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Mathematical Reasoning Ability Based on Interactive Multimedia on Learning Outcomes of Geometry Transformation Material

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ABSTRACT

The advancement of the world and the rapid development of IT have had a good influence on world civilization. Guaranteed quality learning is how the teacher can utilise multimedia learning. This study aims to describe student learning results in mathematics subject matter geometry transformation based on interactive multimedia. This qualitative descriptive research was conducted at a state junior high school in Suwawa 2022-2023 with a total of 27 students. Observation techniques are used to collect research data about student tests and interviews in the learning process through interactive multimedia learning. The indicators are the results of student observations in receiving learning that reaches the whole, the results of teacher observations in managing learning reach the whole, and the assessment of mathematics learning outcomes interviews that reach a minimum of 80% or overall students who achieve the minimum completeness criteria or (KKM = 75). The average learning outcomes in stage I have shown an increase, with 11 students achieving a completion rate of 63.24%. In stage II, this figure rose to 24 students, representing a completion rate of 83.87%. This tool has the potential to be advantageous for educators in the creation of multimedia-driven instructional materials, hence fostering increased student engagement and participation. The impact of technological advancements in the field of education is characterised by a notable augmentation in invention. This surge in innovation has the potential to cultivate a generation that possesses enhanced skills and preparedness to effectively address the evolving demands of the future. In addition to assessing educational achievements, it is imperative to take into account students' perspectives on the utilisation of interactive multimedia in the process of learning.

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1. INTRODUCTION

Information technology is very important in providing innovation, especially in learning. By developing learning media with the help of information technology which is very fast in its development, it demands it adjustment in learning (Damopolii et al., 2019; Nugroho & Fauzi., 2022) . Moreover, the

current era of digitalization is more modern and the trend is often called the 4.0 industrial revolution, which is expected to lead to the 5.0 era, so in terms of the country scale, there has been an acceleration of education in Indonesia. The development of information technology is very impactful in various aspects of life, one of which is in education. Use technology information in learning possibly exists enhancement access, flexibility, interaction, and development of digital . Importance in educating the system For Don't stop embracing and incorporating digital resources to better equip students for today and tomorrow's academic problems.

The current educational problem is the lack of effectiveness in the learning process because students are required to only learn the theory, not enough in practice (Chang et al., 2021; Miller & Metz, 2014) . Mathematics is a subject that has several problems because there are still many students who think that mathematics is boring and very difficult (Abdullah et al., 2021; Mayani et al., 2022) . So that it creates a feeling of laziness to study not because of the subject but of the basic thinking of the students themselves. Theories that a student learns to understand subjects are still not sufficient for the level of implementation related to the life of child That Alone. One of the supporting factors for the success of the learning process is the teacher, where the teacher certainly really needs adjustments to the components of education so that students can achieve abilities Study the best.

In learning In the classroom, teachers have an existence to manage learning that can describe the creativity, motivation, and potential possessed by students. Some students stated that mathematics was the least desirable subject because students had previously assumed that mathematics was a subject with many formulas to calculate and was very difficult (Anggraini et al., 2022) . Math is essential information, as stated by (Arista et al., 2021). Furthermore, Arista argued that the instructor must be held to a higher standard when dealing with subjects as abstract as geometry in the classroom. More and more creative applications are being found for information technologies like learning multimedia and ways that help students better visualise the content they are studying. As stated by (Budiman, 2016), Effective use of multimedia in the classroom is one factor that ensures students receive a great education. Study-teaching activities benefit greatly from the use of learning media, which encompasses any and all programmes that are designed to transfer or channel information effectively and efficiently (Sulastri, 2017). Multimedia education encompasses a wide range of teaching tools, including but not limited to text, images, graphics, video players, and sound. The goal of interactive multimedia is to present content that is more engaging and enjoyable for the user, as well as more easily understood and manipulated.

Reasoning mathematics is an aspect important in learning math. Ability thinking in math includes the ability to think logically, deductively, inductively, and abstractly, all of which are important skills for solving math problems. (Putri et al., 2019; Sulistiani & Masrukan, 2017; Winarso, 2014) . Understanding how interactive multimedia can influence the ability of reasoning mathematics students can give an outlook valuable in increasing learning effective math. The use of interactive multimedia in learning mathematics can increase the ability to reason mathematics in high school. The use of interactive multimedia Android-based learning can increase the static atmosphere and make the learning process interesting, effective, interactive to display motivation in learning (Darussalam, 2014) . With the existence of Android-based interactive multimedia, it can also form a child's imagination in the eyes lessons taught. Seriousness in mathematics education has an influence on teachers so that learning can be overcome by using a method, technique, approach and model. Mathematics is a difficult subject if in the online learning process, the teacher experiences difficulties because most students think that mathematics is boring and very difficult. (Zakaria et al., 2021) . In learning, efforts must be made to be able to create students' seriousness in learning, especially in learning control learning. Given the importance of mathematics lessons, one must keep up with the times and change the curriculum according to the school year. Learning is a responsibility given to all students and learning outcomes depend on the abilities of each participant students (Anggraini et al., 2022)

According to a preliminary study conducted by researchers in the ninth grade at SMP Negeri 3 Suwawa, it has been observed that there are still numerous unresolved issues regarding the learning outcomes of geometric transformations, specifically reflection and translation. This can be deduced from

the average test scores obtained in the odd semester of the 2021/2022 academic year for the ninth grade class. One of the challenges encountered throughout the learning process arises when the use of information-based learning multimedia is not optimised, resulting in suboptimal delivery of learning materials. The objective is to comprehend many facets of assessment, with a particular focus on the evaluation of learning quality. This may be observed through the utilisation of learning outcomes assessments in the context of mathematics education, specifically about geometry transformations. The distinctiveness of multimedia lies in its ability to provide a comprehensive and precise explanation, utilising not only written material but also other supplementary media such as game menus or learning assessments. This approach prevents students from becoming quickly disinterested and enables them to visualise the learning process in a dynamic and lucid manner.

Research related to interactive multimedia-based mathematical reasoning abilities in geometry material has also been researched by (Alim et al., 2020; Hermiati et al., 2021; Santoso et al., 2021) . In research (Hermiati et al., 2021), the Realistic Mathematics Education (RME) approach, which is supported by interactive multimedia, can increase students' mathematical reasoning abilities and self-confidence, but the research instrument used is only a written test related to geometric transformation questions used as a data source in this research. The use of limited instruments may not be able to fully describe students' visual thinking abilities in the context of geometric transformations. Whereas research conducted by (Alim et al., 2020) shows that the development of interactive multimedia-based mathematics learning tools can facilitate the mathematical reasoning abilities of elementary school students, research also only researches at the elementary school level so it is necessary to research to a higher level to generalize research results related to this field. Finally, research conducted by (Santoso et al., 2021) shows that the use of interactive multimedia-based math learning animations can help students understand transformation geometry material better. This research was conducted during the Covid-19 pandemic, when students were limited to online learning. Therefore, the results of this study may have limitations in generalizing the use of animation learning mathematics in the context of normal face-to-face learning. The external validity of this study needs to be considered by considering different learning contexts.

This is important for notice development research already there in development topic study. Previous studies have highlighted the important role of information technology in learning innovation, particularly in the context of mathematics education. In addition, the 4.0 industrial revolution and digitalization have affected the education sector, including in Indonesia. Several studies have also revealed problems in learning mathematics, such as students' negative perceptions of the subject and the lack of use of interactive multimedia. However, research also shows that the use of multimedia learning and information technology can increase students' interest, motivation, and imagination towards mathematics. Also, previous studies have not developed research instruments, only using written tests and only in elementary schools. Therefore, this research needs to pay attention to the latest developments and involve innovative approaches, such as the use of Android-based interactive multimedia, to increase the effectiveness of learning mathematics and overcome existing gaps. The goal is to describe a student's learning outcomes through interactive multimedia.

2. METHODS

The study employed a qualitative descriptive research design. The purpose of this study is to provide a comprehensive description of a learning process that is grounded in reasoning and consists of distinct stages, with the ultimate goal of achieving high-quality learning (Meritriana et al., 2018). In addition, Pauweni et al. (2022) employed a descriptive methodology to investigate the status of a group, object, situation, condition, and cognitive system of students, as well as the events occurring within the classroom. The present study falls under the qualitative research paradigm as it employs a descriptive approach to comprehensively explore the process of learning and its associated results.

The main objectives of descriptive research include describing learning outcomes, learning quality, input, process and especially when managing learning (Sulastri, 2016)s. The test is an instrument used in research in the classroom. The basis of success in a study is largely determined by performance indicators

in learning in the form of aspects of evaluating student activity and test scores on learning outcomes.

2.1. Research design

The present inquiry aims to investigate and analyse a specific subject matter in order to acquire knowledge and This study employed a pre-post experimental design with a single group. This implies engaging in the process of acquiring knowledge and understanding through systematic examination and exploration. This study does not entail the comparison of two distinct groups, but rather focuses solely on a single group that receives an intervention or treatment. The primary objective of this research design is to evaluate the efficacy of an intervention or treatment within a certain demographic. Consequently, data was gathered prior to and subsequent to the implementation of the intervention in order to observe the alterations that transpired within the group.

2.2. Research subjects

The study sample comprised 27 students from the ninth grade class at SMP Negeri 3 Suwawa. The entire student population in the class serves as the topic of the research, therefore indicating the absence of a control group in this study.

2.3. Data Collections

Observation technique used for collect research data about tests and interviews students in the learning process through interactive multimedia learning. In technique observation it is necessary noticed criteria scoring sheet observation interviews and tests. Criteria the can observed in the following table 1.

Table 1. Scoring criteria for interview and test observation sheets

No	Score	Criteria	Information
1	4	Very good	Teachers and students capable carry out activity learning without experience difficulty
2	3	Good	Teachers and students occasionally feel difficulty in carry out activity learning
3	2	Enough Good	Teachers and students often experience difficult moments carrying out activity learning
4	1	Not enough	The execution of learning activities can provide challenges for both teachers and students.

2.4. Instrument Study

The activity split test comprises a total of 20 evaluation aspects, which are divided into 4 aspects in the introduction, 13 aspects in the core activities, and 3 aspects in the closing learning phase. In stage I, the cumulative score for all components of the evaluation met the satisfactory threshold of 60%. In step II, the overall score improved to 87.5%. The assessment of interview activities encompasses a total of 18 components, which can be further categorised into three sections: 4 aspects in the introduction, 12 aspects in the core activities, and 2 aspects in the closing phase of the lesson. In stage I, the cumulative score for all assessment components met the satisfactory threshold, reaching 63%. In stage II, the overall score improved significantly, achieving a score of 92%. The assessment for mathematical learning outcomes comprises a total of nine questions in stage I, followed by an additional five items in stage II. In the first stage, the highest attainable score is 66, while in the second level, it is 48. In the initial stage, a total of 11 students achieved a score higher than the Minimum Completeness Criteria (KKM) threshold of 75. In the subsequent stage, the number of students who surpassed the KKM increased to 24.

In stage I, the instrument used was a divided experimental activity involving 20 evaluation aspects. This evaluation aspect is divided into 4 aspects in the introduction, 13 aspects in the core activities, and 3 aspects in the closing. The indicators assessed include communication skills, use of experimental methods/mechanisms, understanding of concepts, critical thinking skills, problem-solving, and others. Next, there is an assessment of the Interview Activity. In stage I, the instrument used was an Interview

Activity with 18 evaluation aspects. This evaluation aspect is also divided into 4 aspects in the introduction, 12 aspects in the core activities, and 2 aspects in the closing. The indicators assessed include communication skills, mastery of material, critical thinking skills, problem-solving, analysis and synthesis of information, and conformity with learning objectives.

Overall, this assessment includes various aspects and indicators that are relevant to the learning objectives. Through these instruments, an evaluation is carried out to see the extent to which students' achievements meet the set criteria.

2.5. Procedure Study

The topic of investigation the research was conducted in two parts. In the initial phase, two meetings took place. The learning process employs an instructional approach that incorporates interactive multimedia elements to facilitate mathematics education. The study involved the collection of data through the observation of test activities, interviews, and the assessment of students' mathematics learning outcomes in the context of geometry transformation material. The analysis focused on the achievement scores of the test activities, interviews, and mathematical learning outcomes in stage I.

Then in the second stage, there were two meetings. The learning process continues to use interactive multimedia-based mathematics learning. Observations were made of test activities, interviews, and students' mathematics learning outcomes in the geometry transformation material. The achievement scores of the test activities, interviews, and mathematics learning outcomes in stage II were analyzed. For more details, see Figure 1.

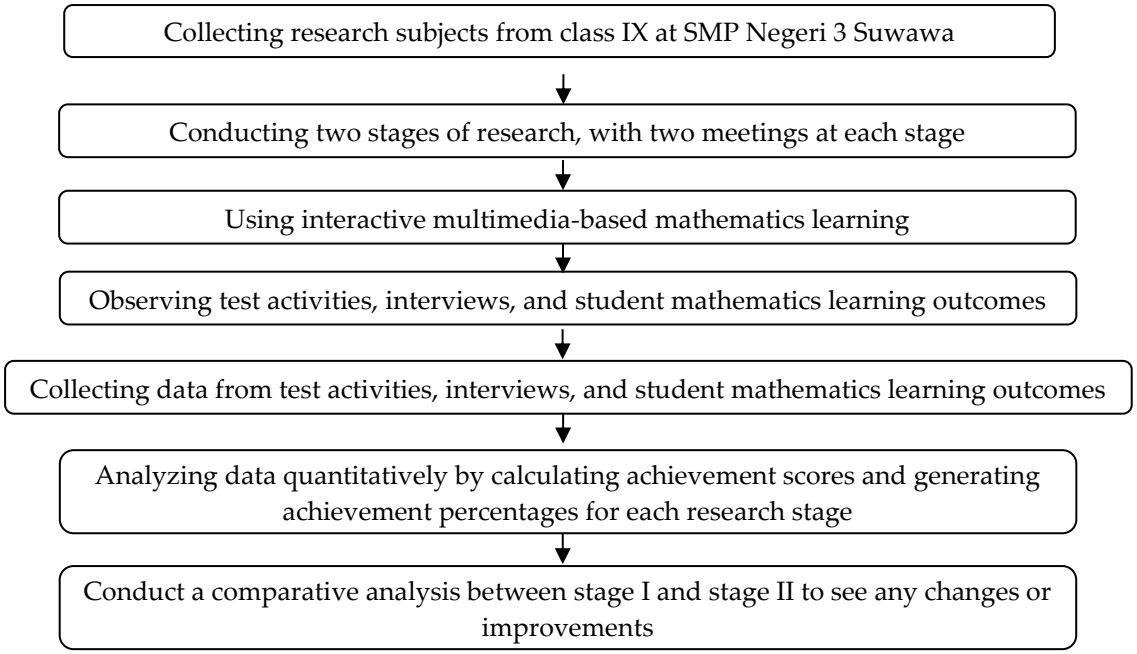

Figure 1. Research Flowchart

2.6. Data Analysis

Quantitative analysis was conducted on the data collected from test activities, interviews, and mathematical learning outcomes. The achievement scores obtained from comprehensive evaluations across several aspects are aggregated and expressed as percentages. Next, the proportion of achievements from each stage will be compared to identify any existing changes or improvements. The data analysis was conducted using a quantitative approach, wherein the count scores were obtained and the percentage of achievements was calculated for each stage of the research.

Deep test form essay questions that require answers in the form of analysis and discussion to measure the extent to which the achievements obtained by using interactive multimedia on student

mathematics learning outcomes. There are two types of learning achievement tests, namely empirical validity tests and reliability tests. The validity criteria and reliability criteria can be seen in table 2 and table 3 below. Validity test empirical use formula point biserial correlation :

$$r_{pbis} = \frac{M_p - M_t}{Sd_t}\sqrt{\frac{p}{q}}$$

Information:

r_{pbis} = biserial correlation coefficient
M_p = average score of subjects whose answers are correct
M_t = total average
Sd_t = total standard deviation
p = the proportion of subjects who correctly answered the item being sought
q = the proportion of subjects who answered incorrectly the item being sought (q=p-1)

Table 2. Criteria for validity

No	Validation criteria	Information
1	81 - 100 %	Very high
2	61 - 80 %	Tall
3	41 - 60 %	Enough
4	21 - 40 %	Low
5	0 - 20 %	Very low

Instrument designed with take into account various aspect assessment that includes knowledge, skill, and attitude. The total score is calculated based on the weight of each aspect. As for the reliability test use the Kuder-Richardson formula :

a. $RK_{21} = \left[\frac{n}{n-1}\right]\left[1 - \frac{M(n-M)}{nSD_t^2}\right]$

Information:

RK_{21} = Reliability sought
M = mean
n = number of test items
nSD_t^2 = total deviation score

Table 3. Criteria reliability

No	Reliability criteria	Information
1	81 - 100 %	Very high
2	61 - 80 %	Tall
3	41 - 60 %	Enough
4	21 - 40 %	Low
5	0 - 20 %	Very low

3. FINDINGS AND DISCUSSION

The study comprised two distinct phases, each of which was conducted over four sessions. Specifically, the first stage involved two meetings, while the second stage encompassed an additional two meetings. The learning process encompasses various stages, each of which includes multiple descriptions of learning that pertain to both competence and learning objectives. The research data was collected through the analysis of test activities, interview observations, and the assessment of mathematics learning outcomes, specifically focusing on the topic of geometry transformation, particularly reflection and translation.

3.1. Phase I learning outcomes

3.1.1. Results of test activities

Based on the assessment carried out on test activities in the learning process, it consists of 20 aspects of assessment, namely 4 aspects of test activities in opening lessons or introductions, 13 aspects of activities in managing learning or core activities, and 3 aspects of assessment in ending meetings or closing learning.

This study aims to evaluate the outcomes of test activities in the context of interactive multimedia-based mathematics learning. Specifically, it focuses on describing the learning outcomes of geometry transformation material among ninth-grade students at SMP Negeri 3 Suwawa. The utilisation of LKPD (Student Worksheets) and RPP (Learning Implementation Plans) enables the attainment of a satisfactory overall score across all assessment aspects, meeting the criteria for a Good rating, specifically 60%.

3.1.2. Results of interview activities

Observation of interview activities was carried out by research colleagues as observers during the learning activities. The assessment carried out on the interview activities in learning consisted of 18 aspects of the assessment, namely 4 aspects in the preliminary learning activities and 12 aspects in the core learning activities and 2 aspects in the closing activities.

Thus the assessment of the results of the assessment of interview activities in the management of learning the application of interactive multimedia-based mathematics learning to describe student learning outcomes on geometry transformation material in class IX of SMP Negeri 3 Suwawa, namely the total score of all aspects of the assessment that meet the achievement indicators of good criteria, namely 63%.

3.1.3. Mathematics learning outcomes

The test was given to 27 students with the number of learning outcomes in stage I as many as 9 questions where the maximum achievement score was 66. Completeness For every the success indicator that has been set according to the Minimum Completeness Criteria (KKM) standard is 75. Referring to the results of the analysis provided, the research was carried out in schools with a total number of students in the class, namely 27 students, of which only 11 students scored above the KKM score with a percentage of achievements 60% while the remaining 16 students did not complete with a percentage of 40%.

3.2. Phase II learning outcomes

3.2.1. Results of test activities

Based on the assessment carried out by test activities in stage II, the teaching and learning process consists of 20 aspects of assessment where 4 aspects are for test activities in the introduction or opening of learning, 13 aspects are for activities managing learning or core activities, and 3 aspects are for activities ending or close learning.

Assessment of the results of the assessment of the implementation of test activities in managing a lesson by applying interactive multimedia-based mathematics learning to describe student learning outcomes on geometry transformation material in class IX at SMP Negeri 3 Suwawa. By using Student Worksheets (LKPD) and Learning Implementation Plans (RPP), a total score is obtained for all aspects that meet the percentage achievement indicator, namely 87.5%.

3.2.2. Results of interview activities

The implementation of observations on interview assessments was carried out by research partners or colleagues as observations when teaching and learning activities were in progress. Observations were made face to face which consisted of 18 aspects of assessment including 4 aspects in preliminary activities or opening learning, 12 aspects in core learning activities and 2 aspects in activities ending or closing learning.

Thus the assessment of the results of interview activities in learning the application of interactive multimedia-based mathematics learning to describe student learning outcomes on geometry transformation material in class IX of SMP Negeri 3 Suwawa, namely the achievement scores for all aspects of interview activities that meet the achievement indicators with good criteria, namely 92%.

3.2.3. Mathematics learning outcomes

The test given to 27 students with the number of learning outcomes in stage II was 5 questions where the maximum score was 48. According to (Arsyad et al., 2022) results Study students are usually still low if it is known that the average score has not met the Minimum Completeness Criteria (KKM), which is 75. Thus after the next stage of rotation is carried out, there is a change where there is an increase in several aspects of the assessment. Referring to the data on learning outcomes using interactive multimedia, it can be seen that from the results of the analysis carried out by the researcher, of the total number of students, there were 27 students where there were 24 students who scored above 75 with an achievement percentage of 83.87% while for the remaining 3 students who did not complete or below the Minimum Completeness Criteria (KKM) standard with a percentage of 16.13%. So that the results of learning mathematics can be observed in Table 4 below.

Table 4. Learning outcomes stage I and stage II

No	Data source	Stage I	Stage II
1	Observation of test activities	60%	87.5%
2	Observation of interview activities	63%	92%
3	Student mathematics learning outcomes	63.24%	83.87%
	Average	62.08%	87.79%

The reasoning ability of learning mathematics is very important for students. Where if students are given the opportunity to use reasoning skills in making conjectures to bring up mathematical instincts based on their own experience, students will be able or able to easily solve problems found in a classroom lesson so that students will quickly and effectively understand the learning that is being taught. been taught.

During the initial stage of mathematics education, it is observed that the test results yield an average score indicating a fairly good level of achievement, with a percentage of 60%. Additionally, the analysis of interview observations conducted by the observer aligns with the learning process, revealing that the average achievement score falls within the fairly good category, specifically at 63%.

After carrying out the advanced learning process or evaluating the cognitive results of students rather than the geometry transformation subjects experienced during the previous learning, there are several aspects of the assessment that are not maximized in the learning activities of stage I so that for the learning activities of stage II there has been a change or increase in both the results of the test activities and interviews and learning outcomes of mathematics. It can be seen that for the observation of the stage I test the achievement percentage was 60% and after the implementation of phase II learning activities the achievement score changed to 87.5%, and then for the results of the interview observation activities in stage II learning there was an achievement percentage of 63% after carrying out an advanced evaluation to describe students' cognitive outcomes, the achievement score changed to 92% in stage II. The student learning outcomes exam in stage I achieved a score of 63.24%. Subsequent evaluation of learning was conducted to assess students' cognitive results, resulting in a score of 83.87% for stage II learning activities. It may be argued that mathematical reasoning can be effectively facilitated through the use of interactive learning multimedia, as supported by the observed test and interview results, as well as the learning outcomes that demonstrate a foundation in sound criteria for reasoning within the learning process. Thus, the test activities and interviews and the mathematics learning outcomes test results show that the expected indicators of success have been fulfilled.

The research completed by Kustiawati (2020) provides support for the findings of the present study. This study will demonstrate that the incorporation of interactive multimedia tools, such as GeoGebra, in the teaching of geometry can foster a positive attitude towards learning among students. The utilisation of interactive multimedia has the potential to enhance students' interest and motivation in comprehending abstract concepts within the field of geometry. However, the findings of this study are in contrast with the research conducted by Cesaria and Herman (2019), which suggests that there is a positive correlation between mathematical reasoning and student accomplishment. It has been demonstrated that more than

50% of students still fall below the Minimum Competency Level (KKM) in terms of their mathematical reasoning abilities. The indicators alter mathematical operations and provide reasoning or evidence for a set of solutions. The disparity in findings between the present study and the research undertaken by Cesaria and Herman (2019) may be attributed to variations in learning methods and approaches, differences in sample characteristics and contextual factors, the influence of other variables on the outcomes, as well as disparities in the timing of the respective research endeavours. There are several reasons that can contribute to variations in the mathematical reasoning achievement indicators among second study students.

This contribution is significant in the advancement of mathematics education through the utilisation of interactive multimedia applications. The results obtained from the conducted investigation This study demonstrates that the utilisation of interactive multimedia in teaching transformation geometry in the ninth grade of SMP Negeri 3 Suwawa has a favourable impact on students' learning outcomes. This study demonstrates that the utilisation of interactive multimedia in teaching transformation geometry has a favourable impact on student outcomes. The utilisation of interactive multimedia has the potential to enhance student engagement in the learning process, as it enables the visualisation of complex concepts and aids in the development of mathematical reasoning skills. This research contributes to the creation of more effective and novel methods for learning mathematics.

This study provides novel insights into the efficacy of interactive multimedia as a tool for enhancing mathematical learning. The findings of the research study are as follows. This can serve as a foundation for the construction of a system similar to learning in other institutions or as a reference for further study in this sector. In addition to the aforementioned point, researching interactive multimedia in mathematics education can serve as a source of motivation for educators and policymakers. This research can be essential in enhancing educational outcomes by exploring the efficacy of including interactive multimedia tools in the teaching process. The subject of investigation is the student.

The findings from this study make a significant addition to the field of mathematics education, particularly in developing new and effective learning methods. Interactive multimedia instruction in transformation geometry has demonstrated noteworthy outcomes in enhancing students' comprehension and mathematical reasoning abilities. The subject of investigation or inquiry. This study provides valuable insights for practitioners in education and researchers who aim to further develop an interactive multimedia-based learning strategy to enhance mathematics learning outcomes for future students. _

The findings of the research study have the potential to serve as a robust framework for further exploration in the realm of mathematics education, specifically focusing on the integration of interactive multimedia tools. Further research can be conducted to explore the following aspects: 1) The Efficacy of Utilising Interactive Multimedia for Mathematics Education in Alternative Learning Materials. This study aims to examine the effectiveness of interactive multimedia in facilitating the acquisition of mathematics among students at the medium school level. Additionally, it seeks to analyse the impact of interactive multimedia on the development of students' mathematical reasoning skills. This study aims to discover certain characteristics in interactive multimedia that significantly effect the development of mathematical reasoning skills in students. Additionally, it seeks to conduct a comparative research between the usage of interactive multimedia and conventional learning techniques in various contexts. This study aims to compare the effectiveness of interactive multimedia with standard learning approaches. The task has not been completed. As a result, conducting further research is necessary to evaluate the relative usefulness of the second technique in various scenarios. In order to further advance in this sector, it is imperative to engage in additional studies. This will enable the development of more effective and novel learning methodologies aimed at facilitating students' comprehension of mathematical concepts and enhancing their mathematical reasoning skills.

4. CONCLUSION

The researcher concludes that students' mathematics learning outcomes in transformation material can be described through two stages of learning after further evaluation to describe students' cognitive outcomes with interactive multimedia, results deep teacher observation manage something learning reach in a manner overall, and assessment results Study mathematics interview that achieve a minim it can be seen 1) increase results observation student during the learning process in stage I is 60% and in stage II experience change to 87.5%, that is there is change positive direct on test activities; 2) upgrade results teacher observation in stage I is 63% and in stage II experienced change 93%, It means there is change positive direct impact on the activity interview; (3) increase in average (average) results learning at stage I acquire completeness of 11 students. Thus, interactive multimedia-based applied learning can positively impact and describe student results. Hypothesis study accepted. All data naturally correlated with problem or indicator achievement. Thus, multimedia-based learning helps teachers engage students. Several restrictions limit this investigation. The study only included 27 SMP Negeri 3 Suwawa pupils, limiting its generalizability. It's also vital to remember that a single academic year may not be enough time to thoroughly analyse the long-term benefits of interactive multimedia in mathematics instruction. Additionally, this study did not distinguish other elements that may affect student learning. Subjective data, such as student and instructor observations and interview assessments, may also affect research validity and reliability. This study provides an early understanding of the benefits of interactive multimedia for maths learning. Along with analysing educational outcomes, students' views on interactive multimedia in learning must be considered. Interviewing or surveying students on their interactive multimedia experiences might reveal their engagement, curiosity, and satisfaction with learning.

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