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The Effectiveness and Relationship of Student Responses toward Learning Outcomes Using Interactive Multimedia-Based E-Modules in Elementary Schools

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Abstract

An interactive multimedia-based e-module is an enhanced version of conventional modules incorporating information technology. It integrates navigation buttons and user instructions, enabling independent use by those at any location and time. This phenomenon facilitates the optimal implementation of learning in the digital literacy era. This study employed a quantitative design utilizing the pre-experimental design research method. It specifically utilized a one-shot case study research form to examine the effectiveness of learning. Additionally, it employed the correlation analysis method to investigate the relationship between student responses and learning outcomes. This effort is achieved by utilizing interactive multimedia-based e-modules focused on the topic of building space in elementary school. A total of 24 fifth-grade students were included as research subjects. Moreover, the employed instruments consisted of tests of learning outcomes and questionnaires. The research data were evaluated using descriptive statistics, the N-Gain, and the correlation test. The findings indicated that using interactive multimedia-based e-modules for teaching space-related content yielded significant positive effects on learning outcomes. The research data were analyzed using descriptive statistics, N-Gain, and correlation tests. The findings revealed that: 1) the utilization of interactive multimedia-based E-Modules for teaching space-related content is quite effective, resulting in significant improvements in learning outcomes falling within the medium category; and 2) there exists a strong and close relationship between student responses to the implementation of interactive multimedia-based E-Modules and their learning outcomes in mathematics learning at the elementary school level.

Keywords:

E-modul, Interactive Multimedia, Digital Literacy in Schools

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Introduction

Mathematics plays a crucial role in the advancement of science and technology, making it imperative for students in both primary and secondary schools to study it. The objective of studying mathematics in Indonesian schools is to foster logical, analytical, systematic, critical, and creative thinking skills (Torar & Wahono, 2016). Furthermore, another goal is to improve students' understanding of mathematical concepts. Unfortunately, a significant portion of the population still has negative opinions or attitudes regarding this particular subject (Gafoor & Kurukkan, 2015; Raj Acharya, 2017). Mathematics is consistently identified as the topic that presents the most challenges for learning, according to many studies (Brown & Quinn, 2006; ,etin, 2018; Mutlu, 2019; Schwartz et al., 2018).The challenge lies in the students' comprehension and application of mathematical principles (Rohmah et al., 2022). The active participation of students is crucial in the learning process to enhance their comprehension of the teacher's instruction (Astuti et al., 2021; Sutarto et al., 2020).

Given the prevalence of technology in today's society, teachers must possess the necessary skills to utilize digital technology effectively to promote children's learning and facilitate their development (Shvardak et al., 2024). No wonder teachers deserve to be introduced and taught about the use of technology. Technological progress has made many changes such as innovation-innovation and creativity by teachers by using technology as a medium of interaction between teachers and students that then materializes in digital access. Digital literacy is expected to be the motivation of teachers in order to be technologically intelligent. Digital literacy is the attitude and skills of a person to obtain, create, solve, and convey information to students using advanced digital technology. One of the learning media with the use of digital literacy is using an interactive multimedia-based E-Module.

An electronic module, also known as an e-module, is a computer-based learning tool that incorporates text, images, graphics, music, animation, and video to facilitate the learning process (Nugraha et al., 2015). This e-module is compatible with both computers and smartphones, allowing for flexible learning opportunities anywhere and at any time. It may be utilized in various settings, such as in schools or for reviewing and reinforcing material at home. Utilizing interactive multimedia-based E-modules enhances the learning experience by fostering innovation and interactivity, thus promoting active student engagement in the learning process (Evans & Gibbons, 2007; Vrtačnik et al., 2000). The integration of text, images, audio, music, animated visuals, or videos in units facilitates the attainment of learning objectives by mutually reinforcing each other (Leow & Neo, 2014).Therefore, it has the ability to alter students' perspectives on challenging learning materials, resulting in increased happiness and motivation to learn (Ampa, 2015).

Student learning outcomes remain low due to the teacher's continued reliance on the lecture method, where students passively perceive information and then complete assigned questions. Teachers have traditionally utilized learning modules, but they have not yet included electronic or modern methods. This approach renders the learners passive and tedious. Hence, it is imperative to modify or diversify the learning module by including technology, multimedia, and interactive elements to enhance the learning experience. One method is to use e-modules that are based on interactive multimedia. Interactive multimedia-based e-modules can cater to the requirements of students with varied learning styles, as they incorporate animation and other engaging displays that stimulate student interest and motivation. This, in turn, fosters a more authentic learning environment and enhances the effectiveness of the learning process (Iasha et al., 2018). Increasing interest in studying can lead to better learning outcomes. One of the requirements for interactive multimedia-based e-modules is self-instruction, which allows students to study the educational materials independently. The purpose of teaching students to be independent is to instill in them the responsibility to self-organize and self-discipline, as well as develop their own learning skills. This includes actively engaging with visual stimuli, such as images and varying forms of written content that incorporate color, movement, animation, and video. Additionally, students should be able to provide responses and feedback on the content, such as through exercises, evaluations, or quizzes (Sidiq et al., 2019).

Previous research has revealed that E-modules are very effective in helping students learn (ISTUNINGSIH et al., 2018; Ningsih & Mahyuddin, 2021) and creating a pleasant atmosphere when learning.(Lumbantobing et al., 2019; Santi & Sholeh, 2020) and can help improve the quality of learning for elementary school students (Mcgill & Bax, 2005) research by (Satriawan, 2020) stated that the ability of other students that can be enhanced through interactive multimedia is the ability to communicate skills in relation to working together and coordinating in solving problems. Furthermore, the ability to think creatively can be one of the points of interactive multimedia development as elementary school students can explore new solutions of delivering interactive material, which can help train them to think creative.(Firdaus et al., 2020; Nada & Araœjo, 2018).

In order to optimize effectiveness in helping elementary school students resolve learning material-related problems (Sudipa et al., 2022). it is imperative to employ appealing concepts that incorporate a blend of visuals, animations, and auditory elements.

This approach facilitates comprehension, motivates students, and enhances their grasp of the subject matter. Furthermore, enhancing efficacy can be achieved by incorporating evaluation features or tasks to engage students' cognition following their exposure to the instructional material, as supported by the research conducted by (Vandri & Usmeldi, 2020). This study underscores the importance of features that provide feedback, as they help students understand their chosen solutions and reinforce their understanding of the problem at hand.

An important factor that can determine student success in learning, one of which is student response. Student response is an essential factor that can determine a student's academic success. A response can be defined as a behavioral change that is induced by an environmental stimulus (Salsabila et al., 2023). The learning process will be hampered if the student's response to learning is still lacking. Students' interest in the teaching materials and learning media presented will make their attention focus on learning activities, and students will not get bored quickly(Midroro et al., 2021). Furthermore, through mathematical experiences in elementary education, students can develop positive attitudes toward the subject and perceive it as both entertaining and practical. Students' motivation to learn mathematics is significantly correlated with their attitudes, according to (Herges et al., 2017; Pambudi et al., 2020). Alternatively, individuals with a negative attitude are less motivated to study mathematics than those with a positive attitude (Pambudi et al., 2020; Singh et al., 2002). The positive attitude that students have toward learning mathematics through interactive multimedia-based e-modules will have an impact on student learning outcomes.

Therefore, the interactive multimedia-based E-module is designed to facilitate students' comprehension of the subject matter and allow them to engage in the learning process. This study aims to describe student responses, the effectiveness of elementary school students on the development of interactive multimedia-based E-Modules, and the relationship between student responses and student learning outcomes in using interactive multimedia-based E-Modules'

Interactive multimedia-based e-modules are designed to offer students a hands-on learning experience, enabling them to independently engage in the learning process andenhance their comprehension of the materials. As a result, this study attempted to describe student effectiveness and the relationship between their responses to learning outcomes while utilizing interactive multimedia-based e-modules for learning mathematics in elementary schools.

Theories And Concepts Used In The Study

E-modul

Modules are a form of learning material that is now being developed to meet the integration of learning outcomes competencies and to facilitate the availability of learning materials that can be accessed independently and direct learning with various sources (Johan et al., 2022). Meanwhile, electronic modules are teaching materials that can help students learn subject matter independently using electronic media. Since electronic modules can help students learn individually/ independently in the classroom, the teacher is only a facilitator (Persepsi & Motivasi, 2019).Electronic modules can display text, images, animations, and videos through computers, and e-modules can improve students' understanding of concepts and learning outcomes (Suyatna et al., 2018).

Digital modules are inherently beneficial because they can deliver certain content through interactive learning media. There are nine characteristics of e-modules. Firstly, users can operate it autonomously (self-instructional). Secondly, the module's content is comprehensive, functioning as a self-contained unit. Thirdly, the module operates independently of any additional media. Fourthly, the module is adaptable to technological and scientific advancements. Fifth, the module is intuitive to operate (user-friendly). Sixth, the module layout is uniform in all aspects (margins, spaces, typefaces). Seventh, the module is compatible with electronic devices, including computers and mobile phones. Eighth, as a multimedia module, it can incorporate various additional electronic media. Finally, the module is meticulously designed and uses software application features (Gufran).

Interactive Multimedia

Interactive multimedia encompasses a variety of media components—text, images, animated graphics, audio, and video—which can be controlled and operated by the user. Users can determine which elements they want to display by utilizing the available options and instructions (Bardi & Jailani, 2015). Interactive multimedia offers a multitude of benefits. To begin with, the integration of interactive multimedia enhances the level of innovation and interactivity in the learning process. Interactivity in multimedia facilitates learning by enhancing comprehension of the presented material. Students are actively involved in the learning process evan(Evans & Gibbons, 2007; Vrtačnik et al., 2000), Secondly, interactive multimedia enables the integration of various components, such as text, images, audio, music, animated images, and videos, into a single unit that supports each other to achieve learning objectives (Leow & Neo, 2014).

Integrating interactive multimedia into the learning process benefits both students and the setting for learning. Focusing on the students makes the learning process more active and interactive, facilitating their comprehension of the material. As a result, the implementation of interactive learning media can potentially enhance student learning outcomes(Iasha et al., 2018)

Digital Literacy in Schools

Digital literacy is also often considered similar to media literacy (Koltay, 2011), as it aims to improve the ability to access, analyze, and evaluate various forms of information and communication. Digital literacy refers to the set of abilities and skills required to effectively utilize the internet and technology (Cartelli, 2010). UNESCO defines digital literacy as the ability to read and comprehend any form of text, including screen-based, written, or aural discourse. Digital literacy covers the ability of an individual to proficiently and effectively operate technological devices for a variety of objectives, including the support of learning objectives by digital literacy schools and, more frequently, as a foundational element of educational practice that prepares students to thrive in a digital society (Leaning, 2019). Enhancing students' early engagement with digital media is the primary objective of digital literacy education, fostering their development into proactive, inventive, productive, and creative individuals.

Method

The study population consisted of all students enrolled in SD Negeri 13 Surau Gadang, Padang City, West Sumatra Province, for the second semester of the 2022 academic year. The research sample comprised 24 fifth-grade students, evenly divided between 12 girls and 12 boys.

This study is quantitative research using a one-shot case study design. It involved a treatment group and aimed to analyze the correlation between two or more variables. Specifically, it examined the relationship between changes in one variable and changes in other variables (Suyitno et al., 2019)

The study used tests and questionnaires as instruments. The test instrument was utilized to gather data on student learning outcomes acquired through the utilization of interactive multimedia-based e-modules in elementary schools. Data collection was conducted using both the pretest and posttest. Additionally, the questionnaire was employed to assess the students' feedback regarding the implementation of interactive multimedia-based e-modules.

Descriptive and N-Gain analyses were performed on the data using the following formula (Utomo et al., 2020)

$$N - Gain = \frac{Posttest\ Score - Pretest\ Score}{Maximum\ Score - Pretest\ Score}$$

The results of the N-Gain data analysis were categorized according to the (Hake, 1998) category listed in Table 1

Table 1:
N-Gain Score Category

Gain Score	Category
G < 30	Low
0.3 ² G ² 0.7	Middle
G > 0.7	High

To measure effectiveness, the categories used are based on Table 2.

Table 2.
The Effectiveness of N-Gain Score (Aeni et al., 2019)

Gain Score (%)	Category
< 40	Ineffective
40 - 55	Less Effective
56 – 75	Quite Effective
>75	Effective

A questionnaire was employed to find out the students' responses to the interactive multimedia-based e-module. The following formula can be used to calculate the percentage of student responses:

$$Score\ Criteria = \frac{Total\ Score}{Total\ Maximum\ Score} x100$$

Respondents determine the response to the statement given with criteria according to Table 3 below ; (Lukitawati, 2014)

Table 3.
Student response categories

Percentage of Teacher and Student Responses	Category
85% ≤ Response Score	Very Positive
70% ≤ Response Score < 85%	Positive
50% ≤ Response Score < 70%	Less Positive
Response Score < 50%	Not Positive

The final step involves examining the relationship between student responses and learning outcomes when using interactive multimedia-based e-modules for studying building space. It is done by calculating the correlation coefficient between the student response variables (X) and the learning outcomes (Y) obtained from the use of interactive multimedia-based e-modules. Correlation coefficients can be obtained using SPSS version 15.

Results

The validity of interactive multimedia-based e-modules has been assessed by two validators who are experts in their respective fields of study. The material was verified by a lecturer specializing in Primary School Teacher Education at Bung Hatta University, while the design and appearance were verified by a lecturer specializing in Informatics and Computer Engineering Education at Bung Hatta University. The analysis of the interactive multimedia-based e-module on grade five elementary school building space material, conducted by material experts and design experts, yielded highly valid results with a percentage of 89.51%. This result indicates that interactive multimedia-based mathematics learning e-modules can effectively serve as a medium for teaching mathematics in elementary schools.

Based on this basis, it is possible to investigate the responses of students and the effectiveness of learning outcomes derived from interactive multimedia-based e-modules, as well as the correlation between student responses and student learning outcomes, in the way described below:

The effectiveness of interactive multimedia-based e-modules

Based on this basis, it is possible to investigate the responses of students and the effectiveness of learning outcomes derived from interactive multimedia-based e-modules, as well as the correlation between student responses and student learning outcomes, in the way described below:

Figure 1.
Respondents' Posttest and Pretest Graph

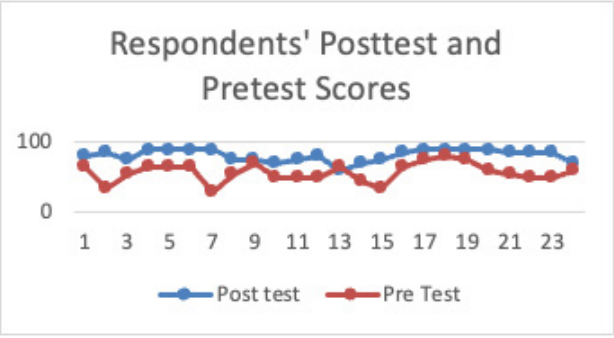


Figure 1 visually demonstrates that respondents' pre-test and post-test scores generally do not overlap. There exists a disparity between the pre-test and post-test scores of the respondents. However, it is necessary to conduct statistical testing using a paired t-test to see if there is a significant disparity between the participants'pre-test and post-test scores. Furthermore, alongside the graph depicted in Figure 1, one can examine the descriptive statistics table below to see if a disparity exists between the pre-test and post-test score data, specifically regarding an increase or decrease in value.

Table 4.
Descriptive statistics of pretest and posttest data
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	57,08	24	12,931	2,640
	Postest	81,25	24	8,629	1,761

Table 4 displays the descriptive statistics of the data collected before and after the test. Table 4 shows that the pretest value has an average (mean) of 57.08, while the posttest value has an average of 81.25. The difference in value between pretest and posttest scores demonstrates a disparity in the mean value of participants. In short, applying an e-module utilizing interactive multimedia in studying building space material leads to a noticeable increase in participants' knowledge. Nevertheless, it is imperative to do a paired t-test for statistical validation. In order to draw meaningful results in parametric testing using a paired t-test, it is necessary for the data being analyzed to have a normal distribution. Hence, it is imperative to initially examine the data distribution of the respondents' pre-test and post-test scores. Below are the results of testing the respondents' pretest and posttest data distribution.

The results of testing the distribution of respondents' pretest and posttest data using the Kolmogorov-Smirnov and Shapiro-Wilk test statistics are presented in Table 5. The test results indicate that the p-values of both the Kolmogorov-Smirnov and Shapiro-Wilk tests on the pretest and posttest data are more than (>) 0.05, confirming that the normality assumption is met.

Once the validity of the pretest and posttest scores is established, the effectiveness of using interactive multimedia-based e-modules to enhance student learning outcomes in space material can be assessed. The effectiveness of this approach is measured through the N-Gain Score, which is presented in the table below:

Table 5.
N-Gain Score Effectiveness Results

Description	Total number of students	Total Score	Average	N-gain	Category
Pre-test	24	1370	57.08	0.51	Quite Effective
Post-test	24	1950	81.25		

Table 5 demonstrates that the utilization of interactive multimedia-based e-modules has resulted in an improvement in student learning outcomes. The pretest score totaled 1370, while the posttest score grew to 1950, with the participation of 24 students. The review results indicate that the N-Gain value is 0.51 (51%), placing it in the fairly effective category. Therefore, it can be inferred that the utilization of

interactive multimedia-based e-modules for teaching building space content is highly effective in enhancing the learning outcomes of fifth grade students, resulting in an average improvement of 69.17.

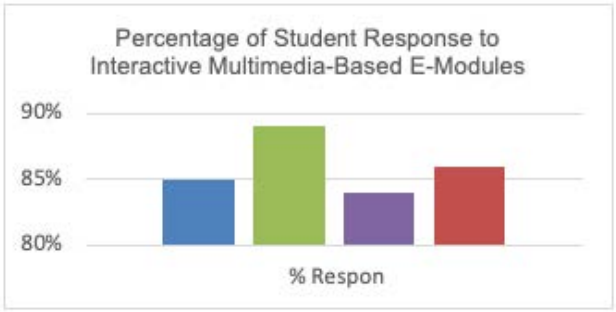
Students' response to the interactive Multimedia-Based E-Module

Twenty-four students filled out student response questionnaires. The student response questionnaire was filled out after the class teacher delivered the learning process using interactive multimedia-based e-modules on the material "building space" in grade 5 of elementary school. The following are the results of analyzing student responses to learning using interactive multimedia-based e-modules

Table 6.
Percentage of Student Response Questionnaire to Interactive Multimedia-Based E-Modules

No.	Assessment Aspect	Total	Practicality Score (%)	Criteria
1	Student Interest	422	84%	Positive
2	Module Usage Process	172	86%	Very Positive
3	Increase in Student Creativity	174	87%	Very Positive
4	Evaluation	248	83%	Positive
Average Practicality of E-Modules			85%	Very Positive

The percentage of student responses to interactive multimedia-based e-modules in elementary schools can be presented in the form of a bar chart as follows:



Ket:
-Student Interest
-The Increase of Student Creativity
-Evaluation
-Module Usage Process

According to the above analysis, 84% of respondents believed that the use of e-modules in learning could increase student interest, which is considered very positive. Additionally, 86% of respondents stated that the process of using e-modules was enjoyable for students, simple to comprehend, and user-friendly, which is also considered very positive. The use of e-modules, according to 87% of respondents, enhanced student creativity. Finally, 83% of respondents believed that the use of e-modules assisted students in assessing their understanding of the material being studied. As stated previously, the average percentage of responses from students regarding the utilization of interactive multimedia-based e-modules for the learning process is 85%, with a very positive category.

Relationship between student response and learning outcomes

Establishing a relationship between student responses and student learning outcomes can be assisted by using SPSS software. To accomplish this, the following hypothesis must be determined in advance:

Ho: There is no relationship between student response and learning outcomes using an interactive multimedia-based e-model.

Ha: There is a relationship between student responses and learning outcomes using an interactive multimedia-based e-model.

Following the analysis results generated by the SPPS software, the following output is obtained:

Correlations

		Respon Siswa	Hasil Belajar Siswa
Respon Siswa	Pearson Correlation	1	,687**
	Sig. (2-tailed)		,000
	N	24	24
Hasil Belajar Siswa	Pearson Correlation	,687**	1
	Sig. (2-tailed)	,000	
	N	24	24

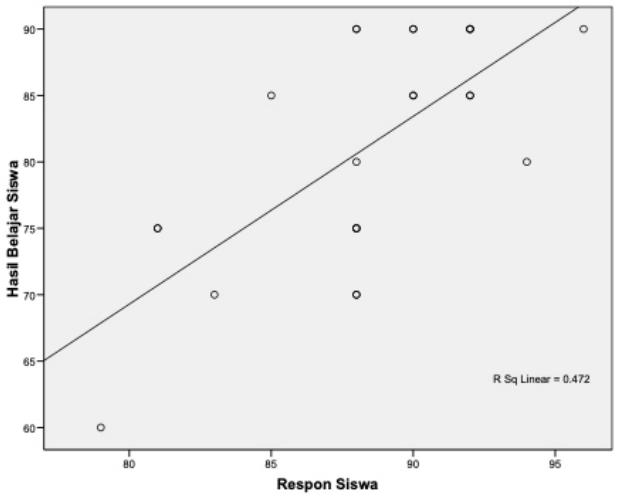
**. Correlation is significant at the 0.01 level (2-tailed).

The analysis above reveals that the correlation result (rxy) is 0.687, denoted by a significance level of 0.000. In addition, the presence of two stars (**) signifies a correlation with a 5% or 0.05 significance level. Because the significance value (0.000) is smaller than α (0.05), Ho is rejected. This is determined by the result of the decision; if Sig. (2-tailed) is less than (<) 0.05, then a correlation exists between the connected variables. Conversely, if the value of Sig. (2-tailed) > 0.05, then there is no correlation between the two variables. Based on the analysis of student responses and learning outcomes pertaining to the utilization of interactive multimedia-based e-modules concerning the subject matter of "building space" in the fifth grade of elementary school, it can be inferred that a relationship exists. Since the correlation result (rxy) is 0.687, the correlation is strong. This is based on the grouping of correlation values below:

Table 7.
Correlation Value Grouping

Value	Correlation
0.00 – 0.20	Closeness correlation is very weak
0.21 – 0.40	Closeness correlation is weak
0.41 – 0.70	Closeness correlation is strong
0.71 – 0.90	Closeness correlation is very strong
0.91 – 0.99	Closeness correlation is extremely strong
1	Closeness correlation is perfect

The above explanation can be shown with a scatter diagram as follows:



It can be concluded that student responses and student learning outcomes have a strong relationship in applying interactive multimedia-based e-modules in elementary schools.

DIscussion

Learning outcomes are measurable indicators that reflect students' level of achievement or performance as a direct consequence of their engagement in the learning process. The assessment of students 'cognitive learning outcomes can be observed through their proficiency in what they have learned. The enhancement of student learning outcomes can be observed through the implementation of pre-test and post-test assessments. The phenomenon of a change in behavior leading to an increase is referred to as effectiveness. In order to assess the effectiveness of interactive multimedia-based e-modules, the pre-test results were examined, which included predetermined indicators. The pre-test findings are intended to ascertain the extent of student comprehension prior to utilizing interactive multimedia-based e-modules. Furthermore, the post-test results following the use of interactive multimedia-based e-modules in the educational procedure exhibit distinct findings. The difference demonstrates a considerable improvement in student learning outcomes before and after implementing e-modules. Administering tests during lessons can enhance the effectiveness of student learning with the aim of enhancing learning outcomes. Tests can be conducted as pre-tests or post-tests, each serving specific purposes to assess the attainment of learning objectives and the effectiveness of learning activities. The research revealed an N-Gain effectiveness result of 0.51 (51%), with the category obtained being quite effective. Hence, the utilization of interactive multimedia-based e-modules is effective in the process of learning.

The increase in students' learning outcomes following the utilization of interactive multimedia-based e-modules demonstrates the significance of focusing on students' cognitive capacities as a crucial component of learning outcomes.

The effectiveness of the e-module is not determined solely by the improvement in student learning outcomes as measured by pre-tests and post-tests. The manner in which students react to their experience with E-Modules provides supporting evidence that interactive multimedia-based E-Modules are highly beneficial for students.

The response can be interpreted as acceptance, rejection, or indifference to what is learned in learning. Based on the findings, 89.8% of students accepted the learning process with interactive multimedia-based e-modules very positively. Students' positive responses will contribute to the improvement of the learning environment. A pleasurable learning environment fosters student comfort and facilitates a more effortless comprehension of the subject matter. As a result, the learning process becomes more meaningful because students learn independently to solve problems and improve their own knowledge.(Lumbantobing et al., 2019)) state that e-modules foster a positive learning environment.

If a teacher can encourage students to engage in his learning approach actively, the relationship between stimulus and response will appear or run effectively. According to Hamalik (2001) in his book "Teaching and Learning Process," the teacher can elicit an effective response from students by giving them a suitable and impactful stimulus. Similarly, if students' responses to the usage of interactive multimedia-based e-modules as a learning tool are favorable, it will positively affect their learning outcomes. Hence, if a correlation exists between these variables, any changes in one of the X variables will lead to corresponding modifications in the other variable (Y). The term is considered a causal term, specifically describing the correlation analysis.

A correlation analysis was performed to determine whether or not a relationship exists between student responses and student learning outcomes. Based on the findings, the significance value (0.000) is smaller than α (0.05), so Ho is rejected. This implies that a relationship exists between the responses of students and the learning outcomes of students when interactive multimedia-based e-modules are utilized. Additionally, the correlation test is conducted, which is a data analysis procedure utilized to ascertain the degree of association between the independent variables (X and Y). The results indicate that the correlation coefficient (rxy) is 0.687, with a significant value of 0.000. With a value of (rxy) = 0.687, the correlation is strong. Therefore, there is a strong correlation between the utilization of

interactive multimedia-based e-modules for building space material in elementary schools and students' responses to learning outcomes.

Alternative e-modules, according to research by (Ricu Sidiq & Najuah, 2020), can generate, stimulate, and strengthen interest in independent learning, resulting in a more effective and efficient learning process and an overall improvement in learning quality. E-modules based on interactive multimedia have the potential to accommodate students with varying learning styles, cultivate a more authentic learning environment, incorporate visually appealing animations or displays to pique students' interest, and ultimately enhance student learning outcomes. Therefore, the implementation of digital learning media can impact learning in various manners, including fostering students' motivation to learn, enabling them to surmount temporal and spatial constraints, furnishing more lucid information, and diminishing superfluous expenditures associated with producing learning materials (Vebrianto & Osman, 2011).

Conclusion

Based on the discussion, it can be concluded that:

1.The application of learning by utilizing interactive multimedia-based e-modules is quite effective in improving elementary school students' learning outcomes on the building space material. The increase in learning outcomes amounted to 24.17, with an N-Gain value of 0.51 (51%) in the medium category.

2.Interactive multimedia-based e-modules developed and tested in this study received a very positive response from students, at 85%.

3.There is a relationship between student responses and learning outcomes when utilizing interactive multimedia-based e-modules in learning, with calculations obtaining a significance value (0.000) smaller than α (0.05), so the null hypothesis is rejected. Furthermore, it is obtained that the correlation value (rxy) is 0.687, so the correlation is strong. Thus, student responses and learning outcomes towards the use of interactive multimedia-based e-modules have a strong relationship.

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