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Development of Teaching Materials using Ai-Based Teachy App at Pela Elementary School

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A B S T R A C T

The transformation of education in the digital era requires innovations in developing adaptive and contextual teaching materials. One potential solution is the utilization of artificial intelligence (AI) technology through the Teachy App, an application that assists teachers in automatically designing instructional materials. This study aims to develop AI-based teaching materials using the Teachy App at SDN Pela and to examine their validity, practicality, and effectiveness. The research employed a Research and Development (R&D) method with the ADDIE model, including the stages of analysis, design, development, implementation, and evaluation. Data were collected through observation, interviews, questionnaires, and learning achievement tests. Validation was carried out by subject matter and media experts, while limited and broader trials were conducted on fifth-grade students. The validation results showed an average score of 87.1% (highly valid). Practicality was categorized as very practical with a score of 85%, supported by students' positive responses to the media's design and ease of use. Effectiveness was demonstrated by an increase in the average score from 67.4 (pretest) to 84.7 (posttest), indicating a 17.3-point improvement. Therefore, the findings confirm that AI-based teaching materials developed using the Teachy App are feasible, valid, practical, and effective in supporting elementary school learning.

1. Introduction

Digital-based learning has become an important need in the education system in the era of the Industrial Revolution 4.0. The rapid development of information technology is driving transformation in the world of education, creating opportunities for learning innovations that are more adaptive, efficient, and relevant to the needs of the 21st century. Digital technology allows the creation of a dynamic learning ecosystem through wide access to information, more active interaction, and personalization of learning materials according to the characteristics of students (Ragohang, 2024), (Ritmayanti et al., 2024). In addition, the digitalization of learning also plays a role in increasing student involvement through the use of interactive media, expanding the reach of education to remote areas, and supporting

the development of digital literacy competencies that are essential for the younger generation in facing global challenges. With the right integration, digital technology is not only a tool, but also a main catalyst to optimize learning processes and outcomes at various levels of education (Putra & Raharjo, 2023).

One of the important aspects of digital learning is the development of contextual and technology-based teaching materials. Digital teaching materials play a role not only as a medium for delivering material, but also as a pedagogical tool to build students' critical thinking, creativity, and digital literacy skills. Teachers are required to have competence in designing teaching materials that are in harmony with the curriculum, student character, and able to utilize technology effectively (Amin et al., 2023). The use of appropriate digital teaching materials can increase learning motivation, expand access to learning resources, and facilitate students' active involvement in learning. Therefore, innovation in the design of digital teaching materials is one of the main keys to creating a meaningful and sustainable learning experience in the digital era (Rusdi et al., 2025).

However, in practice, many elementary schools still face obstacles in adopting digital technology. This is due to the limitations of devices, lack of training for teachers, and low digital competence among educators. Based on initial observations at SDN Pela, it was found that learning is still carried out conventionally without the support of digital technology. Teachers have not used digital platforms in compiling teaching materials, including the use of *Teachy App*. The teaching and learning process is still one-way, and has not touched on the aspects of personalization and interactivity that are characteristic of modern learning (Ministry of Education and Culture, 2022),(Damayanti & Rizal, 2022).

This condition was strengthened by the results of an interview with Mrs. Yayu Rahayu, S.Pd., a teacher at SDN Pela, who stated that the use of technology, especially artificial intelligence (AI), is needed to assist teachers in arranging teaching tools efficiently and in accordance with individual student needs. According to him, many teachers face limited time and resources in designing truly adaptive learning, so the presence of AI technology is a very relevant solution. This is where AI's role stands out as a potential tool to deliver more personalized, fast, and contextual learning. (Holmes et al., 2019) emphasizing that AI can act as a teacher partner capable of analyzing students' learning needs and providing material recommendations automatically and accurately. In line with that, a study by (Suttrisno & Yulia, 2024) shows that the use of AI in learning at the primary education level can increase students' interest in learning by up to 95%, which shows the effectiveness of this technology in supporting a more interesting and interactive teaching and learning process. In line with that, research (Pratiwi & Hidayat, 2023) revealed that the integration of AI in basic learning can assist teachers in designing adaptive assessments as well as providing instant feedback, thereby significantly increasing student engagement.

As a real example of the use of technology *AI* in the world of education in Indonesia is *Teachy App*. The app leverages natural language models (*Language Model*) which allows teachers to prepare teaching materials, lesson plans, LKPD, and

evaluation questions by simply entering basic competencies or topics. *Teachy App* has been designed to support the Independent Curriculum and provide an efficient and responsive learning alternative to the needs of students (Khoirunnisa et al., 2025). Other research also confirms that the use of similar AI-based applications can increase teachers' efficiency in preparing teaching tools while strengthening learning personalization according to students' learning profiles (Santoso & Pramudita, 2024) In addition, research by (Lestari, 2023) shows that the integration of AI in digital learning media has significant potential in improving the quality of assessments and providing faster and more accurate feedback for students.

Based on this background, this study aims to develop artificial intelligence-based teaching materials using *the Teachy App* at SDN Pela. This research is expected to contribute to supporting the transformation of digital learning in elementary schools and strengthening the role of technology as a means of improving the quality of education in the modern era.

2. Methodology

Research Design

This research uses the Research and Development method (*Research and Development/R&D*) with the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. This model was chosen because it is systematic, flexible, and able to produce valid, practical, and effective products. Study by (Suherti et al., 2023) shows that the application of the ADDIE model, especially combined with the Discovery Learning approach, positively improves student learning outcomes in the Educational Management course. While research by (Nasution & Taufik, 2025) proves that digital learning media developed with the ADDIE model received a positive response from more than 85% of students and improved their understanding of the subject matter

Instruments

The research instruments used in this study consist of three types. First, an expert validation sheet that functions to assess the quality of content and learning media. This instrument uses a Likert scale of 1–5 with assessment aspects that include the accuracy of the material, conformity with Core Competencies (KI) and Basic Competencies (KD), relevance to learning objectives, language readability, and visual design and navigation media. Second**,** student response questionnaires were given at the limited trial stage and extensive trials. This instrument is used to determine the level of practicality of the product by assessing the aspects of ease of understanding the material, the attractiveness of the display, the ability of the media to motivate learning, and the ease of navigation. Third, learning outcome tests (pretest–posttest) designed to measure the effectiveness of the teaching materials developed. This test is prepared based on the basic competencies taught and given to students before and after using the product, so that the results can show the extent of increased student understanding after using Teachy App-based learning media.

Data Collection

The data used in this study consisted of primary data and secondary data. Primary data were obtained through observation of the learning process at SDN Pela, interviews with classroom teachers, filling out questionnaires by students, and learning test results. This data involves the participation of grade V students, classroom teachers, as well as validators of material experts and media experts. Meanwhile, secondary data was obtained from curriculum documents, school profiles, and relevant scientific literature regarding the development of digital teaching materials and the use of artificial intelligence (AI) technology in education. These two types of data complement each other and become the basis for analyzing the feasibility, practicality, and effectiveness of the developed product.

Data Analysis

The data analysis in this study uses a descriptive statistical approach. Expert validation was analyzed by calculating the percentage of scores against the eligibility criteria, so that validity categories were obtained consisting of very valid, valid, moderately valid, and less valid. Furthermore, the student response questionnaire was analyzed by calculating the average percentage of answers, which were then interpreted into the category of practicality, namely very practical, practical, quite practical, or impractical. Finally, the learning outcome test (pretest–posttest) is explained by comparing the average score of students before and after learning using the developed teaching materials. Increasing test scores is known to be an indicator of product effectiveness, so that the extent to which AI-based learning media through the Teachy App can improve student learning outcomes.

3. Results and Discussion

Analysis Stage

The results of observations and interviews at SDN Pela show that teachers still use conventional methods without the support of digital technology. Teachers need AI-based media to help prepare more adaptive teaching materials. This data strengthens the reason for the need to develop teaching materials using the Teachy App**.**

Design Stage

At this stage, the content of the teaching materials is designed in line with the basic competencies of the Independent Curriculum**,** including the structure of the material, visual display, and the preparation of evaluations. The design of teaching materials is structured to be simple, interactive, and relevant to the characteristics of elementary school students.

Development Stage

The product that has been designed is validated by material experts and media experts using the Likert instrument. The validation results are shown in Table 1.

Table 1. Material Expert Validation Results

Assessment Aspects	Validator
The material is in accordance with the Core Competencies and Basic Competencies that apply	4
The material is relevant to the learning objectives that have been set	4
All content of the material is scientifically accurate	5
Material free from misconceptions	4
The material includes sufficient discussion for students' understanding	4
Materials are adjusted to the student's ability level	5
The language used is communicative and clear	4
Sentences are arranged according to good Indonesian rules	5
Material is provided with clear sources or references	4
The resources used are relevant and up-to-date	4
The material is in accordance with the Core Competencies and Basic Competencies that apply	4
The material is relevant to the learning objectives that have been set	4
All content of the material is scientifically accurate	5
Sum	**43**
Percentage	**86%**
Category	**Highly Valid**

Based on the results of the validation of the subject matter experts shown in Table 1, a total score of 43 was obtained with a percentage of 86% which is included in the very valid category**.** These results show that the material developed is in accordance with the Core Competencies (KI) and Basic Competencies (KD), relevant to the learning objectives, and scientifically accurate. In addition, the material is prepared in a communicative, clear, and in harmony with good Indonesian rules, so that it is easy for students to understand. The aspect of completeness of the material is also considered sufficient to support understanding, free from conceptual errors, and adjusted to the level of ability of students. The references used are also considered relevant and up-to-date. That way, it can be concluded that the material developed is suitable for use in the learning process without the need for major revisions.

Table 2. Media Expert Validation Results

Assessment Aspects	Validator I	Validator II
Visually appealing learning media display	3	4
Combination of colors and text makes reading easy	4	4
Media navigation is easy for new users to use	4	4
Icons and menus are consistent across the display	5	4
All features work properly without errors	4	4
Media access speed and response are optimal	4	5
Media in accordance with the set learning objectives	5	4
Media content in accordance with the Independent Curriculum	4	4
Media design can increase students' motivation to learn	3	4
This medium provides an enjoyable learning experience	4	5

Sum	40	42
Percentage	85%	87%
Category	Highly Valid	

Based on the results of the validation of media experts shown in Table 2, the total score of Validator I was 40 with a percentage of 85% and from Validator II of 42 with a percentage of 87%, both of which were included in the very valid category**.** This indicates that the designed learning media has a visually appealing appearance, a combination of colors and text that makes it easy to read, and easy-to-use navigation. The consistency of icons and menus across the display is also good, coupled with features that work without errors and optimal access speeds. This media is considered to be in accordance with the learning objectives and content of the Independent Curriculum, and is able to increase students' learning motivation through a fun design. Thus, learning media can be declared suitable for use in the learning process with very minimal revisions.

Implementation Stage (Product Trial)

a. Limited Trial

The limited trial was carried out on 10 students of class V with the aim of finding out the practicality of the teaching materials. The instrument is in the form of a student response questionnaire.

Table 3. Limited Trial Results

Assessment Aspects	Percentage
Easy-to-understand material	90%
Attractive display	88%
Media motivates learning	86%
Easy to use navigation	84%
Average	87%
Category	Very Practical

Based on the results of a limited trial conducted on 10 students in grade V, an average percentage of 87% was obtained with the category of very practical. These results indicate that the teaching materials developed have met the practicality aspect, where students assess the material as easy to understand (90%), the appearance of the media is interesting (88%), the media is able to motivate learning (86%), and the navigation is easy to use (84%). The positive response of these students proves that teaching materials are not only helpful in understanding the material, but also able to attract attention and increase learning motivation through their appearance and ease of use. As a result, teaching materials can be declared practical and feasible to be used at a wider trial stage.

b. Extensive Trials

An extensive trial was carried out on 28 students in grade V with the aim of determining the effectiveness of the product through learning outcome tests (pretest–posttest).

Table 4. Extensive Trial Results

Test Stage	Grade Point Average
Pretest	67,4
Posttest	84,7
Increased	**+17,3**

Based on the results of a broad trial conducted on 28 students in class V, an average pretest score of 67.4 and posttest score of 84.7 were obtained, resulting in an increase of 17.3 points**.** These results show that the use of developed teaching materials is effective in improving student learning outcomes. A significant increase from pretest to posttest scores indicates that the subject matter is easier for students to understand through the application of these learning media. Thus, from this study, it can be concluded that the designed product is not only valid and practical, but also effective in supporting the achievement of learning objectives.

Evaluation Stage

The evaluation is carried out based on expert input, student response, and pretest and posttest results. In general, Teachy App-based teaching material products meet three main aspects in development research, namely:

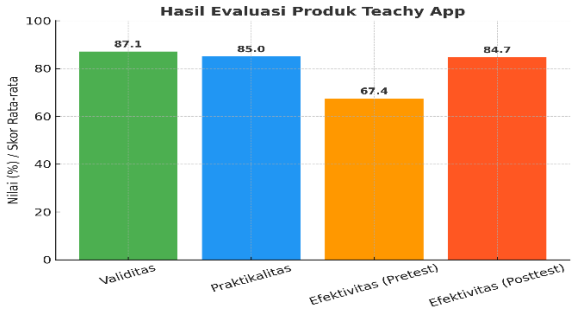

Figure 1. Teacy App Product Evaluation Results Chart

Based on the evaluation stage shown in Figure 1, the results of the evaluation of Teachy App products are carried out through expert input, student response, as well as pretest and posttest results. In general, Teachy App-based teaching material products meet three main aspects in development research, namely validity, practicality, and effectiveness**.** The validity aspect obtained an average score of 87.1% with the *very valid* category, practicality obtained 85% with the *very practical category*, while effectiveness was shown through an increase in student learning outcomes from an average pretest score of 67.4 to 84.7 in the posttest. This improvement indicates that the use of Teachy App is able to significantly improve student understanding. Thus, AI-based teaching materials using the Teachy App have proven to be feasible, valid, practical, and effective to support the learning process at SDN Pela.

The Teachy logo features bird-drawn icons in a simple illustration style that reflects a friendly, modern, and memorable feel (Figure 2). This logo is the main identity of the Teachy application as an artificial intelligence (AI)-based platform that

assists teachers in organizing learning tools efficiently. The presence of the logo is not just a symbol, but also represents the spirit of innovation and digital transformation in the world of education.

Figure 2. Logo Teachy

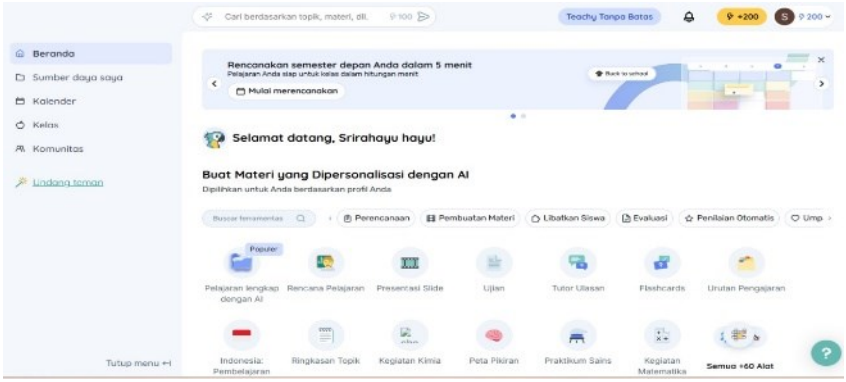

Figure 3. Teachy Home View

Teachy homepage provides a clean, simple, and easy-to-use interface for teachers and other users alike (Figure 3). In this section, there is a material search menu, access to key features such as question creation, lesson plans, and open materials, as well as quick navigation that makes it easier for users to start learning activities. This home view is designed to support teachers' work efficiency by providing instant access to a wide range of learning needs.

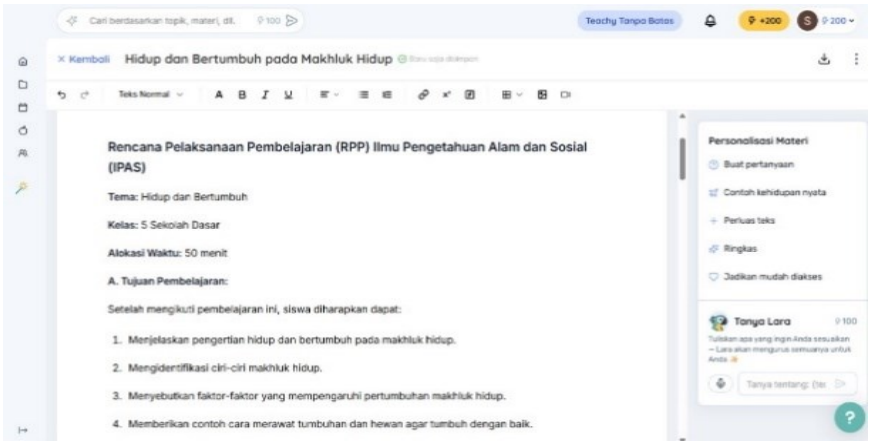

Figure 4. RPP View

On the Learning Implementation Plan (RPP) display (Figure 4), the Teachy application provides a neat format that is in accordance with the needs of the school curriculum. In the picture, an example of a lesson plan with components such as themes, classes, time allocation, learning objectives, and learning activity steps is shown. This feature makes it easier for teachers to compile open tools without having to write from scratch, because the system is integrated with the applicable curriculum templates.

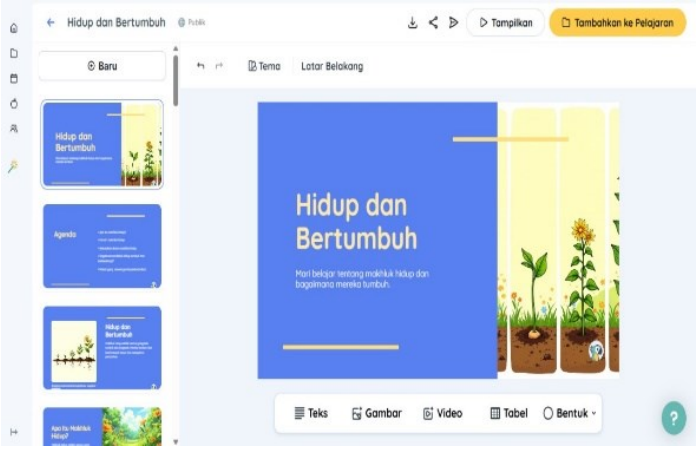

Figure 5. Material display

The display of the material shows how Teachy presents systematic and structured learning content (Figure 5). Teachers can access or customize the material according to the chosen topic, making it more relevant to the needs of students. In addition, the material displayed has a clear arrangement, ranging from introductions, explanation of concepts, to practice questions, which make it easier for students to understand the content of the lesson. This view showcases Teachy's advantages in supporting more interactive and effective learning.

Discussion

The results of the study indicate that teaching material products are based on Teachy App fulfilling three main aspects of learning media development, namely Validity, Practicality, and Effectiveness**.** First, from the Validity, The average score obtained is 87,1% by category *Very valid*. These results reinforce the findings (Andrizal & Munir, 2023) that the use of AI in media development is able to produce material that is adaptive and according to the needs of students. Validation from material experts confirms that the content is in accordance with IP and KD, scientifically accurate, and composed in communicative language. Meanwhile, media expert validation shows an attractive visual appearance, easy navigation, and consistency of features, making the product worth using without major revisions.

Second, from the Practicality**,** Limited trial results show average score 85% by category *Very practical*. Positive student responses include ease of understanding the material, attractive appearance, increased learning motivation, and easy-to-use navigation. This is in line with (Hidayat & Susanti, 2023)which emphasizes that

AI-based teaching media is more interactive and plays a role in fostering students' active participation in the learning process.

Third, from the Effectiveness**,** the results of the extensive trial showed a significant increase from the mean value Pretest 67.4 become Posttest 84.7**,** with an increase of 17.3 points. This improvement indicates that AI-based teaching materials are able to improve students' understanding of concepts. These findings support research (Saputra & Yuliana, 2024). which states that the integration of AI in learning can increase students' interest in learning by up to 95% and contribute to improved learning outcomes.

Thus, the results of this study strengthen the existing literature that the integration of AI in the development of digital teaching materials has a positive impact on the quality of learning, both in terms of feasibility, ease of use, and improvement of learning outcomes (Fitriani & Azmi, 2024), (Putri & Rahmawati, 2023). Therefore, the development of AI-based teaching materials using Teachy App at SDN Pela can be stated valid, practical, and effective to support the 21st century learning process.

4. Conclusion

This research produced Teachy App-based teaching materials developed through the ADDIE model and has been tested for feasibility in grade V students of SDN Pela. Based on the validation results, the product was declared very valid from material experts and media experts. The practicality aspect obtained in the very practical category, showing the positive response of students to the ease of use, attractive appearance, and benefits of media in supporting learning. The effectiveness aspect is evidenced by the increase in the value of student learning outcomes that increase significantly.

Thus, it can be concluded that the development of AI-based teaching materials using the Teachy App has proven to be feasible, valid, practical, and effective to support the learning process in elementary schools, especially in increasing students' understanding and learning motivation. The suggestions for further research are: The development of similar products can be extended to other subjects and levels of education, It is necessary to conduct trials on a larger scale to test the consistency of the effectiveness of teaching materials. Researchers can next explore the integration of the Teachy App with other technologies, such as gamification or augmented reality, to make learning more interactive.

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