

The Urgency Of Implementing *Artificial Intelligence*-Based Project Learning In The 21st Century

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Abstract

The use of technology in the learning process in the 21st century is highly necessary to meet the demands of this era. Learning activities are designed with project-based learning utilizing Artificial Intelligence (AI), which has become a tool to assist individuals in their learning process. Engaging in learning activities through AI-based projects helps students to collaboratively tackle tasks, utilizing the intelligence assistance embedded within AI. This study is qualitative in nature, employing a literature review method, drawing insights from various sources such as books, articles, and others. The research findings indicate the crucial role of AI-based technological learning in the learning process, especially in the current 21st-century era, where precise utilization of technology is demanded. This implies that utilizing AI in learning activities significantly aids in the development of critical and creative thinking skills in students, which are essential components in individuals in the present 21st-century context. Moreover, it is crucial to ensure AI is utilized thoughtfully to avoid generating biased outcomes. Ultimately, these findings can have a beneficial impact on the nation by fostering competent citizens, as a result of habitual use of AI intertwined with critical and creative thinking.

Keyword: Artificial Intelligence (AI); Project Based Learning; The 21st Century

1. Introduction

The current conditions require individuals to be able to face the present-day challenges, including students who are engaged in the learning process within the school environment. Considering that we are now living in the 21st century, which includes the aspect of the ability to use technology that is constantly developing and advancing. Teaching and learning activities in the 21st century heavily rely on students' abilities in creativity and critical thinking (Adnin et al., 2023). This means that the dominant use of these two skills is very relevant to the needs when operating existing technology. Previous research related to this topic, such as the study conducted by Sinaga (2023) titled "The Role of Technology in Education to Shape the Character and Skills of 21st Century Students," found that the rapid development of technology, when utilized in educational activities, provides extensive contributions. However, there are challenges in its application during learning, which necessitates the development and implementation of competencies required for the 21st century to achieve quality learning. Additionally, earlier research by Zubaidah (2019) titled "Empowering 21st Century Skills through Project-Based Learning" concluded that the evolution over time, culminating in the 21st century, demands specific capabilities. These capabilities are cultivated through project-based learning, as it can be designed to align with the current real-world needs, making project-based learning highly beneficial. Therefore, based on these previous research findings, it is evident that developing skills, especially for the 21st century, requires appropriate measures. Aligned with the research I am conducting, which focuses on the implementation of project-based learning utilizing AI technology in the 21st century, this study differs from the aforementioned research by concentrating more specifically on AI-based projects within the learning process. This focus on AI aims to provide innovative and advanced steps in addressing the challenges of the 21st century and beyond.

When the learning activities are designed by combining activities with technology-based media, it results in a change in students' behavior during learning, making them more enthusiastic (Mukaromah, 2020). Seeing this, it can be said that the use of technology in learning today is very important. Therefore, consistent steps are needed to achieve the intended goals, one of which is the implementation of project-based learning using Artificial Intelligence (AI) technology. Currently, the use of AI, including in the field of education, is becoming widespread, especially in the learning process. Of course, its use requires suitable methods, including project-based learning, as it involves detailed and collaborative planning. Therefore, the researcher is very interested in addressing the discussion of the topic related to that matter.

2. Literature Review

2.1 Learning

Efforts to encourage students to engage in learning activities are meaningless if these activities do not result in student learning (Junaidi, 2019). Learning is a stage that involves a two-way interaction between teachers and students in order to achieve the desired educational goals (Supriani et al., 2020). An activity can be considered a learning activity if it includes actions carried out by both students and teachers.

The learning activities carried out must undoubtedly select a learning model that aligns with the intended goals (Adnin et al., 2024). An improvement in learning activities occurs

when teachers utilize students' prior experiences, understand and track the intensity of students' learning speeds, and provide appropriate attention. This approach ensures the effectiveness of the learning process because it is based on previous experiences, thus allowing students to genuinely focus and actively participate in problem-solving (Hasan et al., 2021, Hal. 2). The importance of choosing an appropriate learning model lies in enhancing students' new experiences during the learning process, which requires active student participation.

2.2 Project Based Learning (PjBL)

Project-based learning uses project materials as a medium during learning activities to achieve the objectives in the affective, cognitive, and psychomotor domains (Nirmayani & Dewi, 2021). Project-based learning has a dominant opportunity to build experiences in students (Norhikmah et al., 2022). Through this learning model, students participate directly, which fosters their own experiences. Implementing project-based learning models is beneficial in creating meaningful learning conditions, motivating students, and helping them prepare to face real-world challenges (Kamaruddin et al., 2023). Project-based learning activities are considered capable of enhancing student learning activities, which positively impacts students' reasoning about the material being studied (Iswantari, 2021). The accurate and in-depth understanding experienced by students becomes the foundation of their knowledge when facing real-world challenges, especially in the 21st century. This is also in line with Rosmana et al (2024) who stated that the application of project-based learning can support students in advancing 21st-century skills, including critical thinking, creativity, collaboration, and communication abilities.

2.3 Artificial Intelligence (AI) Technology

Indonesia is among the countries experiencing significant advancements in technology, especially considering its position in the era of digital transformation. The rapid adoption of AI is impacting many sectors, including education (Marlin et al., 2023). This aligns with the findings of Muarif et al (2019) who stated that AI significantly influences the educational field. Due to its ability to analyze and process data, AI technology can offer creative solutions and introduce dominant approaches in personal and adaptive learning during educational activities. These advantages greatly benefit the current educational sector in Indonesia.

There are opportunities indicating future developments in artificial intelligence (AI). This is also due to the dominant opportunities for improvement and optimization in various aspects of human life, including education (Afrita, 2023). Currently, AI better meets the learning needs of today by monitoring students' progress towards advancement, providing relevant learning activity suggestions, and giving detailed feedback (Sugiarto et al., 2023). The contributions from the use of AI in the current era of learning significantly facilitate progress and open up dominant opportunities for further advancement.

2.4 The 21st Century

The 21st century is an era characterized by rapid advancements in the fields of science and technology. As stated by Mahrurnisya (2023) in the 21st century, education aims to create opportunities for all students to develop their abilities so that they can compete with the rapid advancements of the current era. It is also understood that in the 21st century, human life has undergone significant changes, leading to a demand for high-quality human resources through all efforts and achievements (Aran et al., 2024). This means that with the challenges of the 21st century, it is expected that humans will possess high-quality skills that can help them navigate the situations they encounter.

The competency of collaboration is one of the crucial aspects in the competitive sector of the 21st century, considering that the achievement of successful cooperation provides a direction for progress in various fields (Sunendar, 2020). Furthermore, assessments conducted in 21st-century learning involve authentic assessments, which directly engage students in actively participating in real learning activities, conducting investigations, and encouraging them to actively construct knowledge from their surrounding environment (Rosnaeni, 2021). Success will predominantly be achieved when there is a high level of solidarity in the completion of tasks, requiring each individual to be directly involved.

3. Material and Method

This research employs qualitative research methods, followed by a literature review analysis. Qualitative research is a design conducted in studies that results in findings processed descriptively, with the researcher serving as the primary instrument (Adlini et al., 2022). Furthermore, literature review refers to an analytical technique involving data collection through searching various sources and exploring numerous references such as articles, books, and previous studies (Fadli, 2021). Therefore, in describing the research results, this study presents a descriptive elaboration from the combined sources obtained.

3.1 Design Study

The study in this research was conducted by collecting data from various sources to address the issue of the urgency of implementing AI-based project learning in the 21st century. This explanation is done descriptively. Descriptive study design is research conducted in an effort to analyze one or more variables without comparing or discussing the relationships between the existing variables (Arianton et al., 2019). This means that each variable is analyzed by explaining each variable individually.

3.2 Data Analysis

A data search was conducted from various sources regarding the urgency of implementing AI-based project learning in the 21st century. It is explained that the 21st century presents many challenges, as stated by Oktari et al., (2022) The 21st century is an era with numerous challenges, especially related to adapting to activities that increasingly rely on technology, which is continuously advancing. Although technology can simplify tasks, there is also the possibility that human roles could be replaced by technology. Given these conveniences, it is essential to take appropriate steps, particularly in the field of education during learning activities.

In the 21st century, challenges are often associated with the 4C skills, namely communication, collaboration, critical thinking, and creativity. Therefore, developing these skills is essential. These challenges also support many parties, including students and teachers, in gaining technological competencies during learning activities (Kurniawan & Kuswandi, 2021, hal 2). The technology frequently used today is artificial intelligence (AI). As stated by Gitakarma & Tjahyant (2022) AI has indeed been commonly used in everyday life. Furthermore, AI holds potential for driving significant changes in the field of education (Salsabilla et al., 2023). Given the potential related to this matter, it is highly necessary to take specific steps regarding what will be done, especially in the field of education in learning activities, one of which is implementing AI-based project-based learning in the 21st century. Amelia & Aisya (2021) revealed that project-based learning is a teaching model implemented by teachers through steps whereby they first present learning materials that provide opportunities for students to independently process in their efforts to master the learning materials. This indicates that if teachers design learning that applies project-based learning based on the use of AI, it means indirectly that the learning materials studied in the work process and understanding process are processed using AI technology with the learning materials studied independently but not without supervision and guidance from the teacher, so that they will be able to hone students' technology skills according to the competencies required in the 21st century. However, indirectly, this also encompasses the honing of other skills to face the challenges of the 21st century related to the 4Cs.

4. Result

Looking at the current conditions, namely in the 21st century, a competency that students must possess is the 4Cs, including the ability to use technology. Present-day learning activities are never detached from the touch of technology usage itself, from the process of understanding to internalizing a subject matter. Hence, the urgency of implementing technology-based project-based learning, namely artificial intelligence, arises. As previously explained, through the implementation of technology-based project learning models, students will be able to directly experience and engage in running or executing AI technology itself. Consequently, when using it, students can critically, creatively, collaboratively, and communicatively manage it among their classmates, facilitated or accompanied by teachers. Thus, through habitual independent processing, the competencies required in the 21st century can indirectly be fulfilled and solidly built in students when conducting AI technology-based project learning. This means it can serve as their guide to continue advancing and facing present and future challenges.

Project-based learning involving AI technology is designed with activities that are related to what will be done based on the contributions and suggestions provided by students, so during the planning of project implementation activities, students are involved. Mahtumi et al (2022, hal. 28) state that project-based learning activities include methods that utilize a project or an activity as a medium, in which students carry out stages ranging from exploration, assessment, interpretation, synthesis, and there is information so as to obtain various forms of learning outcomes. This method also provides great opportunities for teachers to organize the course of learning activities in the classroom, certainly by implementing a project within it.

A project undertaken always involves work carried out by several individuals and directly

engaged by relevant parties. Through the implementation of AI-based project-based learning, students can gain several meaningful aspects. This aligns with Permana & Astawa (2020) assertion that the application of project-based learning can significantly influence students' attitudes and positively impact their learning processes. It can be stated that efforts to implement project-based learning, especially based on AI technology in the 21st century, are indeed highly necessary. It is also known that AI technology, with its capabilities, is very helpful. As expressed by Anas & Zakir (2024) facing the challenge of building 21st-century skills with AI can make the learning environment dynamic and responsive, thus facilitating students in many aspects, including understanding subject matter, building character, and acquiring the skills needed for success in the era's development. Furthermore, in addition to keeping pace with technological advancements, students also gain an advantage for the future, navigating through the myriad challenges ahead.

Then, from the teachers' side, the use of AI brings several advantages, as expressed by Zahara et al (2023) that with the presence of AI, it can assist in the process of designing learning activities that are tailored to students' needs, both in terms of discussion created according to competencies, students' learning styles, and even up to students' experiences. Furthermore, it provides learning profiles for each student, besides assisting teachers in all aspects, including administrative matters such as final grades determined according to the existing criteria, the creation of active learning activities, and aiding both teachers and students during learning activities. This is also supported by Karyadi (2023) statement that the use of AI greatly assists in enhancing students' competencies and knowledge in the field of education. AI can be utilized not only during school learning activities but also during self-study. This does not mean that AI replaces the role of teachers, but rather serves as a supportive medium during learning activities. This perspective also considers the urgency of a teacher's role as an educator, mentor, and trainer in shaping students' competencies, knowledge, and morals. Throughout history, the presence of AI in education has directed efforts towards continuous utilization of AI benefits to achieve educational goals (Abimanto & Mahendro, 2023). This explanation clarifies that the positive impact of AI usage in education extends beyond just teachers and students to encompass other elements within it. This signifies that AI technology as a medium facilitates the attainment of existing educational objectives in an educational institution, thus demonstrating the high urgency of implementing AI-based project learning.

5. Discussion

This research indicates the varying levels of urgency in implementing AI-based project learning, particularly in the 21st century, encompassing all aspects of education regarding the benefits AI provides. The key point is that AI technology serves merely as a medium in learning activities, not as a replacement for an educator. Previous research also supports this view, as stated by Firdaus et al., (2023) in the realm of education, AI cannot replace the role of educators. Although AI can guide and provide feedback, the role of educators in directing, inspiring, and offering real-life experiences cannot be replaced. Therefore, a balance between technology and the human role is essential in creating beneficial learning experiences. Hence, with the irreplaceable role of educators, project-based learning is crucial, especially using AI technology. The presence of teachers can offer guidance, direction, and other forms of support as facilitators, while AI serves as a medium, and students actively engage in using AI,

equipping them to face life in the 21st century and beyond.

6. Conclusion, Implication, and Recommendation

This research contributes theoretically, particularly to educational activities, by providing information on the importance of using AI technology supported by project-based learning models. These models help develop and sustain 21st-century skills, with quality assistance from teachers as facilitators in the learning process. However, special attention is also needed to understand the beneficial impacts of this research. It is expected to offer future benefits as a reference for building technology-based educational activities, enabling wise and precise decisions regarding the learning models and supporting technological media used for subsequent research.

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