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IMPLEMENTATION OF AN AI-BASED PROJECT-BASED LEARNING MODEL TO ENHANCE STUDENT LEARNING MOTIVATION IN PRODUCTIVE DIGITAL BUSINESS SUBJECTS AT SMK AS SALAFI BALUNG

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Abstract

This study aims to enhance students' learning motivation through an Artificial Intelligence (AI)-based Project-Based Learning (PjBL) model in the Digital Business subject at SMK As-Salafi Balung. The problem addressed is the low level of motivation caused by conventional methods that provide minimal active and contextual engagement, leading to reduced enthusiasm and limited understanding of the relevance of learning materials to the digital work environment. The general objective is to improve the quality of the learning process to be more adaptive to digital technology development. Specific objectives include: (1) increasing students' motivation through AI-based PjBL; (2) evaluating the improvement of non-cognitive learning outcomes, particularly critical thinking and digital technology skills for real-world projects; and (3) presenting innovative strategies aligned with industry demands. This research uses a qualitative approach with Classroom Action Research (CAR) based on the Kemmis & McTaggart model, conducted in two cycles. Data were collected through observation, interviews, and documentation to assess motivation and attitudinal changes. The study expects to produce a contextual AI-integrated PjBL model to enhance motivation and 21st-century skills.

Keywords: Project-Based Learning (PjBL), Artificial Intelligence (AI), Motivation, Student Learning, Digital Business

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INTRODUCTION

In the context of Project-Based Learning (PjBL), technological advancements in the current digital era demand that the education sector continue to innovate. Educational institutions must be able to adapt rapidly, particularly in curriculum design, teaching methods, and the integration of technology into the learning process. PjBL offers a learning approach that actively engages students through project activities reflecting real-life situations. Such learning is highly relevant for developing 21st-century skills, including critical thinking, creativity, collaboration, and communication, particularly in vocational schools (SMK) that prepare graduates for the workforce.

However, field observations reveal that learning processes in most vocational schools, including SMK As-Salafi Balung, still face challenges in adopting contextual and innovative approaches. The Digital Business subject, which should serve as a platform for exploring creativity and practicing digital entrepreneurship, is still predominantly delivered through conventional lecture-based methods and monotonous written assignments. This leads to passive student engagement, low enthusiasm, and reduced learning motivation, reflected in a lack of interest, attention, responsibility, and achievement orientation. Students often receive information unilaterally from teachers without being given sufficient opportunities to create or collaboratively solve real-world problems.

These findings are reinforced by initial classroom observations and interviews showing that most students feel bored, have limited understanding of how the material connects to real-world applications, and make minimal use of digital technology in learning. Students fail to perceive the direct benefits of learning for their future work or life. These results align with research by Marselus (2021), which states that lecture-based methods that do not actively involve students negatively affect their interest and motivation to learn. Similarly, Transformasi et al. (n.d.) found that implementing Project-Based Learning is highly effective in improving students' learning motivation in Digital Business subjects. This model positions students as active participants engaged in completing real projects, which not only enhances their understanding of the material but also fosters responsibility and ownership of learning outcomes.

The issue of low learning motivation has also been identified in other studies. Marselus (2021) emphasizes that teacher-centered lectures reduce students' engagement and motivation, while Megarahyua (2024) concludes that Project-Based Learning significantly increases motivation in Digital Business classes. Moreover, advancements in Artificial Intelligence (AI) open new possibilities for learning. Integrasi et al. (2024) report that integrating AI into the

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learning process successfully boosts students' interest and motivation by providing a more interactive and personalized experience. AI supports adaptive and contextual learning, increasing student engagement. According to Saputra & Komalasari (2024), incorporating AI in PjBL can create enjoyable, game-like learning experiences, reducing boredom and reluctance to participate. Through AI, students can receive instant feedback, conduct digital business simulations, and collaboratively develop innovative products.

Digital transformation in education, particularly in Digital Business learning, offers students opportunities to learn through direct experience. Youwangka (2024) highlights that technology-based active learning strategies improve understanding and motivation. Using digital tools such as online learning platforms and business applications, students can access up-to-date information and analyze data relevant to business activities. This allows them to apply marketing or management theories using AI-driven analytical tools. In Digital Business learning, AI applications such as chatbots for customer service, market trend analysis using digital data, and marketing simulations can enhance the learning experience to better reflect professional practices.

Furthermore, Mashud et al. (2024) emphasize that digital business education in vocational schools must prepare students for the workforce by developing industry-relevant skills. AI-based learning equips students with tools commonly used in real-world settings, increasing their adaptability. For example, proficiency in AI-powered analytical software provides added value for students seeking employment in marketing or management roles. Similarly, Pratama & Pratama & Hidayatullah (2024) demonstrate that integrating PjBL with digital media, such as digital simulators, significantly improves learning outcomes, communication skills, and motivation.

Therefore, combining Project-Based Learning with AI technology is expected to be an effective approach to addressing low learning motivation in Digital Business education. Students will not only learn concepts but also complete digital-based projects using AI as a relevant and up-to-date tool. This approach is expected to make learning more authentic, engaging, and motivating, encouraging active participation.

Based on this background, the study aims to improve students' learning motivation through the application of an AI-based Project-Based Learning model in the Digital Business subject at SMK As-Salafi Balung. Additionally, it seeks to evaluate the improvement of non-cognitive learning outcomes, such as critical thinking skills and the ability to utilize digital technology in real project tasks,

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analyze changes in learning motivation after implementing the AI-based PjBL model, and present alternative learning strategies that are contextual and adaptive to technological developments in education.

This research adopts a qualitative approach using Classroom Action Research (CAR). The CAR model, based on Kemmis & McTaggart (1998) as cited in Sari et al. (2018), is chosen because it allows teachers/researchers to directly improve classroom learning processes through cycles of planning, action, observation, and reflection. The subjects are students majoring in Digital Business at SMK As-Salafi Balung. Data are collected through observation, interviews, and documentation to assess improvements in learning motivation and changes in student attitudes following the implementation of the AI-based Project-Based Learning model.

Through this method, the study is expected to contribute to the development of innovative learning models in vocational schools, particularly by leveraging AI to support Project-Based Learning in enhancing students' motivation to face the challenges of the digital workforce of the future.

LITERATURE REVIEW

Fundamental Concepts and Benefits of Project-Based Learning (PjBL)

Project-Based Learning (PjBL) engages students in real-world projects to enhance motivation and creativity, proven effective in various subjects (Marselus, 2021; Sari et al., 2018; Robbani, 2023). Kemendikbud (2013) outlines its steps: posing essential questions, planning collaboratively, scheduling, monitoring, testing results, and evaluating learning.

Student Learning Motivation

Learning motivation arises from intrinsic factors like personal ambition and extrinsic factors such as rewards and a supportive environment (Rinjani et al., 2022). Technology and teacher creativity enhance engagement and make learning enjoyable (Salomo Leuwol et al., 2023). Strong motivation marked by persistence, independence, and a desire to achieve positively impacts academic performance (Pratiwi & Saptuti Susiani, 2023)

Artificial Intelligence (AI) in Learning

Artificial Intelligence (AI) is reshaping education by enabling personalized learning, boosting engagement, and providing continuous support through tools like adaptive platforms and chatbots (Kim et al., 2022;Luo & Hsiao-chin, n.d.). While it enhances learning outcomes and digital skills, integrating AI poses technological, pedagogical, and ethical challenges that require careful planning (Hamid et al., 2022;Sumakul & Hamied, 2023). Its impact also extends to digital

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marketing, highlighting the need for education that prepares students to use AI effectively (Youwangka, 2024; Khan et al., 2024).

Digital Business Learning in Vocational High Schools (SMK)

In the era of Industry 4.0, digital business learning in Vocational High Schools (SMK) is crucial for preparing students with practical skills needed in a competitive labor market. Integrating digital literacy, entrepreneurship, and technology, such as website design and e-learning platforms, helps students understand digital business operations and enhances learning effectiveness (Rakib et al., 2022;Sutama & Fajriani, 2022;Ma'arif et al., 2021). This approach aligns curricula with industry demands while providing students with essential skills for the modern workforce (Kr.istina & Pahlevi, 2024)

RESEARCH METHOD

This study employs a qualitative approach using the Classroom Action Research (CAR) method. The CAR method was selected because it allows teachers or researchers to make direct improvements to the learning process in the classroom through a systematic cycle, including planning, action implementation, observation, and reflection. The research subjects will involve students from the Digital Business department at SMK As-Salafi Balung. Data collection will be conducted through three primary techniques: observation and documentation. The data will be collected to determine the improvement in learning motivation and changes in students' attitudes following the implementation of the AI-based Project-Based Learning (PjBL) model. Through this method, the research results are expected to provide a tangible contribution to the development of innovative learning models in vocational high schools, particularly in leveraging AI to support PjBL in enhancing students' motivation to face the challenges of the digital workforce in the future.

RESULTS AND DISCUSSION

General Description of the Research

This classroom action research was conducted at SMK As-Salafi Balung in the productive subject of Digital Business, aiming to enhance students' learning motivation through the application of an Artificial Intelligence (AI)-based Project-Based Learning (PjBL) model. The research was carried out in two cycles, each consisting of planning, action implementation, observation, and reflection stages following the Kemmis & McTaggart model.

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The background of this research lies in the low learning motivation of students during conventional learning processes, which tend to be monotonous and lack challenges. By incorporating AI-based projects (such as creating digital posters, chatbots, and business simulations), students are expected not only to understand theoretical concepts but also to engage directly in producing tangible products.

Overall, the research results indicated an increase in students' learning motivation from Cycle I to Cycle II. In Cycle I, learning motivation was already in the good category; however, several challenges remained, including low independence, reliance on the teacher, and lack of self-confidence. In Cycle II, after improving the learning strategies, students' motivation increased significantly, reaching the very good category.

Observation Results of Cycle I

a) Planning

In the planning stage of Cycle I, the teacher prepared learning tools in the form of a Teaching Module, an observation instrument for students' learning motivation, and supporting media in the form of an AI application. The teacher also designed a project for students to complete, consisting of a digital promotional poster and a chatbot. The primary goal of this stage was to introduce students to the application of AI technology within the context of Digital Business learning.

b) Action Implementation

The action stage directly involved students in completing an AI-based project. The teacher explained the material and provided a tutorial on using AI, gave simple examples, and then asked students to complete the project. During implementation, some students showed high enthusiasm, but many were still hesitant and dependent on the teacher's instructions. The learning process was still dominated by teacher guidance, while students had not yet fully dared to experiment with AI features.

c) Observation

The observation results of Cycle I showed that students' learning motivation was in the good category. Several motivation indicators began to emerge, such as interest and attention, where students were eager to try AI, as well as achievement motivation, indicated by some students' enthusiasm to showcase their products. However, the indicator of learning independence remained low. Many students were unable to seek references on their own,

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still waited for the teacher's directions, and some were late in completing assignments.

d) Reflection

Reflection from Cycle I revealed that the use of AI-based PjBL could attract students' attention but had not yet fully increased learning motivation across the board. The main obstacles were:

- Students were still unfamiliar with using AI.
- Low level of independence, with students preferring to ask the teacher rather than seek solutions on their own.
- Lack of confidence in exploring features.

From this reflection, it was found that Cycle I had several shortcomings. These limitations caused project results to be less than optimal, even though an increase in learning motivation had begun to emerge. Therefore, improvements are needed for Cycle II.

Observation Results of Cycle II

a) Planning

In this stage, the teacher refined the learning strategy based on reflections from Cycle I. The teacher prepared a Teaching Module, an observation instrument for learning motivation, and a similar project. As an improvement, the teacher developed a technical guide in the form of step-by-step instructions and a short tutorial video on using the AI application. This guide was provided to enable students to study independently, minimizing continuous reliance on the teacher's explanations.

b) Action Implementation

The implementation began with the teacher giving a brief explanation of the learning objectives and the project to be undertaken. Students were then directed to study the tutorial video and technical guide provided. The teacher no longer dominated the explanation but encouraged students to follow the guide independently. When difficulties arose, students were instructed to seek solutions first before asking the teacher. This approach allowed students to develop greater independence, willingness to experiment, and familiarity with using AI without waiting for constant guidance.

c) Observation

During the observation stage, positive changes were evident compared to Cycle I. Students became more accustomed to using AI, supported by the availability of the tutorial video, which they could revisit at any time. Their

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independence improved, as most students attempted to resolve issues using the guide rather than immediately seeking help from the teacher. Confidence also increased, with students being more willing to explore new features and present their project outcomes. Learning motivation rose to an excellent level, indicating significant improvement from Cycle I.

d) Reflection
The reflection of Cycle II indicated that the use of technical guides and short tutorial videos was effective in helping students adapt to AI, enhancing their independence, and fostering self-confidence. Students were more active, less reliant on the teacher, and more focused on completing projects on time. The resulting works were also more creative and professional. As the research success indicators were achieved, the classroom action was concluded at Cycle II.

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Table 1.
Comparison of Student Learning Motivation in Cycle I and Cycle II

Aspect / Indicator	Cycle I (79.16% - Good)	Cycle II (91.66% - Excellent)	Change
Interest & Attention	Students were interested in trying AI applications but engagement was still limited and not evenly distributed among all students.	Students were more enthusiastic, actively explored AI features, and demonstrated broader and more consistent interest.	Interest increased and became more evenly distributed.
Learning Independence	Low, as students often relied on teachers and rarely sought solutions independently.	Students learned more independently by following technical guidelines and video tutorials.	Significant improvement in independence.
Responsibility	Some students were late in completing projects, and responsibility was not yet optimal.	Students became more disciplined, completing projects on time with higher-quality results.	Increased responsibility.
Self-Confidence	Students lacked confidence in trying AI features and presenting their work.	Students were more willing to experiment and confidently showcase their products to peers.	Improved self-confidence.
Achievement Motivation	Began to emerge through the enthusiasm of some students in presenting their work, but not consistently.	High achievement motivation, with students competing to produce creative and professional work.	Stronger drive for achievement.
Overall Category	Good (79.16%)	Excellent (91.66%)	Percentage increase: 12.5 points

Based on the table above, it is evident that there was an increase in students' learning motivation from Cycle I to Cycle II across all indicators. In Cycle I, aspects such as independence, responsibility, and self-confidence were

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still major weaknesses among students, resulting in a motivation category of Good (79.16%). However, after implementing improved learning strategies through technical guidelines and video tutorials, learning motivation increased to the Very Good category (91.66%) in Cycle II.

The most significant improvement occurred in the indicators of learning independence and self-confidence, where students no longer relied heavily on the teacher but were able to complete projects with minimal guidance. This indicates that the implementation of AI-based Project-Based Learning (PjBL) not only enhanced students' learning interest but also fostered positive attitudes such as responsibility, independence, and confidence in facing digital learning challenges.

Thus, it can be concluded that the application of the AI-based PjBL model successfully improved students' learning motivation in terms of perseverance, interest, responsibility, independence, and achievement motivation. This model also supports the development of 21st-century skills such as critical thinking, creativity, collaboration, and technological literacy, which are essential for meeting the challenges of the future digital workforce.

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