

“Kabulok Komad Quartet Card” Learning Media: Student Interest and Learning Outcomes in Science

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ABSTRACT

Purpose of the study: This study examines the effectiveness of the “Kabulok Komad Quartet Card” learning media in improving students’ learning interest and learning outcomes in science (IPAS) learning at the elementary school level.

Methodology: A quantitative approach was employed using a quasi-experimental posttest non-equivalent control group design. The participants consisted of 22 fourth-grade students at Elementary School 01 Nambangan Lor, Madiun City, divided into an experimental group (n = 11) that utilized the Kabulok Komad Quartet Card learning media and a control group (n = 11) that used conventional textbook-based learning media. Data were collected using a learning interest questionnaire and a learning outcomes test, then analyzed through descriptive statistics and independent sample t-tests at a 0.05 significance level.

Main Findings: The results reveal that students in the experimental group demonstrated significantly higher learning interest and learning outcomes compared to those in the control group. The t-test results indicate a significant difference in learning interest ($t = 5.358, p < 0.05$) and learning outcomes ($t = 5.194, p < 0.05$) between the two groups. These findings suggest that the Kabulok Komad Quartet Card learning media is effective in creating an engaging, contextual, and student-centered learning environment.

Novelty/Originality of this study: This study provides empirical evidence that integrating local cultural content through game-based learning media can enhance both affective and cognitive aspects of learning in elementary science education.

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1. INTRODUCTION

Education is the primary measure of a nation’s progress because it is through education that the quality of human resources can be sustainably developed [1]-[5]. The world of education is dynamic and constantly changing with the times, science, and technology. Therefore, the educational process is required to be adaptable and produce effective, high-quality learning that is relevant to students’ needs. Formal education in schools is the primary vehicle for achieving this goal through systematically designed and high-quality learning activities, where optimal learning outcomes are the result of the interaction of various mutually supporting factors [6]-[11].

In the context of modern education, both educators and students are required to play an active role in realizing quality education [12]-[14]. In line with the development of the digital era, the Madiun City Government has provided concrete support in the form of laptops and Chromebooks for elementary and junior high school students since 2019 as an effort to improve the quality of digital-based education. This policy reflects the local government's commitment to adapting the education system to the demands of the digital age. Today's students, including elementary school students, are already familiar with digital technology through the use of devices such as gadgets and the internet, even before receiving formal instruction from educators.

Although students' digital access capabilities represent a positive potential, at the elementary school level, intensive mentoring and guidance from teachers and parents is required to ensure that the use of digital technology positively impacts students' cognitive, affective, and character development. This aligns with the 2024 Education Unit Curriculum Development Guidelines, which emphasize the principles of interactive, inspiring, enjoyable, challenging, and motivating learning. Interactive learning positions educators as facilitators, inspiring learning provides positive role models, enjoyable learning creates positive learning emotions, challenging learning encourages competency development, and motivating learning fosters active student participation [15]-[19].

Beyond mastering academic competencies, learning must also contribute to the development of student character. In the Independent Curriculum, character is formulated through the Pancasila Student Profile, which affirms that Indonesian students are lifelong learners who are faithful, pious, have noble morals, are globally diverse, collaborative, independent, critical thinkers, and creative [20]-[24]. Thus, education in Indonesia is not only oriented towards cognitive development, but also towards the formation of attitudes, values, and behaviors that align with national identity and global demands. Ideally, this character formation is rooted in Indonesia's diverse culture. Local cultural diversity is a national asset that needs to be introduced and preserved from an early age through formal education. However, in the era of globalization and digitalization, foreign cultures are increasingly accessible to the younger generation and have the potential to displace local culture, including in Madiun City, which is experiencing increasingly modern social and cultural development. Therefore, the world of education has a strategic role in introducing and instilling an understanding of local cultural diversity in elementary school students so that they can develop a strong cultural identity.

At the elementary school level, local culture is taught through science and social sciences (IPAS) subjects in Phases B and C. However, the coverage of local cultural diversity remains limited and highly dependent on the regional context. The learning process must be tailored to the psychological development of students, and that learning will be more effective if supported by media appropriate to the material and the students' age [25]-[29]. In reality, many educators still struggle to develop engaging, contextual, and appropriate learning media for elementary school students. Field observations indicate that the use of textual and unengaging IPAS teaching in Madiun City is still dominated by textbooks and internet sources. The learning media used are unable to present the material concretely and visually, resulting in low student learning interest and suboptimal understanding. However, according to Kandia et al [30], learning media serves as an effective communication tool for conveying learning messages and is crucial for achieving learning objectives. Psychologically, students aged 7-11 are in the concrete operational stage (Piaget), where they understand concepts more easily through real objects or visuals. Therefore, learning media that are concrete, visual, and fun are essential. Avellan-Zambrano et al [31] emphasized that learning in elementary schools requires special energy and strategies because students tend to prefer playful activities. One learning medium that aligns with these characteristics is game-based media, such as quartet cards. Quartet cards are an educational game consisting of picture cards accompanied by brief captions explaining the images [32]-[35]. This medium allows students to learn while playing, encourages active participation, provides immediate feedback, and is practical and flexible. Quartet cards can also be used independently by students without intensive supervision from educators, thus supporting student-centered learning.

Based on the learning conditions of fourth-grade science lessons in elementary schools in Madiun City, particularly in grade IV A of Elementary School 01 Nambangan Lor, it was found that student interest and learning outcomes in the topic of Local Cultural Diversity are still relatively low. As many as 60% of students show low interest in learning and unsatisfactory learning outcomes. This situation highlights the need for innovative learning media capable of significantly improving student interest and learning outcomes. Although various studies have examined the use of game-based learning media and educational cards in elementary schools, most of the research is general in nature and does not specifically address the local cultural context of a particular region. Furthermore, research developing quartet cards based on the local cultural diversity of Madiun City integrated into fourth-grade science lessons is still very limited. Previous research also tends to focus solely on learning outcomes, without simultaneously examining increasing student interest in learning as a critical factor in successful learning. Therefore, there remains a gap in research related to the development of contextual, locally culturally based learning media, appropriate to the developmental characteristics of elementary school students, and relevant to the demands of the Independent Curriculum. Based on this gap, this study implements the *Kabulok Komad (Keberagaman Budaya Lokal Kota Madiun) Quartet Card Learning Media* as a science

learning medium aimed at improving the interest and learning outcomes of fourth-grade elementary school students in Madiun City.

2. RESEARCH METHOD

The researcher's research design is quantitative, using a quasi-experimental posttest non-equivalent control group design. It was done to investigate causal hypotheses by comparing one or more experimental groups that received treatment with a comparison group that did not. This research design was implemented because it aligned with the research objectives, which aimed to determine whether the problem-based learning model could improve student activity and learning outcomes. This study used descriptive statistics (average, minimum, and maximum) and inferential statistics. The inferential statistic used was the independent sample t-test.

Tabel 1. Posttest Non-Equivalent Control Group Design

Group	Pretest	Treatment	Posttest
Experimental	O ₁	Using the "Kabulok Komad Quartet Card" Learning Media	O ₁
Control	O ₂	Traditional Learning media (book of students)	O ₂

This research was conducted at Elementary School 01 Nambangan Lor, Madiun City, with a total of 22 fourth-grade students. There were 11 students in the experimental class and 11 students in the control class. The experimental class used the "Kabulok Komad Quartet Card" Learning Media, while the control class used the Traditional Learning media. The sample collection technique used was purposive sampling. Purposive sampling is a sampling technique based on the researcher's criteria. In this study, the first step in the data collection process was to provide intervention only to the experimental class using the "Kabulok Komad Quartet Card" Learning Media. In contrast, the control class used Traditional Learning media. The results of the assessment of student interest and learning outcomes were then compared between students who used the "Kabulok Komad Quartet Card" Learning Media and students who did not use the learning media. The instruments used were a interest questionnaire and a test for learning outcomes. The interest students used a 4-point Likert scale. Not good a score of 1, moderately active received a score of 2, Good received a score of 3, and very good received a score of 4. Meanwhile, the learning outcomes used 10 multiple-choice questions with a maximum score of 100.

The following are the categories of student interest and learning outcomes, including very good, good, sufficient, not good, and very poor, as shown in Table (2-3).

Table 2. Categorization of students interest

Category	Interval
Very Good	31.1 – 40.0
Good	22.1 – 31.0
Moderate	13.1 – 22.0
Not Good	4.0 – 13.0

And category for learning outcome in Tabel 3.

Table 3. Categorization of learning outcome

Category	Interval
Very Good	75.1 – 100.0
Good	50.1 – 75.0
Moderate	25.1 – 50.0
Not Good	0.0 – 25.0

All data obtained from the questionnaire of student interest and tests for student learning outcomes in the control and experimental classes were collected, then calculated and analyzed using SPSS 21. Descriptive statistics were used to calculate the frequency, percentage, average, minimum, and maximum for the control and experimental groups. In this study, quantitative data were analyzed using parametric statistics, including independent sample t-tests. Independent sample t-tests were conducted to test differences in student interest and learning outcomes in the application of the "Kabulok Komad Quartet Card" Learning Media. This study used SPSS 21 at a significance level of 0.05.

3. RESULTS AND DISCUSSION

This section describes the research findings on student interest and learning outcome. The results of the Category, Mean, Min, Max, and Percentage of the posttest, which show the impact of “Kabulok Komad Quartet Card” Learning Media on students interest and learning outcome among elementary school students, are presented as follows table (4-5).

Table 4. Gaps in Students Interest Scores

	Interval			Mean	Min	Max	%
	Range	Category	Total				
Class Experim ent	31.1 – 40.0	Very Good	8	33	29	38	0.0
	22.1 – 31.0	Good	3				0.0
	13.1 – 22.0	Moderate	0				72.7
	4.0 – 13.0	Not Good	0				27.3
TOTAL			11				100
	Interval			Mean	Min	Max	%
	Range	Category	Total				
Class Control	31.1 – 40.0	Very Good	0	20	12	28	0.0
	22.1 – 31.0	Good	1				9.1
	13.1 – 22.0	Moderate	7				63.6
	4.0 – 13.0	Not Good	3				27.3
TOTAL			11				100

From table 4, which comes from 11 respondents of Elementary School Students, is categorized as good in the experimental class, and after being processed and the results obtained using the SPSS 21 program application, it was found that the learning interest students in the experimental class has a good category of 72.7% for 8 students from a total of 11 students, and very good at 27.3% for 3 students from a total of 11 students. Of the 11 students, the average is 33, the maximum is 38, and the minimum is 29. Then in the control class which comes from 11 respondents, the dominant category is not good, and after being processed and the results obtained using the SPSS 21 program application, it was found that the learning interest students in the control class has a moderate category of 63.6% for 7 students from a total of 11 students, good at 9.1% for 1 students from a total of 11 students, not good at 27.3% for 3 students from a total of 11 students. The 11 students had an average score of 20, a maximum score of 28, and a minimum score of 12.

Table 5. Gaps in Learning Outcome Students' Scores

	Interval			Mean	Min	Max	%
	Range	Category	Total				
Class Experim ent	75.1 – 100.0	Very Good	10	85	71	90	90.9
	50.1 – 75.0	Good	1				9.1
	25.1 – 50.0	Moderate	0				0.0
	0.0 – 25.0	Not Good	0				0.0
TOTAL			11				100
	Interval			Mean	Min	Max	%
	Range	Category	Total				
Class Control	75.1 – 100.0	Very Good	0	50	25	72	0.0
	50.1 – 75.0	Good	3				27.3
	25.1 – 50.0	Moderate	6				54.5
	0.0 – 25.0	Not Good	2				18.2
TOTAL			11				100

From table 5, which comes from 11 respondents of Elementary School Students, is categorized as good in the experimental class, and after being processed and the results obtained using the SPSS 21 program application, it was found that the learning activity in the experimental class has a very good category of 90.9% for 10 students from a total of 11 students, and good at 9.1% for 1 students from a total of 11 students. Of the 11 students, the average is 85, the maximum is 90, and the minimum is 71. Then in the control class which comes from 11 respondents, the dominant category is moderate, and after being processed and the results obtained using the SPSS 21 program application, it was found that the learning outcome of students in the control class has a moderate category of 54.5% for 6 students from a total of 11 students, good at 27.3% for 3 students from a total of 11 students, very not good at 18.2% for 2 students from a total of 11 students. The 11 students had an average score of 50, a maximum score of 72, and a minimum score of 25.

This comparison shows that traditional learning model fails to meet students' need for active participation. At the same time, "Kabulok Komad Quartet Card" Learning Media provide a more contextual, applicable, and problem-solving learning experience, thus encouraging improved student academic achievement.

Table 6. Independent sample t-test for student learning interest

	t	df	Mean	Std.Deviation	95% confidence interval	
					Lower	Upper
Learning Activity	5.358	22	3.2818	.14149	8.912	.6252
	5.358	2.074	2.1286	.20917	7.874	.8622

From table 6 it can be seen that the value obtained (t count) with the t table value. The t table value can be found in the t table with a significance value of 0.05 (2-sided test) with degrees of freedom (df) 22. In this study, the results for the t table are 2.074. While for the t count value can be seen in table 5 (t column) which is 5.358. The criterion for testing the hypothesis is the rejection value of H0. So, it can be concluded that there is a significant difference in student learning interest between the control class taught using the traditional learning media and the experimental class using the "Kabulok Komad Quartet Card" Learning Media. It can be seen from table 6 that the average value of student learning activities is 3.2818, which means it can increase student learning activities.

Table 7. Independent sample t-test for learning outcome

	t	df	Mean	Std.Deviation	95% confidence interval	
					Lower	Upper
Learning Outcome	5.194	22	3.2857	.14357	8.957	.6721
	5.194	2.074	2.6197	.20915	7.157	.8713

From table 7 it can be seen that the value obtained (t count) with the t table value. The t table value can be found in the t table with a significance value of 0.05 (2-sided test) with degrees of freedom (df) 22. In this study, the results for the t table are 2.074. While for the t count value can be seen in table 5 (t column) which is 5.194. The criterion for testing the hypothesis is the rejection value of H0. So, it can be concluded that there is a significant difference in student learning outcomes between the control class taught using the traditional learning media and the experimental class using the "Kabulok Komad Quartet Card" Learning Media. It can be seen from table 5 that the average value of student learning outcomes is 3.2857 which means it can improve student learning outcomes.

The results of this study provide compelling empirical evidence that the use of "Kabulok Komad Quartet Card" learning media has a significant positive effect on both students' learning interest and learning outcomes at the elementary school level. The descriptive analysis of students' learning interest (Table 4) indicates that the experimental class achieved substantially higher interest levels compared to the control class. Specifically, 72.7% of students in the experimental group were categorized as having good learning interest and 27.3% as very good, with a high mean score of 33. In contrast, the control class was predominantly classified within the moderate (63.6%) and not good (27.3%) categories, with a considerably lower mean score of 20. This disparity suggests that conventional learning media are less effective in stimulating students' affective engagement. These findings are consistent with motivation and interest theories, which emphasize that learning interest is strongly influenced by the attractiveness, interactivity, and relevance of learning materials [36]-[40]. The Kabulok Komad Quartet Card media integrates visual elements, game-based interaction, and contextual content, particularly the components of Attention and Relevance. Such features are especially important in elementary education, where students' sustained attention and curiosity play a crucial role in learning engagement.

The significant improvement in learning interest is further confirmed by the independent samples t-test results (Table 6). The obtained t-value (t = 5.358) exceeds the critical t-table value (2.074) at the 0.05 significance level, indicating a statistically significant difference between the experimental and control groups. This result supports previous studies demonstrating that game-based and card-based learning media significantly enhance students' learning interest by fostering enjoyment, competition, and active participation [41]-[43]. In addition to enhancing learning interest, the Kabulok Komad Quartet Card media also produced a substantial improvement in learning outcomes. As shown in Table 5, 90.9% of students in the experimental class achieved the very good category, with a mean score of 85, while the control class was dominated by moderate (54.5%) and good (27.3%) categories, yielding a much lower mean score of 50. This indicates that increased learning interest is accompanied by improved cognitive achievement, reinforcing the close relationship between affective engagement and academic performance. The inferential analysis of learning outcomes (Table 7) further validates

this conclusion. The t-value obtained ($t = 5.194$) is significantly higher than the critical value (2.074), leading to the rejection of the null hypothesis. This finding confirms that the observed improvement in learning outcomes is not incidental but is directly attributable to the implementation of the Kabulok Komad Quartet Card learning media. The meaningful learning occurs when learners actively process information through engaging and well-designed instructional media [44]-[46].

The effectiveness of the Kabulok Komad Quartet Card media can be explained through cognitive and constructivist learning perspectives. The card-based format encourages students to actively retrieve information, make associations, and engage in peer interaction, which are known to strengthen memory retention and conceptual understanding [47]-[49]. Moreover, the collaborative and game-like nature of the media promotes social interaction, which Vygotsky identifies as a critical component of cognitive development in children. Overall, the findings indicate that traditional learning media tend to position students as passive recipients of information, thereby limiting both learning interest and academic achievement. In contrast, the Kabulok Komad Quartet Card learning media creates an interactive, enjoyable, and student-centered learning environment that effectively enhances students' interest and learning outcomes simultaneously. Given that learning interest is a key antecedent of learning achievement, the dual improvement observed in this study underscores the pedagogical value of innovative, game-based learning media in elementary education [50]-[53].

The novelty of this study lies in the development and empirical evaluation of the "Kabulok Komad Quartet Card" learning media, which integrates local cultural diversity of Madiun City into IPAS learning for elementary school students. Unlike previous studies that generally examine game-based or card-based media in a broad context, this research specifically combines local wisdom, visual learning, and game-based interaction within the framework of the Merdeka Curriculum. In addition, this study simultaneously analyzes learning interest as an affective variable and learning outcomes as a cognitive variable, providing a more comprehensive understanding of the effectiveness of learning media. Thus, this research contributes a context-specific and culturally grounded instructional innovation that supports both student engagement and academic achievement in elementary education. The findings of this study have important implications for theory, practice, and educational policy. Theoretically, the results support constructivist and motivational learning theories, emphasizing that meaningful learning occurs when students are actively engaged through interactive and contextually relevant media. Practically, the Kabulok Komad Quartet Card learning media offers teachers an effective instructional alternative to conventional textbook-based learning, particularly for abstract or culture-related IPAS content. The use of local cultural elements helps students connect learning materials with their real-life environment, thereby increasing interest and comprehension. From a policy perspective, this study supports the implementation of the Merdeka Curriculum by demonstrating that culturally responsive and game-based learning media can foster student-centered learning, strengthen cultural identity, and improve learning quality at the elementary school level.

Despite its positive findings, this study has several limitations. First, the sample size was relatively small and limited to one elementary school, which may restrict the generalizability of the results. Second, the research focused only on short-term learning interest and learning outcomes, without examining long-term retention or behavioral changes. Third, the study did not explore other potentially influential variables such as students' motivation, collaboration skills, or critical thinking abilities. Additionally, the implementation of the learning media was limited to one learning topic, which may not fully represent its effectiveness across different subject matters. Based on the findings and limitations of this study, several recommendations are proposed. Future research should involve larger and more diverse samples across different regions to enhance the generalizability of the results. Longitudinal studies are recommended to investigate the long-term impact of quartet card learning media on students' interest, achievement, and character development. Further studies may also integrate additional variables such as motivation, creativity, critical thinking, and collaborative skills. Moreover, future research could explore the integration of the Kabulok Komad Quartet Card media with digital or hybrid learning platforms to further support differentiated and technology-enhanced learning in elementary education.

4. CONCLUSION

This study concludes that the use of the Kabulok Komad Quartet Card learning media has a significant positive effect on both students' learning interest and learning outcomes in elementary school IPAS learning. The results of descriptive and inferential analyses indicate that students who learned using the quartet card media demonstrated higher levels of interest and achieved better academic performance than those who learned through conventional textbook-based media. The independent sample t-test results confirm statistically significant differences between the experimental and control groups in terms of learning interest and learning outcomes, indicating the effectiveness of the developed learning media. The increased learning interest observed in the experimental group suggests that the integration of game-based learning, visual elements, and local cultural content creates a more engaging and enjoyable learning environment for elementary school students. Higher

learning interest was also found to be closely associated with improved learning outcomes, highlighting the important role of affective engagement in supporting cognitive achievement. In contrast, traditional learning media tended to position students as passive recipients of information, which limited both their engagement and understanding of the learning material. Furthermore, this study provides empirical support for the implementation of culturally responsive and student-centered learning media in line with the principles of the Merdeka Curriculum. By integrating local cultural diversity into IPAS learning, the Kabulok Komad Quartet Card media not only enhances academic achievement but also contributes to strengthening students' cultural awareness and identity. Therefore, it can be concluded that the Kabulok Komad Quartet Card learning media is an effective instructional innovation for improving learning interest and learning outcomes in elementary school science learning.

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AUTHOR CONTRIBUTIONS

The author was solely responsible for the conceptualization and design of the study, data collection, implementation of the narrative counseling intervention, data analysis, and interpretation of the results. The author also prepared the original draft of the manuscript, revised the content critically, and approved the final version for publication.

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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