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The Influence of Academic Achievement, IT Proficiency, and Organizational Experience on Vocational Students' Work Readiness: A Structural Equation Modeling Approach

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Abstract: In the era of rapid technological advancement and dynamic labor market demands, equipping vocational students with the right competencies for employability is more crucial than ever. This study explores how academic achievement, information technology proficiency, and organizational experience shape the work readiness of students in vocational education settings. Using a robust Structural Equation Modeling (SEM) approach via SmartPLS, data were collected from students at SMK Negeri 1 Linggo Sari Baganti. The results show that all three variables significantly and positively affect students' readiness for the workforce. More notably, organizational experience emerges as a key mediating factor, amplifying the influence of both academic performance and IT proficiency. This finding highlights a critical yet often overlooked aspect of employability preparation in vocational education. By integrating academic rigor, digital literacy, and active organizational participation, schools can foster a more holistic readiness among students for real-world challenges. This study contributes a fresh empirical model and offers strategic insights for policymakers and educators to design future-ready vocational curricula.

Keywords: Work readiness; Academic achievement; Information technology proficiency; Organizational experience; Vocational education; SEM; Employability skills.

1. Introduction

The rapid and competitive development of industry in the era of globalization requires every country, including Indonesia, to prepare a superior, adaptive, and work-ready human resource (HR) workforce [1]–[3]. One of the main strategies in preparing such HR is through improving the quality of education, particularly at the vocational level [1], [4]–[6]. Vocational High Schools (SMK) serve as the frontline institutions in preparing graduates who possess not only

theoretical knowledge but also practical skills that are relevant to the demands of the job market.

Vocational education is secondary education specifically designed to prepare students for work in particular fields [7]–[9]. This aligns with the SMK curriculum, which emphasizes the importance of achieving work competencies, professional attitudes, adaptability, and entrepreneurial spirit. However, field conditions indicate that SMK students' readiness to enter the workforce still faces various challenges, especially those related to motivation, 21st-century skills, and practical experience.

One of the key factors contributing to work readiness is academic achievement. Academic performance not only reflects the level of knowledge mastery but also represents the seriousness, commitment, and motivation of students throughout the learning process [10]–[13]. Students with high academic achievement tend to have greater self-confidence in facing workplace challenges. Unfortunately, many SMK students still show low academic performance, which may indicate weak preparedness for entering the workforce.

In addition, information technology proficiency has become a crucial component in navigating the dynamics of the modern workplace [14], [15]. Amid the Fourth Industrial Revolution, skills in accessing, managing, and processing digital information are essential competencies that every graduate must possess. However, unequal access and low digital literacy among SMK students remain serious obstacles that need to be addressed.

Organizational experience is also an equally important variable. Through involvement in organizational activities, students can develop social skills, leadership, decision-making abilities, and teamwork—soft skills that are highly valued in the industrial world [16]–[18]. Nowadays, companies no longer solely consider academic grades; they also assess the interpersonal potential and capabilities of prospective employees. Therefore, organizational experience plays a vital role in shaping the mental and social readiness of students for the workplace.

To analyze the complex relationships between these factors—academic achievement, information technology proficiency, and organizational experience—and the work readiness of SMK students, this study uses the Structural Equation Modeling (SEM) approach. SEM is a multivariate statistical method that enables the simultaneous and in-depth analysis of relationships among latent constructs, making it highly suitable for explaining complex and multidimensional educational phenomena [19], [20].

Initial survey results and interviews conducted at SMK Negeri 1 Linggo Sari Baganti show that students' work readiness levels remain relatively low. Many

students enter vocational schools with underdeveloped motivation, weak discipline, and minimal understanding of the challenges of the working world. Furthermore, data from 2023 reveal that approximately 75% of graduates from the school had not secured employment after graduation. This fact serves as a critical indicator that there are fundamental issues that need to be examined further through a comprehensive scientific approach.

Therefore, this study aims to analyze the influence of academic achievement, information technology proficiency, and organizational experience on the work readiness of SMK students. The findings of this study are expected to serve as a basis for formulating measurable and sustainable strategies to improve student work readiness, particularly within vocational education settings.

2. Material and methods

2.1 Research Design

This study employed a quantitative approach using a descriptive method combined with Confirmatory Factor Analysis (CFA), which is part of the Structural Equation Modeling (SEM) technique. CFA was utilized to test and confirm the theoretical model against empirical data collected from the field. In this model, latent constructs that cannot be directly measured are represented by multiple observed indicators. These indicators are measurable variables that serve to operationalize abstract constructs within the framework of the study.

2.2 Population and Sample

The population in this study consisted of all 136 Grade XII students at SMK Negeri 1 Linggo Sari Baganti during the 2023/2024 academic year. To determine the representative sample size, Slovin's formula was applied with a five percent margin of error [21]. Slovin's formula is used to estimate an adequate sample size from a finite population, defined as follows [22]:

$$n = \frac{N}{1+Ne^2} \quad (1)$$

Where:
n = sample size
N = total population
e = error tolerance level (set at 0.05)

Substituting the values yields a required sample of 101 respondents. Sampling was carried out using the proportionate stratified random sampling technique by determining the sample size proportionally for each vocational major to ensure equal representation across strata.

2.3 Research Variables

This study involved two types of variables. The exogenous (independent) variables included academic achievement, information technology proficiency, and organizational experience. The endogenous (dependent) variable was students' work readiness. The relationships among these variables were analyzed simultaneously to examine their collective and individual influence on work readiness within the SEM framework.

2.4 Research Procedure

The research procedure was conducted in three main phases. The first was the preparation phase, which included developing the research schedule, obtaining administrative permissions from the school, and designing the research instruments. The second phase was the implementation, which involved determining the sample, constructing and piloting the questionnaire, distributing the final version to selected respondents, and collecting completed responses. The final phase was data processing and analysis, which was performed using SmartPLS version 4 software.

2.5 Data Collection Techniques

Data were gathered through two primary techniques: questionnaires and interviews. The questionnaire consisted of 19 items measured on a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5), designed to assess students' perceptions of their academic achievement, IT proficiency, organizational experience, and work readiness. Additionally, semi-structured interviews were conducted with selected school representatives to collect qualitative insights on students' readiness for employment, learning motivation, and involvement in extracurricular activities.

2.6 Research Instruments and Pilot Testing

The main instrument was a Likert-scale questionnaire designed to quantify students' attitudes, perceptions, and experiences. Prior to its full deployment, the instrument underwent both validity and reliability testing. Item validity was tested using Pearson's Product-Moment Correlation to assess the correlation between individual item scores and the total score. Instrument reliability was assessed using Cronbach's Alpha formula, expressed as:

$$r_{11} = \frac{k}{k-1}\left(1 \frac{\sum s_i^2}{s_t^2}\right) \quad (2)$$

Where:

r_{11} = reliability coefficient

k = number of items
$\sum S\frac{2}{i}$ = sum of the variances of individual items
$S\frac{2}{t}$ = total variance of the questionnaire

The results of the pilot test indicated that all items were valid and reliable, with correlation coefficients exceeding the minimum threshold and Cronbach's Alpha values demonstrating satisfactory internal consistency.

2.7 Data Analysis Technique

Data analysis was carried out in two stages. The first stage involved descriptive analysis to describe the demographic characteristics of the respondents and the general distribution of their responses. The second stage employed SEM analysis using SmartPLS 4 software. This involved evaluation of the measurement model (outer model) and the structural model (inner model).

The outer model was assessed to examine convergent validity and indicator reliability using factor loadings and Average Variance Extracted (AVE) values. The inner model tested the hypothesized relationships between latent variables by evaluating the path coefficients, t-statistics, and p-values through bootstrapping and blindfolding procedures.

Hypothesis testing was conducted to determine the significance of relationships among variables. A path was considered statistically significant if the t-statistic exceeded 1.96 and the p-value was below 0.05. Significant results in the outer model indicate that the indicators are valid representations of the latent constructs. Similarly, significant results in the inner model demonstrate meaningful relationships between the independent and dependent latent variables.

3. Results and discussion

This study aimed to analyze the influence of academic achievement, organizational experience, and information technology proficiency on the work readiness of students at SMK Negeri 1 Linggo Sari Baganti using the Structural Equation Modeling (SEM) approach based on Partial Least Squares (PLS) through SmartPLS 4 software. The research began with instrument testing, followed by descriptive analysis, outer model testing, inner model testing, and hypothesis testing.

3.1 Descriptive Analysis

The respondents in this study were 101 Grade XII students from various majors at SMK Negeri 1 Linggo Sari Baganti in the 2023/2024 academic year. The composition of respondents by gender and major is presented in Table 1 and Table 2.

Table 1. Respondent Distribution by Gender

Gender	Frequency	Percentage
Male	54	53.5%
Female	47	46.5%
Total	**101**	**100%**

Table 2. Respondent Distribution by Major

Major	Frequency	Percentage
Visual Communication Design	17	17%
Building Modeling and Information Design	19	19%
Audio Video Engineering	14	14%
Motorcycle Engineering	16	16%
Light Vehicle Engineering	20	20%
Computer and Network Engineering	15	15%
Total	**101**	**100%**

3.2 Measurement Model Analysis (Outer Model)

The measurement model (outer model) was employed to evaluate the validity and reliability of the latent constructs by referring to three primary indicators: convergent validity, discriminant validity, and construct reliability. The results of the convergent validity analysis reveal that all outer loading values exceed the minimum threshold of 0.70, the Average Variance Extracted (AVE) values are above 0.50, and both Cronbach's Alpha and Composite Reliability scores are greater than 0.70. These findings indicate that each construct demonstrates acceptable levels of convergent validity and internal consistency [1].

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT), in which all constructs yielded values below 0.90. This confirms that each latent variable is statistically distinct from the others and that the constructs possess satisfactory discriminant validity [2].

In addition, the Composite Reliability values for each construct were as follows: Academic Achievement (0.872), Information Technology (0.870), Organizational Experience (0.910), and Work Readiness (0.868). These values demonstrate a high level of internal consistency across all constructs [3].

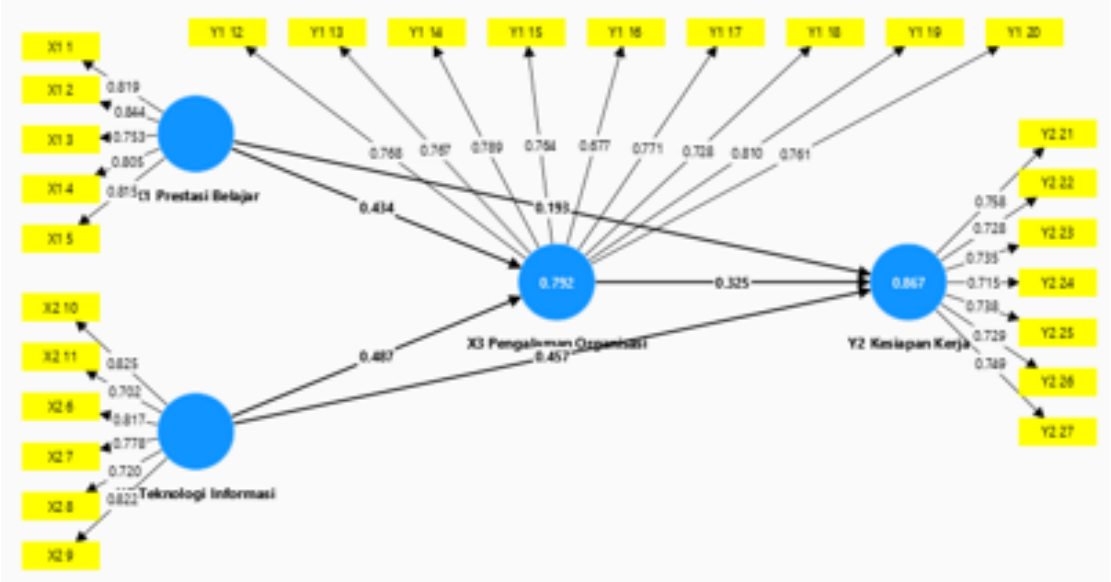

Figure 1. Outer Model Visualization (Factor Loadings and Indicators)

Figure 1 illustrates the outer model visualization, which presents the factor loadings and indicators associated with each latent construct. This visual representation supports the numerical results, confirming that all indicators used in the model contribute significantly and reliably to their respective constructs.

3.3 Structural Model Analysis (Inner Model)

The structural model (inner model) was utilized to evaluate the relationships between latent constructs through several statistical indicators, namely the coefficient of determination (R^2), predictive relevance (Q^2), and effect size (f^2). The R^2 value for the latent variable Organizational Experience was found to be 0.801, while the R^2 value for Work Readiness reached 0.868. According to Chin's classification [4], both values fall within the strong category, indicating that the structural model explains a substantial portion of the variance in the endogenous variables.

Furthermore, the Q^2 values, calculated using the blindfolding procedure, were 0.796 for Organizational Experience and 0.863 for Work Readiness. These values exceed the minimum threshold of 0.50, thereby confirming that the model possesses high predictive relevance [5].

In terms of effect size, the f^2 values for the relationships between constructs ranged from 0.15 to values greater than 0.35. These results suggest that the effects between the latent constructs are within the medium to large range, indicating meaningful and statistically significant interactions [6].

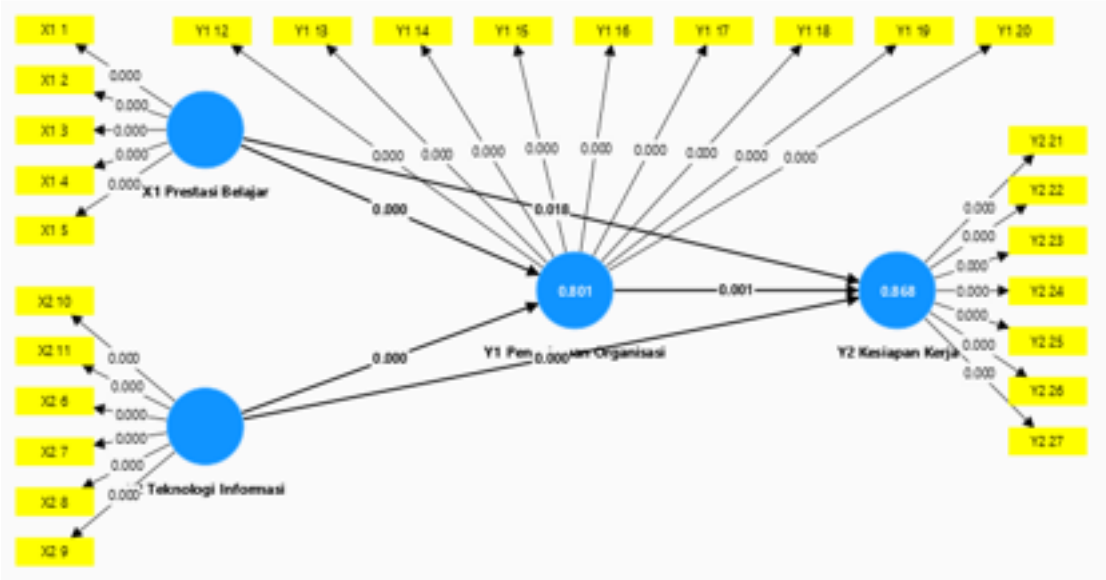

Figure 2. Inner Model Visualization (Path Coefficients)

Figure 2 presents the inner model visualization, illustrating the path coefficients and the strength of the relationships among the latent variables examined in this study.

3.4 Hypothesis Testing

The hypothesis testing process was carried out using the bootstrapping technique available in SmartPLS, which enables statistical validation of the structural relationships among latent constructs. This analysis aims to determine whether the hypothesized paths in the research model are supported by empirical data.

Table 3 presents the results of the hypothesis testing, which includes path coefficients, t-statistics, and p-values for each proposed relationship in the model. The path from Academic Achievement to Work Readiness shows a coefficient of 0.089 with a t-statistic of 2.137 and a p-value of 0.034. The relationship between Organizational Experience and Work Readiness has a coefficient of 0.099, t-statistic of 2.442, and p-value of 0.016. Similarly, Information Technology significantly influences Work Readiness with a path coefficient of 0.091, t-statistic of 2.189, and p-value of 0.031.

Moreover, two mediating relationships were also tested. Academic Achievement affects Work Readiness indirectly through Organizational Experience with a path coefficient of 0.105, t-statistic of 2.561, and p-value of 0.011. Likewise, Information Technology also exerts an indirect effect on Work Readiness through Organizational Experience, with a coefficient of 0.091, t-statistic of 2.432, and p-value of 0.017.

All of the t-values exceed the critical value of 1.96, and all p-values are below 0.05, indicating that each hypothesized relationship in the model is statistically significant and supported by the data [23].

Table 3. Hypothesis Test Results

Construct Relationship	Path Coefficient	t-Statistic	p-Value
Academic Achievement → Work Readiness	0.089	2.137	0.034
Organizational Experience → Work Readiness	0.099	2.442	0.016
Information Technology → Work Readiness	0.091	2.189	0.031
Academic → Organizational Experience → Work Readiness	0.105	2.561	0.011
IT → Organizational Experience → Work Readiness	0.091	2.432	0.017

These findings validate the theoretical framework proposed in this study and confirm the direct and indirect pathways contributing to students' work readiness.

3.5 Discussion

3.5.1 The Effect of Academic Achievement on Work Readiness

The analysis demonstrates that academic achievement has a statistically significant positive effect on students' work readiness, as indicated by a path coefficient of 0.089 and a p-value below 0.05. This implies that higher academic performance among vocational students correlates with greater preparedness to enter the workforce. Academic achievement reflects a student's ability to comprehend subject matter, manage time effectively, and demonstrate discipline—traits that are highly valued in professional environments. The positive relationship found in this study aligns with theoretical frameworks that posit self-perceived competence as a driver of motivation and action in occupational contexts [24]–[26]. Furthermore, consistent academic performance can enhance an individual's confidence in problem-solving and decision-making—core competencies in the 21st-century job market.

3.5.2 The Effect of Organizational Experience on Work Readiness

The results also reveal that organizational experience positively influences students' readiness to work, with a path coefficient of 0.099 and a p-value under 0.05. Engagement in student organizations and extracurricular activities allows learners to cultivate interpersonal communication, team collaboration, time

management, and leadership skills. These soft skills complement technical abilities and are increasingly recognized as determinants of employability [16], [27], [28]. Through organizational roles, students learn how to navigate responsibilities, manage conflict, and contribute to group goals, which are reflective of workplace dynamics. Thus, such experience bridges the gap between academic environments and the real-world demands of employment.

3.5.3 The Effect of Information Technology Proficiency on Work Readiness

Information technology proficiency also emerges as a significant predictor of work readiness, with a path coefficient of 0.091 and a significance level below 0.05. In today's digital economy, the ability to access, process, and communicate information using digital tools is essential. This includes not only the use of productivity software and online collaboration platforms but also digital ethics and cyber safety awareness. The findings of this study are congruent with prior research indicating that digital literacy enhances employability prospects, especially in industries that rely on digital workflows and communication technologies [29], [30]. Thus, equipping students with IT competencies is a strategic component of vocational education reform.

3.5.4 The Effect of Academic Achievement on Work Readiness through Organizational Experience

Beyond the direct influence, academic achievement also indirectly affects work readiness through the mediating role of organizational experience. This pathway, with a coefficient of 0.105 and $p < 0.05$, suggests that students who perform well academically are more likely to participate in school organizations, possibly due to their higher levels of confidence, time management ability, or institutional encouragement. Participation in such organizations then enhances their readiness for the labor market by fostering practical skills not typically addressed in classroom instruction. This mediating effect illustrates the interplay between cognitive achievement and experiential learning as dual pillars of workforce preparation [31]–[33].

3.5.5 The Effect of Information Technology Proficiency on Work Readiness through Organizational Experience

Likewise, the study found an indirect effect of information technology proficiency on work readiness via organizational experience, with a path coefficient of 0.091 and a p-value under 0.05. Students who are skilled in using digital tools are more likely to engage in organizational tasks such as managing communication, documentation, and event planning using technology. These activities not only increase their digital fluency but also deepen their engagement with organizational structures, roles, and responsibilities. The finding supports an integrative approach to education, where technical skills facilitate access to broader learning opportunities, ultimately improving job preparedness [34]. This reflects the holistic competence development model

that emphasizes the synergy between hard and soft skills in vocational education and training systems.

This study offers several novel contributions to the existing literature on vocational education and work readiness. Unlike prior research that often examines academic achievement, organizational involvement, or digital literacy in isolation, this study integrates these three constructs into a unified structural model to assess both their direct and mediated effects on work readiness. This approach addresses a critical research gap, namely the lack of empirical models that simultaneously evaluate cognitive, experiential, and technological dimensions of student preparedness in vocational high schools.

Additionally, the mediating role of organizational experience has been underexplored in the context of Indonesian vocational education. This study highlights how non-academic engagement serves as a vital conduit that strengthens the effects of academic and technological competencies on employability. It also introduces the application of the SmartPLS-based Structural Equation Modeling (SEM) technique in a setting that has not been widely analyzed using advanced statistical methods, thus contributing methodologically to the field.

Moreover, by focusing on students from a rural vocational institution (SMK Negeri 1 Linggo Sari Baganti), this research offers contextual insights into how institutional and regional characteristics might interact with individual competencies to shape readiness for work. Previous studies have predominantly centered on urban or higher-education contexts, leaving a gap in understanding how digital skills and extracurricular experiences influence readiness among vocational students in more remote or under-resourced settings.

These findings contribute not only to academic discourse but also to policy formulation and curriculum development. They support the notion that developing work readiness is a multidimensional process that requires strategic alignment between academic curriculum, co-curricular involvement, and digital skills training. This novelty reinforces the relevance of hybrid educational strategies to prepare students for the evolving demands of Industry 4.0 and the digital workforce landscape.

4. Conclusion

This study empirically investigated the influence of academic achievement, organizational experience, and information technology proficiency on vocational students' work readiness using Structural Equation Modeling with SmartPLS. The results confirm that all three variables significantly and positively influence work readiness, both directly and indirectly through organizational experience. These findings highlight the importance of

integrating academic performance, extracurricular engagement, and digital literacy in developing comprehensive strategies to enhance students' employability. The study contributes to the literature by addressing an existing research gap through the inclusion of organizational experience as a mediating variable—a dimension often overlooked in previous models. Furthermore, it provides empirical evidence from a rural vocational high school context, offering practical insights for educational policymakers and curriculum developers in similar settings.

Despite its contributions, this study is limited by its cross-sectional design and focus on a single institution, which may affect the generalizability of the findings. Future research is recommended to apply longitudinal approaches and involve diverse institutions across different regions to validate and expand upon these results. In conclusion, fostering students' work readiness requires a holistic educational approach that combines academic excellence, digital competence, and active participation in organizational experiences. This multidimensional perspective is essential for preparing vocational graduates to meet the dynamic demands of the modern labor market.

Author's declaration

Author contribution

Risko Agus Susanto conceptualized the research framework, led the methodology design, and supervised the overall project. **Muhammad Adri** was responsible for data collection, processing, and performed the statistical analysis using SmartPLS. **Ika Parma Dewi** contributed to literature review development, instrument validation, and drafting the initial manuscript. **Delvi Asmara** supported in results interpretation, discussion writing, and final editing of the manuscript. All authors reviewed, revised, and approved the final version of the paper.

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Competing interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. All authors have read and approved the final manuscript and have no financial, personal, or professional relationships that could be perceived as influencing the research reported in this article.

Ethical clearance

This study was conducted in accordance with ethical standards involving human participants. Prior to data collection, informed consent was obtained from all participants, and their confidentiality and anonymity were guaranteed throughout the research process. Participation was voluntary, and respondents were given the right to withdraw at any time without any consequences.

AI statement

Artificial Intelligence (AI) tools, including language models such as ChatGPT developed by OpenAI, were used solely to assist in improving the language, grammar, and clarity of the manuscript. All content, analysis, interpretation, and conclusions were produced entirely by the authors, and the use of AI did not influence the scientific integrity or originality of the research. English is checked using Grammarly and has been verified by the authors.

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Universitas Negeri Padang as the publisher and Editor of Jurnal Vokasi Informatika state that there is no conflict of interest towards this article publication.

References

[1] L. B. Lan, "The Demand for Soft Skills and Impacts of Training and Development on Human Resource Outcomes and Firm Performance for the Malaysian Manufacturing Industry Doctor of Philosophy Faculty of Accountancy and Management Universiti Tunku Abdul Rahman," no. April, May 2022, Accessed: Jul. 02, 2025. [Online]. Available: http://eprints.utar.edu.my/id/eprint/4432.

[2] A. Ridwan, A. A. Wibowo, W. Widiyanti, D. Nurhadi, and I. Isnandar, "The Concept Directions of Development 21st Century Vocational Education," *Eurasia Proc. Educ. Soc. Sci.*, vol. 39, pp. 80–92, Dec. 2024, https://doi.org/10.55549/EPESS.874.

[3] T. Santosa and L. F. Muhamad, "Optimizing Economic Development

Through the Synergistic Influence of Information Technology on Educational Access and Human Capital Quality Enhancement," *J. Minfo Polgan*, vol. 12, no. 2, pp. 2429–2437, Dec. 2023, https://doi.org/10.33395/jmp.v12i2.13290.

[4] S. M. Indrawati and A. Kuncoro, "Improving Competitiveness Through Vocational and Higher Education: Indonesia's Vision For Human Capital Development In 2019–2024," *Bull. Indones. Econ. Stud.*, vol. 57, no. 1, pp. 29–59, Jan. 2021, https://doi.org/10.1080/00074918.2021.1909692.

[5] N. ThiHoa, N. T. Hang, N. T. Giang, and D. T. N. Huy, "Human resource for schools of politics and for international relation during globalization and EVFTA," *Ilkogr. Online - Elem. Educ. Online*, vol. 20, no. 4, pp. 2448–2452, 2021, https://doi.org/10.17051/ILKONLINE.2021.04.281.

[6] D. Qutni, M. Kristiawan, and Y. Fitriani, "Human Resource Management in Improving The Quality of Education," *Edunesia J. Ilm. Pendidik.*, vol. 2, no. 2, pp. 354–366, Feb. 2021, https://doi.org/10.51276/edu.v2i2.132.

[7] F. Dahalan, N. Alias, and M. S. N. Shaharom, "Gamification and Game Based Learning for Vocational Education and Training: A Systematic Literature Review," *Educ. Inf. Technol.*, vol. 29, no. 2, pp. 1279–1317, Feb. 2024, https://doi.org/10.1007/s10639-022-11548-w.

[8] C. F. Yeap, N. Suhaimi, and M. K. M. Nasir, "Issues, Challenges, and Suggestions for Empowering Technical Vocational Education and Training Education during the COVID-19 Pandemic in Malaysia," *Creat. Educ.*, vol. 12, no. 08, pp. 1818–1839, Jul. 2021, https://doi.org/10.4236/ce.2021.128138.

[9] E. Schmid and V. Garrels, "Parental involvement and educational success among vulnerable students in vocational education and training," *Educ. Res.*, vol. 63, no. 4, pp. 456–473, Oct. 2021, https://doi.org/10.1080/00131881.2021.1988672.

[10] M. Estrada, D. Monferrer, A. Rodríguez, and M. Á. Moliner, "Does Emotional Intelligence Influence Academic Performance? The Role of Compassion and Engagement in Education for Sustainable Development," *Sustain. 2021, Vol. 13, Page 1721*, vol. 13, no. 4, p. 1721, Feb. 2021, https://doi.org/10.3390/SU13041721.

[11] O. S. Kaya and E. Ercag, "The impact of applying challenge-based gamification program on students' learning outcomes: Academic achievement, motivation and flow," *Educ. Inf. Technol.*, vol. 28, no. 8, pp. 10053–10078, Aug. 2023, https://doi.org/10.1007/s10639-023-11585-z.

[12] Q. Luo, L. Chen, D. Yu, and K. Zhang, "The Mediating Role of Learning Engagement Between Self-Efficacy and Academic Achievement Among Chinese College Students," *Psychol. Res. Behav. Manag.*, vol. 16, pp. 1533–1543, 2023, https://doi.org/10.2147/PRBM.S401145.

[13] Q. Zhang, L. Yu, and Z. Yu, "A Content Analysis and Meta-Analysis on

the Effects of Classcraft on Gamification Learning Experiences in terms of Learning Achievement and Motivation," *Educ. Res. Int.*, vol. 2021, no. 1, p. 9429112, Jan. 2021, https://doi.org/10.1155/2021/9429112.

[14] R. A. Rahimi and G. S. Oh, "Rethinking the role of educators in the 21st century: navigating globalization, technology, and pandemics," *J. Mark. Anal.*, vol. 12, no. 2, pp. 182–197, Jun. 2024, https://doi.org/10.1057/s41270-024-00303-4.

[15] M. Marku, "Navigating the Future of Work: Human Capital in the Age of Industry 4.0," *Interdiscip. J. Res. Dev.*, vol. 11, no. 1, p. 190, Mar. 2024, https://doi.org/10.56345/ijrdv11n127.

[16] M. Poláková, J. H. Suleimanová, P. Madzík, L. Copuš, I. Molnárová, and J. Polednová, "Soft skills and their importance in the labour market under the conditions of Industry 5.0," *Heliyon*, vol. 9, no. 8, Aug. 2023, https://doi.org/10.1016/j.heliyon.2023.e18670.

[17] V. V. Semenova, A. N. Zelenyuk, and Y. A. Savinov, "Human capital development: development of professional competencies through soft skills," *Rev. Tempos e Espaços em Educ.*, vol. 14, no. 33, p. e15253, Feb. 2021, https://doi.org/10.20952/revtee.v14i33.15253.

[18] K. Mwita, S. Kinunda, S. Obwolo, and N. Mwilongo, "Soft skills development in higher education institutions," *Int. J. Res. Bus. Soc. Sci. (2147- 4478)*, vol. 12, no. 3, pp. 505–513, Apr. 2023, https://doi.org/10.20525/ijrbs.v12i3.2435.

[19] H. Zhang and F. Li, "The multidimensional influence structure of college students' online gamified learning engagement: a hybrid design based on QCA-SEM," *Heliyon*, vol. 10, no. 18, p. e36485, Sep. 2024, https://doi.org/10.1016/j.heliyon.2024.e36485.

[20] A. Chinnaraju, "Partial Least Squares Structural Equation Modeling (PLS-SEM) In The AI Era: Innovative Methodological Guide and Framework for Business Research," Apr. 2025, Accessed: Jul. 02, 2025. [Online]. Available: https://papers.ssrn.com/abstract=5225441.

[21] N. Poudel, M. Karki, and K. Shah, "Statistical Approach: Science and Application for Determining Optimal Sample Size in empirical study," *DEPAN*, vol. 6, no. 1, pp. 108–117, Dec. 2024, https://doi.org/10.3126/DEPAN.V6I1.75501.

[22] N. Nurkholis, Wilarso, P. Sukamto, M. A. Sobarnas, S. Jamaludin, and U. A. Tsani, "Digital Survey for Customer Satisfaction of Regional Drinking Water Companies (PDAM) using the mWater Application and the Slovin Formula Method," *BIO Web Conf.*, vol. 144, p. 03006, Nov. 2024, https://doi.org/10.1051/bioconf/202414403006.

[23] P. Maneejuk and W. Yamaka, "Significance test for linear regression: how to test without P-values?," *J. Appl. Stat.*, vol. 48, no. 5, pp. 827–845, 2021, https://doi.org/10.1080/02664763.2020.1748180.

[24] M. Alsadig and A. Zakariya, "The Influence of Emotional Competencies on University Students' Perceived Employability: The Moderating Role of University Commitment," *Eurasian J. Educ. Res.*, vol. 2023, no. 105, pp. 52–69, 2023, https://doi.org/10.14689/ejer.2023.105.004.

[25] A. Aggarwal, A. Mittal, I. Sharma, P. K. Chand, and A. Deshpande, "Success doesn't come to you, you go to it: the role of self-perceived employability among engineering graduates," *Ind. Commer. Train.*, vol. ahead-of-print, no. ahead-of-print, 2025, https://doi.org/10.1108/ICT-07-2024-0073.

[26] H. K. Duggal, W. M. Lim, P. Khatri, A. Thomas, and A. Shiva, "The state of the art on self-perceived employability," *Glob. Bus. Organ. Excell.*, vol. 43, no. 4, pp. 88–110, May 2024, https://doi.org/10.1002/joe.22245.

[27] A. Rakowska and S. de Juana-Espinosa, "Ready for the future? Employability skills and competencies in the twenty-first century: The view of international experts," *Hum. Syst. Manag.*, vol. 40, no. 5, pp. 669–684, 2021, https://doi.org/10.3233/HSM-201118.

[28] B. P. Ping Yong and Y.-L. Ling, "Skills Gap: The Perceptions of Importance of Soft Skills in Graduate Employability Between Employers and Graduates," *J. Techno-Social*, vol. 15, no. 1, pp. 16–33, Jun. 2023, https://doi.org/10.30880/jts.2023.15.01.002.

[29] S. Nikou, M. De Reuver, and M. Mahboob Kanafi, "Workplace literacy skills—how information and digital literacy affect adoption of digital technology," *J. Doc.*, vol. 78, no. 7, pp. 371–391, 2022, https://doi.org/10.1108/JD-12-2021-0241.

[30] D. Cetindamar, B. Abedin, and K. Shirahada, "The Role of Employees in Digital Transformation: A Preliminary Study on How Employees' Digital Literacy Impacts Use of Digital Technologies," *IEEE Trans. Eng. Manag.*, vol. 71, pp. 7837–7848, 2024, https://doi.org/10.1109/TEM.2021.3087724.

[31] X. Wang, Z. Zhou, and C. Wu, "Enhancing vocational students' identities through program-occupation-skill alignment and learning experiences: A mediation analysis based on learning experiences," *Vocat. Technol. Educ.*, vol. 2, no. 1, p. 2025, Mar. 2025, https://doi.org/10.54844/VTE.2025.0888.

[32] B. Khampirat, "The Impact of Work-Integrated Learning and Learning Strategies on Engineering Students' Learning Outcomes in Thailand: A Multiple Mediation Model of Learning Experiences and Psychological Factors," *IEEE Access*, vol. 9, pp. 111390–111406, 2021, https://doi.org/10.1109/ACCESS.2021.3055620.

[33] S. O. Chukwuedo and C. N. Ementa, "Students' work placement learning and employability nexus: Reflections from experiential learning and social cognitive career theories," *Ind. High. Educ.*, vol. 36, no. 6, pp. 742–755, Dec. 2022, https://doi.org/10.1177/09504222221099198.

[34] Y. Zhao, M. Zhao, and F. Shi, "Integrating Moral Education and

Educational Information Technology: A Strategic Approach to Enhance Rural Teacher Training in Universities," *J. Knowl. Econ.*, vol. 15, no. 3, pp. 15053–15093, Dec. 2023, https://doi.org/10.1007/s13132-023-01693-z.