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Exploring the Role of Artificial Intelligence in Learning Media for Vocational Education: A Systematic Literature Review

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ABSTRACT

This article is a systematic literature review which aims to explore information about the use of artificial intelligence (AI) in learning media in vocational education. In the Industry 4.0 era, education needs to keep up with technological developments. AI has an important role in creating learning materials and solving problems in educational environments. AI is able to analyze individual learning styles and needs, providing personalized and relevant material. This research reveals that the use of artificial intelligence in vocational education has several important findings. These findings include personalization of learning based on individual learning styles and needs, engaging learning experiences through interactive simulations and educational games, as well as enriching practical experiences through virtual laboratories and industrial simulations. Additionally, the artificial intelligence assessment system is capable of detecting students' weaknesses and strengths in real-time, providing personalized feedback, and assisting in monitoring overall class performance. This research shows that artificial intelligence is not just a tool, but also a partner that drives innovation in vocational education, helps students reach their full potential, and prepares them for a bright future in their chosen industry.

Introduction

As we transition into Industry 4.0, education needs to keep pace with these technological advancements. It is crucial for the education sector to not only implement these technologies, but also understand and develop them. Artificial Intelligence (AI). AI imitates the way humans think and

is used to create learning materials and solve problems in educational settings. As AI develops rapidly, its influence will expand, impacting everything from social change to classroom learning. schools need to adjust their curriculum to the digital age with 21st century skills, realizing that the education sector will be heavily influenced by rapid advances in AI (Gocen & Aydemir, 2020).

Artificial intelligence has revolutionized vocational education by delivering innovative, adaptive and personalized learning. AI analyzes individual learning styles and needs, providing personalized and relevant material (Essa et al., 2023; Hashim et al., 2022). Through adaptive learning platforms, the pace and difficulty of learning is adjusted, allowing students to progress at their own pace (Li et al., 2021). Interactive simulations and educational games using AI provide an engaging and immersive learning experience. In addition, AI enriches the practical experience by providing realistic virtual labs and industry simulations (Chang et al., 2022; P. Chen, 2022). The AI assessment system detects students' weaknesses and strengths in real-time, allowing teachers to provide timely and effective interventions. AI also assists in the assessment process and provides personalized feedback, helping students understand their learning progress better (Dr, 2023). Through AI data analysis systems, teachers can track overall class performance as well as identify areas that need improvement. Ultimately, AI is not just a tool, but a partner that drives innovation in vocational education (Zawacki-Richter et al., 2019). With better personalization, interaction, practice and evaluation, AI helps students reach their full potential and prepares them for a bright future in their chosen industry (Rosyadi et al., 2023; Spöttl & Windelband, 2020; Tambuskar, 2022). This article aims to find out what and how the use of AI on learning media for vocational education students, by conducting a literature study of published scientific literature.

Method

This research implemented the systematic literature review (SLR) method to explore the application of artificial intelligence in learning media, recognizing the paramount significance of validity, reliability, and replicability in academic scrutiny. Through a comprehensive examination of scholarly peer-reviewed literature within a specific domain, the study aimed to pinpoint research concerns and advancements. Noteworthy contributions by scholars such as Vicente Torres-Carrion et al., 2018 and Xiao & Watson, 2019, underscored the importance of this investigation. The data collection process focused on identifying published articles addressing the integration of AI as a medium for vocational learning. This entailed meticulous scrutiny of titles, keywords, and abstracts to refine the scope and incorporate relevant articles into the review. Leveraging the Scopus database ensured access to dependable information across various scholarly articles and publications,

enhancing the study's comprehensiveness.

In selecting studies for inclusion, the research adopted an inclusive methodology while implementing exclusionary measures to ensure both security and quality. Robust criteria were established to guarantee the acquisition of pertinent outcomes for addressing the research inquiries effectively. The study's selection criteria were carefully delineated in Table 1, distinguishing between inclusion and exclusion factors. Inclusions encompassed research pertinent to learning media, artificial intelligence, and vocational education, with a focus on articles published between 2019 and 2024. Additionally, the accessibility of articles and research papers, with downloadable full versions, was a crucial inclusion criterion. Conversely, exclusions comprised studies unrelated to learning media, artificial intelligence, or vocational education, along with articles published before 2019 and those lacking openly accessible full versions. This meticulous selection process ensured the study's integrity and the relevance of the findings to the research objectives.

In this study, the systematic literature review (SLR) method was applied to investigate the use of artificial intelligence for learning media, recognizing the critical importance of validity, reliability, and replicability in academic analysis. A thorough review of scholarly peer-reviewed literature in a specific field not only identifies research

Result and Discussion

Research Results

From 1996 to 2024, a total of 741 records have been released according to the search results in the Scopus database. Subsequently, these results underwent evaluation utilizing PRISMA procedure that shown on figure 1.

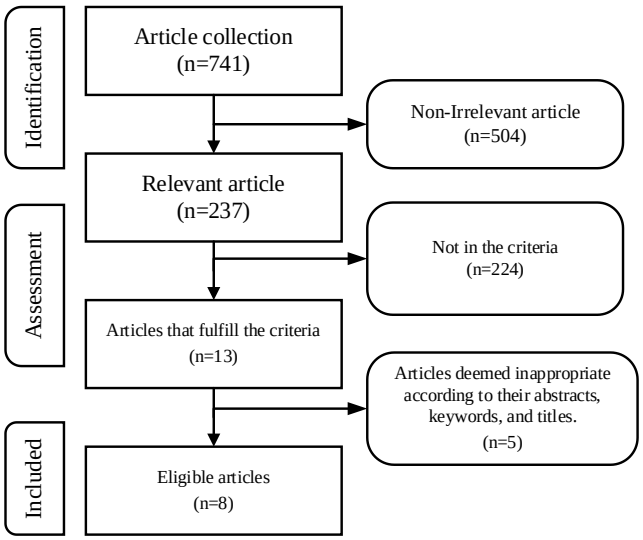

Fig 1: PRISMA flowchart

The 741 articles screened by applying the PRISMA method, 504 articles were deemed not relevant as they are not articles. In addition, 137 articles were published before 2019, and 115 articles could not be accessed for free. The analysis revealed that only 13 articles fulfilled the inclusion and exclusion criteria. To enhance the rigor of the selection process, a more detailed analysis involving matching titles, abstracts, and keywords was conducted, resulting in the identification of 8 eligible articles. The following is the list of articles selected for this research following a rigorous procedure of selection:

Table 2. the chosen articles

Authors	*Publication Title*	*Year*
Xu Y	Research on the application of Artificial Intelligence tools in higher vocational education.	2023
Liu K, Chen J, Wei M, Chen X	Research on the Sharing Mechanism of Vocational Education Resources Supported by Artificial Intelligence.	2023
Hu Y	Application of artificial intelligence technology and blockchain technology in vocational education.	2022
Wu L	Case Study on Application of Artificial Intelligence to Oral English Teaching in Vocational Colleges.	2022
Liu K, Su L	Practical Path of Application of Artificial Intelligence Technology in Vocational Education.	2022
Hou Z	Research on Adopting Artificial Intelligence Technology to Improve Effectiveness of Vocational College English Learning.	2021
Yanrong W	Research of the Innovative Integration of Artificial Intelligence and Vocational Education in the New Ecology of Education.	2021
Chen L, Chen P, Lin Z	Artificial Intelligence in Education: A Review.	2020

Review Article

The findings pertinent to the research questions are showcased based on the results of the literature review. The researcher will methodically organize and explain these findings, potentially grouping them according to identifiable themes or concepts that emerged through the process of analysis. Furthermore, researchers would carefully assess the identified sources to ensure the accuracy and dependability of the presented findings.

The integration of AI in vocational education emerges as a transformative force, as highlighted by various studies. AI tools, showcased as powerful mediums for learning, promise to personalize educational experiences and provide essential teaching support (L. Chen et al., 2020; Hu, 2022). Addressing traditional challenges in language learning, particularly English, AI applications are envisioned to make the learning process more engaging and effective (L. Chen et al., 2020; Liu et al., 2023). Deep learning technologies are proposed for objective assessments of teaching quality, fostering enthusiasm among educators and ultimately raising teaching standards (Hou, 2021).

RQ: How does artificial intelligence play a role as a learning medium in vocational education?

Table 3. Selected articles in review

Article Title	*Artificial intelligence as a learning medium in vocational education*
Application of artificial intelligence technology and blockchain technology in vocational education.	AI tools in vocational education can personalize learning experiences, provide teaching support, and improve teaching efficiency by assisting with tasks like grading and offering data feedback (Hu, 2022).
Artificial Intelligence in Education: A Review.	The application of AI in vocational education can lead to a more engaging and effective English learning experience, addressing issues such as the traditional monotony of language learning and the lack of self-learning platforms (L. Chen et al., 2020).
Research on Adopting Artificial Intelligence Technology to Improve Effectiveness of Vocational College English Learning.	Deep learning technology can be used to objectively assess teaching quality in vocational education, fostering teacher enthusiasm and improving teaching standards (Hou, 2021).
Case Study on Application of Artificial Intelligence to Oral English Teaching in Vocational Colleges.	Vocational education reform should include adjusting training objectives, teaching modes, and content to align with AI advancements, with macro policy support and a focus on student employment (Wu, 2022).
Research on the application of Artificial Intelligence tools in higher vocational education.	The integration of AI in vocational education involves the use of resource network technology and intelligent systems to solve complex problems and empower the educational sector (Xu, 2023).
Practical Path of Application of Artificial Intelligence Technology in Vocational Education.	AI has been adopted in various educational roles, from administration to instruction, allowing for personalized curriculum content and improved administrative efficiency (Liu, 2022).
Research of the Innovative Integration of Artificial Intelligence and Vocational Education in the New Ecology of Education.	The sharing of vocational education resources can be enhanced by integrating AI technologies such as data and cloud computing, machine learning, and VR, to innovate the concept of resource sharing (Yanrong, 2021).
Research on the Sharing Mechanism of Vocational Education Resources Supported by Artificial Intelligence.	AI can specifically improve oral English teaching in vocational colleges by enabling accurate teaching and constructing intelligent learning networks, thus addressing the challenge of ineffective traditional teaching methods (Liu et al., 2023).

The necessity for vocational education reform is emphasized, advocating for adjustments in training objectives, teaching methodologies, and content alignment with AI advancements (Wu, 2022). The multifaceted role of AI extends beyond instruction to administration, enabling the creation of personalized curriculum content and improving administrative efficiency (Liu; Xu)

Moreover, the integration of AI in higher vocational education is seen as a solution to solve complex problems and empower the sector through resource network technology and intelligent systems. Innovative approaches, such as incorporating data and cloud computing, machine learning, and virtual reality, are suggested to enhance the sharing of vocational education resources, revolutionizing conventional concepts of resource distribution (Yanrong, 2021). In addressing the challenges of traditional teaching methods, AI is positioned as a key enabler for accurate instruction, particularly in the improvement of oral English teaching in vocational colleges (L. Chen et al., 2020; Liu et al., 2023). Overall, the analyzed content underscores AI's potential to revolutionize vocational education, emphasizing adaptability, efficiency, and innovation in both instructional and administrative aspects.

Discussion

Based on the analysis, the researcher believes that the integration of artificial intelligence (AI) in vocational education has significant transformational potential. The use of AI tools as learning media can personalize the learning experience and provide essential teaching support. Especially in language learning, especially English, AI applications are expected to make the learning process more interesting and effective. The deep learning technology proposed to objectively evaluate teaching quality has the potential to boost teacher morale and improve teaching standards. Understanding the need for vocational education reform also drives my belief in the importance of adjustments in training objectives, teaching methodologies, and content adaptation to AI advancements. AI's involvement in administrative and learning aspects further shows the potential to create personalized curriculum content and improve administrative efficiency. Overall, researcher believes that AI has a crucial role to play in revolutionizing vocational education, with an emphasis on adaptability, efficiency, and innovation in both teaching and administrative aspects.

In some other studies, it is explained that the integration of AI in higher vocational teaching brings many benefits. AI enables personalization of learning by analyzing student performance data and adjusting the learning path. This allows students to learn at their own pace, providing more challenge for those who understand quickly and additional support for those who need help (Chang et al., 2022; Zekaj, 2023). AI also enhances skill development through simulation, providing realistic practice in a safe virtual environment, which is especially valuable for fields with safety considerations or expensive equipment (Ifenthaler & Schumacher, 2023).

AI simplifies assessment and feedback by automating routine tasks, freeing up instructor time to provide more personalized feedback. AI-based feedback systems provide immediate insight into

student performance, enabling early intervention and better learning outcomes (Lampou, 2023). In curriculum development, AI analyzes real-time industry data to identify the most needed skills, so educators can continuously adjust the curriculum. AI also improves teacher efficiency by automating administrative tasks, freeing up time for lesson planning and student support. With AI, institutions can create more personalized, effective, and industry-relevant learning experiences, preparing students for successful careers (Chang et al., 2022; Shi & Xuwei, 2023; Tambuskar, 2022).

Conclusion

In an in-depth analysis of the role of artificial intelligence (AI) as a learning medium in vocational education, it can be concluded that its application has a significant positive impact. The utilization of AI tools as learning media can not only create personalized learning experiences, but also provide effective teaching support and improve learning efficiency. Particularly in English language learning in vocational schools, AI is expected to overcome traditional challenges, such as monotony and lack of effective self-paced platforms. Deep learning technology is proposed as a means of evaluating teaching quality, which can be carried out objectively to improve teacher morale and teaching standards. The reform of vocational education needs to be in line with the advancement of AI as a learning medium, emphasizing the adjustment of training objectives, teaching methods, and educational content.

The integration of AI in vocational higher education can also utilize resource network technology and intelligent systems to improve learning efficiency. Through innovations such as the use of data, cloud computing, machine learning, and virtual reality, AI-based learning media can enrich the concept of sharing educational resources. All in all, the application of artificial intelligence as a learning medium carries great potential to change the paradigm of vocational education, improve effectiveness, and prepare students for the evolving needs of the world of work. With a focus on adaptability, efficiency, and innovation, AI-based learning media are key in supporting the evolution of vocational education towards a more dynamic future.

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