

Development Of Stem-Based Interactive Multimedia On Human Digestive System For Elementary School

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Abstract

This study aims to determine the feasibility of using STEM-based interactive multimedia on human digestive system for elementary school. This research is a Research and Development which refers to the ADDIE model which consists of 5 stages, namely the analysis, design, development, implementation, and evaluation stages. Data collection techniques in this study were observation, interviews, and validation. This research was conducted in class V. The results showed the multimedia was valid in terms of media by 91,20%, in terms of material by 94.44%, and in terms of instructional design by 93,33%. This multimedia is "Very Feasible" for participants touse in learning education. Furthermore, the results of the assessment from the teacher obtained 93% and limited trials by students obtained 94% which is in the very good category.

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INTRODUCTION

The development of science, information and communication technology has a significant impact on education. With technology, the world of education can provide new colors in the learning process, namely by developing technology-based media. Technology includes any technique or method that can be trusted to be carried out anywhere that involves students learning actively, constructively, authentically and cooperatively (Rajagukguk & Rambe, 2022). Nowadays, teachers are more required to keep up with technological developments, the goal is that the learning provided to students can follow 21st century learning. The quality of education in Indonesia, especially in the field of science in the international world is very low.

According to The Political and Economic Risk Consultancy (PERC) which is a consulting agency from Hong Kong states

that the quality of education in Indonesia is very low, Indonesia is ranked 12th from countries in Asia (Noviar & Hastuti, 2015, h. 42). Teachers are required to have good quality, because the quality of teachers in this case will affect student achievement. Teachers become facilitators to help students transform their potential into abilities and skills that when developed will benefit themselves and those around them (Karo-karo et al., 2020, h. 148). As an educator, improving the quality of education and students' ability to learn can be started by preparing and presenting learning tools such as adequate media to carry out learning.

Learning in elementary schools, especially in science learning, requires learning media in its implementation. Prastowo, (2019, h. 110) states that in order for learning in SD/MI to be effective and efficient, it requires learning media and learning resources that are varied,

multimedia, and multisensory. Multimedia is one of the learning media that is widely developed as learning media because it combines computers with videos. The problem that often occurs today is that teachers rarely use learning media that can increase students' interest in learning, so students find it difficult to understand the learning delivered by the teacher. This will affect the achievement of knowledge competencies such as science knowledge that is less than optimal. According to Apriyani et al., (2022, h. 46) Learning is closely related to the use of educational technology which requires students to pay attention to their auditory, visual and kinesthetic characteristics. The use of technology in teaching methods can increase student interest so that learning becomes more enjoyable. The learning process should be able to attract students' attention and interest so that learning objectives can be achieved optimally (Anika & Fajar, 2020). Less interesting learning will make students feel bored in learning so that it affects low student learning outcomes.

Based on the results of direct observations and interviews conducted at SD Negeri 104197 Desa Klambir focusing on 30 students. The state of the learning process during the observation shows that the teacher focuses on the book and explains with a lecture system, and the lack of supporting media in learning makes it difficult for students to learn with focus. Student enthusiasm becomes invisible due to the absence of innovative learning media. According to Kristianto et al., (2021, h. 1159), the average media used in the learning process is still in the form of still images, so students are less active and interested in participating in learning. Media images of the human digestive system used in the classroom are still difficult for students to understand.

Arsyad, (2020, h. 2) said that media is an integral part of the teaching and learning process in order to achieve educational goals in general and learning goals in schools in particular. Based on this opinion, it means that the media is a component of learning resources or physical vehicles that contain material that can stimulate students to learn. Student activity has not been seen in the learning process because learning media that does not support the development of knowledge owned by students on the material of the digestive system. In addition, the facilities at school have not been maximized.

The lack of innovation in developing learning media makes students feel bored and affects the low learning outcomes of science in fifth grade students of SD Negeri 104197 Klambir Village. From the data obtained, the results of students' daily score data on the science content of the theme of healthy food, each of which has a percentage of incomplete greater than those who are complete with the average presentation of student learning outcomes that have not been completed below $KKM \leq 72$ by 61.72%. So as to increase students' enthusiasm in learning, teachers can develop and utilize technology-based media, namely interactive multimedia with a STEM approach.

Interactive multimedia is the use of computers in the presentation and combination of text, sound, images, animation and video with tools and connections (links) so that users can navigate, interact, work and communicate (Cahyadi, 2019, h. 123). Through the use of interactive media, information will be easier for students to understand. Because the information received is not only heard and seen, but also provides an active response that is absorbed by the senses and can choose what is desired. In this study, the interactivity of the media is

obtained through the provision of menu choices of material that can be studied according to the wishes of the user and the feedback after completing something.

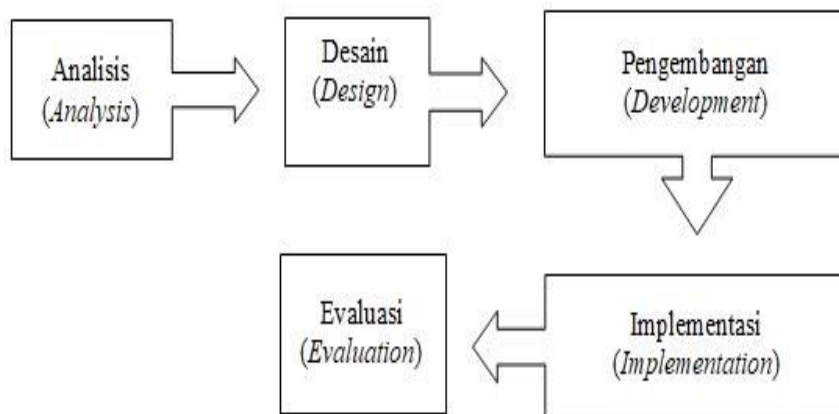
STEM stands for Science, Technology, Engineering, and Mathematics. The STEM approach is proven to improve student learning outcomes (Hutapea & Silitonga, 2020, h. 219). STEM learning is also able to improve students' soft skills, starting from patience, teamwork, and various mental skills that can be applied in personality and daily life. The application of STEM in learning can encourage students to design, develop and utilize technology, hone cognitive, manipulative and affective, and apply knowledge (Nurmala et al., 2021, h. 5026). This STEM-based interactive multimedia is one way to increase student interest and learning.

STEM is very important for science teachers in improving perseverance and academic achievement in students (Djulia & Simatupang, 2020, h. 2). In line with the research of Ulfa et al., (2022, h. 486) that the

teacher provides an overview of the learning of science material on the human digestive system in its application is still not optimal because the teacher must adjust both the model, media, tools, and the content of the learning material. the teacher's difficulty in learning is that the coverage of material in the book is lacking and students have not been able to learn independently or look for learning resources independently so that students still need guidance from the teacher. Therefore, to meet the needs of science learning, teachers need a technology-based media innovation such as STEM-based interactive multimedia.

METHOD

The type of research used is *Research and Development* (R&D). The development design in this study uses the ADDIE model by Robert Maribe Brach (Sugiyono, 2017). As the name implies, the ADDIE model consists of five stages, namely analysis, design, development, implementation, and evaluation.



**Picture 1. ADDIE Development Design
Chart in STEM-Based Interactive
Multimedia Development**

The subjects in this study were class V-C students of SD Negeri 104197 Desa Klambir T.A 2022/2023, with 30 students.

There were 16 male students and 14 female students. The object of this research is the development of STEM-based interactive

multimedia. The instruments used in this study were interview sheets and questionnaires for validation of media experts, material experts and instructional design experts. To calculate the media

RESULTS AND DISCUSSION

The interactive multimedia developed has been validated by several experts, namely media experts, material experts, and instructional design experts. The validation results obtained are:

1. Media Expert Validation Results

Validation related to software engineering aspects and visual

feasibility assessment with a questionnaire, an analysis can be carried out by determining the answer criteria of the validation instrument using a Likert Scale (Sudjana, 2016).

communication aspects of STEM-based interactive multimedia developed by media experts from panca budi university computer science lecturers. The results of the media expert assessment obtained a score of 120 with a percentage of eligibility of 96%. In accordance with the eligibility criteria in the table below:

Table 1. Percentage of media achievement

Achievement Level (%)	Qualification	Description
81-100	Very feasible	Valid
61-80	feasible	Valid
41-60	enough	Revisi
21-40	Less feasible	Revisi
0-20	Not feasible	Revisi

Based on the table, STEM-based Interactive Multimedia is included in the "Very Feasible" category for use in learning.

1. Material Expert Validation Results

This development research, the Material Expert is a biology education lecturer from Medan State University. Validation is carried out related to software engineering aspects, aspects of questions, language aspects, aspects of the implementation of the interactive multimedia developed. The results of the material validation assessment after making

revisions obtained a score of 88 with a percentage of eligibility of 97.77%. STEM based Interactive Multimedia is included in the "Very Feasible" category for use with students during field trials.

2. Instructional Design Expert Validation Results

Instructional design experts are educational technology lecturers from Medan State University. The validation was carried out in relation to the feasibility aspects of the content, presentation aspects, and graphical

aspects of the interactive multimedia developed. The results of the instructional design validation assessment after making revisions obtained a score of 71 with a percentage of eligibility of 94.66%. STEM-based Interactive Multimedia is included in

the "Very Feasible" category to be used to foster student enthusiasm during learning.

The following is a form of STEM-based interactive multimedia that is very suitable for use with students in learning:

a. Home page



b. Menu page



c. Content Page



d. Question page

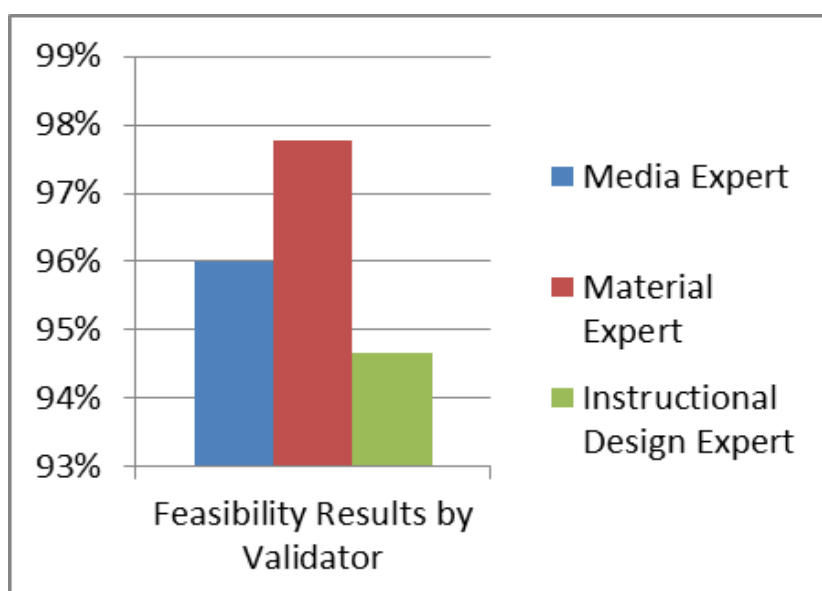


e. Games



The eligibility results in each assessment process during validation with media experts, material experts, instructional

design experts can be seen in the following diagram:



Picture 2. Feasibility Results by Validator

At the time of implementation, the media also received good responses from teachers and students through limited trials. The results of the feasibility percentage of the teacher obtained 93%. The limited trial of students, namely to see students' responses to the media that has been developed, obtained 94% with a very good category used in learning the material of the human digestive system.

CONCLUSION

STEM-based Interactive Multimedia was developed using the ADDIE development model, namely analysis, Design, Development, Implementation, Evaluation. This research and development will be validated by media experts, material experts, instructional design experts. From the results of the assessment by media experts, an average of 96% was obtained which was included in the very feasible category, the results of the assessment by material experts obtained an average of 97.77% which was included in the very feasible category, and the results of the assessment by instructional design experts obtained an average of 94.66%. Furthermore, the results of the assessment from the teacher obtained a average of 93% and limited trials by students obtained 94% which is in the very good category. This means that the STEM-based interactive multimedia developed can be used by teachers during learning because the media has been declared feasible.

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