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Research Article

Development of A Contextual Virtual Lab Practicum Module on Energy Material for Class IV Primary Students

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Abstract

A learning module is one of the teaching materials that enables students to learn independently so that it is known to what extent pupils understand the learning material. However, teachers still rely on government-printed books to create innovative teaching materials that align with technological advancements. The purpose of this study is to find out if it is possible and how teachers and students would react to making a contextual virtual lab practical module on energy topics for fourth-grade elementary school students using the Research and Development model and a three-stage modified ADDIE development model that includes the analysis stage, the design stage, and the development stage. This research employs both qualitative and quantitative data analysis techniques. We did research and found that the contextual virtual lab practicum module on energy material for SDS IT Bina Anak Islam Krapyak class IV A students can be used for learning activities. This is proven by material expert validation getting an average score of 86% and media expert validation getting an average score of 95%, both of which can be categorized as "very decent.". After that, an assessment was also carried out by the teacher, getting a response with an average of 92% in the "very good" category and student responses getting an average score of 70% in the "good" category. It is safe to use the contextual virtual lab practicum module on energy material for fourth-grade elementary school students, as shown by the summary of the validation results.

Introduction

Education is a long-term investment in human resources and has important qualities for the continuation of human civilization, especially in developing countries like Indonesia (Gunawan et al., 2020). The determinants of a person's life and future are also determined by education (Yanti et al., 2021). The country's future progress also depends on the quality of education and human resources (Rusdi, et al. 2021).

In line with this, education becomes a means for individuals to increase their capacity through the learning process carried out (Nadialista Kurniawan, 2021). Every individual has the right to receive education, as stated in the 1945 Constitution Article 31 Paragraph 1 that "Every citizen has the right to receive education" (Ministry of Education, Culture, Research, 1945). Thus, every individual has the right to pursue education in order to improve the quality themselves and their country in the future terms of doing citations (name, year) are emphasized to use reference manager applications such as EndNote or Mendeley. This aims to avoid errors in citation and writing references at the end of the article. To make it easier for you to use this template, it is better to copy-paste (with the keep text only option and then select the "main content" style) of your original paper document into this template. Make sure that your article fits the style

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According to the Minister of Education, Mr. Nadiem Anwar Makarim, the independent curriculum is a curriculum that is much more concise, simple and flexible to support learning loss recovery due to the Covid-19 pandemic (Rani et al., 2023). The implementation of the independent curriculum is not carried out massively and simultaneously referring to policies that give schools freedom to implement the curriculum (Rahmadayanti & Hartoyo, 2022). At the elementary school (SD) level, the implementation of the independent curriculum will officially begin in 2022/2023 (Alimuddin, 2023). The implementation of the independent curriculum in elementary schools is supported by the government by providing teaching tools in the form of textbooks and supporting teaching materials; training and providing learning resources for teachers, school principals and local governments; as well as guaranteed teaching hours and teacher professional allowances (Rahmadayanti & Hartoyo, 2022). In this way, the independent curriculum becomes an alternative for teachers to provide teaching materials that suit students' needs, one of which is learning modules.

Methodology

Learning modules are one of the teaching materials that enable students to learn independently so that it is known to what extent students understand the learning material (Orkha et al., 2020). The preparation of the module is carried out to meet the needs of teachers and students in the form of a series of learning activities that are tailored to the competencies that must be achieved (Hadiyanti, 2021). The learning module is a learning design based on the curriculum that is applied with the learning objectives implemented (Maulinda, 2022). Thus, teachers as facilitators have an important role in designing learning modules by developing teacher pedagogical competencies which will later influence learning that is more effective, efficient, and in accordance with learning objective indicators.

Teacher professionalism is very influential in the success of learning objectives in learning activities the use of teaching materials really determines the continuity of learning activities (Siti Maryam et al., 2022). Therefore, the presentation of material that can provide knowledge related to aspects of learning objectives, namely attitudes (cognitive) and values (affective) needs to be improved through creativity and new ideas (Hidayatul M, 2023). In line with this, the era of revolution in the world of education has ushered in the era of Society 5.0 (Gunawan et al., 2020). So education plays a role as a complementary means to the phenomenon of digital integrity in daily activities where people and machines work together to find new solutions and innovations (Bungkuran, et al. 2021). So the professionalism of teachers as educators is very influential in the success of learning objectives, so teachers are required to increase creativity and innovation in learning media that utilize technology. This can be done with innovation that utilizes interactive teaching materials integrated with virtual laboratories.

Virtual Laboratory, more briefly called virlab, is a platform developed with a learning framework that adapts to student needs so that it is more optimal in supporting independent learning (Suryandari et al., 2022). Virlab becomes a learning media that is right on target if it is managed properly and utilized well (Suryandari, Khairunnisa, 2023). According to Muhajarah & Sulthon (2020) Virlab is a simulation room in the learning process or can also be called a cyberspace social room (virtual world) where scientists communicate to organize groups, connect, share opinions, resources, learning, and work related to science. Continuing with this presentation, it can be concluded that virlab is a learning media in which there is a simulation of the study of natural events which has an important role in science learning and is developed according to needs.

Based on the results of interviews at SDS IT Bina Anak Islam Krapyak on November 18 2023 and observations of learning activities on November 20 2023, it shows that this school implements an independent curriculum in class IV elementary school with the main material in the science and sciences subject so that quite a lot of discussion of the material is given to students during still two semesters. If we look at one of the learning materials, namely energy, we study material that is quite diverse and requires concrete examples in everyday life. Apart from that, teachers' creativity in compiling teaching materials that are in line with technological developments still uses government printed books that are bought and sold. The preparation of teaching materials designed by teachers only follows previous learning guides and modules. Apart from that, the learning activities packaged by the teacher use reference teaching materials and learning media such as Student Worksheets (LKPD), Power Points (PPT) and

learning videos from YouTube, as well as exploring the environment directly. However, students' attention is still not focused or concentrated on learning.

Based on the description of these conditions, the urgency of research using contextual laboratory virtual practicum modules needs to be developed to increase the learning concentration of class IV students. Therefore, the researcher chose the theme to conduct research that focuses on "Development of a Contextual Virlab Practicum Module for Energy Material for Class IV Elementary School Students". The development of this contextual virlab practicum module can be used by teachers and fourth grade elementary school students in science and energy subjects.

This research is included in the type of development research or Research and Development (R&D) (Zulhaida, 2023). According to Sugiono (2016) the R&D research method is a research method used to produce a product and test the effectiveness of a particular product. This development research flow is directed at the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model developed by Dick and Carey (Carey, 2022). However, in this research the ADDIE model was only modified in 3 stages, namely Analysis, Design and Development. This research flow serves to describe each stage of product creation in the form of developing contextual virlab practicum modules. It is hoped that the products that have been developed will be useful for education.

This research was conducted at SDS IT Bina Anak Islam Krapyak in November 2023 - June 2024. The type of data used in this development research is qualitative and quantitative data. The population studied was students of class IV A SDS IT Bina Anak Islam Krapyak.

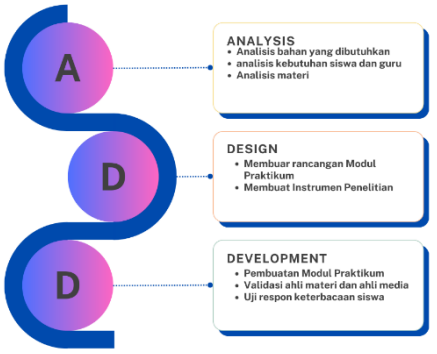

Figure 1. Modified ADDIE Development Model

Results

The product developed in this research is a contextual virlab practical module on energy material for fourth grade elementary school students. The development model used is one type of development model from research and development, namely the ADDIE model modified in three stages, namely the Analyze, Design and Development stages.

Discussion

The results of this research are teaching materials for contextual virlab practical modules on energy material for fourth grade elementary school students. The development of teaching materials for this contextual virlab practicum module can be used by teachers and fourth grade elementary school students. This contextual virlab practicum module contains energy material: energy around us and energy changes which is accompanied by a guide to virtual practicum activities. The virtual practicum activities were carried out through the PhET virlab. This research was carried out in class IV of SDS IT Bina Islamic Children Krapyak.

The research was carried out by validating the product by material experts and media experts. Then the product was tested at SDS IT Bina Anak Islam Krapyak consisting of class IV A teachers and class IV A students to obtain responses to the contextual virlab practicum module on energy material that had been developed. The results of validation by material experts and media experts, as well as teacher and student responses become assessments to measure the appropriateness of the teaching materials for the contextual virlab practicum module on energy material that has been developed. The results of calculating an average score of 84% were then converted from quantitative data to qualitative data with the "very feasible" category which had been validated by material experts. The results of calculating an average score of 95% are then converted from quantitative data to qualitative data with the "very feasible" category which has been validated by media experts.

Based on the results of the teacher response assessment which was carried out on 4 aspects, namely the suitability aspect of content or material standards, the suitability aspect of the practicum module, the suitability aspect in virlab, and the suitability aspect in contextual learning on energy material, the development of the contextual virlab practicum module on energy material received a positive response. So, it can be concluded that

the results of the teacher response assessment obtained a score of 369 with an average percentage of 92%. Then the results of the student assessment were carried out on 2 aspects, namely the appearance of the module design and suitability for contextual learning, the development of the contextual virlab practicum module on energy material received a positive response. So, it can be concluded that the results of the student response assessment obtained a score of 794 with an average percentage of 87%.

Conclusion and Recommendation

Based on the results of the assessment that has been carried out regarding the development of a contextual virlab practical module on energy material to increase the learning motivation of fourth grade elementary school students, it can be concluded that:

1. Assessment of the feasibility of the contextual virlab practicum module is carried out by material experts and media experts. The assessment results from material experts received an average score of 86%, while media experts received an average score of 95%, both of which fall within the "very appropriate" criteria.
2. The results of the teacher's response to the contextual virlab practicum module on energy material received a good response with an average of 92% with the criteria "very good".
3. The results of student responses to the contextual virlab practicum module received a positive response. Students can understand the language and material well. Apart from that, the systematic writing of contextual virlab practical modules is also interesting for students. So, the assessment results from student responses are good with an average score of 70% with the criteria "good".

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