

Development of an E-Module Based on Project Based Learning Material on the Human Circulatory System for Class V Elementary School

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Abstract

This research aims to describe the development process and to describe the feasibility of the resulting product. E-module based development *project based learning* the material on the human circulatory system for class V elementary school is based on science learning in elementary schools where teaching still uses printed books, apart from that learning is still centered on teachers and not students, so learning seems boring, uninteresting and monotonous. This type of research is *Research and Development* (R&D) with the 4D development model (*Define, Design, Develop, and Disseminate*). Data collection uses documentation and questionnaires. Based on the results of research and development, the results obtained are that the e-module development process is based on *project based learning* material on the human circulatory system for class V elementary school is carried out in three stages, namely *define, design, and develop*. The development process has been validated by process experts and obtained 90% results. Feasibility of developing an e-module based on project based learning on human circulatory system material for class V elementary school, media validation obtained a feasibility value of 88.75%, material feasibility validation obtained a feasibility value of 92%, and language validation obtained a feasibility value of 92.5%. Based on the results obtained, it can be concluded that e-module is based *project based learning* the human circulatory system material for class V elementary school is very suitable for use.

Keywords: *E-Module, Project Based Learning, Human Circulatory System*

INTRODUCTION

As time goes by, technology is increasingly advanced and developing rapidly. This development has an impact on all aspects of human life, including education. Current learning, namely 21st century learning, has many challenges, one of which is that all aspects of education must develop according to the times, such as involving technology in the teaching and learning process.(Somantri, 2021).

The industrial revolution has changed the Indonesian education system significantly. The position of teachers as educators is of course greatly influenced by this change. If a teacher wants to be considered good in this century, he must have knowledge as well as skills in using technology. Just having scientific knowledge is not considered enough(Rahmadi, 2019). A teacher in the 21st century must involve technology more in education, one of which is creating innovative and creative teaching materials.

However, the facts prove that many teachers do not involve technology enough and create creative and innovative teaching materials. According to(Prasetyo, 2020), the implementation of learning in elementary schools has not yet reached 21st century learning standards, this is because many teachers still use

teaching materials in the form of printed books. Teachers should be able to develop more interesting technology-based teaching materials, one of which is e-modules.

Digital modules called e-modules are modules that have content in the form of text, images, materials and simulations(Syahputri & Dafit, 2021). Because e-modules do not only contain letters but also pictures and videos, it is hoped that e-modules can become one of the teaching materials that can attract and increase students' learning motivation. According to(Putri et al., 2022), teaching materials that depend on theme books and are less interesting are boring and uninteresting for students. Being interactive, loading videos, loading audio, loading images, loading animations, loading materials, and loading quizzes makes e-modules have advantages over printed modules(Nurulita & Martin. Putut, 2022).

Another characteristic of 21st century learning is student-centered learning. In learning activities, teachers should emphasize the use of learning models that are student-centred and capable of stimulating student activity. The project-based learning model or PJBL can be an alternative to use in learning. Project based learning is a student centered learning model that

allows students to build their own learning experiences (Paristiowati et al., 2022).

There are several advantages of the project based learning model according to (Purwanti et al., 2022), including (1) increasing students' interest in learning and improving students' ability to complete assignments; (2) students' activeness and problem-solving abilities increase; (3) train students to use materials when making a project by emphasizing the principles of clean and healthy and fast but precise; and (4) produce work that can be used and useful in life. The project based learning model is suitable for application in various subjects, including science lessons.

Science subjects are subjects studied by all levels of education, where science learning in its teaching instills knowledge and concepts about the natural environment, this is obtained through experience from various series of scientific processes (Lestari et al., 2019). One of the materials or chapters studied in natural sciences is the human circulatory system. However, because there are so many blood circulation mechanisms that students have to memorize and understand, it makes them difficult to understand and confused about studying the human circulatory system material. (Novisca Wijaya et al., 2020). Besides that, (Aswadin et al., 2021) also believes that the problem with the circulatory system material is that it requires a high level of thinking to understand concepts that are related to each other and the blood circulation processes that take place in the body so that they cannot be directly observed for students to learn. Difficulties experienced by teachers and students in studying material on the human circulatory system can be minimized by maximizing the use of technology in developing teaching materials (Astuti & Wigati, 2023).

Based on the discussion that has been presented, an e-module based on project based learning on human circulatory system material for class V elementary school was developed.

METHOD

This research uses research and development (R&D). Research and development research is a research method used to produce products and to test the effectiveness of the products

produced (Sugiyono, 2018). The development model used is the 4D model (Define, Design, Develop, and Disseminate). However, due to limited time and capabilities, this research will be limited to development only. A diagram of the steps of the restricted 4D model is presented in Figure 1.

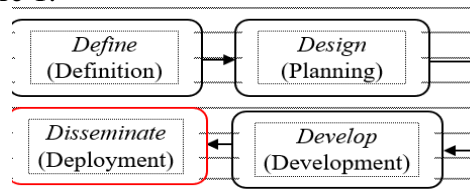


Figure 1. 4D Model Steps Chart

Data collection techniques in this research used two types, namely documentation and questionnaires. Documentation is used to view the development process and questionnaires are used to validate the development process and also the product. The research instrument is a validation questionnaire, including validation questionnaires for process experts, media experts, material experts and language experts. This research data was obtained through scores resulting from process validation, media validation, material validation, and language validation.

The data analysis technique in this research uses a Likert scale with four scales. The assessments carried out by process expert validators, media experts, material experts and language experts are then calculated to obtain an average value. The assessment score is calculated using the following formula:

$$P = \times 100\% \frac{\text{total of data collection}}{\text{total of ideal maksimum score}}$$

Information:

P: Eligibility percentage

Validation questionnaires related to suitability of the development stage, suitability of design, suitability of materials, as well as suitability of language and writing in the project based learning-based e-module being developed are assessed based on assessment scores. The values obtained are then averaged and converted into a statement to determine the feasibility of the product being developed. The values that have been converted into statements can be seen in table 1.

Table 1. Eligibility Criteria Table

Percentage (%)	Criteria
81-100	Very Worth It
61-80	Worthy
41-60	Not Worth It
0-40	Very Inadequate

Based on the feasibility table above, the product being developed is declared complete if the product has reached the feasibility percentage in the feasible or very feasible category.

RESULTS AND DISCUSSION

The result of this research and development is an e-module based on project based learning on human circulatory system material for class V elementary school. This development research model uses a 4D model which is in accordance with opinions(Thiagarajan et al., 1974), where the 4D model consists of four stages, namely define, design, develop, and disseminate. In this research, the 4D model was limited to development only due to limited time and capabilities. The following is a detailed explanation of each stage.

1. *Define*(Definition)

At the define stage, there are several stages that must be carried out, namely (1) Front end analysis, this analysis is carried out to determine the main problems that occur in the process of teaching and learning activities. Observations and open discussions were carried out at this stage, carried out with the fifth grade teacher at SDN Kepuh Kuncian I. The result was that educators still used printed books in the form of theme books and worksheets, especially when studying the human circulatory system. In fact, learning can become less interesting for students if there is no innovation in teaching materials carried out by the teacher(Hariyati & Rachmadyanti, 2022); (2) Student analysis, in this analysis the results showed that the teaching materials used in the human circulatory system material were still in the form of printed books. It can also be seen that when learning, students are bored and not interested in participating in the lesson because the teacher only lectures and the rest makes students read in printed books, so it can be seen that the teacher is active and the

students are passive. The lack of teacher innovation and creativity to make learning less boring reduces students' interest in learning(Puspitasari et al., 2021); (3) Task analysis, this analysis is obtained from the teacher's book or student's book, reviewed through the basic competencies and indicators in the class V theme book, theme 4, subtheme 1, learning 1; (4) Concept analysis, in this analysis identification is carried out regarding the main concepts of the material to be taught to students. For the circulatory system material used in the book theme 4, subtheme 1, learning 1. KD 3.4 Explains the circulatory organs and their functions in humans and how to maintain the health of circulatory organs, KD 4.4 Presents work on circulatory organs in humans; (5) Formulating learning objectives, developing e-modules based on project based learning is expected to increase enthusiasm for learning and make it easier for students to understand material on the human circulatory system.

2. *Design* (Planning)

The first step taken at this stage is media selection, adapting to the results of the front end analysis and student analysis, the media chosen is e-module. The next step is to choose the format, the e-module you want to develop is selected in the form of a link linked to Canva. The final step is to create an initial design for the project based learning based e-module that is to be developed. This initial design contains the composition of the e-module, the subject matter of the human circulatory system, and the project based learning based LKPD which will later be included in the e-module.

3. Development

At this stage, e-module development was carried out based on project based learning on human circulatory system material for class V elementary school and process and product validation. This project based learning based e-module was developed through Canva Pro. The size chosen for this project based learning e-module is A4 size with a description of the size 21x29.7 cm. The design chosen for this e-module is quite simple with a cream colored background combined with other colors such

as brown, red, yellow, green, blue and grey. Next, learning materials, photos and videos are included in the e-module. Quizzes will also be included in the e-module, as will the LKPD which is based on project based learning.

After the product is completed, a validation test is carried out to assess the feasibility of the development process and the product being developed. The results of the values from expert validation can be seen in table 2.

Table 2. Process and Product Validation Values

Expert Validator	Feasibility Percentage Value	Category
Process Expert	90%	Very Worth It
Media Expert	88.75%	Very Worth It
Materials Expert	92%	Very Worth It
Linguist	92%	Very Worth It

Assessment of the process validation results stated that the process stages carried out in this development research were appropriate. For the assessment of three experts who tested the suitability of the product, the results showed that the e-module based on project based learning material on the human circulatory system for class V elementary school was very suitable for use. However, there were also suggestions and input provided by the four expert validators to improve and perfect the development process and the products being developed. In Figure 2, several displays of e-modules based on project based learning material on the human circulatory system for class V elementary school are presented.

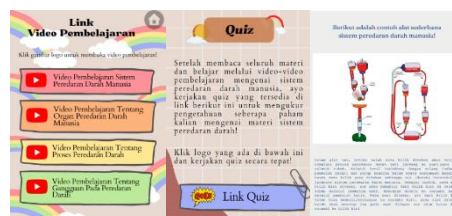
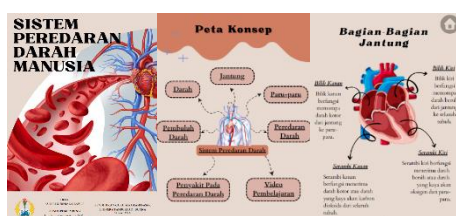


Figure 2. Excerpt of E-Module Based on Project Based Learning Material on the Human Circulatory System for Class V Elementary School

Based on the results obtained, it can be concluded that the e-module developed is suitable for use. Based on the results of the validation process, it is stated that the stages of the development process in this research are very feasible or very suitable, seen from the stages carried out which are in accordance with the 4D model developed by(Thiagarajan et al., 1974), namely the stages consist of define, design, develop, and disseminate. However, this development research only reached the development stage due to limited capabilities and time. In media validation, it was stated that this e-module based on project based learning was very feasible, judging from the preparation of the e-module supported by images, videos and an attractive display. This is in accordance with what is said(Qotimah & Mulyadi, 2022)that a good e-module is an e-module that presents material in the form of text, images, audio or video.

For material validation, the e-module based on project based learning is very feasible. This very feasible level of validation is supported by the suitability of the sequence of material in the e-module, namely material on the human circulatory system which includes circulatory organs, functions, how they work, and circulatory diseases. For teaching materials such as modules, the level of suitability can be seen through aspects of the curriculum, materials and also evaluation(Antari et al., 2023). The last validation, namely language validation, also obtained very decent results, in terms of the language used in the e-module, the language used was simple language according to EYD, suitable for elementary school students. This is in accordance with what was said by(Ningsih & Mahyuddin, 2021)that the extent of students' understanding of the material being taught also



influences the simplicity and efficiency of the language used.

The results of the research, as described, are in line with the research and development carried out (Nuryeni, 2022) with the title "Development of an E-Module Based on Project Based Learning on Environmental Pollution Material for Class VII SMP", from the validation results it was found that the e-module based on project based learning that was developed had very valid results in terms of material, media and language.

Furthermore, research and development is carried out (Sriwindari et al., 2022) with the title "Development of E-Modules Based on PJBL (Project Based Learning) Waste Recycling Materials to Develop Creative Thinking in Class 88% in the "very good" category, so it can be concluded that the product developed is very suitable for use by students in learning.

Based on the description above, it can be concluded that the e-module based on project based learning on human circulatory system material for class V elementary school is very suitable for use, both by teachers and students, in learning. The project based learning based e-module that was developed also has advantages, including that this e-module has an evaluation in the form of a quiz and also a project based learning based LKPD, where this LKPD is included according to the final objective of the project based learning learning model, namely the project or results activity (Azhari et al., 2022). The aim of this project based learning LKPD is so that students can more easily understand how human blood circulation works. Apart from that, the material in this e-module is prepared in simple language to make it easier to understand, and is also equipped with pictures and learning videos related to the material on the human circulatory system. This e-module has a link format, so it is easy to access anywhere without needing an additional application because the e-module link is linked to Canva, so one click will go straight to the e-module.

The use of e-modules based on project based learning is expected to provide a more enjoyable atmosphere in learning. E-modules based on project based learning material on the human circulatory system for class V elementary school contribute to increasing the types of electronic-

based teaching materials that are innovative and interactive.

CONCLUSION

Based on the research and development that has been carried out, it can be concluded that this research and development has produced a product in the form of an e-module based on project based learning on human circulatory system material for class V elementary school. The development of an e-module based on project based learning on human circulatory system material for class V elementary school was developed using a 4D development model which has four stages, namely define, design, develop and disseminate. However, in this research and development, the 4D model was limited to the development stage only due to limited capabilities and time.

The development of an e-module based on project based learning on human circulatory system material for class V elementary school has been carried out by a feasibility test. The feasibility assessment results obtained from process experts were 90% in the "very feasible" category, media experts 88.75% in the "very feasible" category, material experts 92% in the "very feasible" category, and language experts 92.5% in the "very feasible" category. "very worthy". So, it can be concluded that the e-module based on project based learning on human circulatory system material for class V elementary school that was developed is very suitable for use.

SUGGESTION

Based on the research and development that has been carried out, the suggestions that can be given are as follows:

1. For Educators

It is hoped that this e-module can be used by educators in classroom learning and it is hoped that it can be used as a reference by educators to use more varied learning models.

2. For Further Researchers

Because on this research, the e-module developed only contains material on the human circulatory system. It is hoped that in the future we can develop e-modules with

broader material. Apart from that, this research only reached the development stage, it is hoped that future researchers can develop it to the disseminate stage so that they can find out the feasibility of the e-module being developed according to teachers and students as users.

THANK-YOU NOTE

Praise be to the presence of Allah SWT. because with the abundance of His grace, guidance and inayah, the author was able to complete the journal with the title "Development of an E-Module Based on Project Based Learning Material on the Human Circulatory System for Class V Elementary School".

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