DEVELOPMENT OF INTERACTIVE LEARNING MULTIMEDIA BASED ON ARTICULATE STORYLINE 3 MATERIALS OF MAGNETICITY AND ITS UTILIZATION IN TECHNOLOGICAL PRODUCTS

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Abstract

Science and information technology developing so rapidly in every sectors of life including education sector. Now, information technology transform to developing the interactive learning multimedia that's qualify, attractive, and effective to increase the student's study outcomes. This developing interactive learning multimedia is based on Articulate Storyline 3 in Magnetism and Utilization in Technology Product material. This research aim to describe the making of interactive learning multimedia, knowing the qualification, attractiveness, and it's effectiveness to increase the student's study outcomes. The research method uses is RnD (Research and Develompment) with design using ADDIE (Analysis, Design, Development, Implementation, and Evalution). The data collection was carried out in qualitative and quantitative. The qualitative data are collected by interview and observation about needed analysis. The quantitative data are collected by expert validations, readability test using student questionnaires, and student's study outcomes. The result showed that the interactive learning multimedia base on Articulate Storyline 3 in Magnetism and Utilization in Technology Product material is qualify, attractive, and effective to increase student's study outcomes.

Keywords: Learning Multimedia, Articulate Storyline 3, Magnetism Material.

Abstrak

Ilmu pengetahuan dan teknologi informasi berkembang begitu pesat di segala sektor kehidupan termasuk sektor pendidikan. Kini teknologi informasi bertransformasi mengembangkan multimedia pembelajaran interaktif yang berkualitas, menarik, dan efektif untuk meningkatkan hasil belajar siswa. Multimedia pembelajaran interaktif yang dikembangkan ini berbasis pada materi Articulate Storyline 3 pada materi Magnetisme dan Pemanfaatan pada Produk Teknologi. Penelitian ini bertujuan untuk mendeskripsikan pembuatan multimedia pembelajaran interaktif, mengetahui kualifikasi, kemenarikan, dan keefektifannya dalam meningkatkan hasil belajar siswa. Metode penelitian yang digunakan adalah RnD (Research and Development) dengan perancangan menggunakan ADDIE (Analysis, Design, Development, Implementation, and Evaluation). Pengumpulan data dilakukan secara kualitatif dan kuantitatif. Data kualitatif dikumpulkan dengan wawancara dan observasi tentang analisis kebutuhan. Data kuantitatif dikumpulkan dengan validasi ahli, uji keterbacaan menggunakan angket siswa, dan hasil belajar siswa. Hasil penelitian menunjukkan bahwa multimedia pembelajaran interaktif berbasis Articulate Storyline 3 pada materi Magnetisme dan Pemanfaatan Produk Teknologi memenuhi syarat, menarik, dan efektif untuk meningkatkan hasil belajar siswa.

Kata Kunci: Multimedia Pembelajaran, Artikulasi Alur Cerita 3, Materi Magnetisme.

Introduction

Science and information technology are rapidly developing in all sectors of life, one of which is the education sector. Information technology in the field of education is utilized to create various interesting learning media. In Permendikbud No. 22 of 2016 states that one of the principles of learning is to utilize Information and Communication Technology (ICT) so as to improve effective and efficient learning (Ministry of the Republic of Indonesia, 2016). Learning media that utilizes Information and Communication Technology can be used by teachers to support physical science learning. Physics is a natural science that discusses nature and its symptoms that are real (real) to abstract or even only in theory which in its discussion involves the ability of imagination or the involvement of strong mental images (Setiawan, 2013). Physics learning contains various understanding of concepts, calculations, theories, and complex problem solving skills. So it is necessary to use learning media that is feasible, interesting, and effective.

Learning media is a means or tool for conveying information from the source of information, namely the teacher to the student. Good learning media is learning media that effectively improves student learning outcomes. One of the learning media that has proven to be effective in improving student learning outcomes is interactive learning multimedia (Sutarto, 2010). Supported by previous research which shows that interactive learning multimedia can increase student motivation and learning outcomes. This interactive learning multimedia is effective to use and obtained an average score of 60.5 with a percentage result of 86.43% with effective criteria using student questionnaires. In addition, there was an increase in student learning outcomes with a pretest score of 54.50 while the posttest score was 84.00 (Ulfa, 2021).

In addition, research in the same year showed an increase in student understanding by using interactive learning multimedia as indicated by an increase in the average learning outcomes from those who previously did not use interactive learning multimedia (Sari, 2021). Although the use of interactive learning multimedia has been proven to improve student learning outcomes, teachers have not fully used interactive learning multimedia. This is shown through the results of observations at MTs Darussalam Kademangan Blitar where teachers still use printed learning media and have not used interactive learning multimedia. In addition, the results of interviews with teachers revealed that students find it difficult to understand science material, especially in the Physics clump. Students explained in one interview session that students have difficulty understanding Physics material that provides abstract images such as magnetism material.

Physics materials such as magnetism are materials with abstract phenomena. Students find it difficult to understand the material because the phenomena are abstract, there are many formulas, require reasoning, and require understanding of concepts rather than just memorization. The complex content of physical science that cannot be sensed directly coupled with the lack of learning media that supports the learning process causes serious problems in learning physical science (Yasin and

Ducha, 2017). With these problems, students need learning media that can provide an overview of abstract phenomena to improve student understanding in physical science material, especially in the material of Magnetism and its Utilization in Technological Products.

The proposed solution is to develop interactive learning multimedia based on Articulate Storyline 3 on Magnetism and its Utilization in Technology Products. Articulate Storyline 3 is a presentation and communication-based software used to develop interactive learning multimedia. The advantage of Articulate Storyline 3 is that it has features as easy as powerpoint but has other advantages, namely providing various templates that can be used to create quizzes along with discussions and equipped with a trigger feature to facilitate student navigation in selecting the material being studied (Yasin and Ducha, 2021).

Research Method

The type of research used is development research or Research and Development (R&D) with the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) (Sugiyono, 2018). This development stage is divided into two stages of development. The first stage includes the analysis, design, and development stages. While the second stage includes the implementation stage.

The analysis stage is in the form of: a) observations and interviews of the use of learning media by teachers and students; b) observations and interviews of students' learning media needs. The design stage is in the form of: a) compiling validation instruments, readability tests, and the effectiveness of interactive learning multimedia; b) designing products by making flowcharts. The development stage is carried out by: a) making interactive learning multimedia based on Articulate Storyline 3 material on Magnetism and its Utilization in Technology Products; b) validation of interactive learning multimedia by validators; c) product readability test to determine the attractiveness of the product.

The implementation stage is carried out by: a) testing the effectiveness of interactive learning multimedia; b) taking data on experimental classes that use interactive learning multimedia and control classes that do not use interactive learning multimedia developed. The evaluation stage is carried out at each previous stage. At the analysis stage, the evaluation is carried out by evaluating the results of interviews and observations of learning media needs analysis and work analysis. At the design stage, the evaluation is carried out by revising the grids of validation sheets, response questionnaires (readability tests), and revising posttest questions and revising flowcharts.

At the development stage, the evaluation is carried out by revising the product according to the validator's suggestions and revising the product according to students' comments on the readability test. At the implementation stage, the evaluation is carried out by analyzing the data from the effectiveness test results and comparing the posttest results of the experimental and control classes. The research subjects were MTs Darussalam Kademangan Blitar grade IX students in the 2022/2023 school year. Qualitative data collection techniques with observation and interviews while quantitative data collection with material expert and media expert

validation sheets, student response questionnaires, and posttest scores. Expert validators consisted of two lecturers and one teacher. Furthermore, the product readability test was carried out using a 1-2 Guttman scale response questionnaire. The final step is to test the use of the product in the experimental class and compare the learning outcomes of students who use the developed interactive learning multimedia and students who do not use the developed interactive learning multimedia.

Data analysis of validation results and student response questionnaire results to determine the attractiveness of interactive learning multimedia using the equation.

$$P = \frac{f}{N} \times 100\%$$

Description
F = obtained score
N = maximal score
P = percentage

After that, the results of the validation percentage are interpreted by using the validity assessment categories in table 1 as follows:

Table 1. Provisions for Revision of Learning Multimedia Validation Sheet

Value	Description
20%-35%	Invalid, cannot be used
36%-51%	Less valid, cannot be used because it needs major revision
52%-67%	Fairly valid, can be used but needs minor revisions
68%-83%	Valid, can be used without revision
84%100%	Very valid, can be used without revision

The percentage results of the product readability test are interpreted using the attractiveness assessment category in table 2 as follows.

Table 2: The Qualification of the Level of Attractiveness of Learning Multimedia

Value	Description
20%-35%	Unattractive, very difficult to use
36%-51%	Less attractive, difficult to use
52%-67%	Moderately attractive, usable
68%-83%	Interesting, easy to use
84%100%	Very interesting, very easy to use

(Arifin, 2009)

The product effectiveness test was conducted with an independent samples t-test to determine the difference in learning outcomes between experimental class students and control class students. This effectiveness test was conducted in two stages, namely: a) measuring the classical completeness of the experimental and control

classes; b) testing the difference with independent samples t-test. The equation used in measuring classical completeness is as follows.

$$P = \frac{X}{N} \times 100\%$$

Description

F = the number of students who passed

N = total students

P = percentage

The second stage of effectiveness testing is by hypothesis testing with the following conditions: a) H_o = The learning outcomes of experimental class students are lower or equal to the learning outcomes of the control class; b) H_a = The learning outcomes of experimental class students are lower or there are differences in the learning outcomes of experimental and control classes. The test criteria used are presented in the following table.

Table 3. Hypothesis Testing Criteria

sig. (2-tailed)	Interpretation
Sig. (2-tailed) > 0,05	H_o accepted
Sig. (2-tailed) < 0,05	H_o rejected

Result and Discussion

The stages of this research and development are in accordance with the ADDIE model which is described as follows.

1. Analysis

   This analysis stage is carried out with a work analysis and needs analysis. Work analysis is carried out to determine KI-KD and indicators of competency achievement. In addition, the analysis of physical science material, namely Magnetism and its Utilization in Technological Products, was carried out by collecting materials, images, videos, and audio from various sources. Work analysis related to the software used, namely by installing Articulate Storyline 3 on the computer and learning the features in it such as the trigger and quiz features. The needs analysis was conducted by evaluating the results of observations and interviews with teachers and students regarding the learning media needed. Through this needs analysis, researchers know that learning media that is interesting and provides a picture of abstract phenomena in Physics more realistically is the learning media needed by students.

2. Design

   This design is carried out with several processes, namely: a) compiling research instruments in the form of validation sheets to test the feasibility of interactive learning multimedia developed. In addition, a student response questionnaire was prepared for the readability test, and the preparation of posttest questions for the effectiveness of learning multimedia; and b) product design by making a flowchart. The following figure 1 is a description of the flowchart that was made.
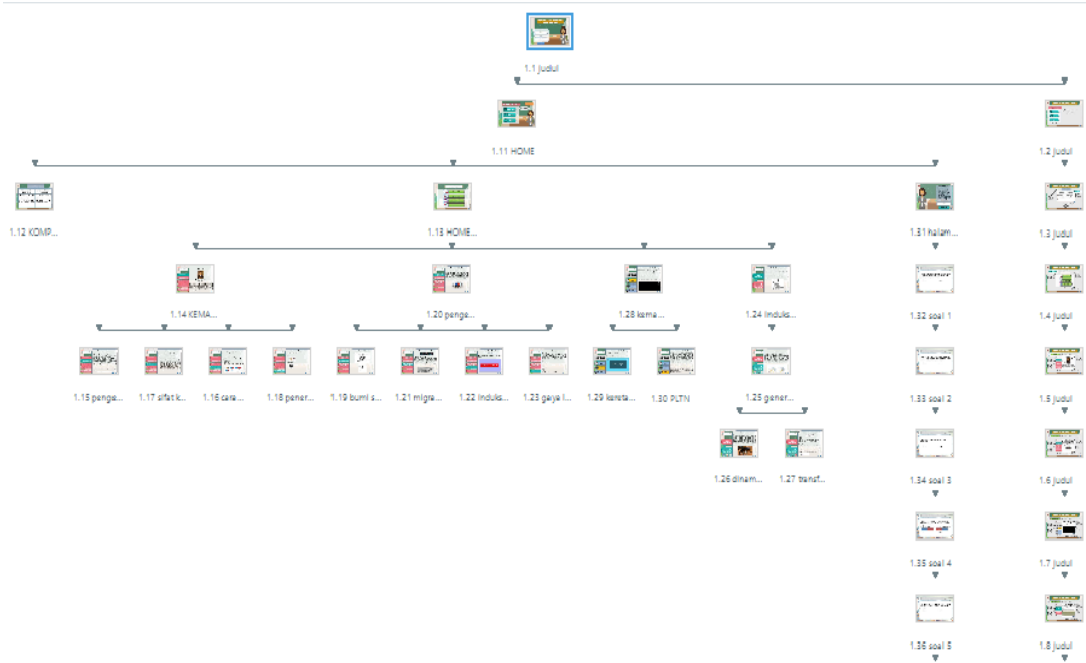
Figure 1. Interactive Learning Multimedia Flowchart

3. Development
   a. Creation of Interactive Learning Multimedia

   The creation of interactive learning multimedia based on Articulate Storyline 3 is in accordance with the flow chart that has been made and adapted to the material of the work analysis results and the results of the analysis of learning media needs. The initial design that has been made is as follows.

Figure 2. *Login*

Figure 3. Main Menu

Figure 4. Kompetence

Figure 5. Material

Figure 6. Material

Figure 7. First Quiz Page
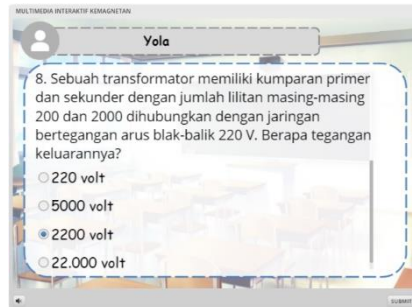
Figure 8. Quiz
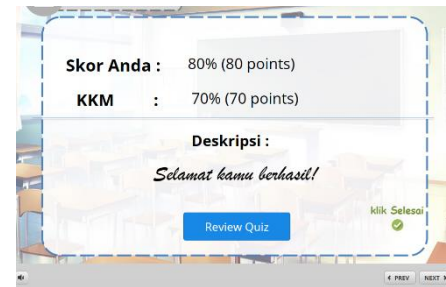
Figure 9. Quiz Score

Figure 10. Exit Page

b. Validation or Feasibility Test of Interactive Learning Multimedia
This validation was carried out to determine the feasibility test of the interactive learning multimedia developed. Validation was carried out by media expert validators, namely one lecturer and science subject teacher and material expert validation by one lecturer and science subject teacher.

The results of media expert validation by lecturer Mr. Gaguk Resbiantoro, S.Si., M.Pd. and science subject teacher Mrs. Jassica Dea Putri P, S.Pd. are presented in table 4 below.

Table 4. Interactive Learning Multimedia Media Validation Results

No.	Aspect	Aspect Percentage
1.	Visual and Audio Display	86,67%
2.	Software Feasibility	93,33%
3.	Programming/Utilization	92%
Percentage (%)		84%
Criteria		Very Valid

Based on the table above, it is evident that interactive learning multimedia used for learning physical science with a percentage of feasibility of 84% which is
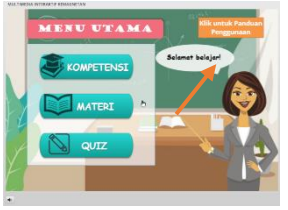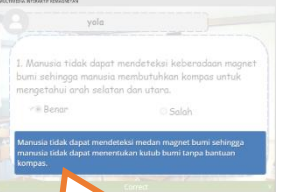
included in the category of very valid or very feasible without revision. The results of the material expert validation, namely from lecturer Mrs. Nani Surnarmi, S.Si., M.Sc. and science teacher Mrs. Jassica Dea Putri P, S.Pd. are shown in table 5 below.
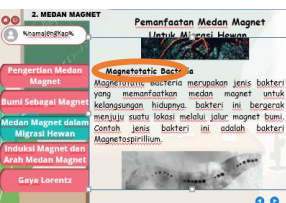
Table 5. Interactive Learning Multimedia Media Validation Results

No.	Aspect	Percentage Per Aspect
1.	Lesson	87%
2.	Content	78,67%
Percentage (%)		81,7%
Criteria		Valid

The results of the material expert validation from the material expert showed a valid or feasible category with revisions according to the validator's suggestions. The suggestions of the material expert validators and the revised results are stated in table 6 below.

Table 6. Revision of Interactive Learning Multimedia

No.	Revision Instruction	Result
1.	Fixed "!" and right-left alignment on slides material	
2.	Adding question discussion to the quiz	

3.	Added material, questions, and discussion questions on the material slide	**Before** **After** **Before** **After** No example / Include examples and discussions

c. Readability/Attractiveness Test of Interactive Learning Multimedia

The readability test was conducted on students who had received the material of Magnetism and its Utilization in Technology Products. The results of product readability by 26 students are presented in table 7 below.

Table 7. Readability Test of Interactive Learning Multimedia

No.	Indicator	Percentage
1.	Interactive learning multimedia is a new innovation	100%
2.	Interest in using	96,2%
3.	Benefits in learning	94,25%
4.	Content and language use	100%
5.	Appropriateness of Figure and video presentation	100%
6.	Suitability of evaluation questions with the content	100%
7.	Appropriateness of the font used	88,5%
8.	Use of sound/audio	100%
Percentage		96,79%
Criteria		Interactive

Based on the readability test through student response questionnaires, it can be said that the interactive learning multimedia developed is very interesting and very easy to use in learning Physics Science material on Magnetism and its Utilization in Technology Products.

4. Implementation

The implementation stage is carried out by testing the effectiveness of the product, namely by testing the learning multimedia developed for the experimental class consisting of 25 students. This effectiveness test began on January 13, 2023 in class IX A using a device in the form of an LCD. Researchers explained magnetism material using interactive learning multimedia developed for four meetings.

In the fourth meeting, students brought their gadgets which were used to open interactive learning multimedia and take quizzes available in it independently. In the fifth meeting, a daily test was conducted to test the effectiveness of the

product. At the same time, daily test/posttest scores were taken from the control class or the class that did not apply interactive learning multimedia. The results of the first stage of the effectiveness test showed that the classical completeness of the experimental class was 88% and the control class was 69.2% where the classical completeness of the experimental class was higher than the control class.

The second stage of the effectiveness test was carried out with an independent samples t-test which obtained a sig. (2-tailed) of 0.014 <0.05 which indicates that H_o is rejected which indicates that there are differences in the learning outcomes of the experimental and control classes. The experimental class is proven to have higher learning outcomes than the control class. The results of this effectiveness test show that interactive learning multimedia based on Articulate Storyline 3 material on Magnetism and its Utilization in Technology Products is effectively used to improve physical science learning outcomes.

The results of this study are supported by similar previous studies. The results of student responses showed very interesting criteria of 81%. In addition, student learning outcomes showed learning outcomes of 45 before using interactive learning multimedia based on Articulate Storyline 3 and increased to 73.75 after using the developed learning multimedia (Burhanudin, 2021). The development of interactive learning multimedia based on Articulate Storyline 3 on science material also shows similar results. The results of the validation of material and media experts each showed valid/worthy of use and practical use and received good responses from students (Romadhona, 2022). Interactive learning multimedia on science material can be feasible to use in learning with the results of material and media expert validation of 86% and 90% respectively and interesting to use with the results of a student response questionnaire of 86.43% (Ulfa, 2021). Interactive learning multimedia is also effectively used to improve student learning outcomes by obtaining an average learning outcome of 87 which is higher than KKM 75 (Sari, 2021).

Conclusion

The research and development of interactive learning multimedia based on Articulate Storyline 3 material on Magnetism and its Utilization in Technology Products was successfully developed through the ADDIE stage. In addition, the developed interactive learning multimedia is feasible to use with a percentage of material feasibility of 81.7% and media feasibility of 84%. The readability of the product shows that the interactive learning multimedia developed is very interesting and very easy to use with a percentage of attractiveness of 96.79. The product effectiveness test showed that the classical completeness of the control class was 88% which was higher than the control class of 69.2%. In addition, the results of the independent samples t-test show sig. (2-tailed) of 0.014 <0.05 which shows that there are differences in the learning outcomes of the experimental class and control class where the experimental class has higher learning outcomes than the control class. The results of the effectiveness test show that interactive learning multimedia based on Articulate Storyline 3 material on Magnetism and its Utilization in Technology Products is effectively used to improve learning outcomes. These results indicate that the interactive learning multimedia developed is feasible, interesting, and effective to use to improve learning outcomes. So, it is necessary to develop similar

learning media on different learning materials as a solution for teachers to create good, innovative, and effective learning to improve student learning outcomes.

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