementing teaching and providing feedback (Yudasmara & Purnami, 2010).

Based on the results of the needs analysis of Mathematics Subject VIII SMP Negeri 1 Padangratu Central Lampung, the data are obtained in Table 1.1

Table 1 Learner Needs Analysis

No	Question Item	Percentage Criteria	
		Yes	No
1	Do you have difficulty learning math ?	82%	18%
2	Are your Math Learning Outcomes Declining ?	89%	11%
3	Does the teacher explain the material only with conventional methods ?	100%	0%
4	Do Mathematics Teachers Only Use Printed Books as Learning Media ?	100%	0%
5	Do all teachers in your school tend to use only printed books as learning media ?	82%	8%
6	Do you know Digital Media / Information and Communication Technology ?	4%	96%
7	Are you still using Media Classroom ?	0%	100%
8	When you use Media Classroom, do you feel bored ?	86%	14%
9	Do you like digital learning media ?	93%	7%
10	Do you know visualization media such as video, sound and animation ?	18%	82%

(Source: GoogleFoam)

Based on the results of the distribution of the Mathematics Subject needs analysis questionnaire to students in class VIII A, it is known that 81% of 28 students experience difficulties in the learning process, 89% of students experience a decrease in Mathematics grades, 100% of educators only explain with conventional methods, 100% of educators only use books as teaching media, 82% of teachers only use printed book media as learning media, 96% of students do not know digital media, students no longer use classroom media as learning media by 100%, 86% of students feel bored when using classroom media, 93% of students like digital learning media, 82% of students know visualization media. Based on the results of the table, it can be concluded that students are not interested in the learning methods and media provided by the teacher, students are more interested in using digital media after being shown powerpoint media during classroom observations.

Based on the problems in learning Mathematics for class VIII students, an educator is required to be able to develop learning so that it can be interesting and fun, of course, with interesting learning methods, with the innovation and creativity of an educator, learning is possible to succeed and improve student learning outcomes. Based on the needs analysis given a questionnaire to 4 (four) teachers and students of SMP Negeri 1 Padang Ratu, it is known:

Table 2 Teacher Needs Analysis for Mathematics Learning Media

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No	Question Indicator	Answer		Persentase
		Yes	No	
1	Do you only use classroom and whatsapp apps during the learning process?	4	0	100%
2	Do you only have classroom and whatsapp app accounts?	4	0	100%
3	Have you ever created your own Math learning app other than classroom or whatsapp?	1	3	25%
4	Does the school only provide classroom and whatsapp apps for online and offline learning?	3	1	75%
5	Do you need other Math learning apps besides classroom and whatsapp?	4	0	100%
6	Are learners interested in learning only by using classroom and whatsapp apps?	1	3	22%
7	Do you have any difficulties when using the classroom and whatsapp learning apps?	3	1	75%
8	Have you ever participated in digital media training ?	2	2	50%
9	Does Mathematics require digital learning media ?	4	0	100%
10	Have you ever asked the school to provide learning media other than classroom and whatsapp?	4	0	100%
	Total	30	10	100%

Source: Educator Google Form Questionnaire

Based on table 2 The results of the questionnaire from 10 question items (attached) show that, with a percentage above 100% of 4 teachers and students need the latest media, this is based on questionnaire question items that refer to the need for learning media such as using learning models and methods that have been provided from schools, classroom applications, google forms, zoom meetings and whatsapp as learning media, the absence of the latest learning media which causes a lack of interest in learning so that it impacts on student learning outcomes, especially in Mathematics Subjects.

Technology-based learning media used so far since the new normal era during this face-to-face meeting are classroom applications, google forms, zoom meetings and whatsapp. However, the four media used are less effective because there are many obstacles faced by teachers and students in their operation and utilization. Teaching materials and media are one of the important components in a learning process. The lack of teaching materials is one of the impacts of the teacher-centered learning process, so students do not have a culture of independent learning. The above phenomenon results in learning becoming meaningless. One solution to create meaningful learning that prioritizes student activeness and student-centered learning is to use computer-based media in learning and Interactive media is one of the computer-based teaching media used in learning.

One of the learning solutions that can be applied so that the learning outcomes of 8th grade mathematics students can improve is, using the Inquiry learning model. Learning activities that emphasize the critical and analytical thinking process to seek and find their own answers to a questionable problem, not only considered from a theoretical perspective, when running properly practiced can significantly improve student reasoning to be creative, critical, and problem solving skills and academic achievement will be achieved. Students' awareness

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can be increased so that they can be trained to carry out scientific problem solving procedures, students are trained that the discovery of science takes place through continuous research and support each other (Media et al., 2014).

In addition to the learning strategy that has been determined, educators must also be able to maximize the learning media that will be used in the process of delivering the learning media, one of the media that will be used in the Mathematics learning process, namely, Edpuzzle media. Edpuzzle is an application and video-based learning media that can be used by all teachers to make lessons as interesting as possible, videos can be taken via Youtube, Khan Academy and Crash Course then the video is entered into the Edpuzzle application and the teacher can ask questions and track whether his students are watching the video provided and how well students understand the material provided. (Amaliah 2020: 37). According to J.Moeller in the Hall When creating videos, you can make sure students don't miss videos, and set due dates. The students can go back to watch the video as many times as they like. In addition, EdPuzzle allows users to import videos from YouTube and add interactive components, such as multiple choice and open-ended questions. This Edpuzzle application is very varied because in addition to watching we are also given questions, so not only watching we also get more knowledge. (Sundi et al., n.d.).

Based on the results of Silverajah's research (2018: 4) The study found that EdPuzzle activities have good potential in developing students' self-learning skills and supporting learning, Edpuzzle provides additional resources to make learning easier so as not to be left out academically, which is a common practice in the classroom. In addition, based on the results of research (Sundi et al., n.d.) found that students enjoy using Edpuzzle in learning and things that must be considered well before using this media, especially in online learning, include supporting facilities and infrastructure, mental readiness of students in receiving learning and of course careful preparation from educators, starting from the planning stage, making learning videos, editing, to the evaluation stage.
Based on the background explanation above, the researcher is interested in raising the issue with the title "Effectiveness of Inquiry-based Edpuzzle interactive media development to improve learning outcomes of Class VIII students".

Research Methods

This research is a research and development study using a mixed approach (Mixed Method) which aims to determine the effectiveness of product development. By using the ADDIE model, analysis, design, development, implementation and evaluation of the development of a product. Furthermore, this research was conducted at SMP Negeri 1 Padang Ratu Central Lampung, the sample of this study amounted to 30 students. The research technique uses an assessment instrument technique. And data analysis using quantitative data from pretest and posttest scores which are then tested using the N-Gain statistical formula.

Research Results and Discussion

Research results

The effectiveness of using Inquiry-based Edpuzzel interactive media products developed in mathematics subjects of number pattern material includes differences in learning

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outcomes of VIII grade students conducted by researchers. This study was conducted four times the first meeting provided a pretest learning process design, the second to third meetings provided learning using inquiry-based edpuzzel interactive media products, the fourth meeting of researchers carried out the posttest.

Measurement of the effectiveness of the development of Inquiry-based edpuzzel interactive media conducted at SMP Negeri 1 Padangratu Central Lampung Regency class VIII. Measurement of effectiveness Based on the results of the pretest and posttest of the implementation of mathematics learning before and after using the product using the N-Gain formula, the results of the effectiveness data analysis using the SPSS application are as follows:

Table 3 Ngain Pretest and Posttest Results

No	Name	Pretest Score	Posttest Score	Ngain_Score	Classification
1	Responden1	42	86	0,76	High
2	Responden2	70	88	0,6	Medium
3	Responden3	50	88	0,76	High
4	Responden4	54	86	0,7	High
5	Responden5	42	84	0,72	High
6	Responden6	40	88	0,8	High
7	Responden7	58	88	0,71	High
8	Responden8	64	90	0,72	High
9	Responden9	50	88	0,76	High
10	Responden10	48	80	0,62	Medium
11	Responden11	70	92	0,73	High
12	Responden12	50	90	0,8	High
13	Responden13	48	88	0,77	High
14	Responden14	48	86	0,73	High
15	Responden15	50	92	0,84	High
16	Responden16	46	88	0,78	High
17	Responden17	72	94	0,79	High
18	Responden18	60	90	0,75	High
19	Responden19	60	90	0,75	High
20	Responden20	64	86	0,61	Medium
21	Responden21	74	88	0,54	Medium
22	Responden22	46	86	0,74	High
23	Responden23	48	88	0,77	High
24	Responden24	42	90	0,83	High
25	Responden25	40	70	0,5	Medium
26	Responden26	40	72	0,53	Medium
27	Responden27	72	88	0,57	Medium
28	Responden28	58	90	0,76	High
29	Responden29	58	88	0,71	High
30	Responden30	48	86	0,73	High

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Source: SPSS data (attached)

Based on the Ngain results, it is known that there is an Ngain_Score classification of 7 (seven) students getting a medium score classification, and 23 (twenty-three) students. Furthermore, the t test is carried out to determine whether the difference in the effectiveness of the two methods is meaningful (significant) or not, by interpreting the output table as follows:

Table 4 Paired Samples Statistic

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	53,73	30	10,619	1,939
	Posttest	86,93	30	5,058	0,923

Source: SPSS data (attached)

At the output of the two samples studied, namely pretest and posttest. For the pretest value, the average learning outcome or mean is 53.73, while for the Posttest value, the average learning outcome is 86.93. The number of respondents used in this study amounted to 30 students. Because the pretest value is 53.73 < posttest 86.93, it means that descriptively there is a difference in the average learning outcomes of math number patterns between pretest and posttest results. Furthermore, to show the results of the correlation or relationship between the two data is known as follows:

Table 5 Correlations

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest & Posttest	30	0,503	0,004

Source: SPSS data processing (attached)

Based on the data, it is known that the correlation coefficient (Correlation) value is 0.503 with a significant value (Sig.) of 0.004. Because the sig value. 0.004 <0.05, it can be said that there is a relationship between the pretest and posttest results of students' number pattern mathematics.

Table 6 t 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	Pretest - Posttest	-33,200	9,182	1,676	-36,628	-29,772	19,805	29	0,000

Source: SPSS data (attached)

Based on the results of the t test data, it is known that the Sig value. (2-tailed) is 0.000 <0.05, According to Singgih Santoso (2014: 265), the decision-making guidelines in the paired sample T-test test are based on the value (Sig) of the output results. Namely as follows:

1. If the Sig. (2-tailed) <0.05, then H0 is rejected and Ha is accepted.
2. Conversely, if the Sig. (2-tailed) > 0.05, then H0 is accepted and Ha is rejected.

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Sig value. (2-tailed) is 0.000 Next is to look for the t table value where the t table is sought based on the df value and the significance value of the output, it is known that the df value is 29 and the value of 0.05/2 is equal to 0.025. This value is the basis for reference to find the t table value in the distribution of statistical t table values. Then it is known that the value of t table is 2.045 (attached) thus, because the calculated t value is 19.805> 2.045, as the basis for decision making above, it can be concluded that H0 is rejected and Ha is accepted. So it can be concluded that there is an average difference between pretest and posttest learning outcomes of edpuzzel interactive media products based on inquiry math number patterns of SMP N 1 Padangratu students.

Discussion

SMP Negeri 1 Padangratu has the potential to develop technology-based learning media, especially in mathematics subjects, based on the conditions of learning characteristics of students really need the latest learning media, especially assisted by technological media. The development of interactive media edpuzzel based on inquiry mathematics number pattern material class VIII has the purpose of using it, namely to improve the learning outcomes of students, when before using interactive media edpuzzel based on inquiry mathematics number pattern material, class VIII students experienced a decrease in math learning outcomes.

The product development process is carried out using the research and development research method using the ADDIE approach which consists of analysis, design, development, implementation and evaluation. Product development of interactive media edpuzzel based on inquiry mathematics number pattern material has characteristics as video-based learning media, questions in interactive form, flexible learning settings, there is assessment and feedback, can collaborate and discuss.

The effectiveness of the development of interactive media edpuzzel based on mathematical inquiry of number pattern material has a high level of effectiveness with a result of 71.2% with a very high level of effectiveness, and the Sig. (2-tailed) is 0.000 The development of interactive media edpuzzel based on mathematical inquiry of number pattern material has attractiveness with the level of questionnaire distribution results obtained a score of 72.00% with very interesting criteria. The results of observations in the field show a positive response from students to the use of interactive media products edpuzzel based on mathematical inquiry of number pattern material, some of them say if the media is very interesting and easy to use, the material is easy to understand because it is related to everyday life. Based on the discussion raised, the development of interactive media edpuzzel based on mathematical inquiry of number pattern material can be a solution in solving problems in learning mathematics at SMP Negeri 1 Padangratu.

This research is in accordance with research conducted by F. Aulia in 2014 with the title development of inquiry-based interactive learning media to improve student learning outcomes. The results of the study showed that the development of inquiry-based interactive learning media products was declared valid with a good category and feasible based on the feasibility test by media experts with an average score of 3.75%; material experts 3.6 and 3.8, the average score of language experts 4. The development product produced was able to improve cognitive, affective, and psychomotor learning outcomes with learning outcomes that exceeded the achievement target. The conclusions of this study are: 1) the interactive learning media developed were tested, 2) interactive learning media received good responses from students (Aulia, 2014).

This research is also reinforced by research conducted by I Gusti Agung Ngurah Trisna Jayantika and Ni Made Putri Andini in 2022 with the title Edpuzzel-based learning media in

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Mathematics learning. The results showed that the effectiveness analysis was carried out based on the initial test on students before the edpuzzel learning media was used, and based on the posttest results after the edpuzzel-based learning media was used by students based on the calculation of the analysis results it can be seen that the use of edpuzzel learning media provides effectiveness in the teaching and learning process and improves student learning outcomes (Jayantika & Andini, 2022).

Conclusion

The effectiveness of the development of inquiry-based edpuzzel interactive media products in mathematics number pattern material has a high level of effectiveness with a result of 71.2% with a very high level of effectiveness, and the Sig. (2-tailed) is 0.000.

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