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Impact of Technology Education and Digital Skill Mastery on Millennial Generation Readinesss: Labor Market Revolution on Automation and Artificial Intelligence Era

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***Abstrak*:** *This study is motivated by the changes in the labor market due to the Fourth Industrial Revolution, which requires technology and digital skills for millennials in Yogyakarta. In facing the challenges of automation and artificial intelligence, this generation needs to master these skills to be ready to compete in the workforce. The study uses a quantitative approach with a descriptive-correlational design, involving 385 respondents selected using purposive sampling. Data were collected through an online questionnaire distributed via social media. Data analysis was conducted using SPSS software, with hypothesis testing using t-tests and F-tests. The results show that both technology-based education and digital skills have a positive and significant impact on the readiness of millennials to face changes in the labor market. The combination of these two factors also significantly contributes to their readiness. These findings are expected to provide a foundation for the development of more effective educational and training policies to prepare millennials to face the challenges of the automation and artificial intelligence era.*

Keywords: *Technology-based education, Digital skills, Labor market readiness*

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INTRODUCTION

The Industrial Revolution 4.0 has brought significant changes to labor markets worldwide, including in Indonesia. Technological advancements such as Artificial Intelligence (AI) and automation have the potential to replace manual and routine jobs while simultaneously creating new opportunities that require advanced skills, particularly in technology and digital domains. In Indonesia, millennials, who make up approximately 25.87% of the total population, are the group most impacted by these changes due to their active role in the workforce (Badan Pusat Statistik, 2021; Indonesia.go.id, 2021). This situation necessitates that millennials master technology and digital skills to quickly adapt to the evolving job profiles resulting from digitization and automation (Sima et al., 2020).

In addressing these challenges, technology-based education plays a crucial role. This type of education not only emphasizes technical proficiency but also supports the development of critical thinking, problem-solving, and digital literacy skills. Through an interdisciplinary approach, technology-based education equips millennials with the competencies needed to navigate an increasingly complex, technology-driven workforce (Takeuchi et al., 2020; Sharkey & Brandt, 2008). However, despite the implementation of various technology-based training programs, the readiness of millennials to work in a digitized environment remains a significant challenge that requires further exploration.

In addition to education, mastery of digital skills is an essential element that enhances millennials' preparedness to face the labor market revolution. These skills include the ability to utilize digital tools, analyze data, and adapt to rapid technological changes. Research shows that digital skill mastery not only increases productivity but also protects workers from the risk of displacement due to automation (Chen et al., 2022; Cramarenco et al., 2023). Nonetheless, despite the recognized importance of digital skills, there is still limited research that specifically examines the relationship between digital skill mastery and millennial readiness for the labor market in Indonesia.

This gap is further underscored by findings from previous studies. Elayan (2022) highlights the importance of digital learning in facilitating the transition of millennials and Gen Z into the new workforce, especially after the COVID-19 pandemic. However, this study does not specifically address the impact of technology-based education and digital skills on millennials' readiness for the labor market revolution. Similarly, the study by Sima et al. (2020) focuses more on human capital development and job transformation, without emphasizing millennials' preparedness for changes driven by automation and AI. The research by Warden et al. (2020) discusses millennials' technological readiness and self-efficacy in online learning but does not directly link these aspects to their preparedness for the constantly evolving

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labor market. These gaps highlight the need for research that specifically examines the influence of technology-based education and digital skills on millennial readiness.

Yogyakarta, as one of Indonesia's educational hubs, presents a strategic potential for this research. According to data from the Statistics Bureau (BPS) of the Special Region of Yogyakarta, in 2019, the region had 126 higher education institutions, including 109 under the Ministry of Education and Culture and 17 under the Ministry of Religious Affairs. These institutions are distributed across Yogyakarta City (51), Sleman Regency (41), Bantul Regency (31), Gunungkidul Regency (2), and Kulon Progo Regency (1) (Pendidikan Harian Jogja, 2025). Data from the Higher Education Service Agency (LLDIKTI) Region V Yogyakarta indicates that during the 2019/2020 academic year, the number of active students in higher education institutions in this region reached 266,491, comprising 137,565 male and 128,926 female students (LLDIKTI 5). With a large number of higher education institutions and students, Yogyakarta serves as a representative location for studying millennials' readiness to face modern labor market challenges.

This study aims to address the identified gaps by exploring and measuring the impact of technology-based education and digital skill mastery on the readiness of millennials in Yogyakarta to face the labor market revolution. The findings are expected to contribute to policymaking by providing insights for designing more effective education and training programs to prepare millennials for the era of automation and artificial intelligence. Furthermore, this research is anticipated to strengthen the foundation for developing national education policies that are adaptive to the dynamic demands of the global workforce.

METHOD

This study employs a quantitative approach with a descriptive-correlational design to analyze the influence of technology-based education and digital skills on millennial readiness to face the labor market revolution. Since the population size is unknown, the sampling method used is purposive sampling. The sample is selected based on specific criteria: millennials aged 25–40 years, currently or previously enrolled in technology-based education, experienced in using technology in learning or work, and residing in Yogyakarta (Badan Pusat Statistik, 2021). The minimum sample size is determined using Slovin's formula with a 95% confidence level and a 5% margin of error, resulting in a minimum requirement of 385 respondents (Sugiyono, 2017).

Primary data is collected through an online questionnaire distributed via Google Forms. The questionnaire is disseminated through social media platforms such as WhatsApp, Instagram, and Telegram to reach respondents who meet the criteria.

The collected data will be analyzed using SPSS software through several stages. Descriptive analysis is used to describe the characteristics of the

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respondents. The validity test is conducted using Corrected Item-Total Correlation, while reliability is measured with Cronbach's Alpha. Data normality is tested using either the Kolmogorov-Smirnov or Shapiro-Wilk tests (Ghozali, 2016).

For hypothesis testing, multiple linear regression analysis is employed to measure the simultaneous influence of technology-based education and digital skills on millennial readiness. A simultaneous F-test is performed to examine the combined effect of the independent variables, while t-tests are conducted to evaluate the individual influence of each variable (Santoso, 2012). The coefficient of determination (R^2) is used to assess the contribution of independent variables to the dependent variable.

RESULTS AND DISCUSSION

Multiple Linear Regression Analysis

Table 1. Multiple Linear Regression Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.432	1.542		10.006	.000
	X1	.015	.003	.421	5.000	.000
	X2	.008	.004	.212	2.000	.005

a. Dependent Variable: Y

Based on the data analysis above, the multiple linear regression equation is obtained as follows:

$$Y = 15.432+0.015X_1+0.008X_2+e$$

Based on the results of the regression analysis, the constant value of 15.432 indicates that when the independent variables X_1 and X_2 are equal to zero, the average value of the dependent variable Y is 15.432. The regression coefficient for X_1 is 0.015, suggesting that for every 1-unit increase in X_1, assuming X_2 remains constant, Y will increase by 0.015 units. Similarly, the regression coefficient for X_2 is 0.008, indicating that for every 1-unit increase in X_2, assuming X_1 remains constant, Y will increase by 0.008 units.

The error component represents the influence of other variables outside of X_1 and X_2 that are not explained by the model. Overall, the relationship between X_1, X_2, and Y is positive, though the impact of these variables on Y is relatively small.

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Individual Parameter Significance Test (T Test)

Table 2. T Statistical Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	15.432	1.542		10.006	.000
	X1	.015	.003	.421	5.000	.000
	X2	.008	.004	.212	2.000	.005

a. Dependent Variable: Y

Based on the results of the t-test displayed in the table above, the effect of variable X_1 on Y indicates that the calculated t-value for X_1 is 5.000, which is greater than the critical t-value of 1.966 at a 0.05 significance level. Additionally, the significance level for X_1 is 0.000, which is smaller than the predetermined threshold of 0.05. This indicates that X_1 has a significant positive effect on Y.

Similarly, the effect of variable X_2 on Y shows that the calculated t-value is 2.000, which is also greater than the critical t-value of 1.966. The significance level for X_2 is 0.005, which is less than 0.05. Therefore, X_2 also has a significant positive effect on Y.

Simultaneous Significance Test (F Test)

Table 3. F Statistical Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	104.512	2	52.256	21.563	.000[b]
	Residual	248.987	382	0.651		
	Total	353.499	384			

a. Dependent Variable: Y

b. Predictors: (Constant), X2, X1

Based on the results of the F-test analysis in the ANOVA table, the significance value was found to be 0.000, which is smaller than 0.05. Therefore, it can be concluded that the independent variables collectively influence the dependent variable. In other words, Technology-Based Education (X_1) and Digital Skill Mastery (X_2) jointly affect Millennials' Readiness (Y).

According to Sujarweni (2014:154), if the calculated F-value (F-hitung) is greater than the critical F-value (F-tabel), the independent variables collectively influence the dependent variable. In this case, the critical F-value with degrees of freedom (df) of (k; n-k) = (2; 385-2) = (2; 383) is 3.02. After calculation, the F-hitung value is 21.563, which is greater than F-tabel (3.02). Thus, both the critical value test and the F-hitung test confirm that the independent variables collectively have a significant influence on the dependent variable.

This conclusion is further supported by the significance value of 0.000, which is smaller than 0.05, indicating that Technology-Based Education (X_1) and

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Digital Skill Mastery (X_2) collectively affect Millennials' Readiness (Y).

CONCLUSIONS

Based on the results and discussion of this study, it can be concluded that technology-based education and digital skill mastery have a significant and positive influence on the readiness of millennials in Yogyakarta to face the labor market revolution in the era of automation and artificial intelligence. More specifically, technology-based education has been proven to enhance millennials' readiness, as does the mastery of digital skills, which significantly contributes to that readiness. The combination of both factors shows an even stronger influence in shaping millennials' preparedness to meet the challenges of the modern job market. However, this study has limitations, particularly due to the sample being restricted to millennials in Yogyakarta, making the results not necessarily generalizable to other regions. Moreover, the use of questionnaires distributed via social media may introduce selection bias, as it only reaches individuals who are active technology users. Other influential factors, such as social skills and work experience, were not considered in this study. Therefore, future research is recommended to expand the scope of the sample to include other regions and to consider a qualitative approach to further explore the influence of additional factors such as emotional intelligence and work experience on the readiness of millennials in an increasingly digitalized labor market.

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