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Manipulative Media KOBI (Kartu Operasi Bilangan Integrasi) to Improving Creative Thinking Abilities

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A B S T R A C T
Learning mathematics requires appropriate learning media. The facts in the field of learning are textbook and monotonous. Kartu Operasi Bilangan Integrasi (KOBI) is a manipulative media developed through game-based methods Teams Games Turnament (TGT). The purpose of this research is to determine the effectiveness of the KOBI media in enhancing students' creative thinking abilities. The study was conducted on 7th-grade students at MTsN 7 Malang, focusing on the topic of integers. The research utilized a quantitative approach through quasi-experimental methods. Data collection involved tests, questionnaires, and direct observations during the learning sessions. The results revealed a significant increase in student creativity after the use of KOBI media, with the percentage of students in the creative category increasing from 0% to 25% and the uncreative category decreasing from 40% to 5%. The Wilcoxon test showed a significance value of 0.001 (<0.05), indicating a significant difference between the pretest and posttest scores, where 80% of students experienced improvement.

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1. INTRODUCTION

The learning media used in class really helps students in making it easier to understand concepts. Research conducted by (Wulandari et al., 2023) states that conveying messages and material content in the learning process is more effective if using learning media. This is in line with the statement regulated in the Minister of Education Regulation, that learning that takes place at least contains elements of innovation and creativity. In an effort to realize innovative and creative learning, it is necessary to carry out learning, one of which is by using media. The media used functions as a visualization tool (Tsabita Primrose et al., 2023). Especially in mathematics material which is dominated by abstract concepts. The media used in mathematics learning is an alternative way to change the face of mathematics into a fun subject for students (Nugraha et al., 2023).

For teachers, learning media functions as an intermediary in conveying important information regarding learning material (Wulandari et al., 2023). The learning media used in

mathematics learning can be manipulative media or digital-based media. The two media have differences in form and manufacturing process. Manipulative media is in the form of physical media that functions as a teaching aid (Yuliwijayanti et al., 2021). Meanwhile, digital media requires IT skills in the process of creating and operating it.

The learning media used in learning really supports students in achieving mathematics learning goals (Erlina et al., 2021). Learning mathematics can equip students with the ability to think logically, analytically, systematically, critically and creatively as well as the ability to collaborate (Nurfadhillah et al., 2021). The existence of learning media functions as a means of communication and visualization of material which really helps students understand the concepts of existing material. With learning plans that have been prepared using learning media, learning mathematics is no longer just about numbers (Dian Juniarti & Tanggu Renda, 2018), but it is more meaningful in contributing to making humans capable of thinking rationally in solving life's problems.

Observation findings at MTsN 7 Malang in class VII provide a strong basis for carrying out learning innovations using manipulative media. Class 7 Mathematics learning at MTsN 7 Malang was never designed and implemented using learning media. Learning takes place conventionally and textbooks. The impact of this learning is that many students do not actively participate in learning. This condition is a strong factor in supporting the number of students who do not master the concepts of number operations (Ayu et al., 2021). The findings of this observation were also similar to those experienced by students in various other schools. Among them is research (Yulia et al., 2021) stated that students tend to be passive and participate less in learning. Other problems were also stated by Maryanto et al. (2023) that inappropriate learning methods cause students' understanding of concepts to be poor. From previous research studies, it was concluded that manipulative media, which is a mathematics learning innovation, can overcome student learning problems.

KOBI media is a manipulative media in the form of game cards which contains number operation content with numerical content presented in the form of Arabic text. Learning with KOBI (Kartu Operasi Bilangan Integrasi) as an innovation that has been content tested by experts who meet the validity and suitability test requirements for use in learning, with an average score of 77%. KOBI media will be used with the TGT type cooperative learning model. The use of KOBI with the TGT model has the potential to increase students' active participation in learning. Students' active involvement in TGT learning will also encourage students to communicate and collaborate to achieve the same goals. In this way, students will be able to master the concept of integer operations well.

KOBI learning media has been developed with systematic and measurable procedures. This media has been tested for the suitability of the content of number operations material, suitability of learning levels and student development as indicated by an average validation score of 78% (subject matter). Researchers assume that this media is relevant to use in overcoming problems at MTsN 7 Malang. Not only that, researchers are also optimistic that KOBI can be used in various other locations with the same provisions on the same material, at the same level of students, and with special conditions, namely for madrasah students. Remembering that the essence of KOBI is to contain Islamic integration values, namely by presenting number cards with Arabic text.

Student’s creative abilities in learning using KOBI media will be explored through group game tournament activities. Each student who plays will take turns compiling number operations consisting of four numbers and three number operators randomly to approach the

smallest (one) or largest (twenty) numbers. Especially if you get a square root operator, the player will get one more operator for a total of four operator cards.

This learning scheme is an important aspect that can improve students' creative abilities in understanding the flow of the game and developing strategies to win tournaments. Players will arrange number operation patterns while still knowing the three number cards and three operator cards. When it is time to arrange the cards for later assessment, one remaining number card is opened. This can damage the strategy that has been prepared, so participants are asked to think quickly and creatively to win the game.

Based on the description above, the researcher will prove that the mathematics learning design using KOBI media which is carried out using the TGT cooperative model will be able to improve students' creative thinking abilities.

2. METHOD

This research was carried out using a quantitative approach through quasi experiments. The research was conducted in class VII at MTsN 7 Malang, Malang Regency, East Java. The selection of class VII was based on a needs analysis in developing KOBI media. Research conducted in June 2024. Use of media KOBI (Kartu Operasi Bilangan Integrasi) Integrative Mathematics learning is carried out using a pre-post experimental design. The purpose of using this design is to prove that learning carried out using KOBI media is able to improve students' creative thinking abilities.

The implementation of KOBI in learning is designed with a fun and game learning approach. This learning approach aims to increase the active participation of all students (Adipat et al., 2021). Learning takes place in groups equipped with student worksheets. Student worksheets contain problems and instructions for using card games to find solutions to integrative mathematics problems according to the number mathematics learning material in the whole numbers sub-chapter.

In practice, KOBI is used in learning through the preparation, implementation and evaluation stages. The preparation stage is to prepare all learning tools. In this article the researcher's focus is on using the results of development research that has been carried out previously. In this article the researcher will focus on discussing the effectiveness of KOBI used in learning in improving students' creative abilities. At the implementation stage, the researcher presents descriptive data from the results of using manipulative media in learning. This implementation stage was carried out on class VII students in one class with a total of 20 students. The final stage is for researchers to evaluate students' creative thinking abilities in solving problems as well as a form of student learning outcomes.

Data collection on students' creative thinking abilities is carried out through tests. The test is a description of 5 items given to students for 60 minutes of processing time. This test was carried out 2 times according to the research design, namely before learning and after learning using KOBI media. The aim of this test is to prove the hypothesis whether learning using KOBI media can improve students' creative thinking abilities in solving integrative mathematics problems. The test used has been proven valid in terms of content, construction and empirical use.

Analysis of research data was carried out through descriptive statistics and hypothesis testing through non-parametric statistics. Descriptive statistics were carried out to provide an overview of students' creative thinking abilities. In this case, a description will be described which includes the average value of creative thinking ability, the highest value, the lowest

value, as well as categories of students' creative thinking ability level according to the research location. The level of creative thinking ability follows the guidelines which can be seen in table 1.

Table 1. Guidelines for Creative Thinking Ability Levels Based on Siswono

Skor	Level
$80 < S \leq 100$	Level 4 (Very creative)
$60 < S \leq 80$	Level 3 (Creative)
$40 < S \leq 60$	Level 2 (Quite)
$20 < S \leq 40$	Level 1 (Less creative)
$0 < S \leq 20$	Level 0 (Not creative)

$S =$ total score

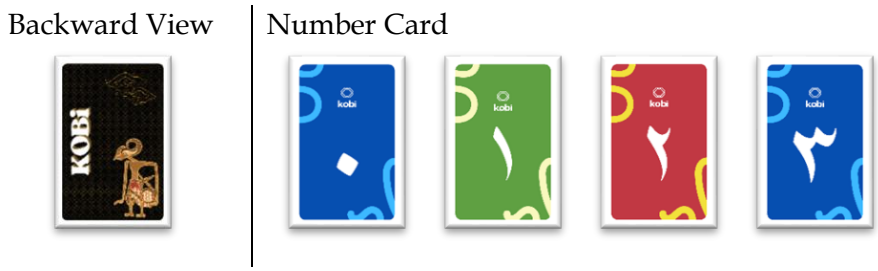
Source: (Siswono, 2011)

The non-parametric statistical test is the Wilcoxon test. This test was carried out with the aim of comparing whether the conditions before and after using KOBI media had changes in the form of an improvement in the results of the tests carried out. Determination of the hypothesis decision will be concluded from the test results if the Asymp.sig value <0.05 then it can be concluded that there is a difference between the pre-test and post-test. (Fadilatunnisyah et al., 2024).

3. RESULTS AND DISCUSSION

This research focuses on class VII students at MTsN 7 Malang, with the aim of evaluating the effectiveness of the media KOBI (Kartu Operasi Bilangan Integrasi) in improving students' creative thinking abilities in integrative mathematics learning. Research data was obtained through pretest and posttest for students. Observations and documentation were also carried out during the research to obtain supporting qualitative data.

KOBI cards consist of number cards in Arabic font and operation cards in the form of addition, subtraction, multiplication, division and square roots. The visual can be seen in Figure 1.



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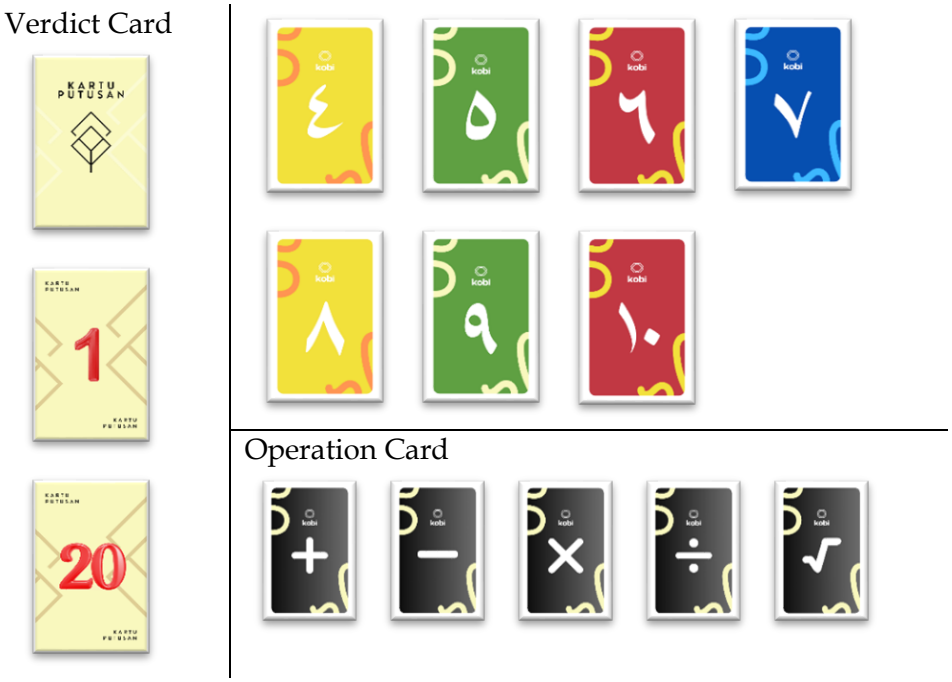

Figure 1. KOBI Visualization

KOBI cards are played in groups, TGT. At the beginning of the round, each group receives operation cards for addition, subtraction, division and 2 decision cards (number 1 and number 20). Number cards are distributed in stages with details of 1 closed number card and 3 open number cards. Multiplication and square root operation cards are shuffled and distributed when dealing open cards. Each group is given discussion time to arrange number operations and decide to play low (composing number operations with results close to or equal to 1 from both the right and left) or high (composing number operations with results close to or equal to 20 from both right and left). When discussing, 1 face down card remains in its position, the face down card will be revealed during the session, each group shows the number operations they have discussed. This card is called a "destroying card" because they have to think again to arrange a number operation whose results are close to the decision card they have chosen. The winner in that round is determined by the group whose numerical operation results are closest to the decision card.

The implementation phase begins with administering a pretest to students. When the pretest was carried out, the researchers found that students were unable to solve the questions given. Especially for questions with level C4 compared to other questions which have a level above it. Solving problems with level C4 and above requires high thinking skills to analyze, evaluate and create (Setyorini & Hw, 2023). This means that students are not used to working on high level thinking or HOTS questions. In line with the research results (Maysaroh & Sutarni, 2023) stated that the factors were that students were not used to solving HOTS questions, did not understand the material, and were not careful.

The game starts and runs according to the game instructions. Group I has number cards 2, 9, 4 and 1 card face down with operations $+, -$, and $\div$ playing low. Group I solved this problem by using the register method. Group I revealed $9 - 2 + 4$ as a temporary number operation arrangement. Then in the final session the closed cards were opened, group I received card number 10. Within a limited time, group I showed the arrangement $10 \div 2 - 9 + 4 = 0$ as the final arrangement. If you pay attention, group I can produce 1 if you arrange the cards in a $9 -$

$10 + 4 \div 2$ arrangement. When told this arrangement, one of the students said "Oh, is that okay?", then the researcher responded with "Yes, why?". The student then answered "9 minus 10, we can't do ...oh, wait, negative one, right?" Based on the findings by Izatul Lailah & Hamidah (2023) the student lacks familiarity with whole number operations as the operations being considered are still limited to whole numbers.. Meanwhile in group II, they succeeded in arranging the cards they had in the arrangement $8 \div 2 - 6 + 3 = 1$. With that, group II won the round.

Figure 2. Implementation of KOBI

Figure 2 shows students' enthusiasm in using KOBI media. It can be seen that the fun and game learning approach applied has succeeded in increasing students' active participation. In line with Gumilar et al. (2024) showed that the use of media can increase students' learning motivation and actively involve them in the learning process. This observation shows that students feel more interested and motivated in learning mathematics using KOBI media. The implementation phase is closed with the implementation of posttest with issues that have been validated by experts.

In addition, observation notes show increased interaction between students in study groups. Students appear to be more active in discussing and exchanging ideas in solving mathematical problems. In line with the finding Ummi et al. (2023) which emphasizes the importance of social interaction in improving mathematical creative thinking abilities.

The results of the implementation of KOBI use are evaluated and described as follows:

a. Analysis pre-test and post-test

Here is a presentation table of levels of creativity on pre-test and post-test.

Table 2. Percentage of Creativity Level in pre-test and post-test

Score	Frequency of student (pre-test)	Frequency of student (post-test)	Level
$80 < S \leq 100$	0	0	Level 4 (Very Creative)
$60 < S \leq 80$	0	5	Level 3 (Creative)
$40 < S \leq 60$	1	5	Level 2 (Quite)
$20 < S \leq 40$	11	9	Level 1 (Less Creative)
$0 < S \leq 20$	8	1	Level 0 (Not Creative)

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Analysis of pre-test and post-test results shows positive changes in students' creative thinking abilities after using KOBI media in integrative mathematics learning. Before the intervention, the majority of students were in the less creative (55%) and not creative (40%) categories. However, after using KOBI media, there was a significant increase. The number of students in the creative category increased from 0% to 25%, and the moderately creative category increased from 5% to 25%. Meanwhile, the number of students in the non-creative category decreased drastically from 40% to only 5%. This can be seen from the details of the pre-test and post-test scores obtained by students which are shown in Figure 3.

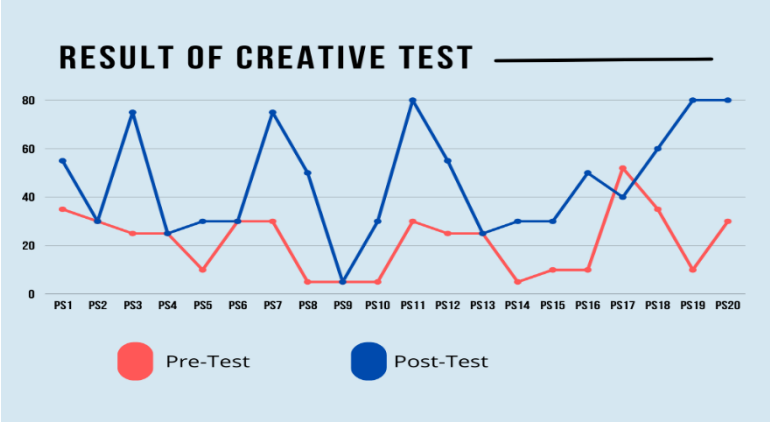

Figure 3. comparison of students' pre-test and post-test scores

Based on the graph in Figure 3, it can be seen that there is an increase in the score results from the pre-test to the post-test. This indicates that the use of KOBI media in integrative mathematics learning has a positive impact on students' creative thinking abilities. This finding is in line with research conducted by Suryani et al. (2023), who found that the use of manipulative media in mathematics learning can improve students' conceptual understanding and creative thinking abilities.

b. Wlicoxon Test

The data in table 3 was carried out by the Wilcoxon test with the help of SPSS 25 to determine the increase in pretest and posttest scores. SPSS output data from the Wilcoxon test is as follows:

Table 3. The result of Wlicoxon Test

Test Statistics[a]

	Posttest - Pretest
Z	-3.360[b]
Asymp. Sig. (2-tailed)	.001

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Table 3 shows the calculated Z value of -3.360 and a sig value of 0.001. With a sig

value that is smaller than 0.05 (5% error rate), it can be concluded that there is a significant difference between the pretest and posttest scores. These results strengthen evidence of the effectiveness of KOBI media in improving students' creative thinking abilities. To find out more specifically, see table 4.

Table 4. Wilcoxon test output with SPSS

Ranks

		N	Mean Rank	Sum of Ranks
Posttest - Pretest	Negative Ranks	1[a]	1.00	1.00
	Positive Ranks	14[b]	8.50	119.00
	Ties	5[c]		
	Total	20		

a. Posttest < Pretest
b. Posttest > Pretest
c. Posttest = Pretest

Based on table 4, the results of the Wilcoxon test show that the number of students whose grades decreased was 1 person (Negative Ranks). Meanwhile, 14 students experienced an increase (Positive Ranks). The remaining 5 students did not experience changes in their pretest and posttest scores. This shows that 80% of students experienced an increase in their grades, this result shows the high effectiveness of using KOBI media. These findings are consistent with research Rahmalasari et al. (2024), who reported that the use of interactive learning media can improve mathematics learning outcomes for more than 65% of students. This is shown in the pre-test results, where 17 students achieved a score above the KKM 70 and 9 students had not achieved learning completeness, while the detailed post-test results showed that 22 students had achieved learning completeness and 4 students had not achieved learning completeness.

4. CONCLUSION

Based on the results and discussion that have been presented, it can be concluded that the use of KOBI media in integrative mathematics learning has a significant positive impact on students' creative thinking abilities. Pre-test and post-test analysis showed a substantial improvement in the distribution of students' creativity levels, with a drastic reduction in the number of students in the not creative category and a significant increase in the creative and moderately creative categories. These results were also confirmed by the Wilcoxon Test results which showed a significant difference between the pre-test and post-test scores. As many as 80% of students experienced an increase in their scores, with only one student experiencing a decrease and five students experiencing no change. These results are consistent with recent research showing the effectiveness of interactive learning media in improving mathematics learning outcomes.

The increase in the number of students who achieved learning mastery from pre-test to post-test also indicates the effectiveness of KOBI media. This confirms the potential of innovative learning media such as KOBI in improving students' creative thinking abilities and

mathematics learning outcomes, as well as opening up opportunities for further research on optimizing the use of learning media in the context of mathematics education.

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