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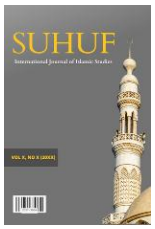

The Effect of Mobile Learning Posters on Students' Creative Thinking Skills in Secondary Schools: An Islamic Educational Perspective

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ABSTRACT

Background: This study addresses the challenge of optimizing students' creative thinking skills, which are often constrained by limited innovation in learning media within the school environment. The lack of interactive learning media tends to reduce students' active engagement during the learning process. **Objective:** This study aims to examine the effect of poster-based m-learning digital learning media on the creative thinking skills of eleventh-grade students. **Methodology:** The research employed a quantitative method with a quasi-experimental approach using a nonequivalent control group pretest–posttest design. Data were collected through questionnaires and creative thinking tests and analyzed using inferential statistics through a t-test. **Results:** The results indicate that the t-count value exceeds the t-table value, meaning that the alternative hypothesis is accepted. These findings demonstrate that the use of m-learning media significantly improves students' creative thinking skills, while interactive and multimedia features increase students' engagement in understanding poster design elements and principles. **Conclusion and Implications:** Overall, mobile-based learning media are effective in improving students' creative thinking skills while also supporting the development of independence, responsibility, and ethical use of technology in learning.

1. Introduction

Education plays a very important role in preparing the younger generation to be the future leaders of the nation. Through education, the younger generation is equipped with the knowledge, skills, and character necessary to drive the progress and development of the nation. Mobile Learning Media Interface Display [1]. Education is not only oriented towards developing thinking skills, but also towards shaping students' ability to adapt to their environment and improve themselves. This process

is realized through interaction between teachers and students in learning activities that are influenced by various factors, such as teachers, students, learning models and approaches, classroom atmosphere, and the suitability of teaching materials [2]. With the rapid development of technology, conventional learning methods that are monotonous are considered ineffective and uninteresting for students in this era [3]. This situation can reduce motivation to learn and hinder creative thinking skills, which are essential for facing the challenges of the 21st century [4]. 21st century learning generally applies a student centered learning approach, which is learning that focuses on students [5]. One method that can be used is Project-Based Learning, which is a learning approach that places students at the center of learning activities through working on projects that produce learning products, such as posters.

From an Islamic educational perspective, the learning process is also understood as an effort to shape the character of students through the development of cognitive, affective, and psychomotor aspects that are integrated with values of faith and morality. Islamic education emphasizes the goal of shaping a well-rounded character, not only knowledge, but also the formation of morals and character [6]. Learning strategies designed based on Islamic values can facilitate students in developing new ideas and solving problems creatively, while strengthening their religious and moral attitudes [7].

Along with the development of digital technology, the implementation of Islamic educational values needs to be contextualized with the dynamics of globalization and technological advances. Islamic education does not reject technological developments, but rather views them as a means that can be utilized to strengthen the process of character building and competence of students [8].

Digital transformation in education is inevitable in the era of the 4.0 industrial revolution and information-based society. The integration of technology in learning is not merely a response to the times, but also a pedagogical strategy to create a learning process that is more adaptive, participatory, and oriented towards the optimal development of students' potential. From an Islamic education perspective, the use of technology can be positioned as an instrument to maximize human intellect and creativity while remaining within the corridor of moral and ethical values [9].

Mobile learning (m-learning) has become a relevant learning alternative. Through mobile devices, students can access learning materials anytime and anywhere in various formats, such as text, images, audio, video, and interactive animations. The advantages of mobile learning lie not only in its flexibility, but also in its ability to increase learning motivation, provide a more personalized learning experience, and encourage the development of creative thinking skills in accordance with the characteristics and learning styles of students [10].

Fig.1. Mobile Learning Media Interface Display

Creative thinking is one of the higher-order thinking skills that enables students to generate new, flexible, and original ideas. This skill not only requires the ability to find the right solution, but also involves imaginative, open-minded, and innovative thinking processes [11]. However, classroom practice shows that many students still find it difficult to develop varied ideas and tend to imitate existing concepts. This indicates that students' creative thinking skills have not developed optimally

and still require learning strategies that can stimulate originality and the courage to innovate [12]. This is in line with the findings [13] which emphasizes the importance of choosing the right learning media so that indicators of creative thinking such as fluency, flexibility, originality, and elaboration can be facilitated properly.

Recent research also reinforces the importance of technology in learning. Proving that mobile learning applications combined with problem-based learning have been shown to improve problem-solving skills in prospective counsellors [14]. In line with this, the application of mobile learning shows that smartphone-based learning applications are effective in improving students' creative thinking skills because they enable flexible, interactive learning that is tailored to the characteristics of the digital generation [15]. Through mobile technology, students are not only actively engaged in the learning process, but also encouraged to explore ideas, develop innovative solutions, and improve the quality of creative thinking in facing real-world problems.

Based on these issues, studies on the application of mobile learning in arts education, particularly in poster design, are still relatively limited. In fact, poster design skills require not only technical abilities, but also originality, visual communication skills, and creative idea exploration, which are often not optimally facilitated through conventional learning. From an Islamic education perspective, the development of creativity cannot be separated from the formation of character, moral values, and the responsibility of students as individuals with good character and creativity.

2. Method

This study uses a quasi-experimental design. Experimental research is research that aims to identify causal relationships between independent and dependent variables, where independent variables are controlled in such a way that their influence on dependent variables can be determined [16]. The independent variable in this study was poster-based mobile learning, while the dependent variable was students' creative thinking skills. The experimental design used in this study is presented in Table 1.

Table 1. Unequal Pretest-Posttest Control Group Design

Group	Pretest	Treatment	Postest
Experimental	O_1	X	O_2
Control	O_1	-	O_2

The population of this study was students at SMAN 1 Surakarta, with a sample of 32 students from a total of 62 students in grades XI.A and XI.B. The study was conducted in the subject of Cultural Arts, specifically on the topic of posters. The selection of 11th grade high school students as research subjects was based on the consideration that students at this level are in the formal operational cognitive development stage, so they have more mature abstract and creative thinking skills to support the development of creative thinking skills through mobile learning-based learning.

The data collection techniques used in this study were questionnaires and tests. Questionnaires were used as a data collection technique by presenting structured statements that could be measured quantitatively to obtain information related to the responses and attitudes of students. Questionnaires were considered effective because they could be used without the researcher being physically present in the field and were relatively easy to analyze statistically [17]. In this study, a questionnaire was used to collect data on students' creative thinking skills during the implementation of poster-based mobile learning.

In addition, data collection techniques to obtain numerical data take the form of tests that objectively describe students' abilities. Tests are commonly used instruments in educational research because they are able to systematically measure learning outcomes and thinking skills, and their validity and reliability can be tested [18]. In this study, tests were used to measure students' creative

thinking skills by assessing their poster designs based on indicators of fluency, flexibility, and originality in generating ideas and creating posters.

In addition to focusing on improving creative thinking skills, the application of mobile learning-based digital learning in this study is also relevant to shaping students' character in line with Islamic educational philosophy. The wise use of technology in the learning process encourages students to develop attitudes of responsibility, discipline, independence, and ethics in the use of digital media. From an Islamic educational perspective, developing intellectual potential ('aql) and creativity is part of humanity's duty as khalifah fil ardh, which is to manage and utilize knowledge and technology for the common good.

Table 2. Creative Thinking Indicators Poster

Criteria	Data Analysis		
	Number	Questions/Assessment	If the Work
Fluency	1	Does the poster contain many ideas or messages about environmental conservation?	High score if many ideas are relevant to the theme
	2	Is the environmental message on the poster clearly and easily understood?	High score if the message is immediately understood by the reader without confusion.
Flexibility	3	Do the posters convey environmental issues from different perspectives?	High score if it contains different points of view.
	4	Are there visual variations or messages that make the poster less monotonous?	High score if there are differences in style, color, or format of message delivery.
Originality	5	Is the main idea of the poster about the environment truly new and rarely used?	High scores for unique, creative ideas that are not imitative.
	6	Does the poster design reflect the creator's personal characteristics or creativity?	High score if there is a personal style that distinguishes the work from others.
Elaboration	7	Do the visual details (images, colors, typography) support the environmental message you want to convey?	High score if the details are neat, harmonious, and reinforce the main message.
	8	Are all elements of the poster used optimally without unnecessary empty space?	High score if all sections are filled in.

Data analysis was conducted after data on students' creative thinking skills were obtained. The data were first analyzed using prerequisite tests, namely normality and homogeneity tests. The homogeneity test was conducted to determine whether the variance of data between the experimental group and the control group was homogeneous. Meanwhile, the normality test was used to determine whether the data on students' creative thinking skills were normally distributed or not.

After both prerequisite tests were met, the analysis continued with hypothesis testing using an independent samples t-test. The independent samples t-test was used to determine whether there was a significant effect of the use of mobile learning posters on the creative thinking skills of students between the experimental group and the control group. All data analysis was performed using SPSS software. The basis for decision making is based on a comparison of the calculated t value with the table t at a significance level of 5%. If the calculated t value > table t, then the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. Conversely, if the calculated t value < table t, then the null hypothesis (H_0) is accepted and the alternative hypothesis (H_a) is rejected.

3. Results and Discussion

Creative thinking skills are one of the important competencies that must be developed in secondary school students as part of 21st century skills. Creativity plays a role in helping students generate original, flexible, and innovative ideas in solving learning problems [19]. Along with technological developments in education, the application of poster-based mobile learning (m-learning) has become an alternative learning strategy that supports the development of creative thinking skills through visual, interactive, and contextual presentation of material.

Various studies have shown the effectiveness of mobile learning in increasing student engagement and learning outcomes. However, studies that specifically integrate the use of poster-based mobile learning in art education to develop creative thinking skills in secondary schools are still limited. In addition, most previous studies have focused solely on cognitive aspects, without linking them to the dimensions of character building and values that are an important part of the educational process. In fact, from an Islamic educational perspective, creativity development is not only understood as the ability to generate new ideas, but also as an effort to optimize intellectual potential in line with moral values and social responsibility. Therefore, research is needed that not only examines the influence of mobile learning on creative thinking skills, but also places it within a holistic educational framework oriented towards character building in students.

Theoretically, poster-based mobile learning has the potential to develop creative thinking skills because it combines visual elements, digital technology, and design activities that require active participation from students. Mobile device-based learning allows for more personal, flexible, and contextual interactions, thereby increasing student engagement and learning performance [10] In addition, interactive digital learning environments can encourage independent exploration of ideas and problem solving, which are important components in the development of creativity.

The process of designing digital posters not only involves the ability to understand the material, but also requires students to interpret information, compose messages communicatively, and combine visual and text elements innovatively. This activity is in line with indicators of creative thinking such as fluency, flexibility, and originality [20]. In this study, the use of poster-based m-learning was proven to improve students' creative thinking skills. This is due to the characteristics of mobile learning, which allows students to learn flexibly, explore various visual sources, and express their creative ideas through digital poster design [21].

From an Islamic educational perspective, developing intellectual potential through creative activities is seen as part of actualizing human nature, which is directed toward goodness and benefit. The application of poster-based mobile learning also has implications for shaping students' characters in line with Islamic educational philosophy. From an Islamic educational perspective, the main goal of learning is not merely the mastery of knowledge, but the formation of civilized, moral, and responsible individuals.

These findings are consistent with previous studies that indicate the use of mobile-based learning technology can increase student engagement and encourage the development of higher-order thinking skills, including creativity [22]. Thus, in its application, poster-based mobile learning not only functions as a learning medium, but also as an effective means of developing creative thinking skills among secondary school students. The concept of ta'dib proposed by Syed Muhammad Naquib al-Attas emphasizes that education must foster a balance between intellectual development and moral cultivation [23]. From an Islamic educational philosophy perspective, ideal learning is not only aimed at transferring knowledge, but also at shaping civilized individuals (insan kamil) through a balance between intellectual, spiritual, and moral development. A purposefully designed mobile-based learning environment can become a space for internalizing values, where students are trained to take responsibility for their learning process, maintain ethics in the use of technology, and reflect on the meaning of each piece of work they produce. Freedom in managing time and learning resources is not merely a form of academic autonomy, but a means of cultivating discipline, trustworthiness, and moral awareness of the values that are at the core of education in the Islamic tradition.

In Al-Ghazali's thinking, knowledge that is not accompanied by moral guidance has the potential to lose its direction and value. The educational process must integrate intellectual and spiritual dimensions in a balanced manner so that students are not only rationally intelligent, but also have ethical awareness in using their knowledge [24]. Targeted mobile-based learning can be a means of fostering personal responsibility, especially when students are given the freedom to manage their study time, choose reference sources, and take responsibility for their digital work.

Through digital poster design activities, students not only learn to express their ideas creatively, but are also trained to convey messages that are positive, ethical, and beneficial to their social environment. The implementation of mobile-based learning is not only viewed as a technological innovation, but also as a pedagogical strategy to support character building in line with the principles of intellectual and spiritual balance [25]. To determine the extent to which this approach is effective in shaping the creativity and character of students, systematic testing is required through a pretest and posttest experimental design to identify changes that occur before and after the treatment is given.

The research conducted was an experimental study consisting of pretest, treatment, and posttest stages. Research data were obtained through instruments used during the research. The results of the instrument data processing were used to determine the improvement in students' abilities after the treatment. One important skill that needs to be developed in secondary school students is creative thinking, because this skill plays an important role in supporting problem solving and innovative idea development in the future

In conducting research at SMAN 1 Surakarta, students showed high enthusiasm in participating in each stage of learning. This was due to the use of poster-based mobile learning, which presented learning in a visual, interactive, and contextual manner. Secondary school students tend to be interested in learning that utilizes digital technology and provides space to express ideas and creativity through digital poster design.

The implementation of poster-based mobile learning aims to improve students' creative thinking skills by actively involving them in the learning process. This medium is used as an alternative learning method that can increase engagement, interest in learning, and students' ability to develop creative ideas through independent processing of visual information and communication messages. To determine the effectiveness of poster-based mobile learning, a descriptive statistical analysis was conducted on the learning outcomes of students in the experimental group and the control group.

Based on descriptive statistics, both groups have similar data distribution characteristics with an identical span value of 40. A comparison of the variance values between the control group (120.673) and the experimental group (141.443) shows no significant difference, providing an initial indication that the data has relatively equivalent or homogeneous variance.

3.1 Pretest Score Data Poster Results

Table 3. Pretest Score of Student Learning Achievement in Control and Experimental Groups

Control		Experiment	
Category	Mark	Category	Mark
Mean	60.31	Mean	64.09
Median	60	Median	62.50
Mode	50	Mode	60
Variants	120.673	Variants	141.443
Highest	80	Highest	85
Lowest	40	Lowest	45
Span	40	Span	40
Total Value	1930	Total Value	2051

Based on Table 3, the average pre-test scores for creative thinking skills of students in the control group (60.31) and the experimental group (64.09) showed equivalent initial abilities before the treatment was given. The experimental group had a median of 62.50 and a mode of 60, while the control group had a median of 60 and a mode of 50.

Both groups had an identical score range (Span) of 40, with scores ranging from 45 to 85 in the experimental group and 40 to 80 in the control group. The variance (Variants) of the experimental group is 141.443 with a standard deviation of 11.893, while that of the control group is 120.673. Cumulatively, the total value (Total Value) of the experimental group reaches 2051 and that of the control group is 1930.

Table 4. Analysis of Pre-test Results of Students' Creative Thinking Indicators

Interval	Frequency	Category		Percentage	
		Pretest Control	Pretest Experiment	Pretest Control	Pretest Experiment
86 -100	Very Creative	0	0	0%	0%
71 - 85	Creative	2	7	6%	22%
56 - 70	Fairly Creative	8	14	25%	44%
41 - 55	Not Very Creative	22	10	69%	31%
<55	Not Creative	0	1	0%	3%
Number	Percentage	32	32	100%	100%

3.2 Test Score Data Posttest Poster Results

After conducting the initial test (pre-test) on the experimental class using poster-based mobile learning and the control class using conventional learning, the researchers then conducted a final test (post-test). This final test aimed to measure the creative thinking skills of students at the end of learning in each class. Descriptive analysis of the post-test data on students' creative thinking skills was carried out using the SPSS program and is presented in the following table:

Table 5. Post-test Scores for Student Learning Achievement in the Control and Experimental Groups

Control		Experiment	
Category	Mark	Category	Mark
Mean	72.50	Mean	85.88
Median	73	Median	87
Mode	65	Mode	87
Variants	83.032	Variants	35.855
Highest	91	Highest	95
Lowest	55	Lowest	75
Span	36	Span	20
Total Value	2320	Total Value	27.48

Based on the post-test results in the table, there was a significant increase in the creative thinking abilities of students in both groups. The experimental group achieved a mean of 85.88 with an identical median and mode of 87. Meanwhile, the control group obtained a mean of 72.50 with a median of 73 and a mode of 65.

The experimental group showed higher data consistency with smaller variance (Variants) of 35.855, compared to the control group of 83.032. The scores in the experimental group ranged from

75 to 95 (range 20), while the control group ranged from 55 to 91 (range 36). Overall, the total post-test score for the experimental group was 2748 and for the control group was 2320, indicating the effectiveness of the treatment in improving students' creative thinking skills.

Table 6. Analysis of Post-Test Results on Students' Creative Thinking Indicators

Interval	Category	Frequency		Percentage	
		Pretest Control	Pretest Experiment	Pretest Control	Pretest Experiment
86 - 100	Very Creative	2	17	6%	53%
71 - 85	Creative	15	15	47%	47%
56 - 70	Fairly Creative	15	0	47%	0%
41 - 55	Not Very Creative	0	0	0%	0%
<55	Not Creative	0	0	0%	0%
Total	Percentage	32	32	100%	100%

3.3 Normality Test of Pretest and Posttest Scores

Table 7. Tests of Normality

		Kolmogorov-Smirno	Shapiro-Wilk	
Student Learning Outcomes	df	Sig.	Sig.	Conclusion
Pretest Eksperiment	32	0.148	0.196	Normal
Postest Eksperiment	32	0.200	0.169	Normal
Pretest Kontrol	32	0.083	0.105	Normal
	32	0.123	0.419	Normal

3.4 The Homogeneity of Pretest and Posttest Scores

Table 8. Test of Homogeneity of Variances

Variable	Levene Statistic	df1	Df2	Sig.
Pretest	1.172	1	62	0.283
Postest	2.316	1	62	0.133

Prerequisite tests were conducted through normality and homogeneity tests to ensure data validity prior to hypothesis testing. Based on the Shapiro-Wilk test, all data were declared normally distributed with a significance value (Sig.) in the experimental pretest of 0.196 and in the control pretest of 0.105 (Sig. > 0.05). Furthermore, the results of the homogeneity test showed that the data variance was homogeneous. In the pretest stage, a significance value of 0.283 was obtained, while in the posttest it was 0.133. Because the significance values of both stages were greater than 0.05, it can be concluded that the control and experimental groups had equivalent (homogeneous) variance. With the requirements of normality and homogeneity fulfilled, data analysis was continued using parametric statistics.

4. Conclusion

Based on the results of data analysis and discussion, the use of m-learning posters has a positive effect on improving the creative thinking skills of grade XI students. This is evidenced by a significant increase in the average score (Mean) of the experimental group, from 64.09 in the pre-test to 85.88 in the post-test. This achievement is much higher than that of the control group, which only achieved a post-test average of 72.50.

The prerequisite analysis shows that all data are normally distributed based on the Shapiro-Wilk test, with a pretest significance value of 0.196 (experimental) and 0.105 (control). In addition, the data are declared homogeneous with a Levene test significance value above 0.05, indicating that both groups have equivalent variances before and after treatment. The experimental group also showed a higher level of consistency in learning outcomes, as indicated by a decrease in the variance value from 141.443 to 35.855 at the end of the study. Thus, it can be concluded that the learning tools tested are effective in consistently improving the quality of learning outcomes and creative thinking skills of students. Mobile learning can also be an effective solution to address the challenge of low creative thinking among students. In addition to having a significant impact on improving creative thinking skills, the application of mobile learning-based digital learning also contributes to supporting the character building of students in line with the philosophy of Islamic education. The use of technology in learning encourages the development of responsibility, independence, discipline, and ethics in the use of digital media.

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