Development of Nearpod Based Interactive Science Learning Media to Improve Students Learning Activities and Critical Thinking Ability of Junior High School

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Abstract

In the 21st century, in the 4.0 revolution era, the Ministry of Education and Culture has developed a learning paradigm that states that students are expected to be able to develop abilities, one of which is the ability to think critically. However, in addition to these demands on learning, it is also emphasized to be able to make students carry out learning activities well. One way to increase students' learning activities and critical thinking skills is to develop Nearpod-based interactive science learning media. The purpose of this study was to describe the validity, practicality, and effectiveness of Nearpod-based interactive science learning media to improve the learning activities and critical thinking skills of junior high school students. This type of research is development research using the ADDIE model. The research subjects were 7th B grade students of MTsN 10 Jember. The research results are as follows: The validation results of the three validators were 92.13%, with very valid criteria. The practicality results on the learning implementation sheet show a proportion value of 93.23% with very good criteria. The results of the effectiveness of the media to increase learning activities are effective because there is an increase in the percentage at each meeting and an average of 84.47%, which is included in the very active criteria. The effectiveness of the media to improve critical thinking skills is included in the effective criteria because more than 75% of students have medium or high improvement criteria. Furthermore, the effectiveness of the media based on student responses obtained an average of 84.06% with very good criteria. It can be interpreted that the media developed are valid, practical, and effective for increasing learning activities and students' critical thinking skills.

Keywords: Nearpod based interactive learning media; learning activity; critical thinking skills

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INTRODUCTION

Education has an important role in the progress of the nation (Budiarso et al., 2022). In the era of revolution 4.0, in the 21st century, the Ministry of Education and Culture, as the ministry in charge of the education sector, compiled a learning paradigm that contained that with learning, students were expected to be able to develop their abilities, such as being able to learn from various literature, formulate problems, be able to think critically and analytically, and mutually work together to solve problems (Haerullah & Hasan, 2021). In line with that, Wahyuni et al. (2022) stated that the purpose of learning science is to carry out learning that is able to stimulate students to apply higher-order thinking skills by carrying out activities such as reasoning, critical thinking, and the scientific process. In addition to the demands of the 21st century, in learning there is also a very important component, namely student activity or learning activities (Vikiantika, 2021). The role of student learning activities in learning is to make learning more lively and meaningful (Krismawati, 2021). Student activity during the learning process has a very vital role because it can trigger the development of positive critical, logical, disciplined, and competitive thinking attitudes (Besare, 2020).

In fact, learning activities and critical thinking skills still need to be improved. Tellusa et al (2022) state that student learning activities have been carried out well, but there are several indicators that have not been carried out. In addition to low learning activity, critical thinking skills are also low. Strengthening this statement, according to Nuryanti et al (2017), class VIII junior high school students still have low critical thinking skills. In addition, Marudut (2020) states that students' activeness in conducting group discussions is also the cause of their low thinking skills. Though critical thinking is very important for students.

The importance of critical thinking for students is that critical thinking can be used to solve a problem and consider a decision correctly (Dores, 2020). Critical thinking plays an important role in preparing students to be able to solve problems, explain reasons, and evaluate information (Agnafia, 2019). Atina (2021) suggests that in life, the ability to think critically is very important, be it in daily activities, at work, or in other areas of life.

Low learning activity and critical thinking skills are influenced by various factors, such as the lack of active student training and less optimal learning by teachers in training critical thinking skills. Strengthening this statement, Nuryanti, et al., (2018) state that low critical thinking skills can be caused by students who are not accustomed to carrying out learning that requires students to be active in order to be able to maximize their thinking potential. Wahyuni et al (2022) also suggested that low critical thinking skills were the result of learning that did not optimize students' ability to think critically. Therefore, students must be encouraged to improve their learning activities and critical thinking skills. One of them is by utilizing learning media (Pramuji et al., 2018).

One of the media that can help teachers provide fun learning activities when delivering learning material is the Nearpod platform (Ismah & Zuliarni, 2022). Nearpod is a platform that can be accessed online or offline that provides learning activities for students to interact directly or indirectly, Nearpod has various features and can be used to make learning fun and free to use (Aulia & Baalwi, 2022). The Nearpod application is recommended for teachers because it is easy to use, stimulates students to actively participate in learning, and makes it easier for teachers to monitor the progress of each student (Minalti & Erita, 2021).

Strengthening this statement, Rahmawati et al (2022) proved that there is a Neapod influence on student learning activities. In addition, Susanto (2021), in his research, concluded that Nearpod e-media through the discovery model can improve critical thinking skills. Feri and Zulherman (2021) also suggest developing media, especially Nearpod-based science learning media, because they suit learning needs. So there is a need for development by utilizing the Nearpod platform.

Based on the description above, this research will be carried out by developing Nearpod-based interactive science learning media to enhance the learning activities and critical thinking skills of junior high school students. The purpose of this research is to describe the validity, practicality, and effectiveness of the developed media. Basically, there has been research on the use of Nearpod in learning, but there is still no research on the development of interactive Nearpod-based learning media that is specific to increasing learning activities and students' critical thinking skills.

METHOD

This type of research is called development research. The development model uses the ADDIE development model, which has five stages in its implementation. The stages can be seen in Figure 1.

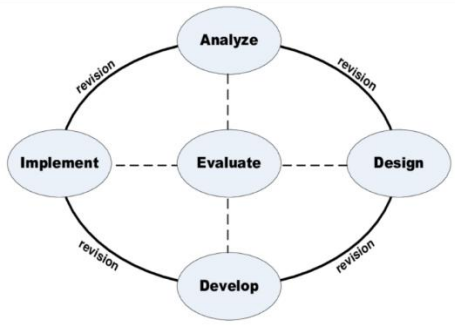

Figure 1. ADDIE Development Model

This development research was conducted at the Science Education Study Program Laboratory, University of Jember. And continued with trials of science learning media products at MTs Negeri 10 Jember in the even semester of the 2022/2023 academic year. Data collection techniques include documentation, observation, interviews, questionnaires, and tests. The instruments used were interview sheets, validation sheets, observation sheets on the implementation of learning, observation sheets on learning activities, student response questionnaires, and tests of critical thinking skills. The data analysis techniques are as follows:

First validity test. This is done to find out the truth and validity of the products that have been made. The validity test data obtained from the assessment data carried out by the validator. The formula used to test the validity is:

$$Validation = \frac{Total\ score\ achieved}{Total\ score\ maksimum} x100\%$$

After calculating each validator, proceed to calculate the average of the calculation results of the three validators. And then interpreted into Table 1.

Table 1. Validity Criteria

Criteria	Presentase (%)
VeryValid	82 – 100
Valid	63 – < 82
Invalid	44 – < 63
Very Not Valid	25 – < 44

(Khamidah & Yundra, 2019).

Next is the practicality test. Practicality is measured by looking at the implementation of learning. The learning that has been implemented will be measured by the observer using the observation sheet for the implementation of learning. Practicality analysis is calculated using the formula:

$$Percentage = \frac{Total\ score\ achieved}{Total\ score\ maximum} x100\%$$

After the calculation is carried out, the results of the calculation will be described using Table 2.

Table 2. Practicality Criteria

Criteria	Percentage (%)
Very Good	82 – 100
Good	63 – < 82
Not Good	44 – < 63
Very Not Good	25 – < 44

(Khamidah & Yundra, 2019).

Lastly, there is the effectiveness test. The effectiveness test in this study consists of three data analyses. First, analyze the increase in student learning activities. Both analyze the increase in students' critical thinking skills. The third analysis is student response. The analysis is as follows:

An analysis of the effectiveness of learning activities is calculated based on data obtained through learning activity sheets. The data that has been obtained will be calculated using the formula:

$$Percentage = \frac{Total\ score\ achieved}{Total\ score\ maximum} x100\%$$

The calculation results that have been obtained for each indicator will then be interpreted in Table 3.

Table 3. Criteria Intepretation Learning Activity

Percentage (%)	Criteria
70 – 100	Very Active
56 – 75	Active
40 – 55	Moderately active
< 40	Less Active

(Rosdiani *et* Al., 2022).

After that, the percentage that has been obtained will be analyzed for the effectiveness of the developed media. The product developed is declared effective if student learning activities increase at each meeting (Topano et al., 2022). In addition, the product developed can be said to be

effective if the average total learning activity is included in the active criteria (Safitri et al., 2018).

The second analysis focuses on improving students' critical thinking skills based on the results of the pretest and posttest, which are calculated using the N-gain formula as follows:

$$< g > = \frac{S_{post} - S_{pre}}{S_{maks} - S_{pre}}$$

Legend:

$< g >$ = *N-gain*
S_{pre} = Score *pretest*
S_{post} = Score *posttest*
S_{maks} = Score Maksimum

The N-gain calculation results that have been obtained are then interpreted using Table 4.

Table 4. Criteria Critical Thinking Skill

N-gain	Criteria
(<g>) ≥ 0,7	High
0,30 ≥ (<g>) < 0,70	Medium
(<g>) < 0,3	Low

(Hake, 1998).

After that, the percentage that has been obtained will be analyzed for the effectiveness of the developed media. The product developed can be said to be effective if students achieve a gain index with "moderate" to "high" criteria of more than 75% (Asmawati et Al., 2018).

The next analysis is on student responses. The analysis of student responses originating from the distributed questionnaire scores will be processed using the percentage formula as

$$Percentage = \frac{Total\ score\ achieved}{Total\ score\ maksimum} x100\%$$

After obtaining the percentage, it is continued by interpreting it in Table 5.

Table 5. Percentage Students Respon

Criteria	Percentage (%)
Very Good	82 – 100
Good	63 – < 82
Not Good	44 – < 63
Very Not Good	25 – < 44

(Khamidah & Yundra, 2019).

After that, the percentage that has been obtained will be analyzed for the effectiveness of the developed media. The product can be said to be effective if the students' responses meet at least some criteria (Lestari & Putra, 2020).

RESULT AND DISCUSSION

The results of the product development are Nearpod-based interactive science learning media. The advantages and differentiators from other learning media are that the media developed has a specific purpose, namely to increase learning activities and students' critical thinking skills. The material used is the material of the Solar System. There are three learning activities in the developed media that contain Solar System material. In the developed there are also several additional features to create interactive learning patterns.

This study uses the ADDIE development model. The aim of the research is to create a product that is valid, practical, and effective to use. The following is the result of the analysis:

1. Validity

Validity is a measure to determine the feasibility of a product. The validation process is carried out by someone called a validator. This study used three validators, namely one science education lecturer at the University of Jember and two science teachers at MTsN 10 Jember. The validator was chosen because it has a higher level of education than the media maker.

The scores that have been obtained from the validation sheet are then analyzed by calculating the percentage of the average value of each aspect and then interpreting them at validity level intervals. There are two aspects of the assessment that are validated by the validator: aspects of content and constructs consisting of material, language, graphics, and presentation. The results of the validator's assessment can be seen in Table 6.

Table 6. Validation Result

Scoring Aspect	Score Interval V1 (%)	V2 (%)	V3 (%)	Average (%)	Criteria
Content	100	100	93,75	97,92	Very valid
Construct	88	94	77	86,33	Very valid
Total Average				92,13	Very valid

Based on Table 6, it is known that the percentage of the average validation value of interactive learning media is 92.13%, which is included in the very valid criteria. There are two kinds of aspects that are validated: content and product design aspects. Next is product

evaluation and improvement based on suggestions from the validator. The advice given is related to the size of the writing, the selection of media colors, and the grammar of the language. Even though there are improvements, based on the percentage values in Table 6, it can be seen that the media developed is valid and can be used. This is based on the statement of Rumantinigsih et al (2020), which states that media analysis that is included in the valid or very valid category is considered valid

2. Practicality

The practicality of the developed media is based on the analysis of the implementation of learning. The learning implementation data was obtained based on the assessments of four observers. The results of the analysis can be seen in Table 7.

Table 7. Pragticiality Result

Observer Aspect	Meeting 1	2	3	Presentation (%)	Criteria
Aspect 1	15	16	16	97,92	Very Good
Aspect 2	16	14	14	91,67	Very Good
Aspect 3	16	13	14	89,58	Very Good
Aspect 4	16	15	14	93,75	Very Good
Total	63	58	58	93,23	Very Good

Based on the results of Table 7, it can be seen that the implementation of learning using Nearpod-based interactive learning media shows an average percentage of 93.23% with very good criteria. Thus, the developed media is practical to use. This is based on the statement of Rumantinigsih et al (2020), which states that a product is considered practical if it is at a good or very good level.

3. Effectiveness

Effectiveness means achieving the goals that have been planned. In this development research, there are three reviews of effectiveness: analysis of increasing learning activities, increasing students' critical thinking skills, and students' responses to the developed media. More details will be explained in the following points.

a. Learning Activities

The effectiveness of the first is based on an analysis of student learning activities during learning using the developed media. The data analyzed came from the results of the assessment of the observation sheets of learning activities carried out by four observers. In this study, there are five indicators: visual, writing, listening, oral, and mental activities. The average results of student learning activities at each meeting can be seen in Figure 2.

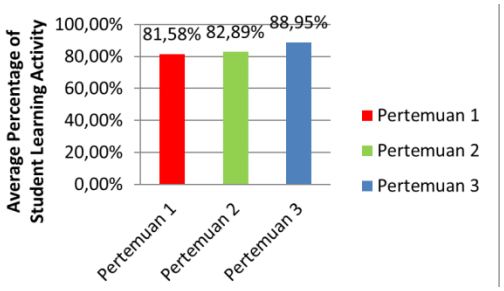

Figure 2. Learning Activity

Based on Figure 2. It is known that there are changes in the conditions of learning activities at each meeting. Changes can be seen from the increase in graphs starting from meeting 1 to meeting 3. At the first meeting, student learning activity averaged 81.58% with very active criteria; at the second meeting, the average learning activity was 82.90% with very active criteria; and at the third meeting, the average learning activity was 88.95% with very active criteria. From these three data points, there is an increase in student learning activity of 1.32% between meetings 1 and 2, an increase of 6.05% between meetings 2 and 3, and an average increase in student learning activity during three meetings of 844.7% for students who meet the criteria of being very active.

Based on the learning activity data, it can be seen that the product developed is effective because it has increased at each meeting and meets very good criteria. This is because the effectiveness of the media in this study is based on the statement of Topano et al (2022) which states that the media is declared effective if student learning activities increase at each meeting. And Safitri et al (2018), which state that the product developed is effective if the average student learning activity from the three meetings is active. With media being developed that is effective, this development research is in accordance with the research of Rahmawati et al in 2022.

b. Critical Thinking Skills

The second effectiveness is the ability to improve students' critical thinking skills. The data analyzed

were based on the results of the pretest and posttest formative tests carried out before and after learning using the developed media The formative test questions tested have been adapted to the indicators of critical thinking skills put forward by Facione, which consist of interpretation, analysis, evaluation, inference, explanation, and self-regulation. The results of the formative average can be seen in Figure 3.

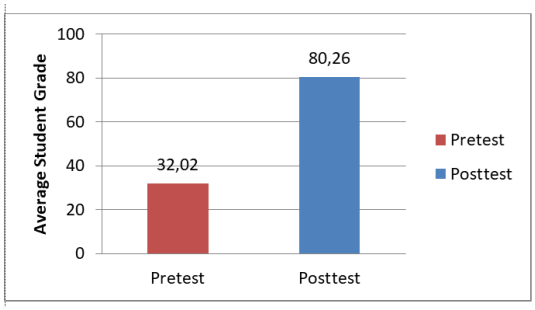

Figure 3. Pretest and Posttest

Based on Figure 3, it shows that there is an increase in critical thinking skills based on an increase in students' pretest and posttest graphs. The data will then be analyzed by N-gain analysis. The results of the N-gain analysis of critical thinking skills can be seen in Table 8.

Table 8. *N-gain* Critical Thinking Skill

Total Sudent	pretest Average	Posttest Average	*N-gain*	Criteria
19	32,02	80,26	0,71	High

Based on Table 8. it can be seen that the N-gain value is 0.71. So it is known that the increase in students' critical thinking skills before and after the use of developed media is high. The next analysis is obtained from the pretest and posttest scores of students. The analysis of increasing students' critical thinking skills can be seen in Table 9.

Table 9. Student Result Criteria Critical Thinking

Criteria	Total Student	Presentation Total Student
Low	0	0
Medium	6	31,58
High	13	68,42

Based on Table 9. it can be seen that students experienced moderate to high increases, and none of them experienced low increases. The effectiveness of the media in improving critical thinking skills itself can be seen based on the number of students who achieve moderate-to-high criteria. Asmawati et al (2018) stated that a product was declared effective if more than 75% of students met the criteria for "medium" to "high" N-gain scores. Based on Table 9. shows that 13 students experienced a high increase and 6 students experienced a moderate increase. In addition, according to these data, more than 75% of students meet the medium or high criteria. So, it can be said that media is effective in increasing critical thinking skills. And it can be concluded that the findings of this study are in accordance with Susanto's findings in 2021.

c. Student Responses

The third effectiveness is the analysis of students' responses to learning using the developed media. The data analyzed came from the response questionnaire given to students at the end of the lesson. The number of students who carried out the assessment was 19; The results of the student response analysis can be seen in Table 10.

Table 10. Student Respons

Aspect	Presentation	Criteria
Media	84,64	Very Good
Material	84,64	Very Good
Language	82,89	Very Good
Average	84,06	Very Good

Based on Table 10, it shows that the average student response is 84.06%, which meets very good criteria. There are three aspects that are assessed by students: media, material, and language aspects. The percentage for the media aspect was 84.64%, which met the criteria very well; the percentage for the material aspect was 84.64%, which met the criteria very well; and the average value for the percentage for the language aspect was 82.89%. From this average value, it can be seen that the product being developed is effective. This is based on the statement of Lestari and Putra (2020), which states that effectiveness can be obtained from student responses that meet at least good criteria.

CONCLUSION

Based on the research that has been carried out, it is concluded that the media is valid, practical, and effective for use in learning science. The results of the validity of the developed media

get 92.13%, which is a very valid category. The results of the practical use of the developed media obtained 93.22%, which is included in the very practical criteria. The results of the effectiveness of the media developed were declared effective because it succeeded in increasing student learning activities at each meeting, and student learning activities scored 84.47%, which was included in the very active criteria. Then the results of the effectiveness of the media to improve students' critical thinking skills were also stated to be effective because more than 75% percent of students were in the medium and high criteria, while students who were in the medium criteria had a percentage of 31.58% and students who were in the high criteria had a percentage of 68 .42%. Furthermore, the results of the effectiveness of the media developed from a review of student responses also show that the media developed is effective because the percentage value is 84.06%, which meets very good criteria.

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