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EMPLOYABILITY SKILL IN VOCATIONAL EDUCATION: A LITERATURE REVIEW ON INNOVATION AND INDUSTRY COLLABORATION

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Abstract

This study explores employability skills in vocational education through a systematic literature review focusing on innovation in teaching and industry collaboration. A total of 25 international articles published between 2020 and 2025 were analyzed from databases such as Scopus and Web of Science. The review reveals a strong trend of integrating soft skills—such as communication, problem-solving, teamwork, and leadership—into vocational curricula alongside technical competencies. Furthermore, innovations in learning, including e-learning and virtual/augmented reality (VR/AR), are identified as effective approaches to enhance students' engagement, critical thinking, and adaptability. Industry collaboration, through internships and joint curriculum development, plays a crucial role in bridging the gap between educational institutions and the labor market by ensuring that graduates meet industry standards. However, challenges remain, particularly regarding technological gaps, curriculum mismatches, and insufficient policy support. These findings highlight the importance of sustainable partnerships between academia, industry, and government to prepare graduates for dynamic labor markets and contribute to the Sustainable Development Goals (SDG 4 and SDG 8).

Keywords: *vocational education, employability skills, innovation, industry collaboration, sustainable development*

INTRODUCTION

Along with the times, the increase in population and the rapid development of technology have ushered the world into the era *of society 5.0.* The *era of society 5.0* can be interpreted as a collaboration by integrating digital technology in people's daily lives as a whole, and there will be a collaboration between humans and technology that will later be able to help solve social problems with the integration of physical and virtual spaces (Rahmadani et al., 2024). *Society 5.0* was first introduced in Japan in 2019 to depict the increasingly close integration between *the real life* world and the virtual world (Setiawan et al., 2020). This era has the

concept of collaboration between *the Internet of Things* (IoT) changed by *Artificial Intelligence* (AI) into something that will help in making people's lives easier.

Entering this era, the world of work has also undergone significant transformation as a result of digitalization, automation, and the rapid use of technology. This condition causes the young generation to not only have technical skills (*hard skills*) but also to be equipped with non-technical skills (*soft skills*) such as *public speaking* skills which are still very underdeveloped in education (Zheng et al., 2025). In addition, skills in critical thinking, problem-solving skills, being able to work in a team, and leadership skills (Siburian et al., 2022). These skills can be used as the key so that the younger generation can compete in the global job market and be able to adapt to very fast changes.

In addition, efforts to improve the skills of the younger generation are also in line with the agenda of the United Nations (United Nations Nation) through the *Substainable Development Goals / SDGs program*. Through the SDGs Program, it is hoped that it can go hand in hand with the development of technology and information systems. Reporting from (ICCROM, 2023) at point 8 *(Decent Work and Economic Growth*) SDGs which aim to be able to substantially increase the number of youth and adults who have relevant skills, including including tennis and vocational skills, for jobs, decent work and entrepreneurship which will later have an impact on the skills skills possessed by the younger generation. In addition, the SDGs program will provide a golden opportunity in creating a more inclusive, equitable, and sustainable development ecosystem through the active involvement of the young generation (Sagara et al., 2025).

In the context of vocational education, the need for job skills is increasingly important because it has a direct influence on the readiness of graduates to face the world of work. Career support will be provided in the form of integrating work skills into learning (Sumarni et al., 2025). (Sulistiobudi & Kadiyono, 2023) stated that the factors that influence the low job skills possessed by vocational graduates are the inability of educators to innovate and design meaningful learning so that the job skills possessed by graduates are not able to compete in the job market. In addition, (Villegas, 2025) in his research suggests that employers have criticized higher education for the quality of students and their lack of soft skills, which are important in the labor market and currently in dire need of individual employability.

Therefore, there is a need for innovation between the world of work and industry through industrial partnerships with academic institutions to encourage research, innovation and knowledge exchange. This innovation is expected to be able to create a university atmosphere that is more open to the emergence of new ideas (Gustina et al., 2024). The benefits of this collaboration will later affect improving the quality of students' practical work programs through internship programs, improving learning outcomes, learning motivation and readiness in transition to enter work life (Bennett et al., 2023). In addition, through internship programs or work experience during the study period, it will reduce the dropout rate in students who are having difficulty understanding the relevance of studies by helping them apply theoretical knowledge in practice. This, in the end, will increase students' understanding as well as interest in learning (Vuoriainen et al., 2025).

In line with the background that has been presented, this study aims to examine job skills in the realm of vocational education through a literature review on learning innovations and

collaboration with the employer industry. The main focus in this research will be directed in understanding innovation and industrial partnerships can strengthen graduate competencies and prepare students to be more adaptive in facing the dynamics in the world of work.

RESEARCH METHOD

This study uses *the literature review* method by analyzing as many as 25 relevant international articles between 2020 and 2025. Searches were conducted in academic databases such as Scopus and Web on Science using the keywords "*employability skills*", "*vocational education*" and "*industrial partnership*". The main focus in this study is to identify trends, findings and gaps. Based on the findings, there is a strong trend in integrating non-technical skills into the existing curriculum.

RESULT AND DISCUSSION

Employability Skills can be interpreted as abilities that tend to lead to non-technical or *soft skills.* (Nugraha et al., 2020) in his research defines that job skills are skills that refer to general or non-technical competencies which include the ability to present, understand and personal attributes that allow a person to get a job and achieve success in the job he or she chooses. In line with research (Edziwa & Blignaut, 2022) which explains that a graduate's skills should refer to the attributes of the graduate, such as non-tennis work skills, entrepreneurship, financial literacy, innovativeness, ethics, honesty and some tennis skills. These abilities must be mastered and highlighted to make it easier to get a job. Therefore, vocational education has an important role in providing graduates with the job skills needed by the industry (Halik Basah, et al., 2023).

As a higher education institution, universities are required to be able to create and produce graduates who have the skills needed by the world of work. Along with the rapid pace of education reform, new social demands, risks and challenges emerge (Tahirsylaj & Sundberg, 2025). (Oomen et al., 2022) in their research stated that to be able to overcome these problems, educational institutions must provide analytical tools that can be used in analyzing how policy visions change over time, including curriculum ideology that focuses on subject knowledge and focuses on individual self-regulation. In addition, digital transformation also plays a role in increasing student learning satisfaction. In line with the research presented by (X. Zhang et al., 2024), universities in China must focus on learning experiences and engagement in order to effectively connect digital technology knowledge with graduate skills.

Efforts to improve the skills of graduate students can also be carried out with collaboration between universities and industry. Through an internship program, (Gutiérrez-Pulido & Orozco-Rodríguez, 2025) the program is designed to complement academic training by offering practical experience and supporting students in acquiring skills relevant to the demands of an increasingly competitive labor market. Internships will not only develop technical abilities but also contribute directly to professional competencies such as communication, teamwork and problem-solving (Byrne et al., 2020). In addition, the collaboration can be done by creating an industry-based curriculum that is relevant and responsive to the needs of the job market. The involvement of industry in designing the

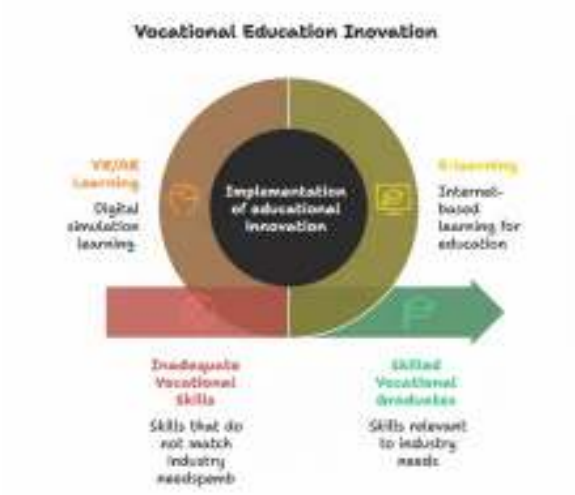
curriculum is expected to be able to reduce skill mismatches and ensure that graduates have competencies that are in accordance with applicable work standards (Hariyono, 2023)

Innovation in Vocational Education

In order to realize vocational graduates who have skills in accordance with the needs of the world of work, innovation is needed in the world of education. These innovations can be in the form of learning through *e-learning media.* This media is based on internet-based training activities designed specifically for educational purposes. This model utilizes a wide range of IT technologies in its practical and more systematic learning (Hu & Raman, 2024). In line with this research, online learning also has weaknesses according to (Meng et al., 2023) this learning cannot run well if the country or region that implements *e-learning* does not have adequate internet access, network problems, lack of adequate electronic devices and poor network infrastructure. So that this learning model can be achieved well if there is an active role of relevant agencies to produce graduates who have *soft skills* and learning outcomes that are equivalent to conventional learning (Bashir & Lapshun, 2025).

Another innovation that can be used to develop soft skills in graduates is using VR (Virtual Reality)-based learning. This media will add the user to an environment that is entirely computer-generated. AR (*Augmented Reality*) will incorporate digital elements into the real world (Curran & Hollett, 2024). (Ibarra Kwick et al., 2024) These technologies are urgently needed, especially in vocational education because through VR/AR media, students get the opportunity to carry out dynamic, historical reconstructive, and scientific visualization simulations. This allows students to carry out replication of exceptional learning activities, such as academic learning in the scope of the virtual world. So it will encourage engagement, understanding, critical thinking, collaboration and practical skills from various cross-disciplinary sciences (Llanos-ruiz & Abella-garcía, 2025).

Figure 1. Innovation in Voational Education



Innovations in vocational education, such as the use of e-learning and VR/AR technology, are essential to prepare graduates with skills relevant to the needs of the workforce. Although e-learning has its drawbacks related to infrastructure, VR/AR technology offers a more dynamic and practical way of learning through simulation, which can improve understanding, critical thinking, and collaboration skills.

Industry Collaboration in Vocational Education

Vocational education plays a role in preparing the workforce in accordance with the needs of the industry today. The relationship between vocational institutions and industry is becoming increasingly crucial in line with the demands of the job market and the increasingly rapid development of science and technology (Yoto et al., 2024). Partnerships between vocational institutions and industry can increase curriculum relevance, strengthen the quality of graduates and expand employment opportunities (Gunawan et al., 2023). Through this collaboration, it is hoped that there will be industry involvement in the curriculum planning stage to the evaluation of learning outcomes so that graduates who have work skills in accordance with the needs of the industry can be created (Comyn & Brewer, 2019).

In addition to partnerships between industry and vocational institutions, internship practices and (*Training on the Job*) OJT also play a role in improving the work skills of graduates. Menerut (Shen et al., 2024) the effectiveness of internships does not only add practical experience but can strengthen vocational identity as well as increase students' confidence and increase understanding in teamwork. In addition, (Tushar & Sooraksa, 2023) explained that skills in the 21st century such as digital literacy skills, rapid adaptability, and cross-cultural communication are needed, so that through internship programs, they will be related to these needed skills.

In recent years, many countries have implemented good practices that vocational education can be used as a means of realizing sustainable development. (Magagula & Awodiji, 2024) explained that the adaptation between vocational institutions and *the society 5.0* era requires partnerships with industry so that the curriculum can be updated according to the needs of the industry. In line with that, (Crew & Märtins, 2023) explains that learning innovations can also improve and grow independent learning skills. Through a positive attitude between students and the learning carried out, it will be closely related to the perception of their job skills, so that cooperation between vocational institutions and industry must also pay attention to psychological factors and students' learning motivation (Ayanwale et al., 2023).

Figure 2. Industry Collaboration

The improvement of the quality of vocational education and the employability of graduates is highly dependent on the close partnership between vocational institutions and industry. This collaboration not only ensures that the curriculum remains relevant to the needs of the job market, but also facilitates internship and OJT programs that provide real-world

practical experience. The combination of these three elements—industry collaboration, hands-on experience, and 21st-century skills development—is critical to creating a workforce that is truly prepared for industry challenges.

Challenges and Barriers

One of the main obstacles to the development of vocational education in various countries today, especially in developing countries, is that there is still a technological gap between the facilities available in the education institution and the technology used by industry (Bartroli et al., 2022). Facilities in the form of machines and software equipment in vocational institutions are often not in line with the development of technology applied in the world of work. (Sohimi et al., 2022) stated that this condition causes a learning process that has a theoretical tendency, so that graduates are not used to getting real work standards as needed in the industry. Thus, even though the industry has moved forward towards the digitalization *of society 5.0,* there are still many vocational education institutions that are lagging behind in preparing graduates with job skills that suit the needs of the industry. In his research (Omar & Kamaruzaman, 2024) he explained the widening skills gap between the needs of companies and the readiness of vocational graduates which creates low competitiveness in the global job market.

Another problem that occurs in vocational education is the incompatibility between the curriculum and the needs of the world of work. (W. Zhang et al., 2020) argue that there are still many curricula used dominated by conventional learning approaches. In fact, at this time the industry requires graduates to have job skills such as mastery of digital technology, the existence of competency certificates, problem-solving skills, and *soft skills* that are relevant to the needs of the job market (Kebede et al., 2024). The mismatch between the curriculum implemented in vocational education and the needs of the industry has a significant impact on the increase in the unemployment rate of graduates and the decrease in job skills possessed by graduates. Therefore, collaboration between vocational institutions and industry in curriculum development is a necessity. This needs to be done as an effort to improve the quality of graduates and graduates who produce relevant appearances (Njonge, 2023).

Limited policies and access to collaboration are also challenges in bridging collaboration between vocational institutions and the industrial world. There are still many countries that have regulations that do not support sustainable partnerships, for example, the government provides minimal incentives for companies involved in internship programs, limited budget allocations, and complicated legal mechanisms in the cooperation process (Muharam et al., 2025). Without strong policy support and adequate collaboration mechanisms, partnership programs between vocational institutions and industry will be difficult to develop and will not be able to produce a significant impact on the job readiness of graduates (Yang et al., 2025). This illustrates that the role of the government is very important as a facilitator in creating regulations and providing incentives that allow the world of education and industry to move in tandem towards the goal of improving the quality of the workforce (Njengele et al., 2024).

Figure 3. Vocational Education Gaps

Through the above explanation, it can be concluded that there are still gaps in vocational education in various countries, especially in developing countries, this is caused by several interrelated factors. These factors include the technological gap between facilities in educational institutions and technology used in industry, by prioritizing practical learning and lack of real training. Second, there is a discrepancy in the curriculum that still uses conventional learning methods, so that graduates do not have the skills needed by the industry. Finally, there are limitations of collaboration and unsupportive government policies such as minimal incentives and complicated regulations that make it difficult for partnerships to carry out cooperation.

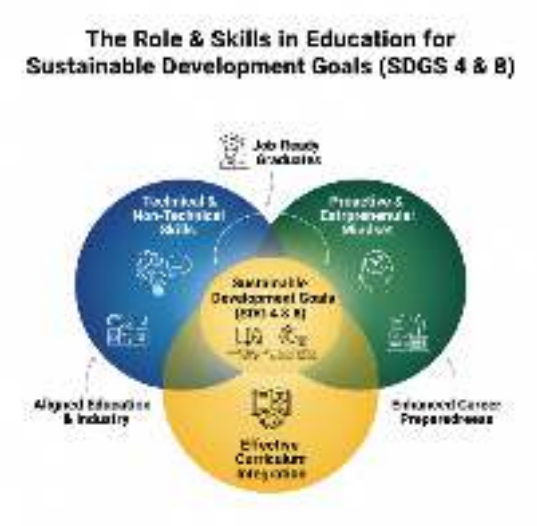
Implications for Sustainable Development

The role of skills in the education system is the main factor in the realization to achieve the global goals of sustainable development. Especially in achieving the 4th point (*Quality Education*) and the 8th point (*Decent Work and Economic Growth*). Because research conducted by (Sumarni et al., 2025) shows that non-technical skills, digital literacy, and critical thinking skills currently have a greater chance of being absorbed in the world of work and can increase economic productivity and encourage population growth. Through research (Walidayni et al., 2023) it is shown that direct student involvement through entrepreneurship education will affect the quality of education and entrepreneurial interest, which reflects the direct synergy of SDGS points 4 and 8.

The ability to master literacy and the quality of education will reduce the unemployment rate and add a decent scale of employment in various countries. For example, a case study carried out in Indonesia in a study (Soliman & Beram, 2025) shows that through the integration of *life skills* and the development of vocational curriculum that is in line with the needs of the industry, it is crucial in preparing graduates who are ready to compete in the world of work. But. Although vocational institutions have provided a curriculum related to technical and non-technical skills, the individual self-factor also plays an important role in the process of competing in the job market. In line with research (Zixuan et al., 2025) which states that in addition to technical skills, self-motivation also affects job readiness. (Lestari et al., 2024)

added that psychological factors also affect students' career readiness through the development of independent skills and confidence in the application of work skills.

Figure 4. The Role & Skills in Education



It can be concluded that the goal of sustainable development, especially in point 4 (*Quality Education*) and point 8 (*Decent Work and Economic Growth*), the education system must integrate three elements, namely technical and non-technical skills, critical thinking skills and entrepreneurship. The combination of these three elements will be able to produce graduates who are not only ready to enter the job market but can also contribute directly to economic growth and sustainable development.

CONCLUSION

This literature review concludes that job skills, especially non-technical skills that are integrated with technical competencies, are important for vocational graduates to be able to compete in the ever-changing world of work. Innovations in pedagogy—such as e-learning and VR/AR—as well as close collaboration with industry through internships and joint curriculum design have proven effective in strengthening graduates' job readiness. However, challenges still include a technology gap between schools and industry, less relevant curricula, and limited government support for sustainable partnerships.

The implications of this study show that vocational education providers need to encourage innovation in a sustainable manner and establish closer cooperation with industry, while governments must create policies and incentives that support such partnerships. The limitation of this study lies in its dependence on literature published between 2020–2025, so it does not necessarily cover new practices in various other contexts. Further research is suggested to explore cross-border empirical case studies and examine the role of psychological factors, such as self-efficacy and motivation, in improving graduate employability.

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