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The Addie Learning Design Model in Physics Education Literature Review and Implementation

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Abstract: This study aims to examine the application of the ADDIE instructional design model in physics education from both theoretical and practical perspectives. The ADDIE model is a systematic approach to instructional design that emphasizes the importance of each stage in developing effective and efficient learning. This study employs a literature review method by searching for articles on previous research that applied the ADDIE model in the development of physics education. The findings of this study indicate that the ADDIE approach can produce effective learning, such as locally-based learning that enhances conceptual understanding, motivation, and student learning outcomes. This study recommends the use of the ADDIE model as an adaptive and flexible framework for developing innovative physics learning that aligns with students' needs.

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INTRODUCTION

Learning is a process of interaction between students, educators, and learning resources in a learning environment to achieve educational goals. Learning is not only understood as a process of conveying information, but also as a systematic effort to develop students' competencies, character, and higher-order thinking skills (HOTS) (Djamaluddin & Wardana, 2019). This is based on the idea that learning should be able to change students' behavior from childish to more mature. There are various learning processes in schools that can shape these three aspects, one of which is physics education.

Physics education plays a crucial role in developing scientific thinking abilities and 21st-century skills known as the 4Cs (Collaboration, Communication, Critical Thinking, and Creativity), which are highly essential for students in this era (Herliandry et al., 2018; Syahrial, 2024). However, field research reveals that physics education often remains conventional, teacher-centered, and fails to actively engage students in classroom learning, lacking contextual and meaningful instruction (Nisak, 2023; Sari et al., 2022; Suliman et al., 2017). This results in low student interest and understanding of physics concepts, particularly those that are abstract and complex. Therefore, a

systematic approach is needed in designing learning that can be adapted to the needs of students, the characteristics of the material, and developments in educational technology. One learning design model that has been widely used by experts is the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation (Hidayat et al., 2021). By applying this model, teachers will be able to design more interesting and applicable learning activities, as well as help students relate abstract physics concepts to phenomena they encounter in their daily lives.

However, in-depth studies on the specific implementation of the ADDIE model in the context of physics learning in high schools are still relatively limited. Many studies focus more on general fields or other levels of education. Therefore, this study aims to conduct a systematic and in-depth review of the application of the ADDIE instructional design model in high school physics learning through a literature review. It is hoped that this review will provide theoretical and practical contributions to teachers and schools in designing more innovative, effective, and contextual physics learning.

METHOD

This research is a literature study that analyzes the implementation of the ADDIE model in the development of physics learning. A literature study is research related to the activities of reading, collecting, recording, sorting, and then managing the literature that has been obtained (Hanifah & Purbosari, 2022). The literature review method used in this study was conducted by examining sources such as articles, books, and other relevant academic sources (Afifah & Martoyo, 2024). This literature review involved a critical and in-depth analysis of the implementation of each stage of the ADDIE model, starting from analysis to evaluation. This literature analysis examines the implementation of the ADDIE stages (Analysis, Design, Development, Implementation, and Evaluation) with a focus on how each stage is applied in the context of physics learning. This study also evaluates aspects of the stages in the ADDIE model to support the development of effective physics learning in the classroom.

RESULT AND DISCUSSION

The ADDIE model stages in physics learning

The ADDIE model consists of five stages, with a systematic framework for designing learning. In physics learning, each stage is adjusted so that the teaching and learning process meets the needs and achieves the learning objectives for students. The stages of the ADDIE model include needs analysis, method design, material development, strategy implementation, and learning outcome evaluation.

Analysis

The analysis stage is the initial stage of the ADDIE model, involving the identification of learning needs and objectives to be achieved by focusing on understanding the learning problems to be addressed and determining whether learning is the appropriate solution in developing teaching materials for learning objectives. In physics education, this analysis stage includes understanding the initial knowledge of how suitable and easy the learning tools applied to students are in relation to the material in the learning tools (Yokap & Yusuf, 2024). Many educators are not yet familiar with various learning media software that can support and facilitate learning activities, including media that encourage self-directed learning for students. Therefore, initial analysis such as interviews and observations is needed to identify difficulties or limitations in the use of learning media (Rahmawati et al., 2021). Therefore, this analysis stage serves as a reference for creating an initial design, such as in the development of instructional materials like learning modules, for example, a science learning module based on local wisdom (Afdalia et al., 2020).

Design

The design stage involves a series of planning activities for developing instructional materials, including the formulation of methods, strategies, and approaches to be used in the learning process. In the ADDIE model, the design or planning stage is a phase that must be thoroughly prepared from the outset, including the selection of appropriate learning media. For example, in physics education, the use of the Videoscribe application in collaboration with the Kinemaster application (Aini et al., 2023). This design stage includes selecting

learning media, developing a syllabus, and creating instructional materials such as modules or learning media on physics concepts (Hidayatin et al., 2022). By designing a systematic and focused plan, this stage serves as the foundation for formulating the structure of the developed learning media (Widiana, 2016).

Development

The development stage is the implementation of the previously designed plan. In physics learning, this stage is carried out by combining all materials such as lesson materials, animated images, student worksheets, and learning videos such as E-Flashcard-assisted learning videos that support active and interactive learning (Wangi & Angung, 2021). Additionally, during the development stage, various validation and revision steps are carried out in accordance with recommendations from media experts and subject matter experts to ensure the materials are suitable for use (Rahmawati et al., 2021). The use of technology, such as interactive and enjoyable educational media in learning, can enhance students' motivation and learning outcomes (Pribowo et al., 2024). Through content development based on the design framework, which includes the use of simple language, engaging illustrations, and relevant activities in Physics learning, students can be trained to observe, collect evidence, identify data relationships, and draw conclusions, thereby enhancing their understanding of real-world learning (Septaria et al., 2025).

Implementation

The implementation stage in the ADDIE design is the step where all plans and elements that have been developed are applied in practice. This phase focuses on the execution of instructional strategies, learning materials, and media that have been designed in earlier stages. It also emphasizes the sustainability and coherence of all instructional components to achieve the set objectives, while conducting an initial evaluation of how effectively the implementation supports learning outcomes (Mesra, 2023).In the context of physics education, an example of this stage involves students participating in hands-on laboratory experiments to better understand complex material. During these activities, students follow structured experimental procedures, collect and analyze data, and engage in reflective discussions about the outcomes. Such implementation promotes experiential learning and helps students develop a deeper conceptual understanding of abstract physics principles (Syahrial et al., 2022).

Evaluation

The evaluation stage in the ADDIE design is the step where all aspects of the learning process are analyzed to assess its effectiveness, including student learning outcomes and material quality, to identify strengths and weaknesses and make improvements in the future (Nesri and Kristanto, 2020). An example of the evaluation stage in physics learning is when teachers conduct tests or quizzes after learning to measure students' understanding of the concepts taught, as well as provide feedback to improve teaching methods and materials in the future (Sriyanti, 2019).

CONCLUSIONS

The ADDIE model consists of five stages—analysis, design, development, implementation, and evaluation—that provide a systematic structure for designing learning experiences. By applying the ADDIE model, educators can better understand the needs of learners and the characteristics of teaching materials, making learning more relevant and contextual. This is particularly important for improving students' understanding and interest in physics, which is often considered difficult and abstract. With the right approach, it is hoped that students will be more actively involved in the learning process.

The analysis stage in the ADDIE model serves as a crucial foundation, where educators must identify learning needs and objectives. Through interviews and observations, teachers can identify the difficulties students face in understanding physics material. This information serves as a reference for designing appropriate learning tools, such as modules and interactive media. Without in-depth analysis, efforts to design effective learning may not produce the desired results, so it is important for educators to invest in this stage. During the design stage, educators plan various methods and strategies to be used in learning. The selection of appropriate learning media, such as

interactive applications and educational videos, can increase student engagement.

The development of interesting and relevant materials is essential so that students can relate physics concepts to everyday phenomena. Therefore, a well-thought-out design serves as the foundation for developing effective teaching materials that are not only informative but also enjoyable for students.

The implementation stage is the step where all plans and elements developed are put into practice. At this stage, educators conduct learning activities in the classroom, involving students in experiments and discussions to understand physics concepts. Evaluation serves to assess the effectiveness of the entire learning process, including student learning outcomes and the quality of the material. Through evaluation, teachers can identify the strengths and weaknesses of the methods used and provide constructive feedback for future improvements. Thus, the application of the ADDIE model focuses not only on the final outcome but also on the ongoing process of improving the quality of physics education in schools.

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AUTHOR CONTRIBUTIONS

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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