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ELECTRONIC MODULE WITH ICARE APPROACH (INTRODUCTION, CONNECTION, APPLY, REFLECTION, EXTENSION) ASSISTANT ARTICULATE STORYLINE MATERIALS OF ATOMIC NUCLEUS AND RADIOACTIVITY

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Abstrak

Penelitian ini bertujuan untuk mengembangkan media pembelajaran berupa modul elektronik dengan pendekatan ICARE (*introduction, connection, apply, reflection, extension*) berbantuan *articulate storyline* pada materi inti atom dan radioaktivitas SMA yang layak digunakan dalam pembelajaran. Model penelitian yang digunakan adalah *Research and Development (R&D)* dengan model pengembangan ADDIE yang meliputi lima tahapan yaitu tahap perencanaan (*design*), tahap pengembangan (*development*), tahap implementasi (*implement*), dan tahap evaluasi (*evaluate*). Modul elektronik yang dikembangkan didesain dengan pendekatan ICARE yang meliputi lima tahapan yaitu: 1) *Introduction*, 2) *Connection*, 3) *Apply*, 4) *Reflection*, 5) *Extension*. Berdasarkan analisis kebutuhan yang dilakukan kepada 35 peserta didik kelas 12 SMAN 79 Jakarta, hasil yang didapatkan menunjukkan: sebanyak 80% (28 responden) sulit memahami pelajaran fisika dengan PJJ; 57,1% (20 responden) menganggap bahwa materi inti atom dan radioaktivitas sulit; 94,3% (33 responden) tertarik belajar fisika menggunakan modul elektronik; 91,4% (32 responden) setuju modul elektronik yang dikembangkan bersifat interaktif dilengkapi video, animasi dan simulasi; 97,1% (34 responden) setuju modul elektronik dikembangkan dengan pendekatan ICARE. Kesimpulan penelitian awal ini dengan judul modul elektronik dengan pendekatan ICARE (*introduction, connection, apply, reflection, extension*) berbantuan *articulate storyline* pada materi inti atom dan radioaktivitas SMA adalah layak dilakukan dengan karakteristiknya produk yang dihasilkan ditulis dengan bahasa komunikatif, dilengkapi gambar, animasi, simulasi, dan video.

Kata-kata kunci: Modul elektronik, pendekatan ICARE, articulate storyline, inti atom dan radioaktivitas

Abstract

This study aims to develop learning media in the form of an electronic module with an ICARE approach (*introduction, connection, apply, reflection, extension*) assisted by an articulate storyline on the atomic nucleus and high school radioactivity that are suitable for use in learning. The research model used is Research and Development (R&D) with the ADDIE development model, which includes five stages: the planning (*design*) stage, the development stage, the implementation stage, and the evaluation stage. The developed electronic module is designed with the ICARE approach, which includes five stages, namely: 1) *Introduction*, 2) *Connection*, 3) *Apply*, 4) *Reflection*, and 5) *Extension*. Based on the needs analysis conducted on 35 grade 12 students of SMAN 79 Jakarta, the results were: 80% (28 respondents) had difficulty understanding physics lessons with PJJ; 57.1% (20 respondents) think that atomic nucleus and

radioactivity are difficult; 94.3% (33 respondents) are interested in learning physics using electronic modules; 91.4% (32 respondents) agree that the electronic module developed is interactive with videos, animations, and simulations; 97.1% (34 respondents) agreed that the electronic module was developed using the ICARE approach. The conclusion of this initial research with the title of an electronic module with an ICARE approach (introduction, connection, apply, reflection, extension) assisted by an articulate storyline on atomic nuclei and radioactivity is feasible with the characteristics of the resulting product written in the communicative language, equipped with pictures, animations, simulations, and videos.

Keywords: Electronic module, ICARE approach, articulate storyline, atomic nucleus, and radioactivity

PENDAHULUAN

The coronavirus pandemic has impacted the whole world, including Indonesia. The impact of the pandemic was that all teaching and learning activities were diverted from offline to online, forcing all educational institutions to use the distance learning system. Educators are forced to use innovative learning to support the continuity of distance learning. So that students are energized and energized following distance learning. The electronic module is an exciting learning media solution [1].

An electronic module is a learning tool or facility containing materials, methods, limitations, and ways of evaluating designed systematically and attractively to achieve the expected competencies. The electronic module is part of electronic-based e-learning, whose learning utilizes information and communication technology, especially electronic devices. Through the module, learning is expected to bring students to the expected essential competencies [2]. An electronic module is also a form of presenting self-study materials systematically arranged in electronic format (animation, video, audio, navigation) to achieve specific learning objectives that make users more interactive with the program [3]. Students can carry out learning activities in electronic modules to run like actual activities, a learning model relevant to the material so that it can integrate the learning process according to the demands of the 2013 curriculum [4]. In the development of electronic modules integrated with the ICARE learning approach.

The ICARE approach has five elements: introduction, connection, application, reflection, and extension. Each stage in the ICARE model directs students to gain complete knowledge while also maximizing each stage in building student concepts [6]. In this research, the application used is Articulate Storyline. Articulate Storyline is software that functions as a presentation medium. The application's functions make users more efficient in using the application because they do not need to use several other applications in making study materials [7]. Based on the needs analysis, as many as 80% (28 respondents) have difficulty understanding physics lessons with PJJ; 57.1% (20 respondents) think that atomic nuclei and radioactivity are difficult; 94.3% (33 respondents) are interested in learning physics using electronic modules; 91.4% (32 respondents) agree that the electronic module developed is interactive with videos, animations, and simulations; 97.1% (34 respondents) agreed that the electronic module was developed using the ICARE approach. Based on the explanation above, most respondents are interested in and support the development of electronic module learning media made using Articulate Storyline. So to answer this need, a study was carried out with the title, "electronic module with ICARE approach (introduction, connection, apply, reflection, extension) assisted by an articulate storyline on atomic nuclei and radioactivity in high school".

METODOLOGI

The research method used in this research is the Research and Development method. Research and Development is a method used to produce specific products and test the effectiveness of certain products [8]. The model used in this study uses the ADDIE (Analyze, Design, Develop, Implement, and Evaluate) model. ADDIE must be learner-centered, innovative, authentic, and inspiring [9]. The ADDIE model was developed systematically and based on the theoretical foundation of instructional design [10].

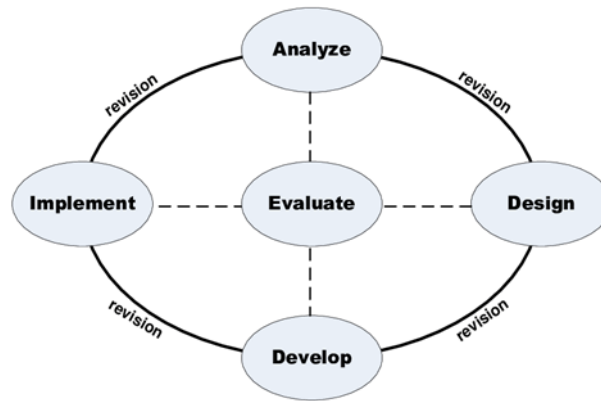


FIGURE 1. ADDIE Model Development Procedure

Analyze

In this analysis stage, the researcher conducts a needs analysis. A needs analysis was conducted to obtain information related to the conditions and needs of students and educators in learning physics by distributing questionnaires to examine the learning activities, the learning media used, and difficulties in learning physics.

Design

This stage aims to make an overview and design of the electronic module that will be produced.

Develop

The design and design are realized at this stage into an electronic module. Electronic modules are arranged systematically using the syntax of the ICARE model approach. The electronic module also has a cover on the first page, instructions for use, researcher profiles, material explanations, and exercises.

Implement

At the implementation stage, validation tests are carried out by material experts, media experts, and learning experts. This validation test is intended to analyze the feasibility of the electronic module developed as a learning material for students. The validation test by the expert was carried out through the distribution of questionnaires using a Likert scale. Revisions will be made based on experts' input to the validation process. After that, a limited field trial was conducted for high school physics teachers and class XII students.

Evaluate

At this stage, an evaluation of the electronic module tested on teachers and students is carried out, whether there are still areas for improvement in the developed electronic module. If there are still shortcomings, it is necessary to complete an evaluation stage to perfect the electronic module.

HASIL DAN PEMBAHASAN

The result of this research is an electronic module with an ICARE approach assisted by an articulate storyline of high school atomic nuclei and radioactivity material as an independent learning medium that can be accessed anywhere and anytime with HTML output. This module is designed by actively involving user response. In addition, electronic modules can be made according to the needs of educators to deliver the material needed by students. With electronic modules, students can study anywhere and anytime independently. The electronic module at least contains learning objectives,

learning materials/substances, and evaluations. The advantage of the electronic module that will be developed is that this electronic module is equipped with material explanations, sample questions & practice questions, and simulations using PhET Simulation.

In its presentation, this developed electronic module is designed according to the stages of the ICARE learning model.

TABEL 1. Design of Atomic Nuclear and Radioactivity Electronic Module with ICARE Approach

| Syntax | Description |
|--------------|--|
| Introduction | Contains learning objectives for atomic core material and radioactivity consisting of essential competencies and indicators of competency achievement. |
| Connection | Contains apperception or connecting atomic structure material studied in class x with the material to be discussed. |
| Apply | Contains tools related to PhET simulation related to atomic nuclei and radioactivity. At this stage, students are expected to be able to practice applying their knowledge and skills. |
| Reflection | It contains quiz questions as a form of evaluation/reflection on how students understand the material of atomic nuclei and radioactivity. |
| Extension | Contains additional knowledge about phenomena related to atomic nuclei and radioactivity. |

The following is an electronic module design that will be developed. Based on the research steps of the ADDIE model:



FIGURE 2. Electronic Module Cover



FIGURE 3. Main Menu



FIGURE 4. Introduction - Learning Outcomes



FIGURE 5. Connection - Material Introduction



FIGURE 6. Apply Menu

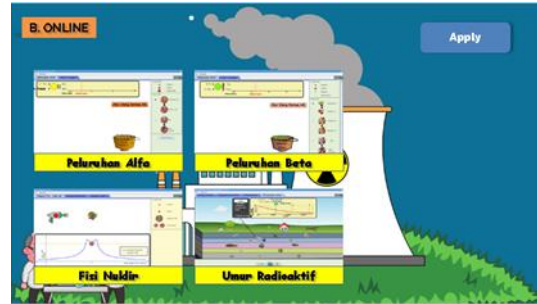


FIGURE 7. Online Simulation

According to Muharti, the ICARE model is a learner-centered learning model [11]. The ICARE model also has the potential to develop students' problem-solving skills [12]. The stages possessed by the ICARE model can provide opportunities for students to apply the knowledge they have learned in real life [13]. Achieving the intended competency standards must include aspects of knowledge (knowledge), skills (skills), and attitudes (attitudes) [14].

SIMPULAN

In this study, a product was developed as an electronic module using Articulate Storyline software on the Atomic Core and Radioactivity material. This study uses the ADDIE development model. Students can use this electronic module as an alternative to independent learning that can be accessed anywhere and anytime. Hopefully, this research can be used well and inspire educators to develop other learning media.

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