How Flashcard Games Improve Critical Thinking Skills on History of Islamic Culture Material?

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Abstract. The material history of Islamic culture, especially the history of Muslim scientists, is something that a student should know. The history of Muslim scientists has now been taught at various levels of education, including in junior high school. So far, the study of the history of Muslim scientists has been carried out conventionally. First, the teacher presents the profile of scientists through the conventional method with the help of PowerPoint media. Then, students sequentially memorize the characters along with the year, place, and events experienced by the character. This makes it easy for students to forget the material presented because the learning process could be more innovative. This study sees this challenge as an opportunity to design the right media using technology in an educational game in the form of flashcard games. Flashcard games can help the learning process be interactive and easy to understand. This flashcard game learning media will enrich with Augmented Reality technology so that it can improve students' critical thinking skills. Critical thinking skills will be measured through the Greenstein rubric, which includes the ability to apply, evaluate, and use data to develop critical insights, analysis, and synthesize. We use the ADDIE learning design development procedure for media development, which consists of analysis, design, development, implementation, and evaluation.

Keywords: Critical thinking · flashcard games · history of Islamic culture

1 Introduction

Globalization in this century resulted in changes in people's lives as a whole, including in the field of education. In the current era, education must be able to develop the skills needed in the 21st century. Some of the skills required are critical thinking skills [1]. Critical thinking skills are intellectual processes related to concept formation and decision-making through algorithmic analysis, synthesis, and evaluation [2]. Implementing critical thinking skills can be done in the learning process with educational games [3].

Knowledge of the history of Islamic culture, especially the history of Muslim scientists, should be known to a student. This material is taught at various levels of education,

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including junior high school. This knowledge of Muslim scientists can motivate a Muslim to demand various knowledge [4]. More specifically, the fundamental historical values of Muslim scientists can be used to face the ever-evolving political, social, and cultural challenges [5].

So far, the study of the history of Muslim scientists has been carried out conventionally [6]. First, the teacher presents the profile of scientists through the lecture method with the help of PowerPoint media. Then, students sequentially memorize the characters along with the year, place, and events experienced by the character [7]. The learning process like this makes the atmosphere in the class monotonous. This makes it easy for students to forget the material presented because the learning process is not innovative [8].

The needs analysis questionnaire that 47 students have filled out shows that students have difficulty learning the material for Muslim scientists. More specifically, it was found that 56.1% of students said they always, 35.7% of students said they often, and 8.2% of students said that they sometimes find it difficult to learn Muslim scientists. This learning difficulty is due to a large number of Muslim scientists studied and the need for more innovation in the learning media used. This is also to research from [9], which stated that students had difficulties learning the history of Islamic culture because of the lack of innovation in learning media.

The problems that arise in learning this material are challenges that must be resolved immediately, both from religious urgency and education. This study sees this challenge as an opportunity to rethink and redesign the right pedagogy using technology in a game. Technology is inevitably advancing teaching effectiveness in this digital era [10]. Today, technology is an important component of a curriculum [11]. This technology will later be implemented in an educational game in the form of flashcard games based on augmented reality.

Card-shaped educational games can help the learning process become easier to understand and increase students' interest in learning [12]. Furthermore, according to [13], educational games significantly affect student learning outcomes. In addition, augmented reality-based learning media for flashcard games has been developed in science learning, such as biology, chemistry, and physics [14]. However, in Islamic Religious Education learning, it has yet to be widely developed, even if there are still in the form of flashcard games [15], without any integration with technology. Therefore, this research aims to develop feasible flashcard games based on augmented reality that can be used to measure students' critical thinking skills.

2 Method

This type of research uses the R&D (Research and Development) method. The model used is ADDIE by [16], which consists of the stages of analysis, design, development, implementation, and evaluation. This development research will produce a viable augmented reality-based Muslim scientist flashcard games product. First, a product feasibility test is carried out by validating materials and media. Then the media will be implemented for students to determine its effectiveness on critical thinking skills. The research procedure for flashcard games of Muslim scientists can be seen in Fig. 1.

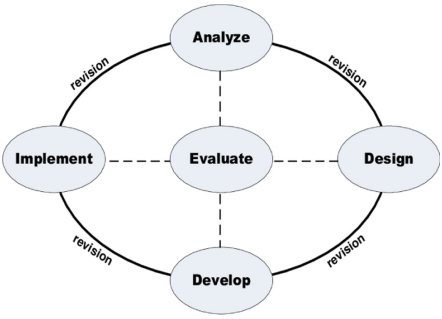

Fig. 1. ADDIE Development Model

The analysis phase was carried out to find out the problems faced by students and teachers related to the learning of Muslim scientists. In addition, at this stage also formulate the product to be developed along with its material components. In the design phase, the researcher designed the teaching materials starting with making a storyboard. At this stage, the researcher also designed material and media validation sheets and pre-test and post-test questions for critical thinking skills that were tested on students. In the development stage, researchers developed learning media using Corel Draw X8 to visualize the character of Muslim scientists. After the character illustration is complete, proceed with the creation of augmented reality using the Unity application. Then the media is tested and validated before being implemented. In this study, the learning media was only limited to testing, without measuring the results of critical thinking skills. Then, the last stage is evaluation, which is to revise every stage of development carried out.

Media validation and practicality are carried out with the media feasibility assessment rubric [17]. After conducting the material and media validation test, proceed to find out the student's response to the media that has been developed. The Interval of student response criteria, validation, and practicality of the media can be seen in Table 1. Finally, the validity data obtained is analyzed by percentage analysis technique with this formula:

$$P = \frac{\sum x}{\sum xi} \times 100$$

Descriptions:
P = Percentage
$\sum X$ = Total score in questions item
$\sum Xi$ = Maximum score in questions item

3 Findings and Discussion

Flashcard games are one type of card game media suitable for learning activities for students of various levels. Flashcard games is an educational media in the form of cards containing visual displays in the form of images, words, or symbols by adjusting the needs of the students they face to develop memory, practice independence, and

Table 1. Qualification Criteria for Validation Results

Percentage	Validity Level	Description
85,01%–100%	Very valid/very practical	It can be used and needs to be reviewed
70,01%–85,00%	Fairly valid/quite practical	It can be used with minor revisions
50,01%–70,00%	Less valid/less practical	it is recommended not to use it because it needs a major revision
0,1,00%–50,00%	Invalid/impractical	should not be used. It needs much revision

increase word capability [18]. In addition, this media can also attract students' attention to encourage their curiosity about the information conveyed [19].

3.1 Flashcard Games Design Media

Several studies have shown that students can be more active, and the learning process is more effective by using interactive media such as card games. Optimization of flashcard games media can be used in history learning which seems full of memorization. Prayogo & Martadi (2022) suggest that selecting cards for learning media to introduce national heroes can bring up children's active attitudes towards objects and people in their environment, improving their learning outcomes. The ease of manufacture and use is also a separate choice for educators to use as a learning media. In developing this flashcard games media, the researcher chose the history of Islamic culture. The main material used for content in flashcard games is about Muslim scientists during the Abbasid dynasty. The basic competencies in the Islamic Cultural History lesson used are on Grade 8 are (1) Convinced that the growth of science during the Abbasid period was clear proof that Islam was implemented properly, (2) Demonstrating reading behavior as an implementation of imitating scientists during the Abbasid period, (3) Understand the history of the growth of science during the Abbasid era, and (4) Presenting a series of the historical growth of science during the Abbasid period.

Researchers are also at the design stage of flashcard games which will be connected through the Augmented Reality application on a smartphone. How to use this card is like playing a quartet of cards. The concept of how flashcard games work is media components such as ordinary cards, special cards, and applications to display Augmented Reality features. The following shows the media design of the card game for several categories of Islamic scientists (Fig. 2).

Regular and special cards are designed on two sides with a size of 6 cm x 9 cm with pictures and a AR 3D object. Regular cards contain concise material, pictures, and markers and are divided into 9 categories. The categories are Tafseer scientists, fiqh scientists, hadith scientists, tasawuf scientists, kalam scientists, mathematicians, chemical scientists, medical scientists, and astronomers. Each category in ordinary cards consists of 4–6 cards according to the designated category members with different colors,

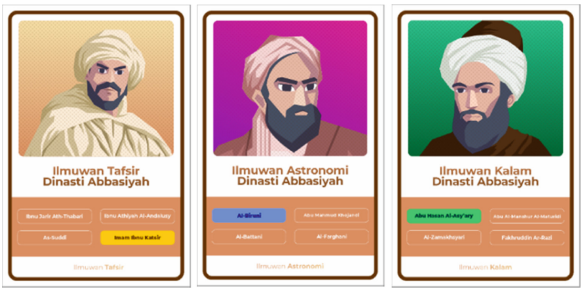

Fig. 2. Display of Muslim scientists' designs on flashcard games

Table 2. Results of material validation of flashcard games product

	Indicator	**Percentage (%)**	**Criteria**
1	The suitability of the material on the flashcard games media	88	Highly feasible
2	The conformity of the material on the flashcard games illustration design	70	Highly feasible
3	Completeness of critical thinking aspect in flashcard games media	80	Highly feasible
4	The effectiveness of flashcard games media in growing students' learning motivation	90	Highly feasible
	Average Percentage		**Highly feasible**

of course, in the form of material in the history of Muslim scientists. Meanwhile, there are 15 special cards that contain questions and markers for the Augmented Reality feature.

3.2 The Product's Feasibility of Critical Thinking Skills

After the draft in the form of flashcard games design completely, it was submitted to the material and design media expert lecturers for review. The feasibility of the learning media used in the classroom is obtained from assessing the flashcard games media developed by the validator. This learning media is validated in terms of material and media design. This material was validated by a Lecturer of the Arabic Department at Universitas Negeri Malang. The following results were obtained in Table 2.

Based on the table above, the average results of material validation are 82%, which means that this learning media is very valid and very feasible in terms of material to improve understanding of concepts in students learning Islamic Muslim Scientist topics. Furthermore, this learning media was also validated in terms of media design. The feasibility of the product as a learning media was obtained from filling out a questionnaire by media design experts, namely the Lecturer of the Art and Design Department, Universitas Negeri Malang. The results of flashcard games' product development validation in learning media are presented in Table 3.

Table 3. Results of media design validation of products

	Indicator	Percentage (%)	Criteria
1	Overall view of physical media design	90	Highly feasible
2	Information flashcard games display	90	Highly feasible
3	Illustration and character of flashcard games display	86.67	Highly feasible
	Average Percentage	88.89	**Highly feasible**

Table 4. Results of questionnaire response to product

	Indicator	Percentage (%)	Criteria
1	Visual media presentation	86	Highly feasible
2	Motivation in learning	88	Highly feasible
3	Media effectiveness	84	Highly feasible
	Average Percentage	86	**Highly feasible**

In preparing flashcard games media, the researcher developed material concepts using Greenstein's critical thinking ability rubric (2012), which consisted of applying, evaluating, and using data to develop critical insights, analysis, and synthesis. The concept of questions developed by the researcher in the special card was made based on the rubric of critical thinking skills by Greenstein; the number of special cards in the product developed by the researcher is 12 cards, where one of the questions:

"Jabir Ibn Hayyan was one of the chemical scientists during the Abbasid dynasty, and he had purified mercury to produce a book entitled "Al-Kimya". In today's era, the use of mercury is very diverse, one of which is useful for……."

Based on the validation results from material and media experts, it shows that this media is feasible to improve students' critical thinking skills so that it can be implemented in junior high schools. Cardgame educational games can help the learning process become easier to understand and improve students' critical thinking [22]. In addition, small group trials were conducted to determine parents' responses to flashcard games. The test subjects were 50 parents, and the results can be seen in Table 4.

The small group trials obtained an average percentage of 86%, so it can be concluded that this learning media is feasible for potential flashcard game media users. Of the three criteria assessed, the motivation to use flashcard games got the largest percentage, namely 88%, which means that these media flashcard games can increase motivation in learning and make learning easier to understand the material. Game-based learning using card games can achieve learning objectives optimally [23]. The researcher designed a customized evaluation procedure based on the literature to assess each learning objective. Based on research from Högberg et al., [24] students can obtain positive experiences and conclusions from learning.

4 Conclusions

The component of developing flashcard games is learning media based on augmented reality visualized on smartphones. The concept of how flashcard games work is media components such as ordinary cards, special cards, and applications to display Augmented Reality features. The average percentage of material validation, media design validation, and small group trial of products were 82%, 88.89%, and 86%. Based on the product's feasibility results, this learning media of flashcard games was feasible to implement and improve critical thinking skills in Islamic Culture material.

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