Project Based Interactive Multimedia Design with The STEAM Approach to Strengthening Pancasila Student Profiles in Elementary School

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ABSTRACT

In producing interesting interactive multimedia based on STEM with the help of virtual reality which is really needed by elementary school students in studying human digestion material, it is hoped that it can be a solution so that students understand human digestion material which cannot be seen by the naked eye and packaged virtually to increase students' understanding both physically. critical and creative research was carried out on the development of interactive multimedia based on virtual reality for learning about human digestion in fifth grade elementary schools using the MDLC stage model. with six stages, namely concept, design, material collection, assembly, testing, and distribution. Then, the VR-based interactive multimedia product was validated by experts and continued with a posttest and user response questionnaire with the following results: Based on the results of material expert validation and media expert validation, an average of 93 and 96 was obtained so that the interactive multimedia product was suitable for use for limited testing at SDN Rejosari. Semarang, then a limited test was carried out to obtain the results of the posttest with the t test obtained results of 0% <5%, which means that the results of learning human digestion material with VR-based interactive multimedia are better than conventional learning models. Looking at the average learning achievement in the mean column, Group Statistics table, the experimental class average is 86.30, while the average of the experimental class is 86.30. the mean of the control class was 60.56. These results show that the learning outcomes of the experimental class are better than the control class. R Square value of 0.844 = 84.4%. This value means that the influence of VR-based interactive multimedia on learning achievement is 84.4%, while 15.6% of learning achievement is influenced by other variables outside of the independent variables in this research.

Introduction

This rapid technological advancement has made the government more aggressive in improving the education system. Developments in the world of education are always a challenge to continue to develop according to the times and technology. All educators ranging from parents to teachers must play an active role to be able to master existing technological developments. So efforts to overcome the problems that are carried out aim to improve the quality of education to be even better (Zahwa & Syafi'i, 2022). The learning process that takes place, should be done by utilizing interesting technology to make it more fun, challenging and motivating students to be more interactive and inspiring (Buchori et al., 2021).

Science learning in elementary schools is not only learning that has been conveyed, but also Elementary school students really have to master the material correctly and the students are happy following classroom learning, then based on observations at Pedurungan Kidul Elementary School Semarang and SD Islam Harapan Bunda Semarang in 2022 shows that 70% Fifth grade elementary school students in science learning really need a touch of technology. In learning in class, this needs to be innovated due to learning Science is concrete learning that requires real examples, giving opportunity to think, explore curiosity, be responsible, disciplined, abstain to give up in the face of a secret or natural phenomenon. Meanwhile, in In class, students are only directed at memorizing information, remembering without understanding information obtained in daily life activities (Deliany et al., 2019). Most teachers are fixated on textbooks as a learning resource. Along with time, technological developments, and research have emerged as many references to make Science learning can be fun, but it doesn't necessarily suit classroom conditions who is supported.

Apart from creating interesting learning media, a teacher must able to choose a learning approach that suits the characteristics of students, wrong the only approach used is the STEAM integrated learning approach project-based (Project Based Learning) is carried out in learning that has. The aim of producing a product by applying STEAM (Science, Technology, Engineering, Art and Mathematics) in making projects. (Anjarwati et al., 2022), then with the application of interactive multimedia can improve understanding of the concept of science students in elementary schools get better (Elyasari et al., 2023). With the existence of multimedia media. This interactive activity is expected to form an independent and independent Pancasila student profile creative with various facilities in this interactive multimedia media. So with multimedia interactive is very effective using STEAM model based augmented reality media and improving the Quality of natural science learning in elementary school (Atmojo et al., 2021). So the development of interactive multimedia on science learning based adobe flash CS6 make student very interesting to learning science around the world. (Sukariasih et al., 2019). Finally with Multimedia Interactive Learning in Science Subjects for Grade Fourth Elementary School Students make student active to practice with multimedia (Islamyati & Manuaba, 2021).

Research Methods

This research method uses multimedia research and development models Luther-Sutopo's version of the Development Life Cycle (MDLC) goes through six stages, namely concept, design, material collection, assembly, testing, and distribution (Setyosari, 2016), so with MDLC Model can make product multimedia interactive valid to used in the class (Sugiyono, 2013).
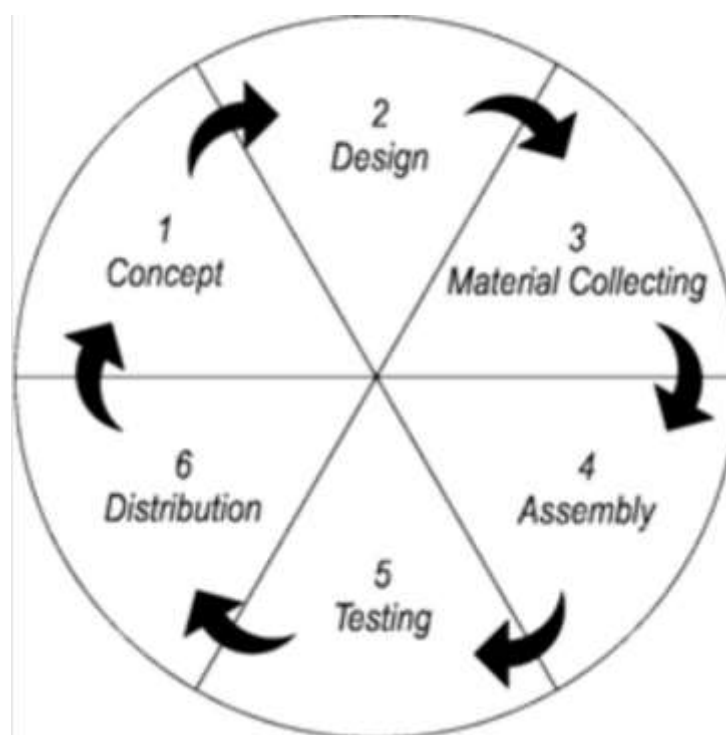
Figure 1. Stages of MDLC

a. Concept

At the concept stage, it starts with determining the purpose and use of interactive media. The purpose and end use of the media influences the theme of interactive multimedia that wants information to reach the end user. At this stage, the researcher conceptualizes, among others, to determine the purpose and benefits of learning media, determine who the users of learning media are, and describe the concept of learning media.

b. Design

At this stage of making interactive multimedia regarding program architecture, style, appearance, and material requirements or materials for the program. The design is made using theasys application that displays 3D objects.

c. Material Collection

This stage is the stage of collecting materials that are in accordance with the needs being worked on. These materials include teaching materials with explanations that students can understand and practicum modules.

d. Assembly

The assembly stage is the stage of making all interactive multimedia objects. Making interactive multimedia applications based on virtual reality. This learning media uses 3D objects that are supported by theasys software.

e. Testing

The testing stage is carried out after the manufacturing stage by running the interactive media application and seeing whether there are errors or not. The first stage is the implementation stage carried out by Focus Group Discussion (FGD) on interactive multimedia products based on Virtual Reality. The second stage is an evaluation that involves end use.

f.   Distribution

This stage is the last stage in this interactive multimedia development cycle. In distributing interactive multimedia products based on virtual reality, it is sent online to make it easier to install on their respective smartphones.

In determining the selection of samples, researchers used random sampling techniques, namely class 5A as an experimental class and 5B as a control class at SDN Rejosari 01 Semarang and SD Hj Isriati Baiturrahman 1 Semarang. The number of samples in each class was 27 students. Data collection is done with the results of the post test. Then to determine the effectiveness and influence of the use of interactive multimedia media based on Virtual Reality using the T test and linear regression test with the help of the SPSS program.

Findings and Discussion

The results of research using the MDLC model are as follows:

1.   Concept.

In this concept step, we have been looking for an interactive multimedia concept that is integrated with STEAM science material for class V, the concept that we have discussed with media experts and teachers at SDN Rejosari 01 Semarang wants interesting learning that can increase motivation, student achievement and especially the profile of Pancasila students, namely independent, critical and creative reasoning, therefore the STEAM approach is suitable by linking technology with learning. One of the technologies that fits the STEAM model is virtual reality which is able to increase students' creativity and critical and creative reasoning.

2.   Design

In designing SD science material, qualified skills are needed, especially in making VR applications for science learning in SD grade V, in making attractive designs and displaying 3D objects for use in SD science learning in class V, one of which is with theasys applications that display 3D objects in learning in class is assisted by VR glasses or Oculus VR.

3.   Material collection

Interactive multimedia materials are collected and prepared according to the theme to be selected for Elementary Science material, the lesson materials used are human digestion materials selected based on discussions with UPGRIS Science lecturers and teachers at SDN Rejosari Semarang, this is because learning human digestion is very it is important for students to master, digestion material in humans is important so that they can think critically about the

food eaten every day what the input and output processes are like, because they cannot be seen by the eye, so innovation is needed so that the 3D looks in class learning.

4. Assembly

The assembling of interactive multimedia products for natural sciences, material for human digestion, which was made for fifth grade elementary school learning, has produced its products and has been validated by material and media experts properly and is suitable for use in classroom learning.
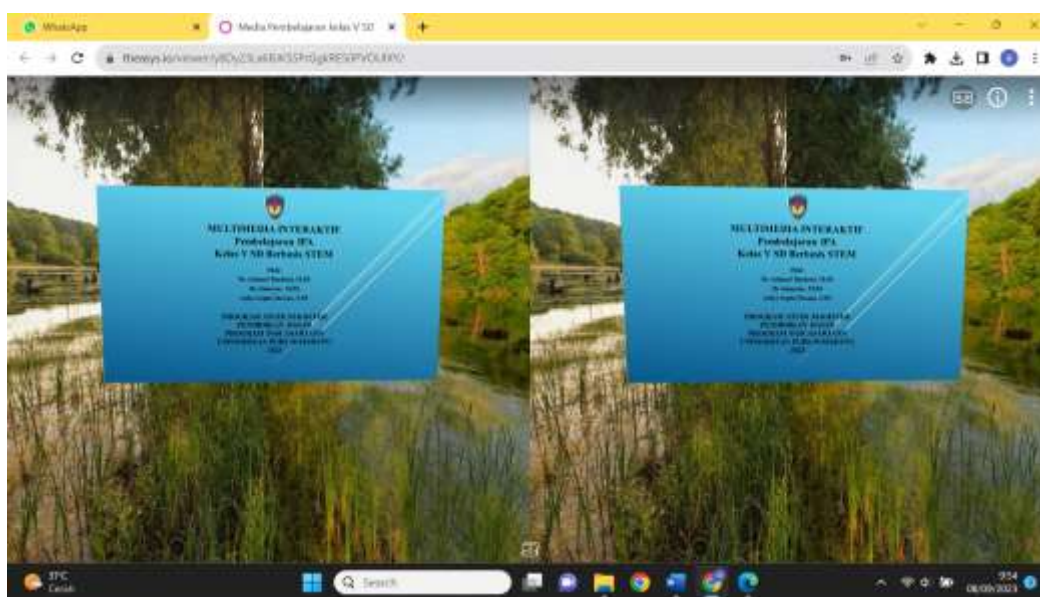

Figure 1. Virtual reality-based interactive multimedia cover design
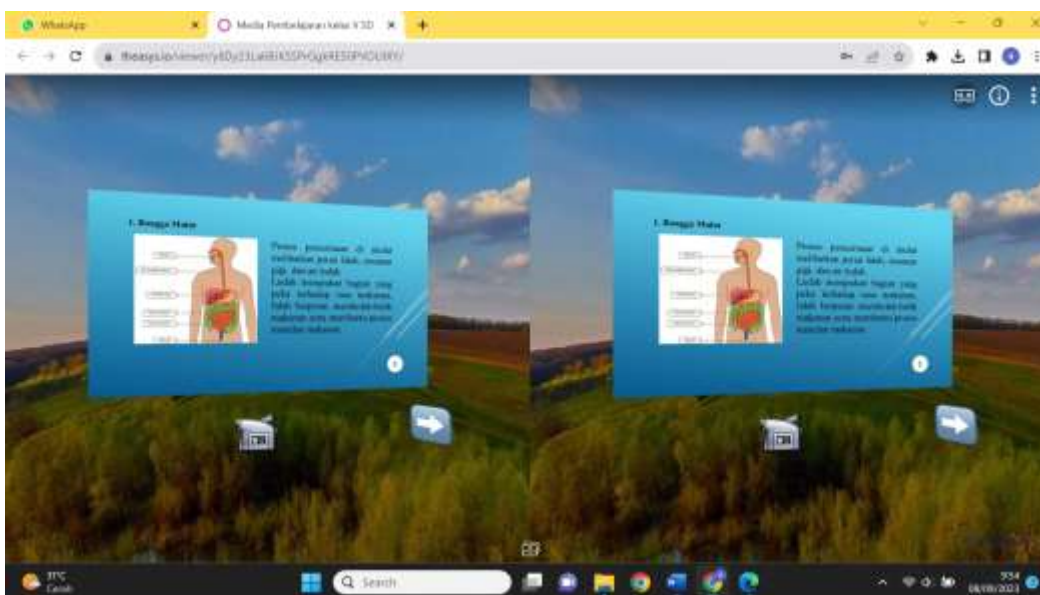

Figure 2. Design of interactive multimedia based on virtual reality of human digestive material

5. Testing

Have tested interactive multimedia products based on virtual reality on human digestive material at SDN Rejosari 01 Semarang through the implementation and evaluation stages with the following results:

a) Implementation Stage

This year, since June 2023, a Focus Group Discussion (FGD) has been carried out on Virtual Reality-based interactive multimedia products which are reviewed in terms of the media and materials contained in Virtual Reality-based interactive multimedia products, especially human digestive material. In the FGD which was attended by lecturers from the basic education master's study program, learning media practitioners from PT Taman Media Digital Semarang and students from the basic education master's study program at PGRI University Semarang, they produced several inputs for preparation for limited tests at SDN Rejosari 01 Semarang. Some of the input obtained in the FGD is (1) it is necessary to prepare Virtual Reality-based interactive multimedia application products that support all types of smartphones and computers because the application used only supports Android smartphones while the iPhone type does not yet support it, (2) then in terms of material it has been The elementary school science lecturers were given input that the material on human digestion needed to be added with more HOTS questions so that later students would better master the material on human digestion. FGD implementation documentation can be seen in the following figure.

Figure 3. FGD of Virtual Reality-based IPA Interactive Multimedia products

The main objective of the implementation phase which is the realization of design and development steps is to guide students to achieve learning goals, elaborating between technology and science, appropriate learning approaches and content of lecture material on an ongoing basis and ensuring that at the end of the learning program using this Virtual

Reality-based Interactive Multimedia Students have knowledge competency, critical and creative thinking skills.

Then based on the validation of material experts and media experts from 2 lecturers and 2 teachers of class V SD, the following results were obtained:
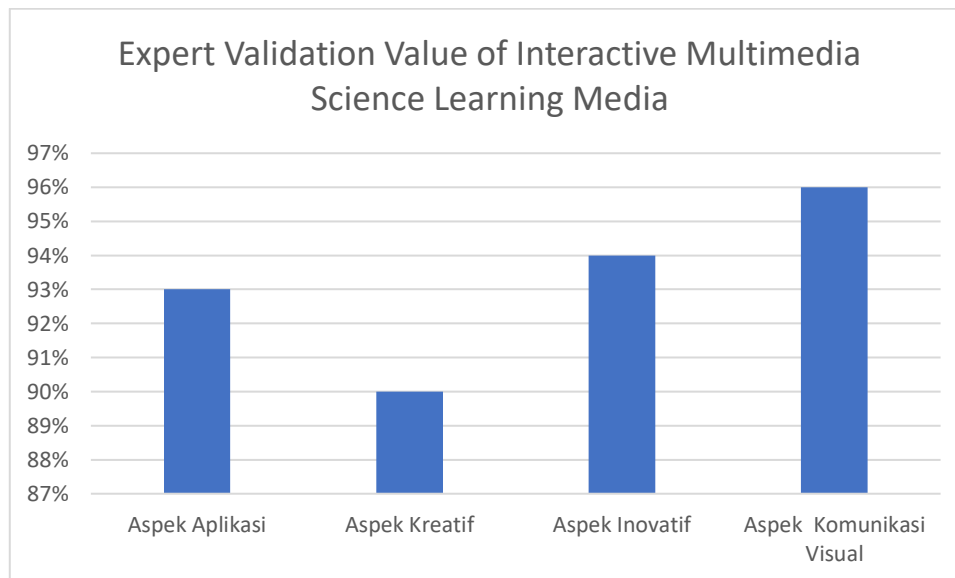

Figure 4. Graph of Expert Validation Value of Interactive Multimedia Science Learning Media

From the validation results of media experts, an average percentage value of 93% was obtained. From the validation results of this learning media expert, it shows that this interactive multimedia is very suitable for use in the learning process in class.
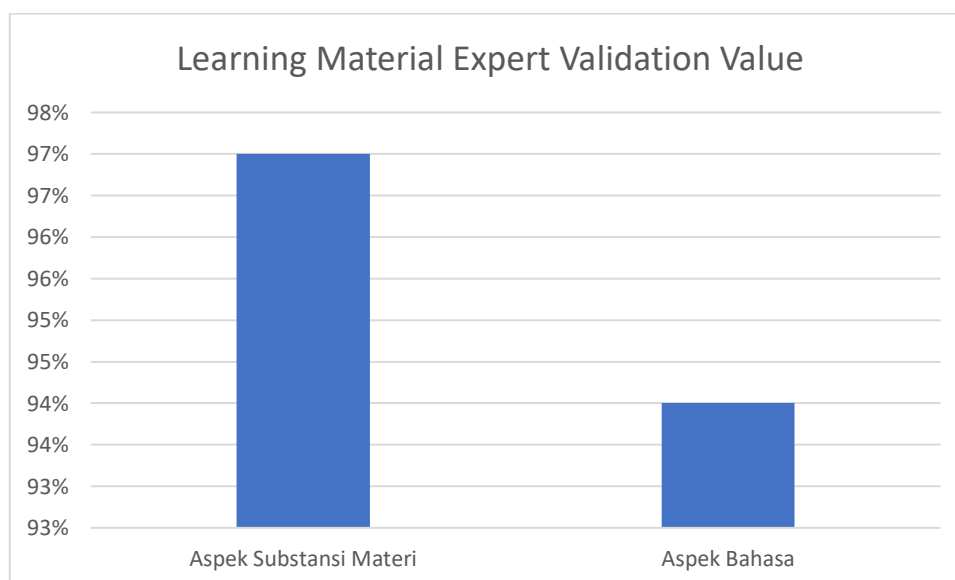

Figure 5. Graph of Learning Material Expert Validation Value

From the validation results of the material experts, an average percentage value of 96% was obtained. From the results of the validation of this learning material expert, it shows that this interactive multimedia is very feasible to use in the learning process in class.

The Multimedia Development Life Cycle (MDLC) research method can be used in the development of Website Learning Multimedia Systems which produces interactive multimedia learning media in the form of websites to facilitate the learning process (Putri et al, 2023). In research (Sumaryana & Hikmatyar, 2020), the implementation of the Multimedia-Based Elementary School Student Learning Aids application using the Multimedia Development Life Cycle (MDLC) method can support teaching and learning activities that are more interesting for students to increase student interest in learning because there are visual elements. Then the implementation of STEM-based PBL with virtual reality media has a positive impact on improving students' critical thinking skills and self-regulation (Khairunnisa et al, 2022).

This is by developing interactive multimedia with a contextual approach which can improve students' problem solving abilities. (Buchori, 2019). Then, in the development of interactive multimedia-assisted inquiry learning in the fifth grade science subjects of elementary school, it was shown that students were greatly helped by discovering the digestive process in depth (Dewanto et al., 2021), then with media-based learning Interactive can strengthen the profile of Pancasila students in elementary schools, students are able to think creatively according to the profile of Pancasila students (Hidayah & Suyitno, 2021). Then, developing interactive multimedia in grade V elementary school thematic learning makes students more enthusiastic in participating in learning. (Sintya et al., 2020). This is strengthened by developing Thematic Teaching Materials for Primary Schools Based on Local Samawa Wisdom in the Form of Interactive Multimedia. Making our students understand related local wisdom relevant to elementary school thematic learning (Fadilah et al., 2020). So the effect of using interactive learning media environment-based and learning motivation on science learning outcomes makes students more motivated to learn science (Sahronih et al., 2020).

In producing STEM-based interactive multimedia products assisted by virtual reality that are needed by elementary school students in learning human digestion material, special skills are needed and tailored to the needs of students, this product is made because human digestion material cannot be seen by the eye and is packaged virtually to increase student understanding properly, the product is made with the MDLC model. VR-based interactive multimedia based on the results of material expert validation and media expert validation obtained an average of 93 and 96 so that interactive multimedia products are suitable for use.

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