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The Influence of Artificial Intelligence (Ai) in the Teaching and Learning Process (PDPC) to Enhance Student Motivation: A Systematic Literature Review

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Abstract

Artificial Intelligence (AI) has increasingly garnered attention within the global education landscape due to its potential to transform the teaching and learning process in a comprehensive manner. AI is capable of offering more personalised teaching approaches by adapting content and delivery methods according to individual students' proficiency levels, interests, and needs. It can analyse student performance in real time and provide immediate, targeted feedback, thereby enhancing students' motivation to remain focused during learning sessions.This systematic literature review aims to critically examine and analyse the influence of Artificial Intelligence (AI) on the teaching and learning process, as well as its impact on student motivation. Scholarly databases such as Google Scholar, the Educational Resource Information Centre (ERIC), and Semantic Scholar were utilised to access relevant articles published within the last five years (2020–2025). A total of 156 articles were identified during the initial screening phase, and 13 were selected for synthesis as they met the specific contextual criteria of the systematic literature review, conducted in accordance with the stages outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) model.Findings from the review indicate a notable increase in both intrinsic and extrinsic motivation among students engaged in learning sessions that incorporate AI elements, particularly through the use of digital applications such as ChatGPT, Chatbot, Moodle, Ask AI, Image AI, Padlet, and others. These findings further substantiate the assertion that AI significantly contributes to enhancing students' motivation during the teaching and learning process.The scope of this study specifically focuses on primary-level students to examine the influence of AI in the classroom context, thereby demonstrating the capacity of Artificial Intelligence to serve as a paradigm shift in fostering student motivation and cultivating a more productive teaching and learning environment.

Keywords: Artificial Intelligence (Ai), Teaching And Learning Sessions (Pdpc), Student Motivation, Digital Applications

Introduction

Artificial intelligence (AI) is a computer or machine-based system technology that uses algorithms to imitate human intelligence. Among the advantages of AI are its ability to collect and analyse complex data, perform natural language processing, recognise speech, and make predictions (Wang, 2019). According to a previous study by Campesato (2020), AI technology is often associated with machine learning (ML) and deep learning (DL). However, artificial intelligence, machine learning, and deep learning have different concepts. Machine learning is a subset of AI that enables systems to recognise patterns, learn independently, and make data-based decisions, whereas DL is a specialised field within ML. This means that all ML and DL are part of AI, but not all AI involves ML and DL (Zuckerman, 2022).

According to Bashir (2022), AI consists of various components, techniques, and subfields that work together to enable machines to simulate human intelligence, as illustrated in Figure 1. The following are some of the major branches of AI:

- Machine Learning: The process of training algorithms to learn patterns from data and make predictions or decisions. This includes supervised learning, unsupervised learning, and reinforcement learning.
- Natural Language Processing: Enables machines to understand, interpret, and generate human language. It is used in applications such as chatbots, language translation, sentiment analysis, and many others.
- Expert Systems: AI systems that imitate human capabilities in making decisions within a particular domain. These systems use rules, domain knowledge, and data processing to provide solutions or recommendations similar to those made by humans.
- Robotics: Enables machines to interact with and provide feedback. This includes tasks such as navigation, manipulation, object recognition, and others.
- Planning: Generates a sequence of actions to achieve a particular goal. It is commonly used in robotics, digital games, and logistics.
- Vision: The ability of machines to interpret and understand visual information from the real world. It is used in tasks such as image recognition, object detection, and facial recognition.
- Speech Recognition: An AI technology that enables computers or machines to understand and interpret spoken language. It involves converting spoken words into text, allowing computers to process and analyse human speech.

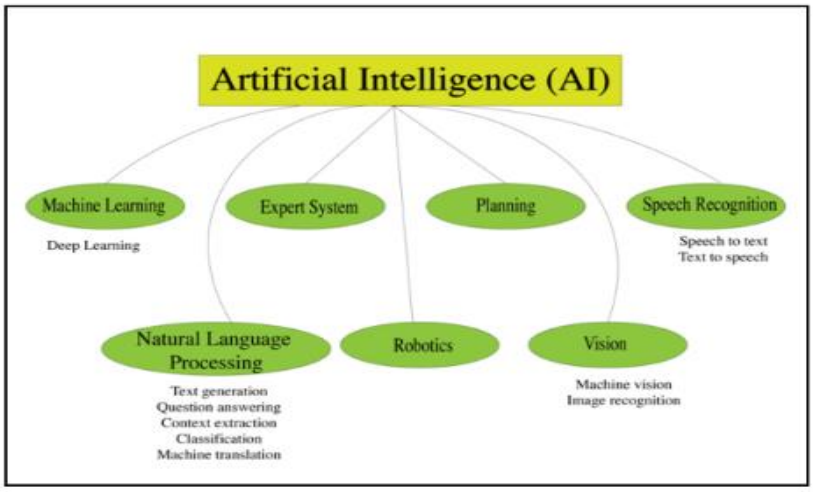


Figure 1 Subfields of Artificial Intelligence

The Concept of Artificial Intelligence in Education

The rapid development of computer science and technology has led to the rapid evolution of AI technology, particularly in education. The development of AI applications in education, for example, the "PLATO" (Programmed Logic for Automated Teaching Operations) project, represents one of the earliest AI applications created in the history of education in the early 1960s. PLATO was an interactive computer system used in various educational courses. PLATO is recognised as one of the early examples of the use of computer technology and AI elements in education at that time (Papangelis et al., 2020). During the 1970s and 1980s, there was an increase in the development of computer-based educational software that incorporated AI techniques such as expert systems to provide guidance and advice to students. There was also an increase in systems based on learning and teaching theories, such as tutoring models and computer-based learning systems. Since then, the use of AI in education has continued to develop with the introduction of technologies such as data-driven learning, adaptive learning tailored to students' needs, speech recognition for language teaching, and others.

AI in education has opened up new opportunities for adaptive forms of learning, the development of curricula that are aligned with industry needs, effective career guidance, and the development of effective learning resources. In line with the objectives of the Malaysian Education Blueprint (PPPM 2013–2025), the Ministry of Education Malaysia (MOE) has introduced digital learning, which is a process in which teachers use digital technology to achieve objectives during the teaching and learning process (Dnan & Usnin, 2024). The evolution of digital transformation in education involves complex interactions encompassing extensive modifications at every level of the educational process. The education sector is one of the key elements in realising the objectives of the Fourth Industrial Revolution (IR 4.0). This approach may utilise appropriate digital technology-based methods in the teaching and learning process (PdPc), in line with advances in automation strategies to address competitive challenges while remaining relevant in specific occupational fields (Ismail et al., 2020). In line with this evolution, the Ministry of Education Malaysia, together with the Ministry of Higher Education Malaysia, introduced the Education 4.0 agenda in response to these changes. The term "Education 4.0" is generally used by educators to describe various approaches to integrating automation and cyber technologies into teaching and learning sessions, whether conducted physically or otherwise (Syakhrani, 2019).

Several new standards have been established within the national education system, including a flexible curriculum framework, comprehensive industry engagement, active use of technology in learning, 21st-century skills, and flexible transformative pedagogical and learning approaches to produce competitive and competent graduates. In this regard, educators should utilise digital technology in line with the increasingly rapid pace of digital transformation in education, as new technologies such as cloud computing and artificial intelligence continue to develop to facilitate the implementation of this educational transformation (Cope et al., 2021).

Student Motivation

Student motivation is an important factor in determining the effectiveness of the learning process. Recent studies indicate that learning motivation depends not only on students' internal characteristics but is also influenced by the learning environment, teachers' approaches, and teaching methods employed. This is supported by Mahad, Magesvaran, and

Hamzah (2021), who stated that student motivation refers to the internal drive that encourages students to actively engage in learning, which can be influenced by factors such as positive attitudes towards a subject and the teaching methods used.

Nasir (2022) further stated that teachers with good pedagogical skills and mastery of educational technology are able to enhance student motivation, particularly in learning environments that have changed as a result of the pandemic. Teachers' ability to deliver engaging and relevant instruction is viewed as a catalyst for active student engagement in the classroom. Overall, recent literature emphasises that student motivation should not be viewed as a static entity; rather, it is highly dynamic and influenced by various contextual factors. Therefore, teaching approaches that are inclusive, innovative, and responsive to students' needs are essential to ensure that learning motivation is maintained and enhanced.

Artificial Intelligence (AI), Teaching and Learning Processes, and Student Motivation

The integration of Artificial Intelligence (AI) into education has brought about significant transformations in the teaching and learning process (PdPc). AI plays a role in personalising learning experiences, improving teaching effectiveness, and subsequently influencing students' levels of motivation. According to Fatimah and Santiana (2017), technology applications can influence students' behaviour by increasing their interest in teachers' instruction. Samsudin et al. (2024) further found that AI applications can increase students' interest, diversify teaching techniques, and facilitate the search for learning materials. This approach can directly foster students' intrinsic motivation as they perceive learning to be more relevant, enjoyable, and suited to their needs.

Therefore, the application of AI in PdPc influences student motivation. Based on statistics reported by Fakhitah (2024) through newspaper reports, the increasing adoption of AI in the learning process demonstrates a drastic increase in users within a short period, with users gaining access through various AI-based digital platforms, particularly among higher education students. However, the actual effects of AI use on school students' motivation remain a question that requires further investigation through rigorous scholarly research.

Several recent studies have also reported varied findings regarding the relationship between AI and student motivation. For example, a study by Henze, Andre, and Becker (2024) found that the use of AI in physics data analysis increased students' motivation and reduced their learning-related stress. In contrast, a Gallup survey conducted in April 2025 reported that 40% of Generation Z individuals felt anxious about the use of AI, with some expressing concerns that AI's capabilities could surpass human intellectual abilities.

Therefore, this study aims to systematically examine the influence of AI in teaching and learning on student motivation, taking into consideration students' varying abilities. A deeper understanding of this aspect is important to ensure that AI integration in education can be implemented effectively and ethically, while genuinely benefiting students' motivation and achievement.

Research Objectives

This systematic literature review is conducted based on the following objectives:

i. To explore the applications of artificial intelligence (AI) in enhancing student motivation within the context of teaching and learning (PdPc).
ii. To identify the influence of artificial intelligence (AI) use in enhancing student motivation within the context of teaching and learning (PdPc).

Research Methodology

This systematic literature review employed the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) method. The PRISMA model was used as a guideline in the article selection process to ensure alignment with the research questions. This model enables the review to be reported in detail, thereby ensuring the transparency, reliability, and validity of the findings. The model comprises four main stages: identification of articles, screening, eligibility assessment and inclusion. Each stage must be carried out systematically in accordance with the specified sequence.

Article Search Strategy

This systematic literature review employed the PRISMA model to identify relevant online articles. The researcher used three databases to locate articles that addressed the research questions. The primary databases used were Google Scholar, Educational Resource Information Centre (ERIC) and Semantic Scholar. Searching through these databases facilitated the literature search, as they are systematic and holistic platforms for collecting scholarly sources. The systematic literature review was guided by the research objectives and questions. Therefore, the article search strategy across all three databases involved the use of keywords, as shown in the table 1.

Table 1
Article Search Strategy Through Databases

Database	Keywords
Google Scholar	Artificial Intelligence School Student Motivation Teaching and Learning Process
ERIC	Artificial Intelligence School Student Motivation Teaching and Learning Process
Semantic Scholars	Artificial Intelligence School Student Motivation Teaching and Learning Process

Article Selection Criteria

Kajian literatur sistematik melibatkan penelitian sumber literatur yang memerlukan penetapan set A systematic literature review involves an in-depth examination of sources, requiring the establishment of focused and strategic criteria to ensure the study is conducted effectively (Xio & Watson, 2019). Therefore, inclusion and exclusion criteria were determined, as shown in Table 2. These criteria are essential for selecting studies that meet specific quality standards, such as a robust research design, adequate sample size and appropriate methodology. This reduces the risk of including weak or biased studies in the analysis. Additionally, setting such criteria enables the systematic review to be replicated by other

researchers who wish to repeat or validate the findings (Reksa, Novaliyosi and Aan Hendrayana,2024).

Table 2
Article Selection Criteria

Criteria	Inclusion	Exclusion
Type of Literature	Empirical studies (survey studies, case studies, quantitative studies, qualitative studies, case-based research)	Books, conference papers, working papers, analytical studies, normative studies, documentation studies
Study Context	Artificial intelligence in school students Student motivation Teaching and learning process	General artificial intelligence General motivation Lectures (higher education students) and workplace environments
Year of Publication	Publications from the past five years (2020 to 2025) only	Publications from 2019 and earlier
Language	Written in Malay, Indonesian and English	Written in languages other than Malay and English
Access	Full access available	No full access available

Based on Table 2, five selection criteria were established: type of literature, study context, year of publication, language used and accessibility of the articles. Only empirical studies those based on data collected through experiments, observations, surveys or interviews to test hypotheses or answer research questions were accepted. Theses, books and studies that rely on theoretical analysis, concepts or secondary sources were excluded. The study context was limited to artificial intelligence, motivation and the teaching and learning process, as the research objectives focused on school students at the primary and secondary levels. Articles that discussed the three main keywords in general without focusing on the target group (students) were excluded.

Articles published between 2020 and 2025 were selected to ensure the data and information obtained were relevant and accurate. This is because artificial intelligence (AI) is dynamic and subject to various external and internal influencing factors. Furthermore, according to Farhana, Norhana and Chin (2020), referencing current studies provides more effective and comprehensive insights for both researchers and readers. Articles written in Malay and English were accepted to allow exploration of findings involving students both locally and internationally. The final criterion was the accessibility of the articles. The selected articles had to be fully accessible to the researcher through the three main databases: Google Scholar, ERIC and Semantic Scholar.

Article Selection Process

The article selection process was based on the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) model as referenced in the study by Azira and Wan (2022).

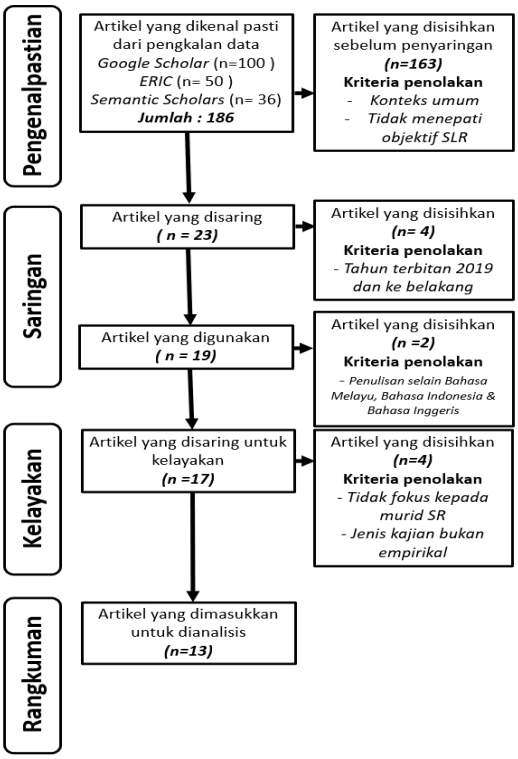


Figure 2 Flowchart of the Article Selection Process Using the PRISMA Model

Identification Stage

The article selection process applied the PRISMA model and was conducted using three databases: Google Scholar, ERIC and Semantic Scholar. A total of 186 articles were initially identified during the identification stage, comprising 100 articles from Google Scholar, 50 from ERIC and 36 from Semantic Scholar. A total of 163 articles were excluded at this stage as they did not specifically align with the research objectives and questions, and were too general in addressing student motivation.

Screening Stage

Following the identification stage, only 23 articles remained that were not overly general and focused on the context of the study. The use of keywords such as 'artificial intelligence (AI) for students' and 'student motivation' led to the exclusion of 10 articles during the first and second screenings, as these did not meet the study criteria due to being published before 2020 or written in languages other than Malay, Indonesian and English. As a result, 17 articles proceeded to the eligibility stage.

Eligibility Stage

At the eligibility stage, 4 more articles were excluded because they did not focus on primary or elementary school students, and the study types were not empirical. This exclusion was necessary as the focus of the review was on school teachers and primary-level students using AI as a tool to enhance student motivation.

Inclusion Stage

A total of 13 articles were included at the final stage, having met all the criteria based on the objectives and research questions of this systematic literature review, as shown in Figure 3.

All selected studies were thoroughly reviewed to generate the findings that answer the research objectives. The articles chosen for analysis are listed in Table 3 below.

Table 3
Articles Included for Eligibility

Kajian	Penulis	Metadologi	Pengkalan Data	Reka bentuk kajian
1	Difa Dewi Ayu Arvi Nurizza Ardhiansyah & Dadang Widodo https://doi.org/10.31316/icasse.v1i1.6913	Questionnaire Observation Sample: 90 students in Rejotangan	Google Scholar	Mix method
2	Ong,S,W & Faridah Mydin https://doi.org/10.47405/mjssh.v7i3.1366	Questionnaire, Pre-post Test, Interview Sample: 4 remedial students	Google Scholar	Mix method
3	Ariya Azamatova, Nuraisha Bekeyeva, Kulyay Zhaxylikova,Arailyn Sarbassova & Nagima Ilyassova https://doi.org/10.46328/ijemst.3712	Pre and Post Test, Questionnaire Sample: 100 students in the Astana district	ERIC	Quantitative
4	Sergio Ruiz Viruel, Enruque Rivas & Julio Ruiz https://doi.org/10.3390/educsci15020150	Questionnaire Sample: 300 teachers in the Malaga area	Google Scholar	Quantitative
5	Udhwa Rani, Nurin Roslan & Syafiqah Wahid https://spaj.ukm.my/jpbm/index.php/jpbm/article/view/394	Interview, Observation Sample: 107 teachers in the Gombak area	Google Scholar	Qualitative
6	Naila Ishmatun, Atmoko Adi & Radeni Sukma & Wahju Kusumjati https://repository.um-surabaya.ac.id/8449/	Data Triangulation (Interview)	ERIC	Quantitative

		Sample: 2 students from an Islamic Primary School		
7	Venessa Iywon & Nurfaradillah Nasri https://myjms.mohe.gov.my/index.php/ijeap/article/view/11910	Observation, Interview, Document Analysis Sample: 288 teachers in the Serian district	ERIC	Qualitative
8	Selvina, R, Titik, R & Adi Sumarsono https://doi.org/10.1016/j.caeai.2020.100006	Questionnaire, Observation Sample: 75 students in the Bandung district	Google Scholar	Mix method
9	Pei,Y,L, Ching,S, C et.al https://doi.org/10.1016/j.caeai.2020.100006	Questionnaire Sample: 420 students in the Beijing area	Google Scholar	Quantitative
10	Hassan Imran, Shahid Nadeem & Luqman Khan https://doi.org/10.62476/soc.2149	Questionnaire, Pre and Post Test Sample: 200 students across Pakistan	Semantic Scholars	Quantitative
11	Younes,A, B, Hicham Moucif & Belaid, B https://doi.org/10.3991/ijep.v13i8.40853	Questionnaire Sample: 150 teachers registered in e-learning platforms	Semantic Scholars	Quantitative

12	Chin,T,K, Moorhouse,B,L & Ismail Mohd https://doi.org/10.1080/10494820.2023.2172044	Questionnaire Sample: 200 teachers using Chatbots	Semantic Scholars	Quantitative
13	Regina K, Simon, J & Sandra Juky https://spaj.ukm.my/jpbm/index.php/jpbm/article/view/397	Questionnaire Sample: 105 Malay language teachers in the Kapit and Song districts	Google Scholar	Quantitative

Data Collection and Data Analysis

The data collection and analysis process was carried out on 13 articles that had undergone the four stages of article selection. Based on the researcher's analysis, there were seven quantitative studies, three qualitative studies and three mixed method studies. All articles were analysed with a focus on the research questions of the literature review. The analysis revealed a variety of sample types (study participants), including students from urban schools, rural schools and international contexts. This is because the implementation of artificial intelligence (AI) elements has begun to take place across various groups in schools, including students. Table 4 provides a more detailed overview of the types of research designs and the databases used in this systematic literature review.

Table 4
Number of Research Designs by Database

Research Design	Pengkalan data		
	Google Scholar	ERIC	Semantic Scholars
Qualitative	2	1	0
Kuantitatif	2	2	3
Mix method	2	0	1

Research Finding

Objective 1: The Application of Artificial Intelligence (AI) to Enhance Student Motivation in the Teaching and Learning Context

Based on the databases used Google Scholar, ERIC and Semantic Scholar studies related to the application of artificial intelligence (AI) in the teaching and learning context to enhance student motivation have been widely conducted both locally and internationally. Table 5 presents a summary of the 13 analysed articles, focusing on two main aspects aligned with the research questions of this systematic literature review. The table below summarises the findings with specific emphasis on the objective, which is the application of artificial intelligence (AI) to enhance student motivation within the context of teaching and learning.

Table 5
Summary of Article Analysis on the Application of A

Study	AI Application Used (Findings)	Increase in Motivation in Teaching and Learning
1	ChatGPT,Ask AI, Chatbot, Videoeditor & Image AI	Yes
2	Augmented Reality	Yes
3	Kahoot!, LearningApps, Padlet, Flipgrid, Nearpod, Socrative!, Duolingo & ClassDojo	Yes
4	ChatGPT	Yes
5	Chatbot	Yes
6	ChatGPT & Bing	Yes
7	ChatGPT	Yes
8	ChatGPT, Ask AI & Chatbot	Yes
9	AI-Generated Characters	Yes
10	Aplikasi berunsur AI (umum)	Yes
11	Moodle, Gamifiction	Yes
12	Chatbot	Yes
13	ChatGPT & Quill Bot	Yes

Artificial Intelligence (AI) is now one of the key technologies driving the transformation of global education.

In the context of teaching and learning, AI offers various benefits that can enhance teachers' instructional methods, enrich students' learning experiences and increase the overall effectiveness of education (OECD, 2021). Through adaptive learning systems, AI can analyse student performance and recommend suitable materials or activities to assist struggling students or reinforce knowledge for others. Various AI-based applications and platforms have been implemented and studied, as identified in the analysed articles, to enhance student motivation. The table above provides a brief summary of the AI applications used by teachers and students during teaching and learning sessions to ensure a more effective learning process and, ultimately, boost student motivation.

Based on Table 4, most studies utilised ChatGPT and chatbots as tools during the teaching and learning process. These adaptive and dynamic applications are capable of automatically answering students' questions, explaining concepts and guiding them through specific tasks. Additionally, AI applications such as Quillionz, used in the study Development of a Sustainable Learning Environment: The Role of Artificial Intelligence in Education by Habsah, Nurfirdaus and Vatrisya (2024), enabled automatic assessment of student work, including objective quizzes and essays, thereby accelerating the grading process and saving teachers time.

Furthermore, the study by Younes and Belaid (2023) applied AI within the teaching and learning context using Moodle, a learning management system (LMS) that can be integrated

with AI features such as learning analytics and content adaptation. The systematic literature review also revealed the use of AI tools for editing and displaying visually engaging and interactive videos and images, including applications like DALL·E, Canva and Deep Dream Generator, aimed at enhancing student motivation.

Most of the analysed articles explicitly identified the AI applications used and the methods of implementation in schools, highlighting their impact on student motivation. AI in education has been enriched with a wide range of tools, from information retrieval systems and interactive quiz creation to virtual reality-based learning and multimedia production. Based on this systematic literature review, the implementation of such AI applications has been proven to positively impact learning by making it more effective and proactive while also creating a fun and engaging educational environment.

Objective 2:The Influence of Artificial Intelligence (AI) Use in Enhancing Student Motivation in Teaching and Learning

In the digital education era, the use of AI is increasingly being adopted in classrooms as an innovative instructional tool. AI not only facilitates information delivery but also stimulates student interest and engagement in a more interactive and personalised manner. Through intelligent applications such as adaptive learning systems, virtual assistants and interactive quizzes, AI creates a more engaging and responsive learning environment. Therefore, this systematic literature review focused on how the use of AI influences and enhances student motivation in the teaching and learning process. Table 6 presents statements from each study's findings that indicate the influence and impact of AI on students' motivation levels during learning. This table focuses specifically on how AI use contributes to increasing student motivation within the teaching and learning context. Three patterns of findings were identified to observe the influence of AI: perception or behaviour, significant relationships and percentage comparisons.

Table 6
Summary of Findings Statements from Each Study Showing the Influence of AI on Student Motivation

Study	Influence of AI Use in Enhancing Student Motivation in Teaching and Learning	Pattern of Findings/Theme
1	"Motivasi murid apabila menggunakan aplikasi AI berada pada tahap yang tinggi dengan nilai min 4.65. Peningakatan motivasi menjadikan murid lebih rajin menyiapkan soalan dan latihan, memperuntukkn masa khas untuk belajar, tertarik dengan soalan dan pertanyaan dengan kaedah pelajaran (menggunakan AI)."	• Significant relationship between AI and student motivation
2	• "Dapatan kajian ini membukti bahawa murid pemulihan berasa penggunaan AR adalah relevan dengan kehidupan harian mereka." • "Dapatan kajian ini membukti bahawa keyakinan murid pemulihan selepas menggunakan AR dalam penulisan adalah tinggi." • "Murid pemulihan menunjukkan tahap autonomi yang tinggi kerana diberi peluang untuk membina objek maya AR dalam konteks penulisan mengikut kreativiti dan imaginasi sendiri."	• Significant relationship between AI and student motivation

3	• "Digital tools and artificial intelligence applications were carried out within the framework of the project-based learning approach, was more positive than the motivation of the students in the control group." • "This finding shows that teaching with digital tools and artificial intelligence applications within the framework of the project-based learning approach is effective in making students exhibit more positive motivation towards lessons."	• Percentage comparison (motivation) between control group (using AI) and non-control group (without AI)
4	• "Hubungan antara ChatGPT dan motivasi belajar ini dinyatakan sebagai hubungan positif." • "Terdapat pengaruh media pembelajaran ChatGPT terhadap motivasi belajar murid kelas X" • Pembelajaran yang menarik melalui media pembelajaran (AI) yang digunakan oleh guru meningkatkan semangat murid dalam mengikuti proses pembelajaran."	• Hubungan signifikan antara AI dan motivasi murid
5	• "Penerapan teknologi AI ini bukan sekadar meningkatkan efektiviti pembelajaran tetapi juga mencipta pengalaman belajar yang lebih menarik dan memotivasikan murid untuk terlibat aktif dalam proses pembelajaran." • "Integrasi Kecerdasan Buatan (AI) menawarkan akses pantas bagi sumber pembelajaran yang holistik dan secara langsung meningkatkan motivasi belajar murid."	• Student perception or behaviour
6	• "The study accentuates the crucial need for exploring motivational dimensions linked to AI utilization." • "In AI-based learning environments, teacher support emerges as a critical determinant in shaping student motivation."	• Student perception or behaviour
7	• "Students who use AI out of pure interest, curiosity, or enjoyment, seeking to go beyond the curriculum and enrich their learning experience with AI, represent intrinsic motivation." • "The data from student interviews and assignments reflects, the adoption of AI for genuine learning and curiosity aligns with intrinsic motivation."	• Student perception or behaviour
8	• "Hasil penelitian menunjukkan bahwa AI dapat memberikan impak secara positif terhadap motivasi belajar siswa melalui beberapa kaedah." • "Berdasarkan data yang telah dikumpulkan dan setelah dikaji, hasil tinjauan penggunaan kecerdasan dan motivasi mempunyai hubungan yang siginifikan dengan pearson correlation 1.00 (implimentasi AI) dan 0.960 (motivasi)."	• Significant relationship between AI and student motivation
9	• "One potential benefit of AI-generated character could be used to personalize and motivate learning experiences by using characters that a student likes or admires and get excitement in learning." • "Based on reaseach, student who liked the instructor created by AI were significantly more motivated to pay attention to the lesson (p = 0.0085) and would like to learn more advanced material from this instructor."	• Significant relationship between AI and student motivation

10	• "The results of this study demonstrate that AI personalized learning significantly enhances both student motivation and academic performance contrasted with conventional learning strategies." • "These findings demonstrate the superior effectiveness of AI personalized learning in enhancing motivation and academic performance."	• Percentage comparison (motivation) between control group (using AI) and non-control group (without AI)
11	• "Similar trends were seen in terms of motivation, where 89% of students in the gamified group felt motivated to do their best compared to 54% in the traditional group." • "These findings clearly indicate the potential of gamification to boost student engagement and motivation, a critical aspect of successful learning and retention."	• Percentage comparison (motivation) between control group (using AI) and non-control group (without AI)
12	• "For the intrinsic motivation, there was significant between AI (using Chatbot) and intrinsic motivation with pearson correlation 0.600 and 1.00." • "Teacher's support while using Chatbot effectively increase intrinsic motivation of student."	• Significant relationship between AI and student motivation
13	• "Berdasarkan data yang diberikan, dapat dilihat bahawa kebanyakan responden menunjukkan sikap positif terhadap teknologi Kecerdasan Buatan (AI) dengan skor purata 3.7893." • "Murid juga merasa puas ketika mengakses teknologi AI seperti ChatGPT dan Quillbot, dengan skor purata 4.7373."	• Significant relationship between AI and student motivation

Significant Relationship Between AI and Student Motivation

Table 6 illustrates the influence of AI in enhancing students' motivation levels. The use of AI-based applications and platforms was proven in the findings of all the analysed studies. Study 1 reported a mean score of 4.65, demonstrating that AI effectively assisted students in completing tasks and helped them manage their study time systematically. This study also highlighted that students appeared more engaged with AI-based questioning methods through applications such as ChatGPT, Ask AI, Chatbot, Video Editor and Image AI.Based on the findings from Study 2, the use of Augmented Reality (AR) was found to increase students' autonomy in creating virtual objects during writing activities. The results also indicated that AI-based AR was perceived as relevant and successfully improved students' confidence and motivation to write. Study 4, which used ChatGPT, reported that the learning media positively influenced Class X students. The researchers stated that "the relationship between ChatGPT and learning motivation is described as a positive one." This was further supported by Study 8, which revealed a significant relationship between motivation and artificial intelligence, with Pearson correlation values of 1.00 and 0.960.

Student Perception or Behaviour

Study 5 showed that the integration of AI not only enhanced effectiveness in teaching and learning but also provided students with a more engaging learning experience through

broader and faster access and more holistic and realistic exploration. Study 6 found that while AI could raise student motivation, it required teachers to act as facilitators. Issues of plagiarism and misinformation also needed to be addressed appropriately. This study stressed the need for AI in learning through the statement, "the study accentuates the crucial need for exploring motivational dimensions linked to AI utilization."

In Study 7, the researcher noted, "the data from student interviews and assignments reflects, the adoption of AI for genuine learning and curiosity aligns with intrinsic motivation." This confirms the significant relationship between AI and student motivation. According to the researcher, students with interest, enthusiasm and enjoyment in using AI elements in learning were more likely to improve performance and develop intrinsic motivation.

Percentage Comparison of Motivation Between Control and Non-Control Groups

According to Study 3, student motivation during the application of AI in project-based learning showed a positive increase. This study also conducted a comparison between the experimental group and the control group (without AI). The researcher stated that "artificial intelligence applications were carried out within the framework of the project-based learning approach, was more positive than the motivation of the students in the control group." This indicates that the use of AI in student learning leads to stronger motivation to produce creative and innovative projects. Study 10 also stated that "AI personalized learning significantly enhances both student motivation and academic performance contrasted with conventional learning strategies." This proves that digital learning using AI is more effective in increasing student motivation compared to conventional learning strategies.

The effectiveness of AI-based digital learning in improving student motivation was also addressed in Study 11, with findings showing that 89% of students who used AI (such as Moodle and gamification) were more interested in learning compared to 54% in traditional teaching sessions. Overall, the influence of artificial intelligence (AI) in enhancing student motivation in teaching and learning has been clearly demonstrated in all the analysed studies. The findings show a significant relationship and positive perceptions regarding the adaptation of AI and student motivation. Researchers presented these findings based on diverse respondents and a variety of AI applications. Indirectly, this has answered both research questions through the systematic literature review of 13 selected articles (inclusion) that focused on AI and student motivation in the teaching and learning process.

Discussion

Application of Artificial Intelligence (AI) to Increase Student Motivation in the Context of Teaching and Learning (PdPc)

In the analysis of this study, among the widely used AI applications are ChatGPT and educational Chatbots. Interestingly, students show a higher tendency to use these applications compared to other learning platforms—a trend that warrants critical examination, as it offers a clear insight into current learning needs and priorities. One of the main factors driving students to choose ChatGPT is the accessibility and user-friendly interface offered by the platform. Unlike certain learning software that requires high technical skill or complex login procedures, ChatGPT can be easily accessed via web browsers or mobile applications without requiring additional software installations. This feature makes it more

inclusive, particularly for students with technological limitations or less exposure to advanced digital skills.

Furthermore, perceptions regarding the reliability of the information provided by ChatGPT play a significant role in influencing student choices. A study by Yu, Yan & Cai (2024) found that information reliability is a key determining factor in shaping positive attitudes and the intention to continuously use ChatGPT among students. This indicates that students use ChatGPT not merely for technical convenience, but also because they trust the validity of the content presented. This reinforces the need for ChatGPT content to be continuously updated, reviewed, and monitored to ensure the accuracy of the information provided. More importantly, ChatGPT supports the principles of personalized learning. Students are no longer bound by the teacher's schedule or pace of instruction; instead, they can learn at their own pace and style. This flexible learning experience aligns well with 21st-century learning concepts that emphasize student autonomy and self-directed approaches. Zhang (2024) noted that ChatGPT functions as a personal tutor, providing immediate guidance and feedback that enables students to correct errors and directly strengthen their understanding. This makes ChatGPT an effective learning aid in supporting students with varying ability levels.

The Influence of Artificial Intelligence (AI) Usage on Increasing Student Motivation in PdPc

Various recent studies show that AI generally has the potential to boost student motivation in teaching and learning. Hidir, Nazlena, Syahmi, and Farahin (2023) found that AI-based applications help students set learning goals, evaluate performance in real-time, and receive immediate feedback. Collectively, these factors drive an increase in intrinsic motivation because students better understand their progress and feel individually attended to. Furthermore, AI's ability to adapt content based on individual capability levels plays a crucial role in ensuring inclusive learning. Low-performing students do not feel left behind because content is tailored to their abilities, while high-achieving students are continuously encouraged to explore more challenging content. This situation supports student-centered teaching principles that are effective and responsive to diverse learning needs.

A literature review by Hapsari, Ramadhan, and Ikramullah (2024) states that the use of AI in teaching and learning activities is proven to create a more engaging and innovative learning experience, which in turn increases student satisfaction and interest. This satisfaction and interest serve as key drivers of motivation, especially among primary school students who are still developing their attitudes toward learning. Overall, AI can no longer be viewed merely as a supporting technology; rather, it acts as a primary catalyst for transformation in teaching and learning approaches. The integration of ChatGPT and Chatbots has demonstrated great potential in enhancing the quality of the learning experience and fostering student motivation through personalization, instant feedback, and active engagement. Nevertheless, challenges such as reliance on machines, academic ethics issues, and a lack of AI literacy among teachers must still be addressed seriously. Therefore, educators and policymakers should formulate a balanced strategy between AI utilization and active teacher involvement, ensuring the full potential of this technology is harnessed without neglecting values, human guidance, and critical thinking in education.

Research Limitations and Recommendations

An analysis of 13 articles provides a comprehensive overview of the role of AI in increasing student motivation; however, several limitations must be acknowledged. These include:

- Most analyzed studies used quantitative or qualitative approaches in isolation without adopting a mixed-methods research design, which could potentially offer a more holistic view of students' experiences using AI.
- The primary focus of past studies leaned heavily toward AI's effectiveness in terms of academic performance alone, whereas other affective dimensions—such as emotional engagement, learning resilience, and student identity formation—were less thoroughly examined.
- Rapid technological advancement means that past study findings may not reflect present realities, as the AI platforms and applications used by students evolve quickly over time.

Based on the identified limitations, several recommendations for future research are proposed to strengthen the existing literature:

- Future research should employ a mixed-methods design to integrate quantitative data (such as motivation scores and academic achievement) with qualitative data (such as students' learning experiences) for a more comprehensive understanding of AI's impact.
- There is an urgent need to explore the long-term implications of AI use on students' affective and social domains, including technology dependency levels and the ability to think independently and critically. Additionally, future studies could evaluate the impact of professional training for teachers on applying AI pedagogically, as skilled teacher support serves as a key catalyst for successful technology integration in PdPc.
- An increasingly relevant area of study is the ethical use of AI in education, including student data privacy, equitable access, and the balance between the teacher's role and technology. Such research is essential to ensure AI serves as an educational enhancer rather than a replacement for human presence in the learning process.

Conclusion

Overall, this systematic literature review indicates that artificial intelligence (AI) plays an increasingly significant role in enhancing the teaching and learning process (PdPc) across various educational levels. Findings from the analyzed studies show that implementing AI in PdPc not only improves teaching effectiveness but also positively impacts student motivation. AI is capable of delivering more personalized, interactive, and responsive learning approaches, thereby creating a more engaging and meaningful learning environment. Furthermore, AI assists teachers in systematically analyzing student mastery levels and recommending relevant interventions to improve achievement. In conclusion, this study recommends that AI integration in PdPc be implemented thoughtfully, grounded in appropriate pedagogical approaches, so that the true potential of AI in driving student motivation and learning can be fully realized.

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