

## Development of Flash Card Learning Media at 3D Distance Materials

**Fitri Umardiyah<sup>1</sup>, Ade Ilud Nabila<sup>2</sup>**

<sup>1,2</sup> Mathematics Education, Universitas KH. A. Wahab Hasbullah

Email: [fitriumardiyah@unwaha.ac.id](mailto:fitriumardiyah@unwaha.ac.id)

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### **ABSTRACT**

*This study aims to develop and produce flash card learning media that has a fairly good level of validity and practicality in three-dimensional material at the high school level. This type of research is RnD (Research and Development) with the ADDIE development model which includes 5 stages, namely Analysis, Design, Development, Implementation, Evaluation. The subject of this research is MA Al - Azhar students as many as 19 students. The instruments used in this study were interview guides to teachers, material validation as well as media by Mathematics Education Lecturers and Mathematics Teachers, student response questionnaires and card playing results tests. The results showed that: (1) The results of material and media validation obtained a percentage of 94% (very feasible) by Mathematics Lecturers and 87% by Mathematics Teachers and (2) The results of the practicality of the media at the time of the test reached a percentage of 85.53% (very good).*

**Keywords:** *Flash Card Learning Media, Types of RnD Research, ADDIE Development Model, Three Dimensions.*

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### **INTRODUCTION**

The world of education cannot be separated from the curriculum. Along with the development of science and technology, there is also a change in the curriculum. The curriculum is not arbitrarily changed, but the curriculum changes are based on the results of analysis, evaluation, predictions and challenges that continue to change both internally and externally (Maulidah, etc., 2021). Changes and improvements to this curriculum require educators to strive to make improvements to the learning process in order to realize the educational goals to be achieved. Improvements were not only made on learning strategies but also teaching aids to support the learning process (Satiti *et al.*, 2022). The use of teaching aids or learning media to support the learning process must also be adjusted to the learning objectives to be achieved.

Considering the development of students' thinking, especially students at the high school level who have entered adolescence, which is an important period in developing potential and improving critical thinking skills. Therefore, to develop students' critical thinking skills, it is necessary to have a learning method which positions students as a learning center (student center) supported by learning media in order to attract students' interest in learning. (Wijayanto & Sutriyono, 2018) mentions that Flash Card is one of the learning media that can be applied to support learning methods in the classroom. In response to this, it is necessary to have learning media such as Flash Card learning media to support the continuity of students' thinking development, especially students at the high school level who have entered adolescence, where this period is important in developing potential and improving critical thinking skills (Lilawati *et al.*, 2022).

The study entitled "Active Learning Software Assisted by Flashcards to Improve Mathematics Learning Outcomes in Vector Materials" conducted by Cycle (2018) strengthens the statement that Flash learning media can be used as an alternatives for teachers to innovate and improve student outcomes. This study aims to apply active learning with the help of Flashcard learning media to improve learning outcomes on vector material for students of class X MIPA 3 SMA Muhammadiyah 3 Yogyakarta. The results of this study indicate that there is an increase in student learning outcomes as evidenced by the difference in the percentage of mastery learning in period I and period II. The percentage in period one increased from 28.13% to 40.63%, because the results from period I had not reached the target of 80%, then the cycle continued in period II with the percentage reaching an increase of up to 100%.

Based on the problems and explanations above, an idea emerged to develop learning media developed from Flash Cards in order to realize student-level learning in terms of understanding problems, giving reasons for answers and drawing conclusions, especially on Three Digital material.

## METHOD

This study uses the Research and Development (R&D) method with the ADDIE development model. The product resulting from this research is in the form of Flash Card learning media on the Three Dimensional Distance material. This research was conducted at MA Al-Azhar Jombang. The population in this study were all students of MA Al-Azhar Jombang. The sample used in this study found 19 students taken from tenth and eleventh grade students. Data collection techniques used are interviews, tests and student response questionnaires. The instrument used is about Flash Cards to determine students' critical thinking skills. The test of the effectiveness of the learning media used is the Independent Sample t-test by comparing the learning outcomes of students who use learning media with learning outcomes of students who do not use learning media. At the Analysis stage, it begins with the process of collecting information through teachers or students at the relevant institution which can be done through interview techniques, observation or other data collection techniques. The second stage of the design is continued by realizing product design, starting with the design of Flash Card learning media using the CorelDraw X7 application based on the analysis stage. The development stage is the stage where the Flash Card learning media is created or developed based on the designs that have been made in the previous stage. Furthermore in this fourth stage the learning media that has been made can be tested. The trial was carried out at the school where the research was conducted with the research subjects in this trial were students of class X and XI MA Al-Azhar Jombang. In the last stage of this development model, an evaluation of the learning media that has been made is carried out. The evaluations carried out included student learning outcomes after using Flash Card learning media, the effectiveness and practicality of learning media and students' opinions about the use of Flash Card learning media.

The analysis used in this study is useful for determining the validity and practicality of the learning media that have been made. In addition, there are materials, learning media and questions that have gone through the validation stage so that all the things tested can be said to be valid. The data analysis technique was carried out using quantitative descriptive analysis techniques carried out by analyzing quantitative data obtained from assessments by mathematics lecturers and teachers. The formula used is as follows:

$$\text{Worthiness (\%)} = \frac{\text{observed score}}{\text{expected score}} \times 100\%$$

The percentage scale used in the validity test can be seen in Table 1 below.

**Table 1.** Validity Test Percentage Scale

<b>Achievement Percentage (%)</b>	<b>Interpretation</b>
76 % – 100 %	Very Worthy
56 % – 75 %	Worthy
40 % – 55 %	Enough
0 % – 39 %	Less Worthy

In the practicality test of the Flash Card learning media, a student response questionnaire was used. The data obtained from filling out the response questionnaire sheet will be calculated as a whole percentage using the following formula.

$$P(s) = \frac{S}{N} \times 100\%$$

Furthermore, the calculation results from the total of all response questionnaire data are classified according to the following Practicality Test percentage table.

**Table 2.** Practicality Test Percentage Scale

<b>Interval</b>	<b>Information</b>
$84\% \leq \text{score} \leq 100\%$	Very good
$68\% \leq \text{score} < 84\%$	Well
$52\% \leq \text{score} < 68\%$	Enough
$36\% \leq \text{score} < 52\%$	Not enough
$20\% \leq \text{score} < 36\%$	Very less

## RESULT AND DISCUSSION

This research was conducted to develop Flash Card learning media on Three Dimensional material. The manufacturing process is carried out according to the stages of the ADDIE development model. Based on the ADDIE development model, the Flash Card manufacturing process is as follows. At the beginning of the process of developing this learning media, it must go through the analysis stage first. The analysis carried out in this study includes needs analysis and material analysis of learning media. The results of the needs analysis conclude that there is a need for useful media to package practice questions into a fun activity through a game, one way is by using Flash Card learning media.

It is known that Flash Cards are very effective in being used as learning media. This can be proven by research conducted by Wijayanto & Sutriyono (2018) in order to develop Flash Card learning media for class VIII SMP students that are valid, practical and effective to use in learning mathematics. The resulting Flash Card learning media shows a material validity value of 90% (very good) and display validity of 84.74% (very good) and a practicality value of 81.54% (good). Based on the N-Gain value, the learning media is said to be able to improve student learning outcomes with an N-Gain value of 0.66 so it is categorized that Flash Card is effectively used in the learning process. In addition, according to the material analysis carried out, it shows that the relevant teaching modules used are the teaching module entitled "Mathematics for SMA/MA" as well as an online reference book on Three Dimensional material.

- Determining Basic Competencies

This research was conducted at MA Al-Azhar Jombang using the K13 curriculum. The Three Dimensional material in this study uses one basic competency, namely describing distances in space (between points, points to lines and points to planes).

- Determining Learning Objectives

Based on the basic competencies above, the learning objectives to be achieved in the development of this learning media are that students are able to describe distances in space (between points, point to line and point to plane).

- Choosing a Learning Strategy

Based on the analysis stage, Flash Cards are proven to be able to attract students' attention and are effectively used during the learning process. Therefore, in this study, a Flash Card learning media was developed in the form of a hard file.

- Choosing Learning Materials

This Flash Card learning media uses Three Dimensional material with research activities in class X and XI MA Al-Azhar Jombang.

- Developing a Flash Card Making Framework

The preparation of the framework for making Flash Card learning media is done by determining the size of the paper, the type of font, preparing the object of spatial drawing and the object of a photo of a mathematician. The paper size for making the learning media framework is A3 (29 cm x 42 cm) with each card design measuring 9 cm x 6 cm. Using the Geometr706BlkCnBT font type. Using images of cubes and pyramids as well as mathematical scientists consisting of: *Euclides, Thales, Socrates, Appolonius, Archimedes, Diophantus, Albert Einstein, Aristoteles, Pythagoras, Plato, Leonhard Euler, Rene Descartes.*

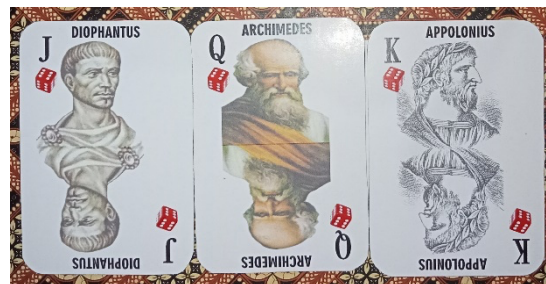
- Prepare Story Questions (Description) according to Critical Thinking Indicators

The preparation of questions is based on critical thinking indicators. Critical thinking indicators include Clarity (clarity), Accuracy (accuracy, thoroughness, thoroughness), Precision (accuracy), Relevance (relevance, linkage), Depth (depth), Breadth (breadth) and Logic (logic).

- Making Flash Cards

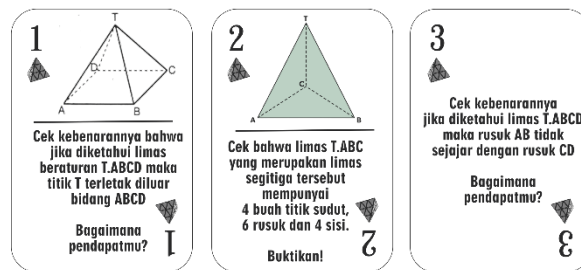
Making Flash Card learning media using the CorelDraw X7 application starting from designing the physical form of the card to the form of card packaging. The initial step taken in the process of making Flash Cards is to make card designs on A3 paper pages with the size of each card being 9 cm x 6 cm. The total card frame made is 64 cards with details of the card series, namely A, K, Q, J, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 duplicate 4 for the Black Cube, Red Cube, Black Pyramid and Red Pyramid. The second step is to insert the components into each card frame and create a Flash Card packaging design by inserting the component in the form of a mathematical scientist's image

object that has been mentioned at the stage of compiling the framework for making Flash Cards. There are several components on the Flash Card K, Q, J with the names of scientists, photos of scientists and objects in the shape of a cube or pyramid with red and black patterns on each shape.



**Figure 1.** Card K, Q, J on the Red Cube

In addition, the Flash Card series starting with numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 consist of several components including questions, pictures of objects related to the questions asked.



**Figure 2.** Series of Cards Contains Questions

- Expert Validation

Expert validation is the stage of evaluating the Flash Card learning media that has been made by the validator. The validation process certainly uses a validation sheet instrument which consists of two aspects, namely the material aspect and the media aspect. The important point in validation is to get criticism and suggestions from the validator and to determine whether the learning media that has been made is suitable for use in research.

- a. Product Revisions

Product revisions are carried out in accordance with the criticisms and suggestions given by the validator. The following are tips and suggestions given by the validator.

Media pembelajaran Flash Card ini dinyatakan:

Layak diproduksi tanpa revisi  
 Layak diproduksi dengan revisi sesuai saran  
 Tidak layak untuk diproduksi

\* Beri tanda (v) pada kotak yang disediakan

Komentar / Saran :

1. Media Pada Pembelajaran ini sudah bagus
2. Karena peserta didik juga senang dalam kbm.
3. ....
4. ....
5. ....

**Figure 3.** Criticisms and Suggestions by Mathematics Lecturers

Media pembelajaran Flash Card ini dinyatakan:

Layak diproduksi tanpa revisi  
 Layak diproduksi dengan revisi sesuai saran  
 Tidak layak untuk diproduksi

\* Beri tanda (√) pada kotak yang disediakan

Komentar / Saran :

1. *Semakin pertayaan pada soal lebih dg Taksonomi Blom*
2. *Sambar foto pada Card di dan nama sehingga lebih berabna*
3. ....
4. ....
5. ....

**Figure 4.** Criticisms and Suggestions by Mathematics Teachers

- Validation Data Analysis

The validation of the Flash Card learning media is determined based on an assessment by the media validator and material from the Mathematics Lecturer (V1) and Mathematics Teacher (V2). The data from the validation results can be seen in table 3 below.

**Table 3.** Validation by Lecturers and Teachers of Mathematics

Rating Point	Rating Score	
	V1	V2
<b>MEDIA QUALITY ASPECT</b>		
1	4	3
2	3	3
3	4	3
4	4	3
5	4	3
6	4	3
7	4	4
8	3	4
9	4	4
<b>ASPECT OF LANGUAGE USE</b>		
1	4	3
2	4	4
3	4	4
4	3	4
5	3	3
6	4	3
7	4	4
<b>ASPECT OF MATERIAL QUALITY</b>		
1	4	3
2	3	4
3	4	4
4	4	3
5	4	3
6	4	3
7	4	3
8	4	4
<b>ASPECT OF USE OF THE QUESTION</b>		
1	3	4
2	3	3
3	4	4
4	4	4
<b>Amount</b>	<b>105</b>	<b>97</b>
<b>Validity Presentation</b>	<b>94%</b>	<b>87%</b>

Based on the validation data above, an average percentage of 94% is obtained for the results of the assessment by Mathematics Lecturers and 87% for the results of the assessment by Mathematics Teachers. From the results of the two assessments, it can be concluded that the learning media is categorized as very feasible.

- Practical Data Analysis

The practicality test of this learning media is determined by the data from student respondents. The following is a table of practicality test assessments by students.

**Table 4.** Student Response Questionnaire Results

Statement	Score	Total Score	Percentage
1	61	76	80,26%
2	66	76	86,84%
3	65	76	85,53%
4	67	76	88,16%
5	56	76	73,68%
6	67	76	88,16%
7	64	76	84,21%
8	64	76	84,21%
9	71	76	93,42%
10	62	76	81,58%
11	68	76	89,47%
12	69	76	90,79%
<b>Total</b>			<b>1.026,31%</b>
<b>Average value</b>			<b>85,53%</b>

Based on the results of the practicality test, the percentage of results was 85.53%. This shows that the learning media that has been made is very good for students to use in the learning process because it meets the percentage of practicality.

## CONCLUSION

Based on the results of research on the development of Flash Card learning media, it can be concluded that:

- The development of this Flash Card learning media uses the ADDIE model where development is carried out in several stages, including: Analysis, Design, Development, Implementation, Evaluation.
- The development of this learning media is very much needed by the instructors because the instructors will find it helpful in delivering practice questions about the Three Dimensions, in addition to the use of Flash Card learning media students can also hone their critical thinking process skills. Students can also do independent learning when school is over.
- The development of Flash Card learning media can be said to be successful because the validity and practicality tests show valid and practical levels in accordance with the specified requirements.
- The percentage of media and material validation scores from Mathematics Education Lecturers is 94% while those from Mathematics Teachers show a score of 87%. Based on the percentage scores of the two validators, the Flash Card learning media can be said to be feasible for students.

- The percentage of the average number of assessments for each questionnaire point filled out by students shows a percentage of 85.53%. Based on this, it can be concluded that students feel helped by the existence of learning media.

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