

The effectiveness of using interactive multimedia in solving problems for class VIII MTS Nurul Jadid students in Informatics learning

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ABSTRACT

Tujuan penelitian ini adalah untuk melihat efektivitas pemanfaatan multimedia interaktif pada siswa dalam pemecahan masalah informatika ditinjau dari kemampuan siswa MTs Nurul Jadid tahun pelajaran 2021/2022. Jenis penelitian ini adalah deskriptif kualitatif. Subjek penelitian ini adalah dua siswa kelas VIII MTs Nurul Jadid dengan kemampuan Informatika yang berbeda yaitu tinggi dan sedang. Teknik pengumpulan data dalam penelitian ini adalah observasi, wawancara, tes pemecahan masalah, dan dokumentasi. Analisis data dalam penelitian ini dianalisis pada setiap teknik pengumpulan data. Hasil analisis data menunjukkan bahwa tingkat efektivitas pemanfaatan multimedia interaktif dalam pemecahan masalah dari masing-masing siswa adalah berbeda, pada siswa berkemampuan informatika tinggi menunjukkan efikasi diri yang tinggi, siswa berkemampuan informatika sedang menunjukkan efikasi diri yang rendah, namun secara keseluruhan penggunaan multimedia interaktif dalam proses pembelajaran efektif karena tidak membuat siswa jenuh dalam proses pembelajaran. Kontribusi penelitian ini terletak pada penguatan posisi multimedia interaktif untuk terus dimanfaatkan, terutama dalam implementasi pemecahan masalah.

The purpose of this study was to see the effectiveness of using interactive multimedia for students in solving informatics problems in terms of the student's abilities at MTs Nurul Jadid for the 2021/2022 academic year. This type of research is descriptive qualitative. The subjects of this study were two class VIII students of MTs Nurul Jadid with different Informatics abilities, namely high and medium. Data collection techniques in this study were observation, interviews, problem-solving tests, and documentation. Data analysis in this study was analyzed in each data collection technique. The results of the data analysis show that the level of effectiveness of using interactive multimedia in solving the problems of each student is different. Students with high informatics skills show high self-efficacy, and moderate informatics students show low self-efficacy. However, overall the use of interactive multimedia in the process is effective learning because it does not make students bored in the learning process. The contribution of this research lies in strengthening the position of interactive multimedia to continue to be utilized, especially in the implementation of problem-solving.



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INTRODUCTION

The new paradigm of education indicates that the purpose of learning is not just to change student behavior but to be able to shape character, attitude, and professional mentality that is oriented towards a global mindset. Innovative learning is learning that can optimize students' potential and existing teaching materials so that students can learn or be happily involved in learning activities (Hotimah et al., 2021). In realizing innovative learning, one way is to develop learning media. In teaching and learning, two essential elements are teaching methods and learning media. Good learning media is not only able to increase students' motivation and desire to learn independently but can also play a role in overcoming boredom in learning in class.

Using technology in the learning process by displaying natural objects so students can be directly involved in the learning process will increase interest and create a fun learning atmosphere for students (Achmad, 2019). The use of appropriate learning media should be accompanied by the selection of the right learning approach (Pratiwi & Wiarta, 2021).

According to Smaragdina et al., (2020). As is happening today, the era of the industrial revolution 4.0 has brought many changes to various aspects of life. Technology has an important role and is the main engine of change in every aspect. Of course, this massive change also impacts the education sector, where students are referred to as digital natives. One of the teaching materials that can facilitate the learning style of the digital native generation is interactive multimedia-based learning media, where this teaching material combines several types of media (text, images, audio, animation, and video) and provides flexibility for users to interact with the material in the teaching materials. The advantages of interactive multimedia-based teaching materials are considered capable of providing different learning experiences for students, as well as increasing student motivation to study the materials provided. Teaching materials also have the potential to be integrated with digital devices and internet technology which are very popular with the digital native generation. In realizing to effective learning in the digital era, one way is by developing learning media (Hotimah et al., 2021).

Interactive multimedia is one of the innovations in developing learning media. Based on this, interactive multimedia as a learning tool can be adapted to individual users' needs and learning abilities, with a learning concept that utilizes the availability of material that can be accessed anywhere and anytime. The purpose of developing this interactive multimedia is to innovative learning whose learning process teaches extended life learning. This can shape students to be more creative and independent in the learning process and save time (Aprianto et al., 2021).

Interactive Multimedia is a multimedia display designed by the manufacturer so that its appearance fulfills the function of informing a message with the aim of having interactivity for the user. Utilization of multimedia is used for learning media, film, medicine, business, sports, advertising/promotion, military, and others. Interactive Multimedia is a phrase that describes a new wave of computer software, especially those related to the information section. The presence of text, images, sound, animation, and video can characterize this Multimedia component. Some or all of the presented content is organized into coherent programs. The existence of user interactivity can be involved in the navigation content and the communication process. Advances in technology are currently a challenge and an opportunity for educators to improve the quality of the learning process in the classroom (Satriawan et al., 2020).

Interactive multimedia teaching media will provide direct visualization of students, so they can interact directly with the media, just as the media will respond in the form of wrong or suitable to students when working on practice questions contained in the media. Computer-based teaching materials make it possible to involve students actively and can get feedback quickly and measurably. Interactive multimedia provides challenges to students, either in the form of exercises or evaluations that can encourage students to complete their assignments. Interactive multimedia is independent in that it can provide convenience and completeness of content that is arranged in a structured manner so that students can use it without the guidance of educators (Arif & Mukhaiyar, 2020). According to Harefa & La'ia, (2021), the media is a determining factor for the success of learning.

One element that has a lot of influence in facilitating achieving learning objectives, among others, is the existence of teaching materials. Interactive learning media can also stimulate thoughts, attention, and feelings and encourage students' learning process. In addition, the media is used as a means of channeling messages from the source to the recipient of the message so that learning can optimally achieve the desired learning objectives. The use of learning media will help to learn activities that run interestingly because they make students curious about what material is presented in the media (Raibowo et al., 2020). Interactive games are designed to interest students so they do not get bored while studying (Candra & Rahayu, 2021).

Responding to the low problem-solving abilities of students, a learning model that is appropriate and in line with current developments in technology and information is needed (Fariz & Dewi, 2022). Anita et al., (2021) state that problem-solving is an attempt to solve a problem to achieve a goal.

Wordwall is a web-based digital gamification application that provides a variety of games and quizzes that educators can use to rank material. This application was developed by visual education LTD, a British company. This application is suitable for educators who want to make teaching materials pretty interesting among millennials. The most exciting thing about Wordwall is the game which provides many templates so students can play interactive multimedia games in various forms. Making teaching materials on the Wordwall website is relatively easy, so teachers can design teaching media according to what they want (Olisna et al., 2022).

The main problem at MTs Nurul Jadid Botolinggo in the learning process is understanding the material, so it is necessary to hold media that makes learning more concise and clear. Based on the observations made at MTs Nurul Jadid, the first step in the analysis is to make observations at the location. The results are (a) educators are more likely to use lecture models and manual assignments, (b) printed books are the media used by educators during the learning process, so students are less interested in learning, and (c) students get sleepy and bored quickly. This study will analyze and discuss the effectiveness of learning using interactive multimedia to increase student learning activeness and problem-solving. This research is ex post facto using a qualitative descriptive research approach.

METHOD

The approach used in this study uses a qualitative approach. Fadli (2021) states that the qualitative method is also called the naturalistic research method because the research was conducted in natural conditions. Research conducted on natural objects is an object that develops as it is, not manipulated by researchers. Researchers themselves are instruments of research with this qualitative approach. Qualitative research generally uses informal and personal language such as understanding, findings, and values. Methodologically, this study uses inductive logic by categorizing data obtained during the research, resulting in a pattern or theory that can explain the phenomena that occur (Surayya, 2018). The sampling of data sources was carried out by purposive sampling. Purposive sampling is a technique for determining criteria regarding which respondents are selected as samples by relying on the researcher's judgment, also using a collection technique with triangulation (combined), data analysis is inductive/qualitative, and qualitative research results emphasize meaning rather than generalization (Fadli, 2021). Based on the current research focus, this research aims to evaluate the effectiveness of problem-solving skills in utilizing interactive multimedia in Informatics Class VIII MTs Nurul Jadid, Academic Year 2021/2022.

RESULTS AND DISCUSSION

Results

The data in this study were obtained through observation, media tests, documentation, and interviews. The taking of subjects in this study was obtained from the Informatics learning ability of class VIII students of MTs Nurul Jadid Lumutan, which was seen from the last test scores and

was supported by data on the value of practical assignments in Informatics lessons by subject teachers, so two research subjects were selected who had high informatics abilities and is by the criteria stated by Ratumanan and Laurens in Table 1.

Table 1. Criteria for Informatics Capability

Value	Category
$85 \leq x$	A (very high)
$70 \leq x < 85$	B (high)
$55 \leq x < 70$	C (medium)
$40 \leq x < 55$	D (low)
$x < 40$	E (very low)

(Source: Ratumanan dan Laurens, 2016)

The determination of research subjects was carried out by categorization with the following steps: (1) Requesting data on the last test scores and final assignment scores from the informatics teacher of class VIII; (2) Classifying values into several groups according to the informatics ability criteria according to Table 1; (3) Selecting two students who will be used as research subjects by considering the documentation data; and (4) Presenting interactive multimedia to students. The table of ability categorization in informatics learning for class VIII students is in Table 2, and the research subjects were divided into two ability categories in Table 3. The two selected subjects were then subjected to an interactive multimedia utilization test which would later be analyzed. The following explains the results of the interactive multimedia utilization test for each subject.

Table 2. Categorization of Informatics learning abilities

No.	Name	Test Score	Assignment Score	Description
1	Amelo	75	75	Intermediate
2	Dien	75	75	Intermediate
3	Ditara	75	78	Intermediate
4	Aluca	80	80	High
5	Acid Face	80	80	High
6	Cujo	75	75	Intermediate
7	Alma	80	81	High
8	Basium	75	75	Intermediate
9	Esquire	75	75	Intermediate
10	Fruzzzer	75	80	High
11	Kiena	75	75	Intermediate
12	Risani	75	75	Intermediate
13	Sumsum	78	78	Intermediate
14	Mieta	75	75	Intermediate
15	Ayyana	75	75	Intermediate

Table 3. Research Subjects

Informatics Ability Value	Informatics Ability Category	Subject Score	Subject Code
$70 \leq x < 85$	High	82	ST
$55 \leq x < 70$	Sedang	68	SS

Subjects with High Informatics Ability (ST)

The following are the results of HIA self-efficacy analysis in each step of Informatics problem solving, namely self-efficacy in understanding the problem (T1), self-efficacy in planning solutions (T2), and self-efficacy in re-checking solutions or solutions that have been worked on

(T3) in Figure 1.

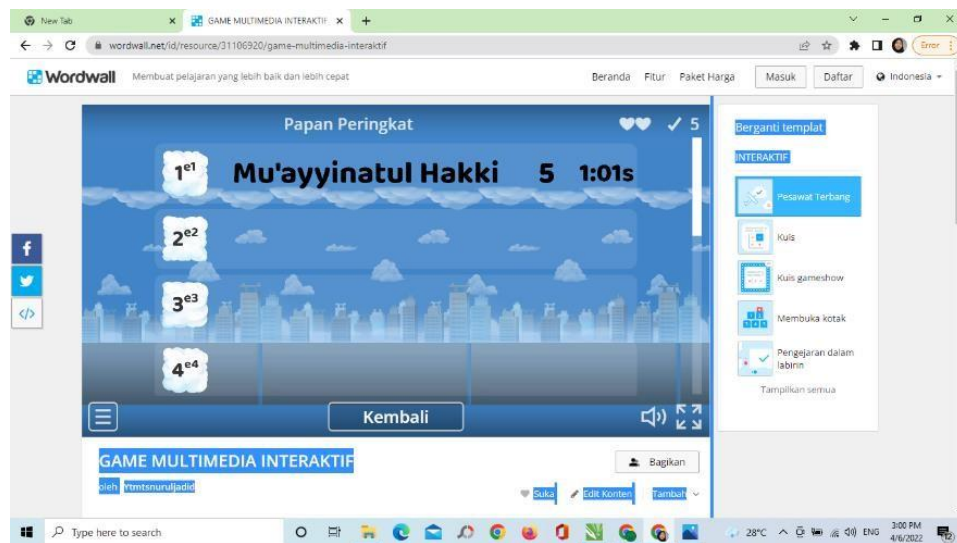


Figure 1. The results of the test scores for subjects with high informatics skills (ST)

ST Self-Efficacy in Understanding Problems (T1)

In this problem (Table 4), ST uses interactive multimedia in the questions confidently. This can be seen from the operation of the laptop by ST, namely getting the highest score in Figure 1 to help solve the ST-T1 questions in Figure 2. The following results from interviews between researchers (P) and competent subjects (ST) related to self-efficacy in understanding the problem.

Table 4. Interview fragments of ST

P/ST	Explanation
P2	<i>Okay, first question, what do you know about the question?</i>
ST2	<i>Answering the question using a game, sir</i>
P3	<i>What do you need to do in that game?</i>
ST3	<i>Answering by using an airplane animation, sir.</i>
P4	<i>Are you confident that you can finish all the questions?</i>
ST4	<i>Yes, sir, because I have already tried it during a practice session.</i>

From Table 4, it can be seen that ST's level of self-efficacy in understanding the problems in the questions is high. This was also proven when ST operated a laptop that had been provided with interactive multimedia, ST confidently used this multimedia without any doubts and was not nervous in taking action to answer questions, and from the results of interviews P4-ST4 in Table 4 ST firmly answered questions from researchers, although sometimes there is a feeling of nervousness because of the background of students who usually tend to be shy.

ST Self-Efficacy in Planning Completion (T2)

ST has also been able to plan the solution to the problem, namely multiplying what is known in the problem with its friends to solve the problem in the ST-T2 problem in Figure 1 with complete confidence. The following are the results of interviews between researchers (P) and subjects with high mathematical abilities (ST) related to the subject's self-efficacy in planning completion.

In Table 5, ST has been able to plan the completion of the questions, and from the results of the interviews that P7-ST7 has conducted in Table 5, ST has the confidence and courage to

answer the questions given. This proves that ST's self-efficacy in planning the settlement is good.

Table 5. Snippets of the ST

P/ST	Explanation
P5	<i>How do you plan to solve the question?</i>
ST5	<i>I will use the mouse to hit the correct answer.</i>
P6	<i>What if there are obstacles in front?</i>
ST6	<i>I will turn the plane around or fly up or down, sir.</i>
P7	<i>Are you sure about the steps you are taking?</i>
ST7	<i>Yes, sir, because I have already tried it during a practice session and it was successful.</i>

ST Self-Efficacy in Ability to Check Back Completion that has been done (T3)

ST's level of self-efficacy is high, and ST has re-checked the completion that has been done by ST-T3. **Table 6** is the result of an interview between the researcher (P) and the subject with the high mathematical ability (ST) related to the subject's self-efficacy in re-checking the completion that has been done.

Table 6. Snippets of Interview with Subject ST

P/ST	Explanation
P8	<i>Are you confident in your answer?</i>
ST8	<i>Yes, sir.</i>
P9	<i>Do you want to wait for your friend's answer?</i>
ST9	<i>No, sir.</i>
P10	<i>Why?</i>
ST10	<i>I am confident in my work, sir.</i>
P11	<i>If your answer is wrong, would you be disappointed?</i>
ST11	<i>No, sir, because it is my result.</i>
P12	<i>Have you double-checked your work?</i>
ST12	<i>Yes, sir, before the plane hit the answer, I read it carefully, sir.</i>
P13	<i>So, your answer is the same as what you have done?</i>
ST13	<i>Yes, sir.</i>

From **Table 6**, ST has re-checked the work that has been done. This can be seen from the process carried out by ST, who is not in a hurry to make a choice. This proves that ST has corrected each question. However, it is still not correct to evaluate every step it takes. ST's level of self-efficacy in re-checking the solutions worked is high. This statement is consistent with the results of the researcher's interview with ST at P8-ST8 to P10-ST10 in **Table 6**. ST confidently answered each question that he was sure of, even though answering the questions required a pretty long time.



Figure 2. Documentation of Student Performance (ST)

Subjects with Moderate Informatics Ability (SS)

Figure 3 and Figure 4 are the results of ST's self-efficacy analysis in each step of Informatics problem solving, namely self-efficacy in understanding the problem (T1), self-efficacy in planning a solution (T2), and self-efficacy in re-checking the completion or solution that has been worked on (T2, T3).



Figure 3. Problem-solving test results for subjects with moderate Informatics ability (SS)



Figure 4. Problem solving test results of capable subjects

SS Self-Efficacy in Understanding Problems (T1)

SS also worked on the questions well, but SS lacked confidence in operating the interactive multimedia contained in the questions. The following are the results of interviews between researchers (P) and subjects with moderate informatics skills (SS) related to the subject's self-efficacy in understanding the problem in Table 7.

Table 7. Snippets of the SS Interview

P/SS	Explanation
P1	Okay, first question, what do you know about the question?
SS1	Answering the question using a laptop, sir.
P2	What is the question about?
SS2	It's about the ICT subject, sir.
P3	Are you confident that the information you found in the question is correct?
SS3	Yes, sir, because I saw it that way.

From [Table 7](#), SS has understood the problems asked in the questions. However, SS's level of self-efficacy in understanding the problem was low. This can be seen from the results of the interviews conducted by the researcher at P2-SS2, as well as being strengthened in the SS process of writing down the information he found while working on the questions. SS was silent and hesitated to write down the information he found.

SS Self-Efficacy in Planning for Completion (T2)

In the questions in [Table 8](#), the self-efficacy level of SS in planning solutions is low. Even though SS has been able to operate the interactive multimedia used in the problem, even though in this operation there are still doubts in solving the problem in the SS-T2 problem in [Figure 3](#). The following is the result of an interview between the researcher (P) and the subject with moderate informatics skills (SS) related to the subject's self-efficacy in planning a settlement.

Table 8. Snippets of the SS Interview

P/SS	Explanation
P4	<i>How do you plan to solve the question?</i>
SS4	<i>By avoiding collisions with the plane.</i>
P5	<i>Why is that?</i>
SS5	<i>If there is a collision, the game will be finished, sir.</i>
P6	<i>Why were you hesitant to solve the problem when working on the question?</i>
SS6	<i>I was afraid of getting it wrong at that time, sir.</i>
P7	<i>But, are you confident in your answer now?</i>
SS7	<i>Yes, sir.</i>

From [Table 8](#), SS has been able to plan the solution to the problem. However, lacking confidence in his abilities while working on the questions, SS was not sure whether the steps he planned were correct or wrong, so he asked the researcher first whether the steps taken to solve the problem were correct or wrong. This proves that the level of efficacy is still low.

In the problem in [Figure 5](#), SS was not careful in re-checking the solutions that had been done in [Figure 4](#) and still did not believe in the answers he was working on. The following are the results of interviews between the researcher (P) and subjects with moderate informatics skills (SS) related to the subject's self-efficacy in re-checking completion.



Figure 5. Self-Efficacy of SS in Completion Planning with moderate Informatics ability (ST)

Table 9. Snippets of the SS Interview

P/SS	Explanation
P8	<i>Have you double-checked before deciding to answer the question?</i>
SS8	<i>Yes, sir.</i>
P9	<i>How did you check the question?</i>
SS9	<i>I did not immediately answer, sir.</i>
P10	<i>Are you confident in your answer?</i>
SS11	<i>Sometimes I am unsure, sir.</i>
P12	<i>Why?</i>
SS13	<i>I forgot the answer.</i>
P14	<i>Which one are you less confident in?</i>
SS14	<i>The answer, sir.</i>
P15	<i>Oh, do you want to see your friend's answer?</i>
SS15	<i>Sure, sir.</i>
P16	<i>In your opinion, which one is correct?</i>
SS16	<i>I'm not sure, sir.</i>
P17	<i>So, you are less confident in yourself?</i>
SS17	<i>Actually, I am confident, but it seems like something is wrong, sir.</i>

From [Table 9](#) it can be seen that the self-efficacy level of SS in re-checking their completion is still low. This was proven from the results of interviews at P10-SS10 to P17-SS17 in [Table 9](#), and during the interview SS looked pale and sweaty because he was afraid of being blamed, this proved that SS still lacked confidence and was sure of his abilities.

Discussion

This section will answer questions from the research focus. What is the description of self-efficacy in students in "Effectiveness of Interactive Multimedia on Student Problem Solving in Informatics Learning at MTs Nurul Jadid?". The following describes self-efficacy in each stage of informatics problem-solving in research subjects.

Subjects with High Informatics Ability (ST)

Based on the results of data analysis presented from the results of problem-solving tests in Informatics learning and the results of interviews, it shows that ST is good at understanding problems. This can be seen when ST smoothly analyzes the information without any doubts. This proves that ST is already confident in making choices in answering the questions he gets. This statement was also reinforced when the interview took place; ST confidently answered every question asked by the researcher without any fear. In planning the settlement, ST has high confidence in planning the settlement properly.

This is shown when ST operates the Interactive Multimedia presented by the researcher, the plans he takes to solve the problems in the questions quickly without thinking for a long time. However, sometimes they are still not careful in making decisions. This is not far from the background of ST, an active santri; it cannot be denied that there is still very little social media. ST also confidently answered every question asked by the researcher during the interview process. This can prove that the level of self-efficacy that ST has in planning a settlement is high.

In the last stage of problem-solving, ST's self-efficacy level in re-checking the solution is high. This can be seen during the interview process. ST confidently answered that the results of his work were correct and were not in a hurry in making choices in each question. This is also evident in [Figure 6](#), which proves the results obtained by ST in solving the questions. However, ST does not fully understand the process of working on interactive multimedia presented by researchers,

this is proven by ST still asking questions to researchers.



Figure 6. Effectiveness of Using Interactive Multimedia on Problem Solving with High Self-Efficacy

From the statement above, it can be concluded that ST's self-efficacy in understanding problems, planning problems, and re-checking solutions are high. This statement is reinforced by the statement of [Masitoh & Fitriyani \(2018\)](#) that someone with high self-efficacy will believe that they can do something to solve a problem so that it can support the success of the learning process and can improve student achievement. This statement is supported by information obtained from the informatics teacher that ST does have a high level of self-efficacy in learning, as well as from the results of the observation process while working on it, ST confidently works on it focussed and smoothly without hesitation. During the interview process, ST answered firmly and confidently every point asked by the researcher.

Subjects with Moderate Informatics Ability (SS)

Based on the results of data analysis in [Figure 7](#), which has been presented, it can be stated that the level of self-efficacy possessed by SS in understanding problems is low. This can be seen when SS still lacks confidence in seeing the information he finds in the problem, so SS still asks the researcher for the first step he wants to take. The lack of confidence that SS has makes him feel unable to solve the problems in question. In planning the solution, SS was able to formulate steps for solving it, but they still needed to figure out the steps taken to solve the problems contained in the problem. This proves that the level of self-efficacy possessed by SS subjects in planning solutions is low.



Figure 7. Effectiveness of Using Interactive Multimedia on Problem Solving with Moderate Self-Efficacy

This can be seen when the SS planning a settlement are still trying to figure out the steps they are taking. In fact, SS was good at formulating, but because of his lack of confidence, SS still questioned the correctness of the steps he had taken in formulating a solution to the problem. The mistakes made by SS are better than the mistakes made by ST. SS is only less thorough and focused on using Interactive Multimedia. This is because during the processing.

At the stage of re-checking the completion that had been done, SS was still unsure about the answers that had been done. This shows that the level of self-efficacy possessed by SS in re-checking the completion is low. The ability of SS to summarize the results of settlements is still lacking. Therefore, SS is not sure about the answer itself.

It can be concluded that the self-efficacy of SS in understanding problems, planning problems, and re-checking solutions are low. Because of the lack of self-confidence that SS has, causes incorrect results in completing the settlement process. This is also supported by the statements of [Sampling \(2013\)](#) and [Huan & Ng, \(2018\)](#) that someone with low self-efficacy considers himself unable to work on problems and tends to avoid specific tasks because of doubts in himself to be able to solve the problems at hand. This statement was also proven by the information obtained from the informatics teacher that SS lacked confidence and was not sure of his abilities, so he still saw the results of his friends' work. During the interview process, the way SS answered each question asked by the researcher was still lacking in confidence, so he was afraid to express his opinion freely.

CONCLUSION

Based on the results and discussion, it can be concluded that students with high informatics skills have a high level of self-efficacy. Students with moderate informatics skills have a low level of self-efficacy. From the results of the analysis of research data, there are 2 outlines that become conclusions. Namely, effective Interactive Multimedia to be used in the learning process with a high level of student efficacy. However, in terms of the use of Interactive Multimedia with a moderate level of efficacy, MTs Nurul Jadid Botolinggo students were less effective.

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