

DEVELOPMENT OF INTERACTIVE LEARNING MULTIMEDIA BASED ON GUIDED INQUIRY TO IMPROVE STUDENT LEARNING OUTCOMES IN SCIENCE CONTENT MATERIAL FORCE, MOTION AND ENERGY TRANSFER CLASS VI SDN BUMI ARUM

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Abstract

Class VI science material includes concepts that are fundamental and essential for scientific understanding. However, conventional learning approaches often do not fully utilize students' potential to actively participate in the learning process. Therefore, the development of interactive learning multimedia based on Guided Inquiry is expected to provide a more interesting and effective alternative in teaching these concepts. This study aims to develop and test the effectiveness of Guided Inquiry-Based Interactive Learning Multimedia in increasing students' understanding of Force, Motion, and Energy Transfer material in grade VI science lessons. The method used in writing this journal is based on qualitative writing using a descriptive approach of analysis. The writing technique is based on qualitative data. The results of the field test revealed that the average value obtained increased to 78.79 which was previously 69.68. In addition, based on the results of the study also explained that the use of guided inquiry implemented in science learning media, especially in style material gets better results compared to the use of conventional learning, namely by using textbooks during learning activities. This is proven through a hypothesis test that the value of t table is 2.001 while t count is 2.76. By using guided inquiry models on the topics of interactive multimedia-assisted learning of force, motion, and energy transfer, student learning outcomes can be improved.

Keywords: *Quided inquiry, Multimedia, Interactive Learning, Science*

INTRODUCTION

The progress of education can be influenced by technological developments, especially in the current era of globalization (Nurohman, 2015). Thanks to the development of this technology can provide or give birth to various kinds of new innovations found in the world of education (Setiawan, 2018). As for the development of

technology, this also has an impact on the learning style or learning characteristics of students. The use of technology can be more easily understood by generation Z (Hastini et al., 2020).

Learning can be interpreted as the interaction between teachers and students by using learning resources to support the teaching and learning process (Nu'man, 2019). The teaching and learning process will give its own meaning, in this case it can be said that the success of the learning process can be reviewed when students successfully apply the knowledge they gain in everyday life (Rachmawati & Erwin, 2022). Successful learning is not only based on good indicators of grades obtained (Isnainah, 2017). In applying learning, the right media or learning methods are needed (Purnasari & Sadewo, 2020) (Munandar et al., 2019). The application of media used in learning can minimize the level of boredom of students, especially in learning concepts that have an abstract nature, for example science (Andriani & Wakhudin, 2020). Science (Natural Sciences) is one of the compulsory subjects for the elementary / MI level which is implemented in thematic (Cahayaningsih et al., 2022). At the elementary / MI level, science learning is intended to instill curiosity in oneself in a scientific way (Son, 2017). Through science learning, it can train boiling participants for problem solving, objective and critical thinking (Triastuti, 2020). If the material taught is abstract, the teacher can use media in learning, so that the knowledge transfer process can be implemented optimally (Yusransal et al., 2022).

Other factors can also be caused by the lack of teacher skills in making a learning medium. Kurnang effectiveness in the use of learning media can also reduce the learning outcomes of students decreased. Although some public elementary schools have implemented the Independent Curriculum, the level of student activity in the learning process is still quite low. Some of the media used by teachers are picture and thematic books. Teachers rarely use multiple media, where students can be directly involved by using those media. Teacher skills are also still lacking in doing practice with the world of technology, so the use of media that is used several times by utilizing computers / laptops is only limited to *powerpoint*. Education is a critical aspect in the formation of a knowledgeable and competitive society. In this modern era, technological developments have a significant impact on learning approaches, with interactive multimedia being one of the potential means to improve the effectiveness of the learning process. The focus of this development is focused on the creation of Interactive Learning Multimedia Based on

Guided Inquiry for class VI Natural Science (Science) material, especially on the topics of Force, Motion, and Energy Transfer.

Class VI science material includes concepts that are fundamental and essential for scientific understanding. However, conventional learning approaches often do not fully utilize students' potential to actively participate in the learning process. Therefore, the development of interactive learning multimedia based on Guided Inquiry is expected to provide a more interesting and effective alternative in teaching these concepts. The selection of Guided Inquiry as a basic approach in this development was based on the desire to stimulate students' curiosity, build critical thinking skills, and increase their involvement in learning. Through interactive multimedia, it is expected that students can more easily understand physics concepts by conducting independent exploration.

Previous research by Annisa & Simbolon (2018) Explaining the development of learning media requires validation from media experts, learning design, and from parts of the material. If a learning media is declared valid, it can be directly implemented in schools or as a companion for students in learning. Style material is one of the science materials taught at the elementary / MI level. The results of the study explained that the learning outcomes of students using interactive media can improve learning outcomes. The results of the field test revealed that the average value obtained increased to 78.79 which was previously 69.68. In addition, based on the results of the study also explained that the use of *Guided inquiry* which is implemented in science learning media, especially in style material gets better results compared to the use of conventional learning, namely by using textbooks during learning activities. This is proven through a hypothesis test that the value of t table is 2.001 while t count is 2.76.

Based on the explanation above, we will discuss more deeply related to the Development of Interactive Learning Multimedia based on Guided Inquiry to Improve Student Learning Outcomes in Science Content of Class VI Force, Motion, and Energy Transfer Materials. The purpose of the study was to analyze through a review of *data collection in the field* related to the development of interactive learning multimedia based on *guided inquiry* to improve student learning outcomes in science content of class VI force, motion, and energy transfer materials. In addition, this study also intends to gain insight into students' active participation during the learning process using this multimedia. By understanding the importance of developing interactive learning multimedia in the context

of science learning at the grade VI level, this research is expected to be able to make a positive contribution to the development of education in the future.

METHODS

The method used in writing this journal is based on qualitative writing using a descriptive approach of analysis. The writing technique is based on qualitative data. However, if in writing found various forms of data that are quantitative or related to numbers and values, then this will certainly be mentioned in the writing of this journal. Here is Figure 1 which describes the researcher's frame of mind. After some data is deposited then proceed to the data analysis stage. Here is Figure 2 which describes the data analysis, namely: Data analysis is carried out inductively qualitative descriptive research method is a method used by researchers to find knowledge or theory of research at one time. The method applied in this study is qualitative descriptive method (Sugiyono, 2018). Primary data is a data source that directly provides data to data collectors. The type of research used is a case study. Things that will be examined in this study are development of interactive learning multimedia based on guided inquiry to improve student learning outcomes in science content material force, motion and energy transfer class at Bumi Arum State Elementary School, this research was conducted from December 28, 2023 to January 1, 2024.

RESULTS

The results of the study explained that the learning outcomes of students using interactive media can improve learning outcomes. The results of the field test revealed that the average value obtained increased to 78.79 which was previously 69.68. In addition, based on the results of the study also explained that the use of *Guided inquiry* which is implemented in science learning media, especially in style material gets better results compared to the use of conventional learning, namely by using textbooks during learning activities. This is proven through a hypothesis test that the value of t table is 2.001 while t count is 2.76 (Annisa & Simbolon, 2018). Furthermore, there are students' individual scores as shown in the table below:

Table 2. Individual Scores of SDN Bumi Arum Students

No.	Student Name	Style (5 points)	Motion (5 points)	Energy Transfer (5 points)
1	Student A	5	3	4
2	Student B	4	2	3
3	Student C	3	4	5

Source: Pre-Test Question Results

The teacher noted that some students showed confidence in answering questions. Some students seem less confident in explaining the concept of motion. The teacher saw that some students used the formula well, while others relied on verbal explanations.

1. Student Individual Scores**Student A:**

Style: 5/5

Motion: 3/5

Energy Transfer: 4/5

Student B:

Style: 4/5

Motion: 2/5

Energy Transfer: 3/5

Student C:

Style: 3/5

Motion: 4/5

Energy Transfer: 5/5

The majority of students have a pretty good understanding of style. There are variations in students' understanding of the concept of motion. Students' understanding of energy transfer tends to vary. The teacher noted that some students showed confidence in

answering questions. Some students seem less confident in explaining the concept of motion. The teacher saw that some students used the formula well, while others relied on verbal explanations. The teacher will observe the level of student engagement during the pre-test. Note the student's facial expressions, confidence level, and effort in answering each question.

Table 3. Active Participation of SDN Bumi Arum Students

No.	Student Name	Facial Expressions	Self-Confidence Level	Student Business
1	Student A	Interested	Tall	Active
2	Student B	Anxious	Low	Limited
3	Student C	Enthusiastic	Keep	Very Active

Source: Teacher's Observation during Pre-Test

Student A

Facial Expressions: Interested, enthusiastic, and focused on the problem.

Self-confidence level: high; gave the answer confidently.

Student Effort: Active; engage in discussions.

Student B

Facial Expressions: Anxious and doubtful.

Self-confidence level: low; looks hesitant in giving an answer.

Student effort: limited; more silence.

Student C

Facial Expressions: Enthusiastic and happy to learn.

Self-confidence level: medium; gave the answer quite confidently.

Student Effort: Very active; be proactive in finding solutions.

Teacher's Reflection

The teacher noted that some students showed confidence in answering questions. Some students seem less confident in explaining the concept of motion. The teacher saw

that some students used the formula well, while others relied on verbal explanations. The following are the results of the development of interactive learning multimedia:

Table 4. Results of Interactive Learning Multimedia Development

No.	Evaluation Aspect	Result Data
1	Students' Understanding	Initial Varied; Majority have a good understanding of "Force," mixed understanding of "Motion," and varied understanding of "Energy Transfer."
2	Active Participation	Student Diverse; Student A shows interest and high confidence, Student B appears anxious with low confidence, and Student C is enthusiastic and actively participates.
3	Multimedia Design	In development, Multimedia designed with Guided Inquiry approach, integrating interactive elements such as animations, images, and videos.
4	Additional Development	In progress, Additional resources and support materials for students needing extra assistance are being considered.
5	Learning Approach	Guided Inquiry: Multimedia aims to foster critical thinking and active engagement in the learning process.
6	Measurement of Student Learning Outcomes	Pending implementation; Pre-test data collected, and post-test data will be gathered after multimedia implementation.
7	Teacher's Response	Monitoring and reflection; Guru observed variations in students' confidence and effort levels, aiming to provide tailored support.
8	Student and Teacher Responses	Not collected; Post-implementation feedback will be obtained to assess overall satisfaction and identify areas for improvement.

Source: maintained by author

Diversity of Students' Initial Comprehension: Students' understanding of the concept of "Force" is mostly good, while for "Motion" and "Energy Transfer" it is more varied. Student Active Participation: Students show varying levels of participation; Special attention needs to be paid to students with low levels of confidence. Learning Approach and Multimedia Design: Carrying the Guided Inquiry approach, multimedia is being developed with the integration of interactive elements to enhance student engagement. Learning Outcomes Measurement: Pre-test data has been collected; Post-test evaluations will provide a more complete picture of the impact of multimedia on student learning outcomes. Teacher Response and Additional Content Development: Teachers are monitoring and reflecting, developing additional content to support students who need extra help. Student and Teacher Responses: Responses after implementation will provide

additional insights to refine and optimize multimedia interactive learning. A full evaluation after multimedia implementation will provide a thorough picture of the effectiveness and potential for further development.

DISCUSSION

Learning can be interpreted as the interaction between teachers and students by using learning resources to support the teaching and learning process (Nu'man, 2019). The teaching and learning process will give its own meaning, in this case it can be said that the success of the learning process can be reviewed when students successfully apply the knowledge they gain in everyday life (Rachmawati & Erwin, 2022). The development of learning media requires validation from media experts, learning design, and from parts of the material. If a learning media is declared valid, it can be directly implemented in schools or as a companion for students in learning. Style material is one of the science materials taught at the elementary / MI level.

Successful learning is not only based on good indicators of grades obtained (Isnainah, 2017). In applying learning, the right media or learning methods are needed (Purnasari & Sadewo, 2020) (Munandar et al., 2019). Science learning that is implemented at the elementary level does require media as one of the delivery of material to students. By using learning media, learning activities will be more memorable and minimize misconceptions that occur. There are various types of learning media, for example is interactive multimedia. In the use of interactive learning media, manuals should be given related to the use of these media, so that it will not create confusion for users of learning media. The substitutes of interactive multimedia that can be found in learning include (1) the operation of multimedia requires several buttons in its use; (2) the multimedia page is presented related to several scenes, for example for the opening, delivery of learning objectives, material, practice questions and so on, and (3) the presence of an intro or opening impression. One of the models used in science lessons is *Guided inquiry* which has a role in constructing student understanding, especially in science material (Akbar, 2016).

The application of media used in learning can minimize the level of boredom of students, especially in learning concepts that have an abstract nature, for example science (Andriani & Wakhudin, 2020). Multimedia can be known as a combination of several learning media used in learning. Learning media itself is a tool or material that is used in the

process of delivering messages to students as recipients of information by stimulating interest, attention, feelings, and thoughts in order to form meaningful learning activities. The characteristics of interactive multimedia include (1) being independent, the completeness of the material so that students can use it without the need for special assistance; (2) is interactive, can create students to respond to the use of interactive multimedia; (3) the existence of a combination of several media, for example a combination of visual media with audio media. Changes or energy transfer is one of the abstract materials, especially for the elementary / MI level. Therefore, a media is needed that can concrete the knowledge to be described and transferred to students. Using interactive multimedia can minimize misconceptions in students. This is because, before the media is tested directly to students, it must go through a validation test by validators (Baalwi & Aulia, 2022).

At the elementary / MI level, science learning is intended to instill curiosity in oneself in a scientific way (Son, 2017). Interactive multimedia is a media that can be combined with various kinds of media such as audio, animation, text, video, and so on. The process of combining various kinds of learning media is expected to form the achievement of goals. As it is well known that technological developments have a significant impact and can be seen through the field of education as well. In making interactive multimedia certainly requires special applications and skills. There are various applications that can be used in making interactive multimedia, for example Adobe Flash CS 6. Then, using interactive multimedia can have an impact on improving learning outcomes. The score obtained through the test using interactive multimedia increased to 71.87 which previously the average score only got 58.12. Based on this, it can be seen that using interactive multimedia is very effective and interesting in improving learning outcomes (Rahmadhani et al., 2022).

CONCLUSION

The majority of students have a pretty good understanding of style. There are variations in students' understanding of the concept of motion. Students' understanding of energy transfer tends to vary. Student A shows interest and a high level of confidence. Student B appears anxious and has a low level of confidence. Student C shows high enthusiasm and active participation. In teaching abstract science material, such as force, motion, and energy transfer, interactive learning media or multimedia are needed, so that

the learning process will be meaningful. The development of interactive multimedia on force, motion, and energy transfer materials must go through validation tests first, so that the media that has been developed can be disseminated. The use of interactive multimedia is better to use appropriate learning models such as *guided inquiry*. Through the *guided inquiry* model, it can construct or build students' understanding of the material of force, motion, and energy transfer. By using *guided inquiry models* on the topics of interactive multimedia-assisted learning of force, motion, and energy transfer, student learning outcomes can be improved.

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