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Assessing Workplace Readiness of Vocational School Students for Industry 5.0: A Skills Gap Analysis

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Research paper

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ABSTRACT

Background: The fast-paced growth of the global landscape has triggered significant transformations in various sectors, including education and the workforce. As the world enters the era of Industrial Revolution 5.0, which emphasizes sustainability and human-technology collaboration, it becomes critical for vocational high school (SMK) graduates to possess job skills that align with modern industry demands. However, a persistent skills gap remains between what vocational education delivers and what industries require.

Methods: This study aims to analyse the employability level of vocational high school students in meeting industry demands during the Industrial Revolution 5.0. A quantitative approach was employed using an online survey distributed to 450 vocational students and 40 industry representatives across various sectors in Indonesia. The survey instrument focused on two main job skill dimensions: problem-solving practices and planning and organizing activities. Descriptive statistical analysis (frequency distributions, means, and standard deviations) was conducted, followed by inferential analysis using a t-test to compare students' self-assessments with industry evaluations of job readiness.

Results: The findings revealed that vocational students' skills are currently at a moderate level and have not yet fully met industry expectations. A statistically significant gap was found between student perceptions and industry assessments, indicating a misalignment in readiness levels.

Conclusion: These results highlight a critical employability gap that must be addressed to ensure vocational graduates are better prepared for the evolving workforce. Strengthened collaboration between vocational education institutions and industry is essential. Joint efforts should focus on establishing shared competency standards, enhancing industry-based training programs, and increasing industry participation in curriculum development to improve the alignment between education outcomes and labour market needs.

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INTRODUCTION

The 21st century is characterized by globalization and rapid technological advancements, significantly impacting various aspects of life, including the workforce (Pacher, Woschank, & Zunk, 2023; Pacher et al., 2023). The Industrial Revolution 5.0 emphasizes human-centered innovation, requiring a workforce equipped with complex and adaptive skills to navigate these rapid changes. In this context, vocational education plays a crucial role in preparing graduates for an increasingly dynamic and competitive job market. However, a persistent challenge remains in ensuring that vocational graduates possess industry-relevant competencies (Wulansari, 2021).

Globally, there is a growing concern over the *skills mismatch* between vocational graduates and labour market requirements. Research by Xinming (2023)highlights that despite the critical role of vocational institutions in fostering job-ready professionals, a significant disconnect persists between curricula and the practical skills demanded by industries. Similarly,Somantri & Pramudita (2024) note that assessment and certification systems often fail to reflect real-world competencies, contributing to high unemployment rates among vocational graduates.

One of the primary concerns in vocational education is the gap between the skills possessed by graduates and those required by industry (Malik, 2019;Patt, Ruhose, Wiederhold, & Flores, 2021). Studies in Indonesia indicate that vocational school graduates often struggle to meet market demands, limiting their employability and competitiveness (Winterton & Turner, 2019). This highlights the urgent need to design a curriculum that integrates both technical (hard) and non-technical (soft) skills to ensure graduates are well-prepared for workforce challenges(Lamri & Lubart, 2023)(Mosca & Ball, 2023).

Previous research has underscored the importance of both hard and soft skills in vocational education, particularly problem-solving, communication, and adaptability, which are essential for workplace success (Mosca & Ball, 2023)(Prabowo et al., 2023). Additionally, technical competencies play a critical role in ensuring quality industrial production (Prabowo et al., 2023). However, despite these insights, gaps remain in aligning students' competencies with industry needs. Specifically, research has paid insufficient attention to the practical application of workplace skills such as initiative, problem-solving, and planning (Subekti, Ana, & Muktiarni, 2019) (Subekti et al., 2019) (Jackson, Shan, & Meek, 2022).

The aim of this is to bridge this research gap by identifying and analysing essential skills that need further enhancement in vocational schools. By assessing both industry expectations and current student competencies, this study will provide valuable insights into curriculum adaptation strategies that align vocational education with the evolving demands of the industry.

METHODS

To evaluate vocational school students' skills in meeting industry needs, this study adopts a quantitative descriptive approach. The research involved an online survey conducted in vocational schools across Indonesia, specifically those offering the Construction and Property Technology Expertise Program in collaboration with industry partners.

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Sample and Populations

Using a purposive sampling approach, this research selected 490 participants comprising vocational school students in Indonesia who had completed internships or acquired experience in their relevant fields. In terms of this study, the criteria for sampling students are 1). Vocational students, 2). Competence in expertise: modelling, design, and building information; sanitation and maintenance of building construction; construction and housing engineering, 3). Have participated in Field Work Practice, and 4). The location of the students is in the provinces of Aceh, West Java, and West Nusa Tenggara. The industry respondents consist of 40 individuals who meet the following criteria: (1) they serve as supervisors in the companies where students undertake their Field Work Practice, and (2) the companies are partner industries of the vocational schools involved.

Instrument

The survey includes 10 statements related to Job Skills, categorized into two aspects: initiative in addressing problems (5 indicators) and the ability to plan and organize activities (5 indicators), as presented in Table 1.

Table 1.

Student Skills in Fulfilling Industrial Needs in Vocational Schools

Aspect	Indicator
Practice in The Face of a Problem	Able to adapt well to the environment
	Able to read the situation in the workplace
	Able to identify opportunities that exist
	Able to implement previously formulated plans into concrete actions
	Able to present innovative solutions to a problem
Planning and Organizing Activity	Able to manage their time and prioritize activities that should be prioritized according to the priority scale
	Able to take initiative and make decisions
	Able to engage in the planning process of activities and contribute to their improvement.
	Able to make the goals of a project/activity so that it is directed and its implementation is in accordance with the plan
	Able to adjust existing resources to be able to deal with unexpected changes during the implementation of activities

The survey was administered via Google Forms and disseminated through email and WhatsApp platforms. Each item utilized a four-point scale, ranging from very capable to very incapable. Instrument validation was carried out through a pilot test involving 50 students who met the sampling criteria. The validity analysis employed Cronbach's Alpha, resulting in all items being declared valid with a high reliability coefficient of 0.951.

Data Analysis

The data were analysed using measures of central tendency and dispersion, including mean, standard deviation, and frequency distribution, to describe students' competencies in fulfilling industry-required skills. The overall data is distributed normally and homogeneously. Therefore, parametric tests are conducted. Self-sample tests are conducted to compare student and industry outcomes. This study uses Levene's Test to find out the results for each

student and industry. This analysis aims to compare two separate data groups. To assess student skill levels, the EPIK Model is used, which categorizes scores into four levels: very incapable (1.00–1.75), incapable (1.76–2.50), capable (2.51–3.25), and very capable (3.26–4.00).

RESULTS AND DISCUSSION

The Characteristics of Respondents

The number of respondents in this study was 490 people, consisting of 450 vocational school students and 40 respondents from industry. Of 450 respondents, vocational school students were divided into 389 vocational school students (86.5%) from West Java Province, 46 students (10.2%) from Aceh, and 15 vocational school students (3.3%) from West Nusa Tenggara. The survey gathered 450 vocational school students and 40 people from the industry. A total of 450 students responded, 236 male students (52.5%) and 214 female students (47.5%) responded to the questionnaire. Most respondents dominated with 389 students (86.5%) from the Building Modelling and Information Design Expertise Program. Additionally, 60 respondents (13.3%) were from the Construction and Housing Engineering expertise program, while just 1 respondent (0.2%) was from the Building Construction, Sanitation, and Maintenance program. Regarding the industry, 13 individuals (32.5%) were from national companies, while the majority, 27 respondents (67.5%), came from local companies.

The gender of vocational students is dominated by males at 52.5%. This can happen because majors that are in demand in certain fields are considered more difficult, so many men are interested in them. However, gender differences in the choice of majors cannot be solely attributed to the difficulty of majors. Research shows that gender differences in field characteristic references play an important role in gender primary choice (Combet, 2023). It is shown that men prefer careers in STEM (Science, Technology, Engineering, and Math) fields to women (Stewart-Williams & Halsey, 2021).

Employable Skills

Table 2 illustrates that the employability of vocational school students is at the ability level (M = 3.05, SD = 0.46) for students and (M = 3.2, SD = 0.4) for industry participants. A significant difference in employable skills between students and the industry was observed, as shown by the t-test results [t (490) = -2.627, p = 0.009], which are detailed in Table 2.

Table 2.

Independent Sample T-test for Employability Skill

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Employability Skills	Equal variances assumed	0,335	0,563	-2,627	488	0,009	-0,17337	0,06600	-0,30304	-0,04370
	Equal variances not assumed			-2,831	47,684	0,007	-0,17337	0,06124	-0,29651	-0,05022

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Practice in Facing the Problems

The results of Table 3 show that the practical ability to face problems of vocational school students is at the advanced level (M=3.1, SD=0.32) for students and (M=3.2, SD=0.4) from industry. There are differences between students and industry in the Practice of Facing Problems based on this t-test [t (490) = -1.763, sig = 0.079] Table 3.

Table 3.

Independent Sample T-test for Practice in The Face of Problems

Practice in the Face of Problems		Levene's Test for Equality of Variances		t-test for Equality of Means						
				t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.						Lower	Upper
	Equal variances assumed	6,859	0,009	-1,763	488	0,079	-0,09867	0,05598	-0,20866	0,01133
	Equal variances not assumed			-1,387	42,985	0,173	-0,09867	0,07114	-0,24214	-0,04481

This indicates that, according to their self-assessment, students consider themselves most capable in areas such as 'presenting innovative solutions to a problem' and 'identifying existing opportunities,' with 81% of students rating themselves highly in these aspects. Furthermore, there is no significant difference between student self-assessments and industry assessments. According to industry evaluations, students demonstrate greater ability in 'translating plans into action' compared to the other three aspects, with a rating of 75%. Strong thinking skills are crucial for effective problem-solving and can help prevent failure in task execution (Simamora, Saragih, & Hasratuddin, 2018).

As for the indicator of 'being able to adapt well in the environment', students rated themselves very capable, with a percentage of 30% and industry rated 43%. The two have a considerable percentage difference. Adaptability is the key to success in a dynamic world of work, allowing individuals to quickly adapt to changes, new technologies, and the demands of an ever-evolving work environment (Jiang, 2017). Furthermore, in the 'being able to read situations in the workplace' indicator, the industry rated students at a level capable of 60%, compared to students who rated themselves at a percentage of 77%. The ability to read situations in the workplace is an essential skill, allowing individuals to respond appropriately to interpersonal dynamics, organizational policies, and changes in the work environment (Ritter, Small, Mortimer, & Doll, 2018).

Students must have problem-solving skills, because problem-solving skills are an important aspect of dealing with problems, especially in the world of work (Al-Mutawah, Thomas, Eid, Mahmoud, & Fateel, 2019). Currently, the professional industry is entering a period of looking for employees who can think critically in the workplace, so critical thinking skills are highly sought after in the industry in this era (Yosintha & Arochman, 2020).

Plan and Organize Activities

The results of Table 3 show that the planning and structuring of vocational student activities is at a qualified level (M=3.1, SD=0.35) from students and (M=3.2, SD=0.4) from industry. However, there are differences between students and industry in this plan and organizing activities based on t-tests [t (490) = -2.118, sig = 0.035] can be seen in Table 4.

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Table 4.
Independent sample t-test for Planning and Organizing Activities

Planning and Organizing Activities		Levene's Test for Equality of Variances		t-test for Equality of Means						
				t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.						Lower	Upper
	Equal variances assumed	7,174	0,008	-2,118	488	0,035	-0,12500	0,05902	-0,24096	-0,00904
	Equal variances not assumed			-1,741	43,444	0,089	-0,12500	0,07178	-0,26972	0,01972

In their self-assessment, students rated themselves as more capable in the aspect of 'taking initiative and making decisions in response to challenges,' with 78% indicating high competence. According to industry evaluations, students' ability to 'participate in the activity planning process and contribute to the improvement of activities' is considered higher than their performance in other aspects, with a rating of 73%. The ability to participate in the planning process is important in the world of work, as it allows individuals to make meaningful contributions, advance innovation, and achieve organizational goals effectively (Goswami, 2018). Meanwhile, in the indicator of 'being able to manage time and prioritise activities that should be prioritized according to the priority scale', students rated themselves with the lowest percentage among other indicators, which was 69%. The ability to prioritize important work on a priority scale is an important skill that a person must have in managing time and tasks to achieve maximum productivity in the work environment (Alvarez Sainz, Ferrero, & Ugidos, 2019).

Then the industry considers the ability to 'be able to adjust existing resources to be able to face unexpected changes during the implementation of activities' and 'Able to make the goals of a project/activity to be directed and its implementation according to plan' are the indicators with the lowest percentage at the ability level, which is only 63%. Meanwhile, the ability to formulate work goals and implement them successfully is an important aspect that an employee must have to achieve optimal performance and make a meaningful contribution to the organization (Chakraborty & Biswas, 2019). In an industrial environment, limited time and resources are a frequent situation. Lack of discipline, such as being late and procrastinating, can lead to a lack of responsibility and awareness, negatively impacting performance (Apriyani, Isyanto, & Yani, 2023). Therefore, students need to get training in planning and organizing their activities, so that they can complete their work efficiently (Erdogan, 2019). It can also help students to prioritize tasks that must be completed first, and work discipline plays a crucial role in the success of an organization.

CONCLUSION

The findings of this study indicate that vocational school students possess moderate workplace readiness skills that align with industrial requirements in the era of Industrial Revolution 5.0. However, there are still notable gaps in specific competencies, highlighting the need for further skill development to ensure students are fully prepared for the evolving job market. These gaps demonstrate that vocational school graduates are not yet fully equipped to navigate the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) work environment or

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compete effectively in the global workforce. To address these challenges, stronger collaboration between vocational education institutions and industry stakeholders is essential. This partnership should focus on establishing clear competency benchmarks and aligning curricula to industry needs. One effective strategy is the enhancement of Field Work Practice (FWP) programs, which provide students with hands-on experience and real-world exposure to their respective industries. These programs serve as a crucial stimulus for professional skill development and workplace adaptation. While this study focused on the Construction and Building Technology sector, other vocational fields may require additional competencies tailored to their specific industry demands. Future research should explore skill requirements across different vocational sectors to provide a broader perspective on employability readiness and further refine vocational education strategies.

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