

Learning Motivation via Artificial Intelligence: A Bibliometric and Systematic Literature Analysis

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v14-i7/22107>

DOI:10.6007/IJARBSS/v14-i7/22107

Published Date: 17 July 2024

Abstract

The integration of artificial intelligence in education is a significant advancement that fundamentally transforms education delivery and reception. Artificial intelligence relies on technologies like machine learning and big data analysis to offer customized and interactive learning experiences. Analyzing students' performance and providing individualized advice may improve their knowledge. Artificial intelligence (AI) may also enhance the creation of cutting-edge educational materials using technologies like augmented and virtual reality, making the learning experience more engaging and interesting. Nevertheless, further comprehensive research is necessary to fully understand the lasting impact of AI approaches on student learning results. In order to address this deficiency, the present work proposes a novel strategy that integrates bibliometric analysis with systematic literature review (SLR) utilizing the PRISMA methodology. The first stage focused on a comprehensive bibliometric, which included key nations, educational establishments, publications, keywords, and influential authors in the realm of artificial intelligence in education. This phase facilitated a comprehensive understanding of the overall state of this field across different disciplines. The subsequent phase was a systematic literature review (SLR) of 12 specifically chosen scholarly articles. This review focused on the current use of artificial intelligence (AI) in education. This review also examined the impact of implementing artificial intelligence (AI) in education, specifically focusing on its influence on student motivation and the desire to learn. The present study aims to implement artificial intelligence (AI) technology in education and explore strategies for achieving sustainable education for future generations.

Keywords: Artificial Intelligence, Motivation, Learn, Systematic Literature Review (SLR)

Introduction

With the rapid advancement of technology, it has become critical to stay up-to-date on modern-day innovations. One of these technologies is artificial intelligence, which offers a

diverse array of tools across several fields. Education must actively contribute to constructing the intellectual foundation for new technologies and effectively utilize them to enhance students' abilities, elevate their academic performance, and foster their motivation to acquire knowledge.

The motivation to learn is a crucial factor in the educational process, as it elevates learners' academic achievement, fosters the development of their diverse skills, and boosts their self-confidence and retention of knowledge (Al Shahrani, 2023). Consequently, it enhances their motivation and proactivity in carrying out their educational responsibilities. AI technologies are critical in fostering the development of students' varied talents, as evidenced by the Hodges. et.al (2023); Karal.et.al (2014) study, which demonstrated that AI technologies are enhancing students' educational experiences.

The purpose of this work is to provide a comprehensive and evaluative analysis of the impact of artificial intelligence (AI) on motivational learning. This study includes a variety of academic articles.

We are conducting research studies and analyzing academic contributions to identify the current trends and future directions of this rapidly changing topic. The integration of artificial intelligence (AI) with educational technologies has led to a significant increase in innovation. The objective of this systematic literature evaluation is to provide educators, researchers, and policymakers with a clear plan for using artificial intelligence (AI) to shape the future of education by effectively employing AI.

The uniqueness of this work stems from its innovative integration of bibliometric analysis and systematic literature review (SLR) employing the PRISMA approach [14]. This novel mix of bibliometric analysis and systematic literature evaluation enables a thorough investigation of the incorporation of artificial intelligence (AI) in education by identifying key contributors, trends, and future prospects. The study offers vital insights to educators, researchers, and policymakers by emphasizing the revolutionary capacity of AI in the field of education. The text distinguishes itself through its thorough compilation and examination of papers, providing a comprehensive understanding of the influence of AI on education and deliberating on potential avenues. This paper's broad and forward-looking perspective makes it a unique and valuable contribution to the field of educational technology research. This study will structure the review into two main sections: a bibliometric analysis and a systematic literature review, to achieve its objectives. These questions pertain to the initial stage of the review, specifically the bibliometric analysis. The subsequent inquiries are formulated to tackle the aims of this evaluation:

1.Which countries, educational institutions, publications, authors, and keywords are at the forefront of integrating artificial intelligence into education?

Furthermore, the Second Phase of the Review (SLR) will receive answers from these inquiries.

2. What are the uses of AI, and how does it affect students' motivation to learn?

3.What are the key variables in AI education?

4. What are the key trends and notable discoveries regarding the impact of AI in education?

5.What are the potential avenues for AI's influence on education?

Materials and Methods

A. Research Design

We will accomplish the goals of this article by dividing this study into two primary components: a bibliometric analysis and a systematic literature review.

These questions are preliminary in nature and pertain to the review's bibliometric analysis. We employed a methodical approach in our thematic investigation of the impact of artificial intelligence (AI) on students' motivation to learn. This enabled us to uncover common themes, emerging trends, and possible future paths in this field. We conducted a comprehensive content analysis using a systematic technique to accurately determine and categorize these elements.

The results obtained from this thematic analysis provided us with a thorough understanding of the beneficial impacts of AI in education. Understanding this is critical for guiding future research and implementation strategies, as well as ensuring the effectiveness and responsibility of developing and incorporating AI technology in educational settings.

B. Search Strategy

A thorough search for peer-reviewed publications on impact of AI in students' motivation was conducted using Scopus. The study was conducted on May 21, 2024. The following are explanations of the search criteria we utilized: Initially, we conducted a bibliometric analysis and a preliminary exploration of the Scopus database yielded a total of 2,363 entries. The researchers obtained the dataset by conducting a Scopus study and downloading it. The Vosviewer software was used to display the mapping and occurrences of the results. Based on the results of the investigation.

The VoSviewer program has been instrumental in identifying connections between key terms in research, thereby inspiring academics to pursue more studies to investigate these linkages. We used a set of keywords, including "artificial intelligence" and "students' motivation," to extract crucial data from the retrieved papers and obtain more precise results.

As an example, TITLE-ABS-KEY (artificial intelligence, motivation and learning). For instance, AND (LIMIT-TO (EXACTKEYWORD , "Artificial Intelligence") OR LIMIT-TO (EXACTKEYWORD , "Motivation") OR LIMIT-TO (EXACTKEYWORD , "E-learning") OR LIMIT-TO (EXACTKEYWORD , "Machine Learning") OR LIMIT-TO (EXACTKEYWORD , "Virtual Reality") OR LIMIT-TO (EXACTKEYWORD , "Intrinsic Motivation") OR LIMIT-TO (EXACTKEYWORD , "Learning Motivation") OR LIMIT-TO (EXACTKEYWORD , "Artificial Intelligence (AI)") OR LIMIT-TO (EXACTKEYWORD , "Student Motivation") OR LIMIT-TO (EXACTKEYWORD , "Motivation And Engagements") OR LIMIT-TO (EXACTKEYWORD , "K-12 Education") OR LIMIT-TO (EXACTKEYWORD , "Intelligent Robots") OR LIMIT-TO (EXACTKEYWORD , "Digital Technologies") OR LIMIT-TO (EXACTKEYWORD , "Artificial Intelligence Education") OR LIMIT-TO (EXACTKEYWORD , "AI Education")) AND PUBYEAR > 2012 AND PUBYEAR < 2024. Finally, we limited our search.

to social sciences, and arts and humanities (LIMIT-TO (SUBJAREA, "SOC") OR OR LIMIT-TO (SUBJAREA, "ARTS")). Moreover, only articles were included such as) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SRCTYPE , "j"))) AND (LIMIT-TO (LANGUAGE , "English"))

C. Data Synthesis and Analysis

The study examined and explored the prevailing patterns, tendencies, and prospective paths regarding the impact of artificial intelligence on the drive to acquire knowledge.

- **Method:** Content analysis has been employed to methodically discover and classify prevalent subjects pertaining to the influence of AI on students' motivation and academic achievement.
- **Process:** Publications have been reviewed to derive the positive effects of AI in the educational process, particularly regarding motivation to learn.
- **Outcome:** This analysis provided a comprehensive understanding of the beneficial impacts of AI on the drive to learn, as well as guidance for future research and deployment strategies.

D. Inclusion and Exclusion Criteria

In order to conduct this research, a predetermined set of criteria for including and excluding data was used. During our systematic literature review (SLR), we employed a rigorous methodology to evaluate the quality and reliability of the chosen research. Initially, we determined our inclusion criteria based on the years of publication, specific keywords, English language, and relevance to the field of AI in education. We successfully extracted 47 papers from the first pool for a thorough examination.

The stringent quality assessment criteria played a crucial role in narrowing this decision. We thoroughly examined the design of each study, with a focus on the clarity and suitability of the research questions and hypotheses. We assessed the appropriateness and representativeness of the sample size in each study. In addition, we thoroughly analyzed the techniques employed to collect data, ensuring their appropriateness for addressing the study inquiries and their capacity to produce impartial and all-encompassing findings. An essential component of our evaluation was the accuracy and reliability of the findings from these investigations. We conducted a comprehensive assessment of the extent to which the data effectively supported the results of the study, ensuring that there was logical coherence and justified inferences.

After thorough and comprehensive research, we arrived at a final selection of 12 publications that are of exceptional quality. Every selected study satisfied our rigorous criteria, guaranteeing that our systematic literature review is based on a solid and meaningful body of research. We have meticulously documented the selection process, and the Supplementary section provides a comprehensive analysis of each featured work. This technique has guaranteed that our literature evaluation is both exhaustive and based on the most reliable and pertinent research in the field of AI and its impact on motivation to learn. Table 1 specifies the criteria.

Table 1

The criteria for inclusion and exclusion

Inclusion	Exclusion Criteria
Publications published between 2013 and 2023 will be taken into account to capture recent information in the domain.	Unverified sources, such as blog posts and news stories, will be omitted.
English articles	Studies unrelated to AI in education will be excluded.
Research studies largely investigate the influence of artificial intelligence on learning, specifically in the context of motivation.	

E. Evaluation and Analysis

In order to provide clarity regarding the present state of research on the subject, the synthesized data will be thoroughly reviewed and discussed.

F. Evaluation of Quality

Assess the reliability of the selected studies and ensure the evaluation's accuracy. We identified a total of 134 papers after implementing the inclusion and exclusion criteria, which involved considering the range of years, specific keywords, language of the articles, and topic area of the publications. We then attempted to download these files but were only able to successfully acquire forty-seven. This systematic literature review (SLR) includes just 12 publications. These publications were selected based on rigorous criteria such as study design, sample size, data gathering procedures, and the validity and dependability of the results. The supplementary materials provide additional illustrations of the analyses conducted in the publications containing this research. The PRISMA framework is a meticulous methodology specifically developed to guarantee transparent and comprehensive reporting in systematic reviews and meta-analyses. We widely acknowledge its systematic approach to research, which is especially valuable in evaluating randomized trials and other forms of intervention reutilizing the PRISMA framework is critical for improving the quality and dependability of systematic reviews and meta-analyses. Following the criteria ensures researchers conduct and present their investigations with utmost rigor, thereby providing the scientific community with useful and reliable findings.

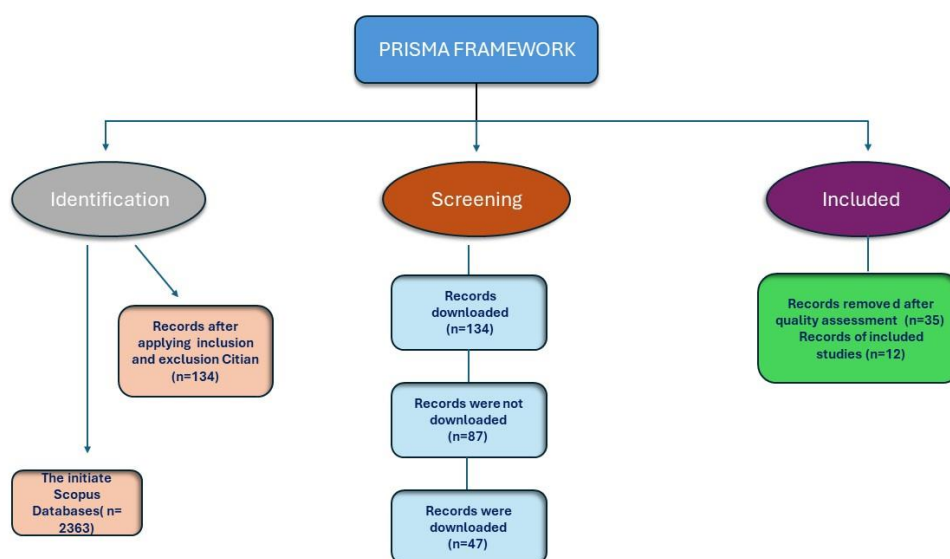


Fig. 1. PRISMA framework

The technique of this review was illustrated using the PRISMA framework, as depicted in Figure 1.

Result

To gain a thorough understanding of our study subject, we employed a dual-method approach that integrates bibliometric analysis with a systematic literature review.

We evaluate the effectiveness of a Systematic Literature Review (SLR). We can effectively leverage this amalgamation by integrating the extensive findings acquired through bibliometric analysis with the deep understanding offered by the systematic literature review (SLR).

By seamlessly transitioning from the bibliometric analysis to the systematic literature review (SLR), we ensure the consistency of the narrative. We employ bibliometric analysis to uncover trends and patterns that provide a broader framework for discussing the detailed insights from the systematic literature review (SLR). By employing this approach, we not only enhance the logical coherence of our findings but also achieve a comprehensive understanding of the subject matter.

The study extensively uses cross-referencing to improve the interaction between the two methodologies.

The bibliometric analysis highlights important progress and recurring topics in the area, while the systematic literature review gives thorough assessments of selected articles that delve into this field. Cross-referencing ensures that the specific evidence in the literature review solidly supports the broader trends identified through bibliometric data.

A. The initial stage (Bibliometric Analysis)

Given the proliferation of AI technology in education, it is imperative to perform a thorough evaluation in this field. In this context, we emphasize bibliometric analysis as a powerful

methodological tool for defining the intellectual framework of AI efficacy and its relationship to knowledge acquisition. Through the examination of relevant literature, we can establish a forthcoming database that researchers can use in the swiftly advancing realm of artificial intelligence.

1) The dominant countries in the field of artificial intelligence and motivation to learn

Bibliometric analysis provides a method for visualizing the conceptual framework of AI in education through the examination of publications, citations, and collaboration patterns. This introduction delves into the field of bibliometric analysis in AI education, examining its significance in students' motivation to learn.

Moreover, to provide in-depth information in this analysis, the VOSviewer software was used to present the top key words in the field of AI and motivation to learn.

An analysis of the publications pertaining to AI and motivation to study reveals that the United States, China, and Taiwan have a significant influence on the intellectual domain, as evidenced by their respective notable publication numbers of 26, 17, and 14. The United States' dominant position in the subject can be attributed to its significant funding, extensive research efforts, and a well-developed ecosystem that promotes innovation in education and technology. China's focus on AI is characterized by its quick technological progress and widespread practical applications, which can be attributed to significant government support. Taiwan's strong STEM education system and growing technology startup environment contribute significantly to its prominence in this industry. European nations such as Spain, the United Kingdom, and Germany have a lower production of articles compared to other countries. However, their contributions are notable and unique. Germany is renowned for its practical technology applications, and the United Kingdom is renowned for its innovative educational methodologies. Australia, Hong Kong, Mexico, and Norway also make noteworthy contributions, each offering distinct talents and perspectives on the subject. The global distribution of research and innovation highlights a diverse and intricate approach to integrating AI in the field of education. This is promising for a future when educational methods are personalized, efficient, and comprehensive, driven by the transformative capabilities of AI technologies.

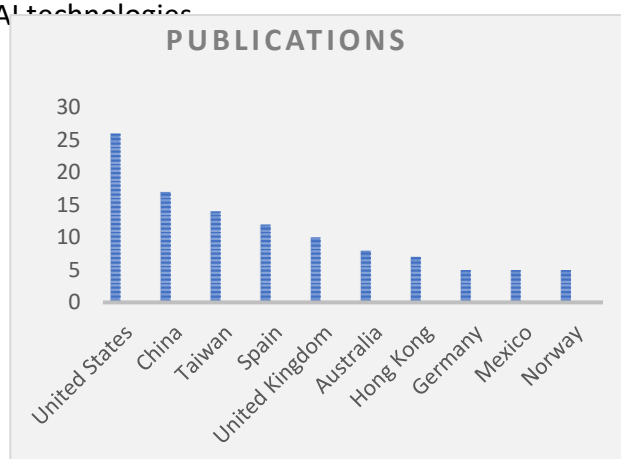


Fig. 2. The top 10 countries at the forefront of publishing demonstrate the worldwide influence of AI on motivation to learn.

2) The top educational institutions in the field of AI and motivation to learn

Bibliometric analysis provides a methodical approach to mapping the intellectual framework of AI and the drive to acquire knowledge by examining publications, citations, and

collaboration patterns. In this introduction, we discuss the significance of bibliometric analysis in the field of artificial intelligence (AI) and the drive to acquire knowledge in order to reveal crucial insights that will have a profound influence on the future of education in a technologically advanced society.

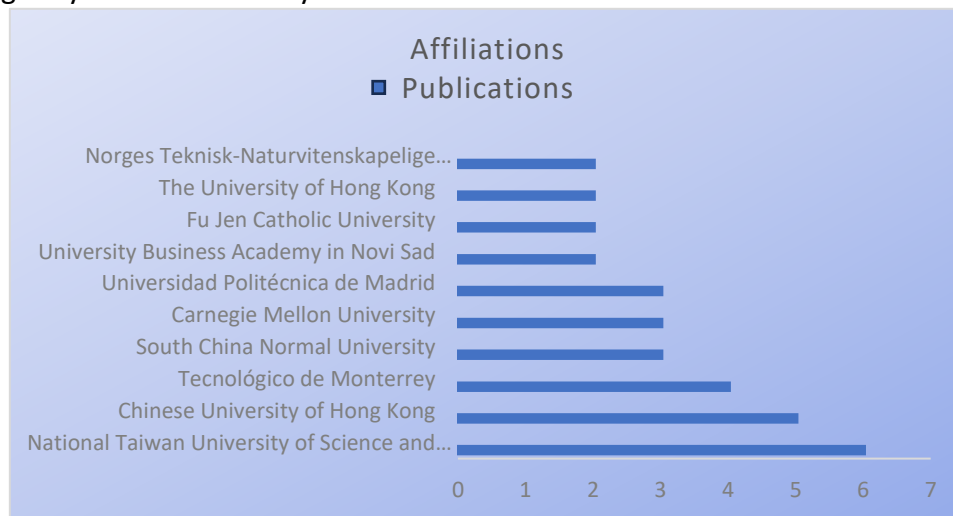


Fig. 3. Distribution of publications by affiliations.

3) The top authors in the field of AI and motivation to learn.

Table 2

The top authors in the field of AI and motivation to learn

Author	¹ TP	H-index	² TC	Affiliation	Country
Hwang, Gwojen	572	79	23728	National Taiwan University of Science and Technology	Taiwan
Chai, Ching Sing	264	55	8788	Chinese University of Hong Kong	Hong Kong
Chiu, Thomas K.F.	65	25	2107	Chinese University of Hong Kong	Hong Kong
Chen, Peiying	16	9	301	Chihlee University of Technology	Taiwan
Chu, Samuel Kai Wah	177	35	4082	Hong Kong Metropolitan University	Hong Kong

tab					
Hsia, Luho	16	12	441	National University of Technology	Taiwan
Ilić, Valentin Kuleto Milena	21	9	273	University Business Academy in Novi Sad	Serbia
Khambari, Mas Nida Md	67	7	262	Universiti Putra Malaysia	Malaysia
Author	¹ TP	H-index	² TC	Affiliation	Country
Koedinger, Kenneth R	347	62	15396	Carnegie Mellon University	United States
Liu, Chenchen	16	8	232	Wenzhou University	China

¹ TP= Total Publications, ² TC= Total citations.

Table 2 provides a comprehensive compilation of distinguished authors who have written about AI and the factors that drive motivation to learn. This paper examines the initial 10 prominent authors who have made significant contributions to the emerging field of artificial intelligence and the drive to learn. Gwojen Hwang is a notable figure among these writers. His publication career is notable for having authored 572 papers, achieved an excellent H-index of 79, and accumulated a total of 23,728 citations. His affiliation with National Taiwan University of Science and Technology. Table 2 is a comprehensive compilation of the most productive authors who have extensively contributed to the field of artificial intelligence and the study of the desire to learn. This study examines the initial 10 prominent authors who have made significant contributions to the ever-evolving field of artificial intelligence and the drive to acquire knowledge. Numerous significant collaborators from various nations and organizations accompany these renowned authors, whose research and expertise shape in the field of AI and the drive to learn.

4) The top journals that focus on Aiand motivation to learn

Table 3

The top journals that focus on Aiand motivation to learn

Journal	¹ TP	² TC	Cite score 2019-2022	Time Cites	Publisher
Sustainability (Switzerland)	48515	281274	5.8	294	Multidisciplinary Digital Publishing Institute (MDPI)

Computers and Education: Artificial Intelligence	105	806	7.7	252	Elsevier
Education and Information Technologies	1298	10614	8.2	128	Springer Nature
European Journal of Engineering Education	247	1441	5.8	40	Taylor & Francis
International Journal Engineering Education	413	1203	2.9	8	Tempus Publications
Journal	¹ TP	² TC	Site score	Times cite	Puplisher
British Journal of Educational Technology	533	7381	13.8	136	Wiley-Blackwell
Interactive Learning Environments	370	4054	11	104	Taylor & Francis
International Journal of Emerging Technologies in Learning	1683	8389	5	24	International Association of Online Engineering
International Journal of Artificial Intelligence in Education	105	863	8.2	138	Springer Nature
Artificial Intelligence Review	591	13565	23	278	Springer Nature

¹ TP= Total Publications, ² TC= Total citations.

Table 3 shows the top 10 leading journals in artificial intelligence and motivation to learn. Multidisciplinary Digital Publishing Institute (MDPI) publisher of Sustainability (Switzerland) ranked first with 48,515 publications (TP), 281,274 quotations (TC), and Cite score at 5.8. Followed by Computers and Education: Artificial Intelligence Journal issued from Elsevier has 105 TP, 806 TC, and a Cite score of 7.7. The phrase has been cited 252 times. These publications, along with others on the list, are leading the way in academic publishing in AI and motivation to learn, driving the discussion and enhancing our comprehension of this dynamic field.

5) The most often used keywords in academic publications in the subject of artificial intelligence and the incentive to learn.

The graph illustrates the often-used phrases in the field of artificial intelligence and the drive to acquire knowledge. An exhaustive examination of the most notable terms in the domain of artificial intelligence and the drive to acquire knowledge reveals the phrases that exert the most profound influence on this ever-evolving sector.

"Artificial intelligence" stands out as the predominant topic among these terms, highlighting its great importance in the conversation. There are 110 occurrences and a cumulative link strength of 310, "students" phrase closely follows, indicating a significant influence of artificial intelligence on students. The variable "motivation" demonstrated the highest level of significance in relation to artificial intelligence, as indicated in the diagram. Additional keywords serve a crucial function in research, directing researchers to investigate the connections between the variables depicted in the diagram.

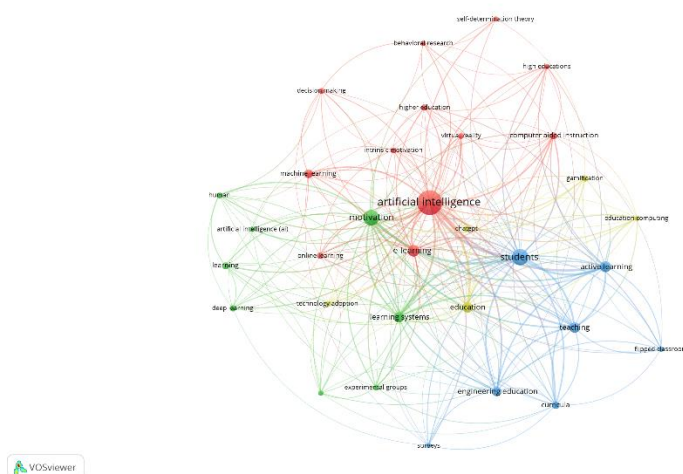


Fig. 4. The most used keywords used in publication in the field of AI and motivation to learn

B. The second phase is the Systematic Literature Review (SLR).

The extensive literature research revealed significant novel findings regarding the use of artificial intelligence (AI) in education and its correlation with student motivation. These newfound insights highlighted recurring patterns, significant discoveries, emerging patterns.

1) The applications of AI that pertain to its influence on students' motivation.

This section highlighted the applications of AI in relation to its influence on learning motivation, drawing from the reviewed literature.

Table 4

Displays the most significant AI applications that impact education

Studies	AI applications	AI's impact on motivation to learn
[4]	metaverse-related visualization technologies, such as Virtual Reality (VR) and Augmented Reality (AR)	The objective of this study is to examine the efficacy of employing metaverse-associated visualization technologies, such as

		Virtual Reality (VR) and Augmented Reality (AR), in the instruction of chemistry.
[3]	Chat Generative Pre-Trained Transformer (ChatGPT)	The objectives of this study are to investigate the capacity of AI approaches to enhance the sustainability of educational systems, analyze the use of ChatGPT for personalized learning and increased engagement, and propose a sustainable model in AI-integrated learning
Studies	AI applications	AI's impact on motivation to learn
[16]	The application of artificial intelligence technology in EFL classrooms or AI-injected learning.	This study investigates whether there is a motivation when implementing artificial intelligence technology in English as a Foreign Language courses or AI-integrated learning.
[13]	AI-based systems	The purpose of this study was to clarify the factors that influence college students' use of AI-based systems and investigate the impact of their learning motives.
[10]	Development of 10 AI application storyboards	The aim of this study is to investigate students' perspectives on the use of AI applications to support self-regulated learning (SRL) and to determine the

			pedagogical and psychological factors that they regard as significant.
[5]	A fuzzy-based intelligent tutoring system (ITS)		This paper provides a comprehensive assessment of a fuzzy-based intelligent tutoring system (ITS) designed to teach computer programming. The review pertains to various facets of the Intelligent Transportation System (ITS). The evaluation criteria consist of six factors: (i) context, (ii) effectiveness, (iii) efficiency, (iv) accuracy, (v) usability and satisfaction, and (vi) engagement and motivation.
[16]	An educational VR-based calligraphy game application		The study explored the influence of virtual time, place, and technical accessibility on students' comprehension, creativity, and engagement in virtual reality education.
[12]	Artificial Intelligence-Based Educational Techniques		The primary goal of this study was to examine the complexities involved and propose recommendations for Saudi English as a Foreign Language (EFL) instructors to adjust their teaching methods while ensuring the mental and cognitive wellbeing of their students.
Studies	AI applications		AI's impact on motivation to learn
[15]	Learning-based module training artificial intelligence (AI) subject (SLBM-TAIS)		This study seeks to assess the impact of SLBM-TAIS on the practical knowledge

				and motivation of pre-service teachers (PSTs).
[9]	Artificial Intelligence-Based Techniques	Intelligence-Based	Educational	This study's primary objective is to examine how AI impacts students' skills.
[11]	The robot			The purpose of this research is to develop a suite of interactive robot-assisted learning tools for use in the classroom, with the hope of assisting students who are struggling academically.
[8]	An AI book			This study examines how students interact and learn using an AI book that allows them to input questions and receive suggested questions to improve their understanding of biology.

The findings of this study illustrate the numerous educational uses of artificial intelligence. These applications play a significant role in the educational process.

2) Variables relating to artificial intelligence and the motivation to learn.

The table below illustrates the transformative and enhancing effects of some variables associated with AI on various aspects of the educational environment, such as blended learning, academic performance, and motivation to study.

Table 5

Variables associated with artificial intelligence (AI) and motivation for learning.

Studies	AI variables	AI impact
[4]	Teaching chemistry in the metaverse	Use AI to development teaching chemistry
[3]	Blended learning	Artificial intelligence provides potential solutions to improve the efficiency and long-term viability of blended learning systems.

[16]	Motivation in classroom	The investigation is likely focused on the use of AI techniques in teaching methods, as well as how students perceive and experience this technology.
[13]	Students' Actual Use of AI-Based Systems	Assessing the motivations behind students' use of artificial intelligence
[10]	students' self-regulated learning	Artificial intelligence is anticipated to be employed in order to enhance students' self-regulated learning.
[5]	learning outcomes	Utilizing artificial intelligence has the potential to improve the outcomes of the educational process.
[12]	Distance learning	Virtual reality (VR) probably has the potential to improve the quality of online distance learning.
[1]	Online EFL Learning	Artificial intelligence can assist in overcoming challenges encountered while studying English as a second language.
[15]	Pre-Service Teachers' Practical Knowledge	The artificial intelligence technology used in this study may improve and enhance the learning process.
[9]	Performance in higher education	AI technologies may have the potential to greatly aid in the development of a new higher education strategy.

[11]	Students' Interaction and Learning with	The book of AI may help simplify understanding of science.
[8]	Sustainable Learning Efficiency and Motivation	This study may be useful in exploring the importance of robotic in students' academic education.

3) Analysis of current developments and discoveries in the field of artificial intelligence, as well as the factors that motivate individuals to acquire knowledge in this area.

According to our analysis, these articles provide a holistic view of the impact of AI on students' learning motivation by highlighting the most important technologies and practices associated with AI and their impact on motivation. In study by Amirbelcova and Mironova (2024), the metaverse platform was used to measure its effect on stimulation for learning in study participants. The Al Shahrani (2023) study highlights the effectiveness of using ChatGPT to achieve sustainable learning, and this paper also provides insights to educational institutions on how to leverage AI. A study Sumakul and Hamied (2023); Li (2023) conducted in- depth research on students' motivations for using AI in the classroom, where data and information on the topic were analyzed comprehensively. The importance of AI in supporting the self-regulation of learners was showed in study (Jin.et.al., 2023).

Moreover, Article Chrysafadi et.al (2017) shed light on one of the technologies of artificial intelligence, the Intelligent Fog- Based Teaching (ITS), and its impact on multiple aspects of the learning process. A study Li and Jiang (2022) looked at virtual reality technology and how effective it is in learning. The study Pu.et.al (2021) aimed to design an AI- based unit and measure its impact on teachers and students. The Marta study Koc (2020) pointed to the importance of AI book in enhancing students' understanding of the subjects. Finally, the study Hsieh (2020) addressed the importance of using the robot in the classroom and its role in boosting motivation to learn. These publications provide a thorough assessment of the substantial influence that AI will exert on the educational setting.

4) Prospects for future development and suggestions for improvement

These studies collectively shed light on the potential future orientations and impacts of artificial intelligence (AI) in education, offering valuable insights into the possibilities that lie ahead. A research study Amirbelcova and Mironova (2024) suggested Subsequent studies can explore the effects of virtual reality (VR) and augmented reality (AR) technologies on students' anxiety levels. Additionally, we can develop a predictive model to predict student performance in a chemistry classroom that utilizes a metaverse platform. Based on the positive results Chat GPT has achieved in the learning process and enhancing student engagement, the study Al Shahrani (2023) has brought trends for future research in order to maximize the benefits of integrating Chat GPT into education. A study Sumakul and Hamied (2023) pointed the importance of motivation in students' learning and suggested that designing AI applications and designing lessons may affect students' motivation. Furthermore, According to the proposed theoretical and practical implications Jin.et.al (2023), AI applications may help students learn more independently while they are studying online. This could lead to a mutually beneficial relationship between humans and AI in education. Based on the positive results obtained in study Chrysafadi.et.al (2017), it recommended that the technique be applied in other areas of education. The study Li and Jian (2022) hopes to expand the application of virtual reality technology to include the elderly

and school-age children. The study Abalkeel (2022) offered suggestions to curriculum designers, developers, and legislators regarding the difficulties associated with e-learning systems and how to effectively tackle them. Milena Ilić (2021) specified that future research should present specific artificial intelligence (AI), machine learning (ML), and extended reality (XR) systems. Finally Koc (2020); Hsieh (2020) suggested that the use of robots and artificial intelligence book in the educational process could be expanded, due to their positive impact on enhancing students' motivation towards learning.

Discussion

The project's initial phase focuses on investigating AI and its impact on motivation to learn, offering valuable worldwide insights into this rapidly expanding field in order to address the primary inquiry. The United States is the top contributor with 26 articles, while China and Taiwan follow closely with 17 and 14 papers, respectively. This demonstrates a worldwide dedication to utilizing AI technologies in education. The National Taiwan University of Science and Technology, the Chinese University of Hong Kong, and Tecnológico de Monterrey are leading institutions in the discipline, showcasing their worldwide influence. The writer Hwang, with a total of 572 publications, has made a substantial contribution in this field. Keywords such as "artificial intelligence" serve as evidence for the concept of "motivation to learn." These technologies are significant because of the worldwide partnership between artificial intelligence and education.

During the second phase, an examination of methodological literature reveals numerous uses of artificial intelligence (AI) in education. These include augmented reality, virtual reality, Chat GPT, AI comics, a fuzzy -based intelligent teaching system, robotics, and AI book. These technologies have significantly improved the effectiveness of education, increasing student engagement and motivation to learn.

The study's third section involved analyzing several variables in the literature, with a particular emphasis on elements linked to students. These variables included motivation, student self-organization, classroom performance, and the effectiveness of sustained learning. This demonstrates the researchers' keenness to investigate the influence of AI and its correlation with those variables.

The study's fourth and fifth sections presented a thorough analysis of the literature's findings and provided suggestions based on those findings. Amirbelcova and Mironova (2024) highlighted the significance of the metaverse, underscoring the necessity for further investigation in the next few years. The study also validated ChatGPT's potential growth in the educational domain based on the positive outcomes that included improved student engagement, motivation, and self-directed learning. A study (Sumakul and Hamied, 2023) suggested that structuring classes with AI technology enhances students' motivation to learn. Another study Li (2023) took a step further by suggesting the utilization of AI to elucidate students' behavior. Researchers Jin.et.al (2023); Chrysafadi.et.al (2023); Li and Jiang (2022); Pu.et.al (2021) concentrated on examining the influence of AI in education. The findings highlighted the positive effects of AI on students' cognitive and behavioral development, their active engagement in learning, and their increased satisfaction and motivation to learn. These results recommend further integration of AI technologies in education in the future. Academic research (Ilić, 2021) suggests using artificial intelligence in educational psychology. Researchers Koc (2020); Hsieh (2020) have recently advocated for the wider use of robots and AI books in education. This is due to their significant benefits in enhancing students' memory of material and fostering their passion for science.

Conclusion

Ultimately, our comprehensive analysis of forthcoming patterns and pragmatic recommendations for the efficient integration of artificial intelligence technology in the realm of education captivates the attention of politicians, scholars, and educators. Contemporary approaches, based on our study findings, aim to guide the field towards the innovative and ethical utilization of these technologies.

For teachers, we suggest that they give priority to integrating AI technologies in a way that aligns with traditional teaching methods. It is critical for educators to receive training in order to obtain the essential skills and knowledge required to effectively utilize AI technology. This would enable educators to personalize learning experiences for students, thereby improving their level of involvement and overall academic achievement.

Practical AI implementation strategies in education include investing in teacher training for AI technology, developing AI ethics guidelines for educational contexts, and fostering partnerships.

Our findings encourage the use of practical initiatives, such as fostering collaboration between academic institutions and technological companies, to enable the exchange of resources and expertise. By focusing on these potential paths and implementing these actionable recommendations, we can guide the appropriate and effective use of AI technology in education.

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