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The Role of 21st Century Skills in Enhancing Workforce Readiness: a Case Study at BLK Wonojati

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Abstract

Introduction/Main Objectives: This study examines the role of 21st century skills comprising creativity, critical thinking, communication, and collaboration in enhancing workforce readiness among trainees at the Vocational Training Center (BLK) Wonojati. The topic is relevant because industrial transformation and technological advancement require workers to possess not only technical abilities but also adaptive and collaborative competencies to navigate the challenges of the modern labor market.

Background Problems: The main problem addressed in this study is the low level of work readiness among vocational training graduates in Indonesia, primarily due to a gap between technical skills and 21st century competencies. This skills mismatch indicates that while trainees possess practical expertise, they often lack critical thinking, creativity, effective communication, and teamwork skills that are essential for employability.

Novelty: The novelty of this research lies in applying a quantitative associative approach within a nonformal training institution context (BLK Wonojati) to empirically measure the influence of 4C skills on work readiness. Previous studies have mostly focused on vocational high schools and college students, whereas this study expands the scope to community-based training participants.

Research Methods: This research employed a quantitative associative method using a Likert-scale questionnaire distributed to 120 respondents. Data were analyzed through validity, reliability, multiple linear regression, and F-tests using SPSS version 27.

Finding/Results: The results show that all four 21st century skill variables have a positive and significant effect on workforce readiness with an Adjusted R^2 value of 0.434, meaning that 43.4% of work readiness variation is explained by the 4C skills.

Conclusion: Enhancing creativity, critical thinking, communication, and collaboration has been proven to strengthen work readiness among vocational trainees. Therefore, integrating 21st century skills into training curriculum is a strategic step in preparing adaptive and competitive human resources for the industrial era 4.0.

Keywords: Creativity; Critical Thinking; Communication; Collaboration; Workforce Readiness

Introduction

The 21st century is marked by rapid social, economic, and technological changes as a result of the Industrial Revolution 4.0 and is now moving towards the 5.0 era. The development of digital technology, globalization, and the ever-changing needs of industry require workers to have new skills that go beyond technical abilities alone (Karaca-Atik et al., 2023) . 21st century skills, known as the 4C skills creativity, critical thinking, communication, and collaboration are essential for individuals to adapt to the complexities of the modern workplace (Hidayatulloh & Ashoumi, 2022). In the context of global employment, companies now place critical thinking and teamwork skills as key indicators in the recruitment process, replacing the old paradigm that only emphasized technical competencies (Mulyono et al., 2023).

This phenomenon also occurs in Indonesia, where the increase in open unemployment among vocational graduates remains a crucial issue. Data from the Statistics Indonesia (BPS) shows that the open unemployment rate of vocational high school (SMK) graduates is still the highest compared to other education levels. As of February 2025, the open unemployment rate for SMK graduates was recorded at 8.00%, followed by SMA graduates at 6.35%, and university graduates at 6.23% (Loahandi, 2024). This condition indicates a skills mismatch between the competencies taught in educational or training institutions and the skills required by the industrial world (Angraini et al., 2021). According to (Kholilaini et al., 2024) vocational graduates are often unprepared to enter the job market because soft skills such as communication and collaboration have not been optimally developed. As a result, even though they have good technical abilities, many still lack the mental, social, and professional readiness to work effectively.

Within the framework of human resource development, vocational training institutions such as the Vocational Training Center (BLK) play a strategic role in bridging this gap. BLKs are non-formal training centers that serve to hone the work skills of the community, both for formal education graduates and the general public who wish to improve their competencies. One of the active BLKs in East Java is BLK Wonojati, which focuses on improving practical skills and industry-based vocational training. However, with the growing demand for labor in the digital era, questions arise regarding the extent to which BLKs such as BLK Wonojati have integrated 21st century skills into their training programs. Does training at BLKs only emphasize technical aspects, or does it also foster critical thinking, effective communication, collaboration, and innovation skills?

The main issue that arises is that most training participants at BLKs are oriented towards mastering practical skills (hard skills), but are not yet fully equipped with the 4Cs that determine work readiness in the modern era (Winarti et al., 2023). Critical thinking skills, for example, are an important element in decision-making in a dynamic work environment, while communication and collaboration skills determine a person's effectiveness in working as part of a team (Angraini et al., 2021; Hidayatulloh & Ashoumi, 2022). Similarly, creativity is not only related to product innovation, but also the ability to find new solutions in complex work situations (Ramadhan, 2024). Thus, the integration of these four skills in the BLK environment is highly relevant to meet the demands of contemporary industry.

The empirical and theoretical gap in this study lies in the limited research that empirically measures the influence of 21st century skills (4C) on workforce readiness among non-formal training participants such as BLK. Most previous studies have focused on vocational high school students and vocational college students, but few have analyzed the relationship between 4C skills variables and work readiness in the context of community training institutions (Kholilaini et al., 2024; Mulyono et al., 2023). Therefore, a quantitative study is needed to objectively test the relationship and influence between these indicators.

In terms of novelty, this study highlights the context of BLK Wonojati as a non-formal training institution that has not been widely studied using an associative quantitative approach. The novelty of this study lies in its empirical analysis of the influence of 21st century skills, including creativity, critical thinking, communication, and collaboration, on the workforce readiness of training participants. The quantitative approach allows researchers to identify the measurable contribution of each variable and see which variables have the most significant influence on workforce readiness (Karaca-Atik et al., 2023; Ramadhan, 2024).

The Influence of Creativity on Workforce Readiness

Creativity is the ability to generate new ideas, solutions, and approaches in completing tasks or facing complex problems. Individuals with high levels of creativity will tend to be more adaptive to changes in a dynamic work environment and capable of bringing innovation to the workplace. In the context of vocational education, creativity is an important factor in fostering work readiness, as students are required not only to understand theory but also to be able to apply new ideas practically in training and field work activities.

(Thornhill-Miller et al., 2023) explain that creativity is one of the core competencies of 21st century skills that functions as a meta-ability to adapt to a complex, dynamic, and innovation-based world of work. Creativity is not only seen as an individual ability but also as the result of interactions between thought processes, learning environments, and institutional support that encourage the emergence of new ideas. Therefore, in the context of vocational education and training, creativity needs to be developed through collaborative, reflective learning environments that are open to experimentation and diversity of thought.

The creativity instrument developed by (Prayitno et al., 2023) emphasizes three main aspects, namely fluency, flexibility, and elaboration, which represent the ability to generate diverse ideas, view problems from various perspectives, and develop ideas into tangible products. These three aspects are important dimensions in supporting work readiness, because today's world of work demands workers who not only follow procedures but are also capable of innovation.

Empirical research conducted by (Ramadhan, 2024) proves that student creativity has a positive and significant effect on work readiness. The regression test results show that increased creativity contributes significantly to students' ability to face work challenges, make decisions, and adapt to industry demands. In other words, creative individuals are more mentally and competently prepared to enter the workforce. Thus, creativity is not merely an additional element in the vocational education process but a key variable that determines students' workforce readiness in the modern industrial era.

H_1: Creativity has a positive and significant effect on Workforce Readiness.

The Influence of Critical Thinking on Workforce Readiness

Critical thinking skills are one of the key 21st century skills that determine an individual's readiness to face the dynamic world of work. Individuals with critical thinking skills are able to analyze information logically, evaluate alternative solutions, and make appropriate decisions based on evidence and rationality. In the context of education and job training, critical thinking encourages students to systematically identify problems and develop effective solutions, thereby improving their adaptive competence in various work situations.

(Sciences et al., 2023) emphasizes that critical thinking is the skill most needed by employers in the 21st century, as it enables individuals to bridge the gap between theory and practice through reflective and analytical processes. His research shows that online and experience-based work-readiness training can improve trainees' critical thinking, confidence, and problem-solving skills. Thus, strengthening critical thinking in vocational training environments is a strategic step toward producing graduates who are ready to work and adapt to complex professional environments.

Research by (Karaca-Atik et al., 2023) shows that critical thinking skills fall under the category of learning and innovation skills, which contribute significantly to the career sustainability and work readiness of social science graduates. These skills are not only related to analytical abilities but also to an individual's capacity to argue rationally, evaluate information from various sources, and deal with the pressure of decision-making in a professional environment.

In line with this finding, (Aryasandy et al., 2025) demonstrated that strengthening critical thinking skills in vocational education contributes significantly to improving students' work readiness. Through continuous practice in reflective and analytical thinking, learners become better prepared to assess workplace situations, make appropriate decisions, and respond more adaptively to the demands of the professional environment.

Thus, critical thinking is not only a cognitive skill, but also a key foundation for workforce readiness and career sustainability in the modern era.

H_2: Critical thinking has a positive and significant effect on Workforce Readiness.

The Influenceof Communication on Workforce Readiness

Communication skills are one of the main skills that determine an individual's readiness to face the world of work. Effective communication allows a person to convey ideas, receive instructions, and interact professionally in the work environment. In the context of vocational education, communication does not only mean the ability to speak and write well, but also includes the skills of listening, understanding messages, and adapting to different audiences. Individuals with high communication skills will be better prepared to face the dynamics of work that require cross-field collaboration and team problem solving.

According to (Prayitno et al., 2023), communication skills are one of the key competencies of the 21st century that need to be developed through contextual learning and performance-based assessment. The instruments developed in the study emphasize indicators such as clarity in

conveying ideas, politeness, fluency in speaking, as well as the ability to understand other people's ideas and present data in visual form (Prayitno et al., 2023). These skills strengthen students' capacity to express ideas, influence others professionally, and build trust in a collaborative work environment.

Meanwhile, the results of research by (Sartika & Nengsi, 2022) show that communication skills are the aspect that needs the most attention in preparing graduates to be ready for work. Quantitative assessments and interviews conducted with students show that although their academic competence is relatively good, most prospective graduates still have weaknesses in oral and written communication. This proves that communication has a significant contribution to work readiness and is one of the indicators that determine the success of adaptation in the world of work.

Thus, communication serves as a bridge between technical competence and social readiness, making individuals more competent, confident, and able to collaborate productively in a professional environment

H_3: Communication has a positive and significant effect on Workforce Readiness.

The Influence of Collaboration on Workforce Readiness

Collaboration is one of the most needed 21st century skills in the modern workplace. The ability to work together, share responsibilities, and achieve common goals is a key indicator of an individual's readiness to enter a complex and dynamic work environment. Collaboration does not only mean working in groups, but also includes the ability to adapt, accept differences, resolve conflicts, and build effective communication among team members. In the context of vocational education, collaboration is an important means of shaping a cooperative and professional work character, so that graduates are able to contribute productively in the industrial world (Hidayatulloh & Ashoumi, 2022).

(Hidayatulloh & Ashoumi, 2022) emphasize that collaboration, along with communication, has a significant influence on the work readiness of vocational school students. Collaboration creates a sense of belonging, responsibility, and care for one another, as well as increasing work productivity within the group. Through teamwork, individuals learn to suppress their personal egos and prioritize collective goals, resulting in more mature decisions and more creative solutions to work problems.

The results of the study by (Mulyono et al., 2023) reinforce these findings with empirical evidence that teamwork skills have a positive and significant influence on the work readiness of vocational school students in Surabaya. Path analysis shows that collaboration has a direct influence coefficient of 0.778 on work readiness, with a total determination value of 84.4%. This means that communication and collaboration simultaneously explain most of the variation in student work readiness. The researchers concluded that collaboration is more influential than communication because teamwork fosters adaptive abilities, leadership, and social responsibility, which are key prerequisites for the 21st century workforce.

Thus, it can be concluded that collaborative skills are a key factor in improving the work readiness of vocational students. Collaboration not only builds team efficiency but also

strengthens the psychological and professional readiness of individuals to face the demands of the modern world of work.

H_4: Collaboration has a positive and significant effect on Workforce Readiness.

Research Methods

Type and Source of Data

This study uses an associative quantitative approach because it aims to determine the influence between variables, namely 21st century skills (creativity, critical thinking, communication, and collaboration) on the workforce readiness of training participants at BLK Wonojati. A quantitative approach is used because this study focuses on measuring numerical data through questionnaires and statistical hypothesis testing.

According to (Sugiyono, 2020) quantitative methods emphasize objective measurement of social phenomena through numbers, statistical analysis, and testing of relationships between variables to obtain measurable empirical conclusions.

The data in this study consisted of primary and secondary data. Primary data was obtained directly from respondents through the distribution of a Likert scale questionnaire (1–5) to BLK Wonojati training participants. The research instrument was compiled based on indicators from each variable that had been adapted from the theory of 21st century skills and previous studies.

Meanwhile, secondary data was obtained from scientific literature, journals, books, and research reports relevant to the themes of 21st century skills and work readiness, which were used to strengthen the theoretical framework and support the analysis of the research results.

Population and Sample

The population in this study consisted of all 120 active training participants at the Wonojati Vocational Training Center. Because the population size was relatively small and all members could be reached, the sampling technique used was total sampling.

According to (Sugiyono, 2020), total sampling is a sampling technique in which all members of the population are included in the sample. Thus, the sample size in this study was also 120 respondents, which was representative of the entire population of training participants at BLK Wonojati.

Result

Validity Test

Table 1. Validity Test

Variable	Indicator	r Count	r Table	Sig.	α	Conc.
Creativity (X1)	X1.1	0,844	0,1509	0,002	0,05	Valid
	X1.2	0,893	0,1509	0,000	0,05	Valid
	X1.3	0,860	0,1509	0,003	0,05	Valid
Critical Thinking (X2)	X1.1	0,882	0,1509	0,002	0,05	Valid
	X1.2	0,901	0,1509	0,000	0,05	Valid
	X1.3	0,881	0,1509	0,003	0,05	Valid
Communication (X3)	X1.1	0,831	0,1509	0,002	0,05	Valid
	X1.2	0,872	0,1509	0,000	0,05	Valid
	X1.3	0,830	0,1509	0,003	0,05	Valid
Collaboration (X4)	X1.1	0,857	0,1509	0,002	0,05	Valid
	X1.2	0,900	0,1509	0,000	0,05	Valid
	X1.3	0,872	0,1509	0,003	0,05	Valid
Workforce Readiness (Y)	Y1	0,859	0,1509	0,000	0,05	Valid
	Y2	0,886	0,1509	0,000	0,05	Valid
	Y2	0,875	0,1509	0,000	0,05	Valid

Source: Author's Work, 2025.

The research instrument is declared valid if the calculated r value is greater than the table r value or the significance value (Sig.) is less than 0.05. Based on the validity test results, all statement items in the research instrument used to measure the variables of Creativity, Critical Thinking, Communication, Collaboration, and Workforce Readiness have a calculated r-value greater than the table r-value and a Sig. value < 0.05. Thus, it can be concluded that all questionnaire items in this study are valid.

Reliability Test

Table 2. Reliability Test

Variable	Cronbach's Alpha	Standard	Information
Creativity (X1)	0,833	0,60	Reliable
Critical Thinking (X2)	0,865	0,60	Reliable
Communication (X3)	0,794	0,60	Reliable
Collaboration (X4)	0,849	0,60	Reliable
Workforce Readiness (Y)	0,844	0,60	Reliable

Source: Author's Work, 2025.

The reliability test is used to determine the consistency of the questionnaire in measuring research variables. A variable is considered reliable if the Cronbach's Alpha value is > 0.60. Based on the results of data processing using SPSS, all variables have a Cronbach's Alpha value above 0.60, so the questionnaire in this study is considered reliable.

Table 3. Multicollinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Err	Beta			Tolerance	VIF
1	(Constant)	3.620	.958		3.777	.000		
	X1	.037	.111	.038	.334	.739	.366	2.729
	X2	.080	.125	.083	.641	.523	.286	3.496
	X3	.405	.156	.394	2.589	.011	.205	4.869
	X4	.201	.123	.203	1.631	.106	.307	3.255

Source: Author's Work, 2025.

Multicollinearity testing is a statistical method used to detect high linear relationships between independent variables in a multiple regression model. The purpose of this test is to ensure that the independent variables are not strongly correlated with each other, as this can affect the stability of the regression coefficients and the accuracy of the analysis results. A model is said to be free from multicollinearity if it has a tolerance value > 0.100 and a VIF value < 10.00.

The analysis results show that the independent variables have a tolerance value > 0.100 and a VIF value < 10.00, so it can be concluded that the multicollinearity assumption has been met or that there is no multicollinearity.

Table 4. Kolmogorov-Smirnov Test

		Unstandardized Residual
N		120
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1.46373072
Most Extreme Differences	Absolute	.098
	Positive	.051
	Negative	-.098
Kolmogorov-Smirnov Z		1.073
Asymp. Sig. (2-tailed)		.200

Source: Author's Work, 2025.

If the Asymp. Sig (2-tailed) value is > 0.05, then it can be concluded that the data is normally distributed. The analysis results show that the Asymp. Sig (2-tailed) value obtained is 0.200 or > 0.05, so it can be concluded that the data is normally distributed, because the significance value obtained is greater than 0.005.

Uji Heteroskedastisitas *(Scatterplot)*

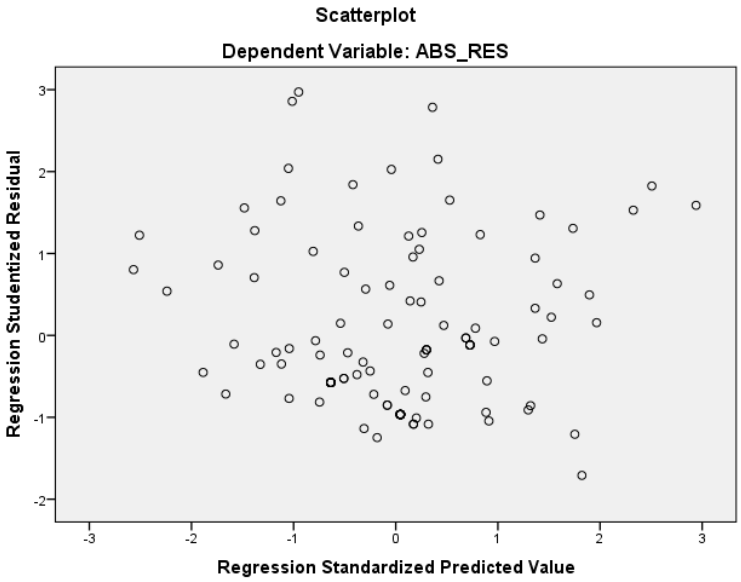

Figure 1. Scatterplot
Source: Author's Work, 2025.

The analysis results show that there is no clear pattern and the data distribution is scattered above and below or around the number 0, so it can be concluded that there is no heteroscedasticity in the data or that the heteroscedasticity test assumption has been met.

Table 5. F Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	211.033	4	52.758	23.797	.000[b]
	Residual	254.958	115	2.217		
	Total	465.992	119			

Source: Author's Work, 2025.

The analysis results show that the significance value obtained is 0.000 or < 0.005, so it can be concluded that the variables of creativity, critical thinking, communication, and collaboration have a significant simultaneous effect on the dependent variable.

Table 6. T Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.620	.958		3.777	.000		
	X1	.037	.111	.038	.334	.003	.366	2.729
	X2	.080	.125	.083	.641	.002	.286	3.496
	X3	.405	.156	.394	2.589	.000	.205	4.869
	X4	.201	.123	.203	1.631	.001	.307	3.255

Source: Author's Work, 2025.

The analysis results show that all 21st-century skill variables have a significant effect on workforce readiness. The creativity variable (X_1) has a significance value of 0.003 (< 0.005), critical thinking (X_2) is 0.002 (< 0.005), communication (X_3) is 0.000 (< 0.005), and collaboration (X_4) is 0.001 (< 0.005). Thus, all variables are proven to have a positive and significant effect on workforce readiness. These results confirm that increased creativity, critical thinking skills, effective communication, and good collaboration can strengthen an individual's readiness to face the demands of a dynamic work environment.

Table 7. Multiple Linear Regression Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.620	.958		3.777	.000		
	X1	.037	.111	.038	.334	.003	.366	2.729
	X2	.080	.125	.083	.641	.002	.286	3.496
	X3	.405	.156	.394	2.589	.000	.205	4.869
	X4	.201	.123	.203	1.631	.001	.307	3.255

Source: Author's Work, 2025.

Y=3,620 + 0,037X1 + 0,080X2 + 0405X3 + 0,201X4 ..... (1)

The constant value obtained is 3.620, which means that if the constant values of the variables creativity, critical thinking, communication, and collaboration are assumed to be 0, then the workforce readiness value is 3.620.

The creativity variable has a positive coefficient of 0.003, indicating that an increase in creativity has a positive and significant effect on workforce readiness.

The critical thinking variable has a positive coefficient of 0.002, indicating that an increase in critical thinking skills has a positive and significant effect on workforce readiness.

The communication variable has a positive coefficient of 0.000, meaning that an increase in communication skills has a positive and significant effect on workforce readiness.

The collaboration variable has a positive coefficient of 0.001, indicating that an increase in collaboration also has a positive and significant effect on workforce readiness.

Table 8. R-Square Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.673[a]	.453	.434	1.48897

Source: Author's Work, 2025.

The analysis results show that the adjusted R Square value of 0.434 means that the variables of creativity, critical thinking, communication, and collaboration collectively contribute 43.3% to the workforce readiness variable, while 56.7% is influenced by other variables outside this study.

Discussion

The Effect of Creativity on Workforce Readiness

The results show that the creativity variable has a regression coefficient value of 0.037 with a significance level of 0.003 (< 0.05), which means that creativity has a positive and significant effect on workforce readiness. This indicates that the higher the creativity of the training participants, the greater their ability to adapt and face the dynamics of the world of work. Creativity in a vocational context not only includes the ability to generate innovative ideas, new solutions, and the courage to experiment, as described by (Harianto et al., 2024), also encourages participants to apply a flexible approach to problem solving. This finding is in line with (Prayitno et al., 2023) research, which confirms that creativity is a major factor in shaping workforce readiness through increased innovation capacity and divergent thinking in the training environment.

The Influence of Critical Thinking on Workforce Readiness

The critical thinking variable has a regression coefficient value of 0.080 with a significance level of 0.002 (< 0.05), which means that critical thinking has a positive and significant effect on workforce readiness. This means that training participants who are able to analyze information logically, evaluate information, and make rational decisions the three main components of critical thinking according to (López et al., 2023) are better prepared to face complex work demands. This ability allows participants to assess alternative solutions objectively and adjust their actions according to work conditions. These results are consistent with (Sciences et al., 2023) research, which states that strengthening critical thinking in job training increases individuals' readiness to face change and the pressure of decision-making.

The Influence of Communication on Workforce Readiness

The regression test results show that the communication variable has the highest regression coefficient value, namely 0.405 with a significance level of 0.000 (< 0.05), which means that communication has a positive and significant effect on workforce readiness. Effective communication skills include clear delivery of ideas, understanding of instructions, and professional communication as described by (Karaca-Atik et al., 2023). Training participants with good communication skills are able to establish more effective work interactions, minimize misunderstandings, and improve team coordination. These findings are in line with the research by (Hidayatulloh & Ashoumi, 2022) which confirms that communication is a dominant factor in strengthening workforce readiness by improving the quality of interactions in the training environment.

The Influence of Collaboration on Workforce Readiness

The collaboration variable has a regression coefficient value of 0.201 with a significance level of 0.001 (< 0.05), indicating that collaboration has a positive and significant effect on workforce readiness. Collaboration in a vocational context includes active teamwork, acceptance of feedback, and team adaptation, as described by (Setiaji et al., 2020). Participants who are able to collaborate effectively tend to adapt more easily to organizational dynamics, demonstrate collective responsibility, and achieve work goals efficiently. This finding is reinforced by (Mulyono et al., 2023) who state that collaboration plays a significant role in improving workforce readiness by strengthening interpersonal skills and team synergy.

Conclusion

The results of the study indicate that the four 21st century skills variables, namely creativity, critical thinking, communication, and collaboration, have a positive and significant effect on the workforce readiness of training participants at BLK Wonojati. This implies that improving these four skills can strengthen individuals' readiness to face the dynamic world of work. With an Adjusted R^2 value of 0.434, the 4C skills were proven to explain most of the variation in work readiness, so vocational training institutions need to strengthen learning strategies based on creativity, critical thinking, effective communication, and team collaboration to improve the quality of graduates who are competitive and adaptive to industrial developments.

This study has limitations in terms of scope, covering only one training institution, and research variables limited to four aspects of 21st century skills. Therefore, further research is recommended to expand the population to training institutions in different regions and add other variables such as digital literacy, motivation, or work experience for more comprehensive results. A longitudinal approach can also be used to observe the development of participants' skills over time to understand the long-term impact on work readiness.

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