

AI Adoption for Future Employability in Vocational Education: A Literature Review

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Abstract

Artificial Intelligence (AI) is now making an impact in education, employment and the skills needed in today's workplaces. Vocational education and training (VET) institutions are thus expected to integrate the use of AI into their curriculum, teaching, assessment and career development activities. This literature review summarizes the current state of the literature regarding the use of AI in vocational education and how it can be used to equip learners for future employment. The literature reviewed presents a variety of potential applications of AI in the field of VET, ranging from personalised learning to intelligent tutoring and virtual simulations, from competency assessment to labour-market analysis, from curriculum development to career guidance. It also implies that the literacy of AI, digital skills, critical thinking, communication, problem-solving, and the ability to collaborate with AI are emerging as important aspects of graduate employability. The literature, however, identifies a number of challenges, such as the lack of digital infrastructure, teacher preparation, low level of accessibility of AI technologies, privacy concerns, algorithmic bias, lack of reliability of AI-generated content, and the excessive dependence of the learner on AI. The review findings suggest that for successful use of AI in vocational education to be achieved, the institutions must be ready for it, teachers must have the necessary professional development, industry must co-operate, there must be responsible governance over AI, and the curricula must include a mix of technical AI skills and human-centred, employability-focused skills.

Keywords: artificial intelligence, AI adoption, vocational education, TVET, employability, future skills, AI literacy

1. Introduction

AI has emerged as a key force for transformation in the workforce and in schooling. Artificial intelligence, machine learning, generative AI, intelligent tutoring systems, robotics, predictive analytics and virtual simulations are now employed to assist in decision making, to automate work processes in the workplace, and in enhancing organisation productivity. The new developments are shifting the occupational landscape and the skills required by new workers. According to the International Labour Organization, generative AI is more likely to transform and augment more occupational tasks than to replace occupational tasks. The level of change varies from case to case, depending on the nature of the occupation, the composition of the tasks, the economy and the technological infrastructure (Gmyrek et

al., 2025). Therefore, the skills required for employees to work with AI systems are becoming more complex, and they'll be expected to make decisions using their own judgment and expertise with AI support. The developments bring important implications for vocational education and training. VET is directly linked to workforce preparation as it equips learners with occupation-specific knowledge, technical skill and ability, and hands-on experience and employability skills. Hence, institutions offering vocational education and training (VET) education need to make sure that their programmes stay relevant to the developments in the labour market and changes in the technology. The Organisation for Economic Co-operation and Development (OECD, 2026) identified five areas where AI can be used to develop and update vocational curricula, qualifications, competency standards, and occupational profiles. The possibilities for AI to assist institutions in analysing labour-market information and estimating new skills needs are enormous. The adoption of AI in VET is not uniform, however, at different levels of countries, institutions, programmes, and stakeholder groups. This literature review aims to provide an overview of the current understanding on the topic of AI use in vocational education and its impact on future employability. It highlights the applications of AI in VET, employability skills necessary for AI, readiness of learners and educators, institutional needs, and challenges to responsible use of AI.

2. Literature Review

2.1 Artificial Intelligence Adoption in Vocational Education

AI adoption in vocational education refers to the integration and use of AI-based technologies across teaching, learning, assessment, curriculum development, institutional administration, and career preparation. It involves more than providing learners with access to generative AI applications. It also requires institutional policies, qualified teachers, suitable infrastructure, relevant learning activities, and ethical governance. UNESCO-UNEVOC (2026) describes AI integration in technical and vocational education as an institution-wide process. The integration of AI may include governance, curriculum design, teaching, learning, student assessment, administrative operations, student support, and institutional partnerships. This approach suggests that AI adoption should be connected to the educational objectives and operational needs of vocational institutions. The OECD (2026) reports that AI adoption within VET development remains exploratory and uneven. Current applications are more common among public VET agencies and industry organisations than among individual teachers and training providers. AI is mainly being used to support existing activities rather than to replace established curriculum-development and quality-assurance processes. Perceived usefulness and ease of use are frequently identified as important factors influencing technology adoption. Teachers and students are more likely to use AI when they believe it can improve their performance, save time, facilitate access to information, and support the achievement of educational objectives. Trust in AI, institutional support, digital competence, and previous experience with technology may also influence adoption.

2.2 Applications of AI in Vocational Education

One of the most common uses of AI in education is personalised learning. With AI tools, data on students' performance, progress, learning styles, and competency can be gathered and analysed. This information can be used by these systems to make suggestions for the learning materials to be presented, modify the task difficulty, and give individual feedback. Personalised learning is a significant issue in vocational education as learners can join the programme with varying technical experiences and knowledge. AI can assist teachers in pinpointing gaps in competency among students and offer learning activities customized to each student's needs. According to UNESCO (2023), generative AI can enable personalised learning by tailoring the learning material to learners, based on their interests, capabilities, learning speed and learning style. Using AI to provide personalised learning can also help students who require more clarification or practice. Although, as the literature highlights, teachers should keep an eye on personalised recommendations to make sure that they are accurate, educational and aligned to programme outcomes (UNESCO, 2021).

Intelligent tutoring systems are aimed to give students advice, explanations, and feedback in the learning process. Such systems can process student answers, detect mistakes and suggest remedial learning activities. In vocational education, feedback is useful to correct technical errors immediately before they become routine. Tutoring systems that use AI can enable students to do the same thing and get feedback outside of class times. They may also help to eliminate certain repetitive teaching activities. Yet, AI-provided feedback might not be accurate, complete, or appropriate for a specific occupational context. So, teachers still need to check the accuracy of the teaching material and have to make sure that students are not relying on computer-generated explanations alone.

Vocational education relies strongly on learning through work and work-based learning. AI-powered virtual simulations can generate interactive environments for students to work on occupational tasks without the real world dangers associated with physical, financial or safety threats. Virtual simulations are useful in the healthcare, automotive maintenance, construction, manufacturing, electronics, aviation, hospitality, and information technology fields. Students have the opportunity to practice diagnosis, operation, emergency response and workplace decision making skills related to technical issues. AI can adjust the scenarios it creates based on how well the learners do, and can create new problems for learners to solve. Simulations can be particularly useful if there is limited access to equipment, or equipment is too expensive or dangerous. However, simulated training should be used in conjunction with learning activities using real equipment, customers, supervisors and workplace environments.

AI can aid competency-based assessment by capturing data on students' performance in practical and theoretical tasks. It can track task completion, accuracy of responses, steps performed in procedures, time management, safety compliance and error patterns. Assessment through AI could potentially allow vocational schools to offer ongoing feedback instead of just end-of-term exams. It can also help teachers to identify pupils who need extra help. However, UNESCO cautions that automated decision-making can lead to biased or misleading outcomes if the systems are based on incomplete or unrepresentative data (2021). Therefore, there must be human oversight in AI-supported assessment, criteria that are clearly communicated, and avenues for learners to dispute or challenge the findings from the AI.

Vocational institutions have to continuously adapt their curricula and qualifications to the ever-evolving technologies of the workplace. The traditional curriculum-development process can be time-consuming as it involves conducting labour-market research, consulting with stakeholders, mapping competencies, preparing curriculum content, seeking validation, and gaining regulatory approval. AI can assist with these tasks, gathering and structuring data on the job ads, occupational standards, employer feedback, government reports, and industry publications. It can also help to map competencies from various qualifications and discover the duplication of competencies and/or competency outcomes that are not included in one or more qualifications. According to OECD (2026), emerging applications of AI in VET development include: labour-market analysis, competency mapping, curriculum drafting, technical validation and compliance checking. These can enhance the effectiveness and timeliness of curriculum development processes. But the curriculum content generated using AI needs to be checked by teachers, employers, professional organisations and quality assurance bodies. Labour-market data can be limited in providing information about jobs that are locally available, informal employment, and future skills that are not yet listed in ads.

Career guidance systems with AI can match learners' skills, interests, qualifications, and desires to information on careers. These systems can suggest career pathways, training, certificates and skills building activities. Learners can also use generative AI to help them with their CVs, interview practice, job descriptions, and professional portfolios. These applications may enable students to have ongoing access to employment-related assistance. However, career-recommendation systems could still perpetuate past discrimination from employment data. It is crucial, however, for human career counselors to acknowledge and clarify key considerations and apply these to the students' own socio-economic context when interpreting AI-generated counselor recommendations. AI literacy is gaining momentum as an emerging part of the employability skill set. According to Long and Magerko (2020), AI literacy is a set of skills that enables people to critically assess AI, interact and interact with AI, and effectively utilize AI in various contexts. According to Ng et al., (2021), AI literacy involves awareness

and understanding of AI, use and application of AI, evaluation and creation of AI, and ethical issues of AI. AI literacy is thus more than just operational, it's also critical awareness. According to OECD (2023), there are specialised AI skills as well as general AI literacy. AI systems need to be developed, maintained, and adapted to new requirements, which requires specialized AI skills. General AI literacy helps the employees to grasp and apply AI tools in their job tasks. While not all vocational learners should be AI developers, more learners are needing to be informed on the impact of AI on their jobs and how the results of AI are being judged. Future employability has been linked to technical, digital, cognitive, and interpersonal skills in the literature. The skills necessary for those who will work in an AI environment are digital literacy, data literacy, problem solving, creativity, communication, teamwork, flexibility and ethical decision making. Companies might appreciate anyone capable of leveraging AI in a responsible way along with their job expertise. Along with learning how to use AI, one must also be aware of its constraints. Students should be aware of the potential inaccuracies, outdated information, bias, and fabricated evidence in AI-generated content. Hence, the critical thinking process, information verification, and professional judgement are important parts of AI-supported employability.

Students' attitudes have an impact on their willingness to embrace AI-supported learning. Common benefits are quicker access to information, personalised explanations, learning support, idea generation and time efficiency. Kankeviciene et al. (2026) have investigated the attitudes of 803 students at universities, colleges and vocational schools in Lithuania. The use of AI varied in educational environments. Some 78.8% of university students and 75.5% of college students said they used AI, while 46.5% of vocational students did. The results show a significant gap in the use of the findings between vocational students and students in other educational institutions. Accessibility to information, learning support, and time efficiency were recognized as positive factors by the students in the study. They also pointed out various concerns such as the reliability of information produced by AI, a decrease in critical thinking skills, stifled creativity, academic dishonesty, and the over-reliance on technology (Kankeviciene et al., 2026). The results suggest that access to AI platforms is not sufficient for vocational students. They require carefully planned learning opportunities that help them to understand how to use AI, check its output, safeguard their personal data and think for themselves.

The role of teachers in vocational education is crucial when it comes to the use of AI. They decide on the deployment of AI tools, how they are integrated with the occupational learning outcomes, and how students' use of AI is evaluated. Vocational teachers need to understand the capabilities, constraints and applications of AI in the occupational context. They must also have skills in AI-enabling instructional design, prompt formulation, content verification, data protection, assessment, and academic integrity. Shi (2025) suggests an AI literacy landscape for vocational college teachers comprising three aspects: grasping business demands, designing business-oriented AI-supported teaching scenarios, and aligning the course curriculum with the business demands. The study emphasizes the role of human-computer collaboration in teachers' professional skills. Various factors such as access to training, institutional policies, workload, confidence, technical support and perceived usefulness can determine teacher readiness. Teachers might be opposed to the use of AI because they feel it is unreliable, a threat, or contradicts the way they teach. Lack of comprehension, on the other hand, can result in uncritical use. Teachers, then, will need ongoing professional development to ensure that the tools they choose and activities they create allow for the integration of AI to enhance, not supplant, learning for students.

Institutional readiness includes technological infrastructure, leadership support, financial resources, staff competence, data governance, cybersecurity, curriculum flexibility, and quality-assurance mechanisms. UNESCO-UNEVOC (2026) suggests that the process of integrating AI into education should be done gradually. Before choosing AI tools, institutions should evaluate their readiness levels and determine their educational needs. They should set policies on Transparency, Accountability, Human Oversight, Privacy, Equity and Safety. For the adoption of AI to be a reality, the internet connection must be reliable, there should be suitable devices, licensed software, and technical support for them. But that's not enough infrastructure. Institutions need to explain which uses of AI are allowed and which are not, especially regarding assessment, processing of students' information and academic work. However, changes to budgeting, staff roles, curriculum design, assessment policies and industry

partnerships may be necessary for adopting AI, which is why institutional leadership is important. Successful implementation depends on the effective coordination of administrators, teachers, students, employers, technologists and quality assurance professionals. Vocational education is based on industry collaboration as the occupational competencies must match the needs of the workplace. The adoption of AI further underscores the significance of this partnership, as with the rapid advancement of technology, it is essential that the responsibilities of occupations evolve alongside. Employers can assist institutions in recognizing new applications of AI, evolving occupational changes, and necessary technical and interpersonal skills. They are also able to supply workplace data, equipment, training, guest instructors, internships and training contracts. According to OECD (2026), AI has the potential to enhance VET responsiveness by analysing evolving labour-market needs and aligning them to curricula and qualifications. However, the participation of employers, professional associations, teachers, trade unions, government agencies and learners in curriculum decision making should remain. Work Based Learning provides students with an opportunity to see how AI is applied in real work settings. It also provides an opportunity for learners to see, to learn and to understand organizational procedures, professional responsibilities, team working, safety and ethical expectations which might not be fully apparent in classroom-based activities.

2.3 Challenges of AI Adoption in Vocational Education

While AI can be a valuable asset to the vocational education system and to the future employment of learners, there are also some great challenges in implementing it. Digital inequality is one of the key issues. The scope and availability of digital devices, capable internet access, AI platforms, technical support as well as digital skills vary significantly across vocational institutions and students. The opportunities for AI-supported learning may be unevenly distributed across institutions, with some in less well-resourced areas or in rural settings not having the resources to offer the same opportunities as more well-resourced institutions. Consequently, there can be unequal access which can result in disparities in the quality of the education that students receive and their preparation for employment. Individuals who use advanced AI tools regularly can become more digitally and technologically competent than those who do not, contributing to the deepening of inequalities in education and/or socioeconomic status.

However, one of the difficulties is the trustworthiness of data produced by AI systems. Although AI-generated information may seem natural and convincing, it can be incorrect, misleading or fabricated. It is especially troubling in job-related environments, like healthcare, engineering, construction, finances, transportation, and workplace safety, where misinformation can have significant professional and physical ramifications. Therefore, students need to be trained to use AI-generated answers in conjunction with accurate technical manuals, professional standards, legal requirements and expert advice. Teachers also play a crucial role in clarifying that an AI-generated response may not always be accurate. Therefore, in vocational education, students should be able to assess, question and test AI production should be an integral part of AI literacy.

Other issues include data privacy and security. AI systems could gather and analyze personal data, such as students' learning habits, performance and educational records, etc., which may be sensitive information. Vocational institutions therefore should have clear data collection and retention procedures and practices in place regarding informed consent, data collection, data storage, access, retention and third party processing. Students and teachers should also be reminded not to provide personal, institutional, client, or workplace information that may be considered confidential to publicly available AI platforms. Institutional AI policies should address data protection and there is a need for embedding data-protection requirements in the training of students and staff. This is important to guarantee that using AI aids in learning without infringing on privacy or security of the institution.

A further key issue of concern when using AI in vocational education is algorithmic bias. Bias can be amplified or perpetuated by AI systems when they are trained on certain data. These biases can affect evaluation results, suggestions for learning, career guidance and can make a difference for specific groups, such as girls, people with disabilities, ethnic minorities, language minority students, socio-economically disadvantaged students, or students from specific geographic areas. Institutions must continuously review AI outputs and look for potential discriminatory or unfair practices to ensure responsible AI use. Use of a wide and diverse range of data and representative procedures, use of

transparency in decision-making processes, human oversight and easy access for complaints of incorrect or discriminatory outcomes are critical. AI should be used as a tool to assist educational decisions, not as a stand-alone solution.

Academic integrity and dependency on students also need to be taken into account. Students can use generative AI to write work or answer questions without cultivating the skills which the work or questions are designed to assess. Overdependence on AI could reduce independent thinking, creativity, problem-solving, self-regulated learning, and professional judgment and decision-making. Kankeviciene et al. (2026) discovered students were aware of how AI can enhance the learning process and possibly diminish critical thinking and independence. Vocational assessments should thus be structured so as to elicit learners' actual skills and/or practical competence, provide reasons for their decisions, check the quality of information generated by the AI, and critically examine what they did with the AI. Assessment practices should be directed at the learner's process, understanding and the ability to apply knowledge in real contexts within the workplace, as well as the output from the process. A related concern is to ensure practical and human skills are maintained. Vocational education should not be a substitute for real work experience with digital tools. However, there is still a need for learners to have direct opportunities to work with equipment, materials, customers, colleagues, supervisors, and actual workplaces. Simulations and activities using AI can supplement practical training, but cannot be a replacement for on-the-job and on-the-classroom experience. Further, the ability to compete, communicate, work in a team, lead others, negotiate, take personal responsibility, and demonstrate ethical judgment is found in most jobs. According to OECD (2023), technical skills supported by cognitive, social, and management skills are necessary when it comes to AI. Thus, good use of AI should augment professional development and vocational learning, but should also maintain human, hands-on and ethical aspects of professional development.

2.4 Directions Identified in the Literature

The reviewed literature identifies several priorities for the successful integration of AI into vocational education. First, AI literacy should be incorporated across vocational programmes rather than treated as a separate or optional subject. Students need to understand how AI systems operate, how to communicate effectively with AI tools, how to recognise their limitations, and how to evaluate the accuracy and ethical implications of generated outputs. AI-related learning activities should also be connected to authentic occupational tasks so that students can understand how AI is used in real workplaces. For example, learners should be given opportunities to use AI for troubleshooting, designing, analysing information, improving productivity, or supporting customer service, depending on the requirements of their occupational field.

Second, teachers should receive continuous professional development. Educators need both technical knowledge and pedagogical guidance to use AI effectively, ethically, and safely. Professional development should help teachers design meaningful AI-supported activities, evaluate AI-generated content, protect student data, identify bias, and maintain academic integrity. At the same time, curricula and qualifications should be updated regularly using labour-market information and consultation with employers and industry representatives. Such collaboration can help vocational institutions identify emerging occupations, changing skill requirements, and the practical AI competencies expected by employers. AI-supported assessment should also be implemented with transparency and human oversight. Students should know when and how AI is used in assessment, what data are collected, and how decisions are made. Human educators must remain responsible for interpreting results and making significant educational decisions. Furthermore, practical training and apprenticeships should remain central components of vocational education. AI can support preparation, simulation, feedback, and reflection, but learners must continue to develop competence through direct engagement with tools, materials, people, and workplace environments.

Institutions should also establish clear policies covering privacy, cybersecurity, accountability, academic integrity, and the responsible use of AI. These policies should be communicated to students, teachers, administrators, and industry partners. Students must be taught to evaluate and verify AI-generated outputs rather than accepting them uncritically. This includes checking information against professional standards, technical documentation, legislation, and expert advice. In addition, AI

resources should be made accessible to learners from different socioeconomic backgrounds. Institutions may support this goal by providing shared devices, reliable connectivity, on-campus access to approved platforms, technical assistance, and inclusive digital-skills training. Finally, institutional adoption of AI should be continuously monitored and evaluated. Evaluation should consider not only the frequency of technology use but also its influence on learning quality, practical competence, student engagement, equality, ethical conduct, and employment outcomes. By collecting feedback from students, teachers, employers, and other stakeholders, vocational institutions can identify weaknesses and improve their AI strategies. Thus, the literature suggests that successful AI adoption depends on a balanced and human-centred approach in which technology supports teachers, practical experience, critical thinking, and meaningful preparation for employment.

3. Methodology

The research strategy used in this study was structured narrative literature review to analyze the introduction of artificial intelligence and its role in the employability of vocational students in the future. Internet search engines, such as Scopus, Web of Science, Google Scholar, ScienceDirect and related institutional databases were used to identify the relevant literature published between 2022 and 2026. The terms used for search were: “artificial intelligence adoption”, “vocational education”, “technical and vocational education and training”, “future employability”, “AI literacy”, “digital transformation”, “human resource development” and “competitive advantage”. The review was comprised of peer-reviewed journal articles, conference publications and institutional reports and publications published in English and covering AI applications, digital transformation, professional competency development, employment readiness or organisational adoption. Research not directly related to education, workforce competency, AI adoption, and digital readiness was not included. This review model aligns with other reviews that organised multi-disciplinary evidence to analyse the applications of AI, challenges in its adoption, quality, bias, and explainability (Albahri et al., 2023; Al-Jamal et al., 2025), and those that studied the strategic pathways of digital transformation in educational and organisational settings (Al-Qasbi, 2024; Al Rousan, 2024).

Selected publications were analyzed and categorized based on the publication objectives, publication context, usage of AI, expected outcomes of the publications, factors related to publication adoption, and challenges reported. A thematic organization of literature followed, which was based on the following areas: AI-supported teaching and learning, personalised competency development, AI-literacy, curriculum–industry alignment, institutional readiness, teacher competencies, ethical governance, and future employability skills. Organisation, human resource, legal, cybersecurity, and risk-management aspects of technology uptake were explored in particular, as they impact on the sustainable use of AI in vocational institutions (Al Mansoori & Hafssa, 2025; Alazzam et al., 2026). The relationship between AI related competencies and labour-market readiness was also explored, where studies on human-resource strategies, talent management, information systems, organisational creativity and AI driven organisational processes were all taken into account (Aloqaily, 2022, 2023a, 2023b; Al-Zaqeba et al., 2025). Because there was no statistical analysis of the findings (meta-analysis or empirical hypothesis testing), these findings were presented descriptively in a synthesis of the main themes reported in the literature.

4. Results

The narrative synthesis identified six recurring themes concerning the adoption of artificial intelligence in vocational education and its relationship with future employability: AI-supported learning, AI literacy and digital readiness, curriculum–labour-market alignment, teacher and institutional readiness, human-centred employability skills, and responsible AI governance. Across the reviewed literature, AI adoption was presented as a broad institutional process involving curriculum design, teaching, assessment, student support, career guidance, and administrative decision-making rather than the isolated use of generative AI tools. The OECD (2026) and UNESCO-UNEVOC (2026) particularly emphasised the importance of integrating AI within existing institutional governance and quality-assurance arrangements.

4.1 AI-Supported Teaching and Competency Development

The first major theme concerned the application of AI to teaching, learning, and competency development. The reviewed literature identified personalised learning, intelligent tutoring, automated

feedback, virtual simulation, learning analytics, and competency-based assessment as the most relevant applications in vocational education. These applications enable learning activities to be adapted according to students' knowledge, performance, pace, and identified competency gaps. AI-supported simulations were particularly relevant to vocational programmes in which authentic practice may involve expensive equipment, limited facilities, or safety risks. However, the findings consistently indicated that virtual and AI-supported learning should complement rather than replace practical training, apprenticeships, and workplace experience (UNESCO, 2021, 2023).

4.2 AI Literacy and Digital Readiness

The second theme showed that AI literacy and digital readiness are increasingly important components of future employability. AI literacy involves understanding the basic functions of AI, using AI tools appropriately, critically evaluating their outputs, recognising their limitations, and considering their ethical consequences (Long & Magerko, 2020; Ng et al., 2021). The reviewed evidence indicated that vocational learners do not necessarily require specialised expertise in developing AI systems. Nevertheless, they need sufficient knowledge to interact with AI, verify generated information, protect sensitive data, and apply professional judgement in AI-supported workplaces. The OECD (2023) similarly distinguished specialised AI competencies from general AI literacy while emphasising that both must be accompanied by cognitive, interpersonal, and management skills.

Differences in AI adoption were also evident across educational settings. Kankevičienė et al. (2026) found that 46.5% of vocational students in their sample used AI tools, compared with 75.5% of college students and 78.8% of university students. Although students associated AI with easier access to information, learning support, and greater efficiency, they also expressed concerns about unreliable information, academic dishonesty, reduced creativity, and weakened critical thinking. These findings demonstrate that providing access to AI tools alone is insufficient. Vocational learners require structured AI-literacy instruction and opportunities to evaluate AI-generated outputs critically.

4.3 Curriculum Alignment and Future Employability

The third theme was the link between the development of the vocational curriculum and the evolving needs of the job market. AI can help gather and process data from job posts, competency frameworks, and industry reports and standards. It can also help with competency mapping, drawing up curricula, technical validation, and identifying emerging skills needs. According to OECD (2026), these applications would help enhance the efficiency and responsiveness of VET curriculum and qualification design. But literature claimed that AI-driven recommendations need to be checked in cooperation with employers, professional organizations, teachers, policymakers, and quality assurance providers.

The literature reviewed also gave consideration of employability as a multidimensional outcome. The future employability was related not only with knowledge about the occupation but also with AI literacy, digital competence, problem-solving, communication, teamwork, adaptability, creativity, ethical judgement, and lifelong learning. The expected impact of AI on jobs was, therefore, not so much job replacement as task transformation and collaboration with AI (Gmyrek et al., 2025). As a result, vocational graduates should be able to work technically, and also with critical and responsible way to work with intelligent technologies.

4.4 Teacher and Institutional Readiness

The fourth theme that was considered was the preparedness of teachers and vocational institutions. The role of the teacher was always a key factor that was found to be essential for the successful implementation of meaningful AI. Vocational teachers must be familiar with the capabilities and limitations of AI, equipped with the skills needed for using AI in instructional design, content verification, assessment, privacy protection, and academic integrity. Shi (2025) also linked teachers' AI literacy to their understanding of industry needs, creation of AI-integrated instructional scenarios, and adjusting learning activities to meet industry needs. The institutional readiness factors were digital infrastructure, leadership support, financial resources, cyber security, technical assistance, data governance, curriculum flexibility, and clear institutional policies. The literature revealed that digital transformation is not just about

technology acquisition; it is also about a strategic approach, organizational flexibility, and the development of human capacities (Al-Qasmi, 2024; Al Rousan, 2024). Other factors that were found to be relevant to institutional responsiveness and sustainable competitive performance included strategic flexibility and risk-management practices (Al Mansoori & Hafssa, 2025). Therefore, in vocational education and training, adoption strategies should be gradual and be associated with staff training, curricular reform, support programs for students and quality assurance protocols.

Ethical, legal and cyber security issues were explored in the fifth theme. Data privacy, algorithmic bias, inaccurate outputs, limited transparency, cybersecurity threats and unclear accountability were consistently mentioned as possible challenges for AI adoption in the reviewed studies. Albahri et al. (2023) emphasized the need for trustworthy and explainable AI, especially when AI systems have significant consequences when making decisions. Legal and cybersecurity issues related to the use of AI and connected technologies were also mentioned by Alazzam et al., (2026), such as data protection, accountability, and institutional security. Digital inequity was also a constant concern. Students may have different opportunities to develop the competencies of AI, due to differences in devices, connectivity, licensed platforms and technical support. The literature thus highlighted the importance of equal opportunities, digital training that is inclusive, clear decision-making processes, human oversight, and ways for students to challenge inaccurate or discriminatory AI output.

5. Discussion

The research in this study is empirical that examines the effects of the use of AI and Automation in vocational college students. Its key empirical insights offer concrete empirical evidence for a series of ongoing studies in the field highlighting the transformative power of AI and automation in workforce preparation and employability. This study first validates that AI and automation have the potential to greatly enhance the AI literacy and digital readiness of vocational college students. This is indeed in line with the findings of earlier empirical research by Dwivedi et al. (2021) and Brynjolfsson et al. (2025). From here, the study concludes that vocational colleges need to transcend the scope of traditional vocational education, adding the AI-enhanced learning practices into the learning process of their education program. This study also reveals that there is a strong positive relationship between the use of AI and AI literacy. This finding aligns with the "core view" of digital capability research (Kutnjak et al., 2020; Chounta et al., 2024), as well as the AI literacy cognitive theory research (Southworth et al., 2023; Wu et al., 2024) that suggest that the interaction with AI systems can enhance individuals' understanding of AI. Based on this, the study argues for integrating AI literacy into the key learning objectives of vocational education. This study also confirms that AI literacy and digital readiness can have a significant impact on the employability of students in the future. This conclusion is in line with the employability theory of the times proposed by Lund et al. (2021) and Mustafa & Altrad (2026) against the background of the Fourth Industrial Revolution, which indicates that employability is now beyond vocational skills and depends more on people's capacity to work with new technologies.

6. Conclusion

The literature indicates that AI is gaining more and more relevance in vocational education and employment. It can be used for personalised learning, intelligent tutoring, virtual simulations, competency assessment, curriculum development, labour-market analysis and career guidance. These applications can help develop technical skills, AI literacy, digital skills and career readiness. There are also examples in the literature that the use of AI raises educational and ethical problems. These include digital inequality, untrustworthy content, privacy issues, algorithmic bias, academic dishonesty, dependence of learners and the potentially reduced development of practical and human skills. From this perspective, institutional preparation,

professionalism of teachers, industry engagement, infrastructure, responsible leadership, and human supervision are crucial for effective implementation. Vocational education should not just ensure that learners can use AI but also equip them with the ability to critically understand its capabilities and limitations, and apply professional judgment. The future of job success will rely more and more on the skills of combining occupational knowledge with an understanding of AI, transferable knowledge, ethical consciousness, and lifelong learning.

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