LEARNING AGILITY AS A MECHANISM FOR ENHANCING CAREER ADAPTABILITY IN VOCATIONAL EDUCATION

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Abstract
This study investigates the relationships among digital literacy, self-efficacy, decision-making, and career adaptability, with learning agility as a mediating variable, among vocational high school students. A quantitative design was employed using structural equation modeling (SEM). The sample comprised vocational students majoring in automotive engineering who had completed fieldwork practice. Data were collected through a Likert-scale questionnaire and analyzed using AMOS. The findings reveal that digital literacy, self-efficacy, and decision-making significantly predict learning agility. However, these variables do not exert a significant direct effect on career adaptability. Learning agility fully mediates the relationships between digital literacy, self-efficacy, decision-making, and career adaptability. This study extends career adaptability literature by positioning learning agility as an adaptive psychological mechanism that explains how vocational students transform competencies into adaptive career behavior.

Keywords: Career Adaptability, Decision Making, Digital Literacy, Learning Agility, Self-Efficacy

INTRODUCTION

The transition from school to work has become increasingly complex for vocational students due to rapidly changing workplace demands, employment uncertainty, and the growing need for adaptive career competencies. Although vocational education is designed to prepare students for employment, many vocational graduates continue to experience difficulties adapting to evolving workplace expectations and an uncertain career environment [1]. However, the persistent mismatch between industry needs and the competencies of vocational school graduates remains a complex and

[1] Denise Jackson, "An International Profile of Industry-Relevant Competencies and Skill Gaps in Modern Graduates", *The International Journal of Management Education*, 8.3 (2010), 29–58 <https://doi.org/10.3794/ijme.83.288>; Arum Dwi Hastutiningsih, Ardi Ariyanto, and Diah Rina Miftakhi, "Evaluation of Competency Standards for Vocational High School Graduates in the Era of Industrial Revolution 4.0", 5.3 (2024), 213–25 <https://doi.org/10.12928/ijemi.v5i3.10102>.

pressing issue [2]. Amid rapid advancements in automotive technology, including the emergence of electric vehicles and digitalization of vehicles, vocational graduates must demonstrate strong competitiveness in the industrial labor market. Students in automotive engineering programs must acquire not only technical competencies but also adaptive capabilities to respond to ongoing technological developments[3].

The digital transformation of the global automotive industry has led to significant changes in work practices and required competencies. Rapid workplace transformation increasingly requires vocational students to develop adaptive capacities to respond effectively to continuous change and career uncertainty[4]. Therefore, vocational education must not only enhance students' theoretical understanding but also enable them to learn quickly and adapt effectively to an ever-evolving technological landscape. Work readiness in the era of digital transformation is closely associated with digital literacy and learning skills that enhance productivity and everyday functioning[5].

Furthermore, the development of green technology in the automotive industry, such as electric vehicles (EVs) and renewable energy systems, is closely linked to digital literacy. Digital literacy enables students to access, evaluate, and apply information effectively in learning and workplace contexts [6]. The integration of digital literacy and green technology into vocational curricula has been shown to improve students' adaptability by up to 37% compared to traditional curricula [7]. Thus, digital literacy learning in vocational education not only supports current academic performance but also contributes to the growth of environmentally sustainable automotive industries.

A lack of adequate career adaptability can negatively impact vocational graduates. Individuals who can adapt to various career pathways tend to experience fewer difficulties when transitioning from school to the workplace [8]. Conversely, low career adaptability may lead to higher turnover rates and increased unemployment. Career adaptability has also been identified as a significant predictor of vocational graduates' success in maintaining their initial employment [9]. Therefore, integrating educational approaches that foster career adaptability from early stages of schooling to graduation is essential.

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In efforts to enhance career adaptability, several internal factors must be considered. Digital literacy is a key factor, encompassing not only the ability to use technology but also critical thinking, digital communication, and technology-based problem-solving skills [10]. Students with higher levels of digital literacy tend to demonstrate better communication skills and greater adaptability to technological changes in the workplace [11].

In addition, self-efficacy plays an important role in shaping individuals' ability to face life challenges. Self-efficacy refers to individuals' beliefs in their ability to overcome obstacles and handle various situations[12]. Students with higher self-efficacy tend to exhibit stronger learning motivation and greater resilience in facing challenges [13]. However, prior studies suggest that self-efficacy does not always directly influence adaptability, indicating the need for further investigation into more complex relationships. Another important factor influencing career adaptability is decision-making ability. Decision-making is a critical process that shapes individuals' life directions and expectations [14]. This ability enables students to select optimal options based on available information and rational considerations [15]. Students with strong decision-making skills are generally better prepared to face workplace demands.

Previous studies have primarily examined direct relationships between individual competencies and career adaptability. However, limited attention has been given to the adaptive learning mechanisms through which these competencies are transformed into adaptive career behavior among vocational students. In dynamic work environments, learning agility refers to the ability to learn quickly and adapt to change. It involves the capacity to learn from experience, adjust to new situations, and respond effectively to evolving conditions [16]. Individuals with high learning agility are better able to develop new skills and navigate challenges in continuously changing work environments[17]. Existing studies have predominantly examined career adaptability as a direct outcome of individual competencies. However, limited research has explained the adaptive learning processes through which vocational students transform cognitive and psychological competencies into adaptive career behavior. This study advances vocational education literature by positioning

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learning agility as an adaptive mechanism that explains how students develop career adaptability in uncertain workplace environments.

RESEARCH METHODS

This study employs a quantitative, explanatory design to analyze causal relationships among variables. Data analysis was conducted using covariance-based Structural Equation Modeling (SEM) with IBM AMOS 24. This approach was chosen because it can simultaneously test relationships among latent variables and identify mediating effects within the research model. The relationships between variables are presented in Figure 1.

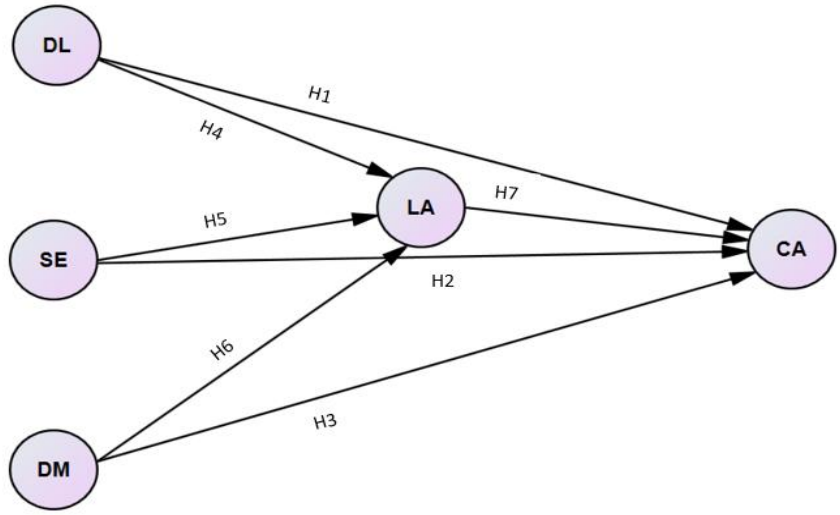

Figure 1. Design Plan Study

The population of this study consisted of vocational high school students in the light vehicle engineering program in Pasuruan who had completed fieldwork practice. Purposive sampling was employed to ensure that all participants had prior exposure to industry-based learning experiences through fieldwork practice. This criterion was considered essential because adaptive career development is closely associated with students' exposure to workplace environments.

The instruments used in this study were adapted from previously validated scales related to digital literacy, self-efficacy, decision-making, learning agility, and career adaptability. All instruments were translated and refined using back-translation procedures to maintain conceptual equivalence and measurement accuracy. A total of 255 respondents were included in this study, which meets the minimum sample size requirement for SEM analysis.

Since the data in this study were collected via self-reported questionnaires completed by students on a four-point Likert scale, Harman's single-factor test was conducted to assess the potential for common-method bias. The analysis indicated that no single factor accounted for the majority of the total variance, suggesting that common method bias was not a serious issue in this study.

Confirmatory Factor Analysis (CFA) was conducted to evaluate construct validity, and indicators with factor loadings below 0.50 were excluded to ensure adequate construct representation. Construct validity was rigorously assessed using Confirmatory Factor Analysis (CFA), while convergent validity and construct reliability were evaluated through Average Variance Extracted (AVE) and Composite Reliability (CR) as shown in Table 1.

Table 1. Construct Reliability and Convergent Validity Results

Variables	CR	AVE
Digital Literacy	0,87	0,58
Self-Efficacy	0,88	0,60
Decision Making	0,89	0,57
Learning Agility	0,91	0,64
Career Adaptability	0,90	0,61

The results presented in Table 1 indicate that all constructs exceed the recommended thresholds of AVE > 0.50 and CR > 0.70, confirming the robustness of the measurement model. The measurement model also demonstrated excellent goodness-of-fit indices, indicating strong compatibility between the theoretical model and empirical data. Normality and outlier tests were conducted to assess SEM assumptions. Data were considered normally distributed if skewness values were within the range of ±3. At the 0.001 significance level, outliers were identified using the Mahalanobis distance method.

Hypothesis testing was conducted through structural model analysis by examining critical ratios and p-values. Relationships between variables were considered significant if the p-value was less than 0.05 and the critical ratio exceeded 1.96. In addition, the Sobel test was used to examine indirect effects among mediating variables and other variables in the research model to determine the significance of mediation effects.

RESEARCH RESULTS AND DISCUSSION

1. Descriptive Analysis

Descriptive analysis was conducted to provide a general overview of the research variables, including digital literacy, self-efficacy, decision-making, learning agility, and career adaptability. This analysis utilized the mean values of indicators that met the validity criteria based on Confirmatory Factor Analysis (CFA). The mean scores were calculated using a four-point Likert scale and categorized to facilitate data interpretation. Thus, the results of the descriptive analysis more accurately reflect the empirical conditions of the variables in this study. A summary of the descriptive analysis results is presented in Table 2.

Table 2. Summary of Descriptive Variable Analysis of the Study

Variables	**Indicator Items**	**Mean**	**Category**
Digital Literacy (X1)	DL3	2.50	Pretty good
	DL6	2.51	Pretty good
	DL8	2.49	Pretty good
	DL11	2.51	Pretty good
Self-Efficacy (X2)	SE2	2.50	Currently
	SE6	2.49	Currently
	SE8	2.54	Currently
Decision Making (X3)	DM3	2.53	Pretty good
	DM5	2.55	Pretty good
	DM8	2.54	Pretty good
	DM12	2.55	Pretty good
Learning Agility (Z)	LA3	2.50	Tall
	LA4	2.55	Pretty good

	LA7	2.49	Tall
	LA12	2.50	Tall
Career Adaptability (Y)	CA2	2.48	Currently
	CA5	2.52	Pretty good
	CA7	2.47	Currently
	CA12	2.49	Currently

Table 2 shows that the digital literacy variable is in the moderately good category, indicating that students possess basic abilities to understand and use digital technology. However, to maximize the use of technology, their ability to critically evaluate information still needs improvement [18]. The self-efficacy variable is moderate, suggesting that students' confidence in facing challenges remains limited. Self-efficacy is an important component that influences how individuals act, think, and make decisions under certain conditions [19].

Meanwhile, the decision-making variable is in the good category, indicating that students can identify problems and determine appropriate solutions. However, their ability to evaluate decisions needs to be strengthened to ensure more effective, logical decisions. Learning agility is relatively high, reflecting students' ability to learn from experience and adapt to change. This finding highlights the importance of this ability in dealing with the complex dynamics of the workplace[20]. On the other hand, career adaptability is at a moderate level, indicating that students still need to strengthen their ability to adapt to career-related changes [21].

2. SEM Structural Model (Model Feasibility Test)

Structural model analysis was conducted using Structural Equation Modeling (SEM) to examine the causal relationships among the study's variables. The proposed model includes digital literacy, self-efficacy, and decision-making as exogenous variables; learning agility as a mediating variable; and career adaptability as the endogenous variable. This model was developed based on the previously established conceptual framework. The visualization of the structural model is presented in Figure 2.

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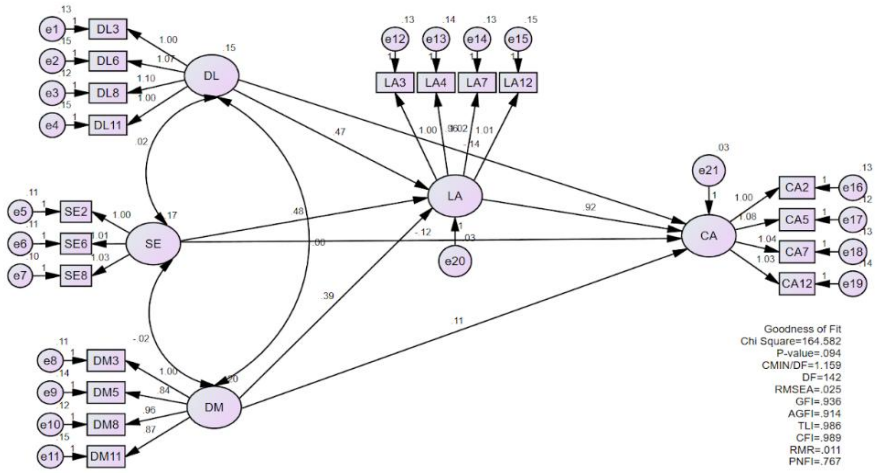

Figure 2. Structural Model

Based on Figure 2, the exogenous variables have direct relationships with learning agility and indirect relationships with career adaptability. This pattern indicates that learning agility plays an important role in structuring the influence among variables. In addition, the direction of the relationships is consistent with the hypotheses proposed in this study. Therefore, the theoretical relationships are well represented by the developed model.

A model fit assessment was conducted to ensure the compatibility between the theoretical model and the empirical data. The results indicate that most fit criteria are satisfied, particularly given that the CFI and TLI values are close to or exceed 0.90, and the RMSEA value is below 0.08. The fit indices used include chi-square, CMIN/DF, GFI, AGFI, TLI, and CFI. These results suggest that the model demonstrates a good level of fit [22]. The results of the model fit assessment are presented in Table 3.

Table 3. Goodness of Fit Test Results

Fit Indicator	Research result	Cut - off Value	Information
Chi-Square	164,582	Expected Small	Good
P-Value	0.094	≥ 0.05	Good Fit
CMIN/DF	1,156	≤ 2	Good Fit
GFI	0.936	≥ 0.90	Good Fit
AGFI	0.914	≥ 0.90	Good Fit
CFI	0.989	≥ 0.95	Good Fit
TLI	0.986	≥ 0.95	Good Fit
NFI	0.924	≥ 0.90	Good Fit
RMSEA	0.025	≤ 0.08	Good Fit
RMR	0.011	≤ 0.05	Good Fit

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Table 3 shows that the research model has adequate goodness-of-fit for hypothesis testing. The results of the model fit assessment indicate that there are no significant problems and that parameter estimation can be performed accurately. Therefore, structural analysis can be continued to the hypothesis-testing stage, thereby supporting the validity of the study's findings.

3. Hypothesis Testing

Hypothesis testing was conducted to examine the effects of each variable within the research model. The analysis was performed using critical ratios (CR) and p-values, with significance criteria set at $p < 0.05$ and $CR > 1.96$. The results of the hypothesis testing are presented in Table 4.

Table 4. Hypothesis Test Results

Hypothesis	Connection	Estimate	CR	P-Value	Decision
H1	DL → CA	-0.136	-1,169	0.242	Rejected
H2	SE → CA	-0.120	-1,031	0.303	Rejected
H3	DM → CA	0.106	1,087	0.277	Rejected
H4	DL → LA	0.470	7,292	***	Accepted
H5	SE → LA	0.479	7,909	***	Accepted
H6	DM → LA	0.390	7,292	***	Accepted
H7	LA → CA	0,918	4,125	***	Accepted

Based on Table 3, the results show that digital literacy, self-efficacy, and decision-making have a significant effect on learning agility. In contrast, the direct effects of these three variables on career adaptability are not significant.

These findings indicate a different pattern of relationships among the exogenous, mediating, and endogenous variables. Therefore, further analysis is required to examine the indirect effects through the mediating variable.

a. Influence Digital Literacy, Self-Efficacy, and Decision Making on Career Adaptability

The results of this study indicate that digital literacy, self-efficacy, and decision-making do not have a significant direct effect on career adaptability. These findings suggest that students' competencies have not yet translated into readiness to adapt to career demands. Career adaptability is shaped not only by individual capabilities but also by experiences and interactions with the environment. Therefore, without adequate learning processes, cognitive and psychological competencies may not directly foster adaptive career behaviors.

One possible explanation for the lack of direct effects is students' limited exposure to real work experiences. Individual learning experiences, career exploration, and psychological readiness play a more substantial role in influencing career adaptability [23]. Therefore, an intervening variable is needed to bridge the relationship between individual competencies and career adaptability.

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b. Influence Digital Literacy, Self-Efficacy, and Decision Making on Learning Agility

The results of this study show that digital literacy, self-efficacy, and decision-making skills significantly affect learning agility. These findings suggest that cognitive and psychological competencies play a crucial role in shaping students' adaptive learning capacity. Digital literacy facilitates access to and the effective use of information in the learning process [24]. In contrast, self-efficacy enhances individuals' confidence in dealing with new problems and experiences [25].

Decision-making ability also helps individuals determine appropriate responses to the situations they encounter[26]. Learning agility refers to the ability to learn from experience and apply that learning in new situations [27]. Therefore, these three variables collectively shape learning agility as a key competency for adapting to dynamic work environments.

c. Influence Digital Literacy, Self-Efficacy, and Decision Making to Career Adaptability through Learning Agility

The mediation test was conducted using the Sobel method to test the indirect effect using the formula $Z = (a \times b) / \sqrt{((b^2Sa^2) + (a^2Sb^2))}$. The Z value is greater than the critical value, indicating that the mediation effect is significant. The results of the mediation test are presented in Table 5.

Table 5. Mediation Test Results (Sobel Test)

Hypothesis	Mediation Path	*Z (Sobel)*	*P-Value*	Decision
H7a	DL → LA → CA	3,89	***	Accepted
H7b	SE → LA → CA	3,76	***	Accepted
H7c	DM → LA → CA	3,52	***	Accepted

The findings indicate that learning agility plays a significant mediating role in the relationship between digital literacy, self-efficacy, decision-making, and career adaptability. Learning agility enables individuals to integrate experience and knowledge when facing career-related changes [28]. Thus, students' competencies can be transformed into adaptive capabilities through the learning process.

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Previous studies have also shown that learning agility plays an important role in enhancing work readiness and career adaptability [29]. This study has several limitations that should be considered when interpreting the findings. Although purposive sampling enabled the selection of participants with relevant industrial learning experiences, this technique limits the generalizability of the findings beyond vocational students with similar educational backgrounds and training experiences. Therefore, future studies are recommended to involve broader and more diverse vocational education contexts to strengthen the external validity of the findings.

CONCLUSION

This study provides strong evidence that career adaptability among vocational students is not automatically developed through competencies alone, but through adaptive learning processes represented by learning agility. The findings demonstrate that digital literacy, self-efficacy, and decision-making contribute to career adaptability only when these competencies are transformed into adaptive learning capacities that enable students to respond effectively to workplace uncertainty and continuous change.

The findings further confirm that learning agility functions as a critical adaptive mechanism linking competencies with adaptive career behavior. This indicates that career adaptability should be understood as a dynamic developmental process shaped through continuous learning, reflection, and adaptation rather than as a direct outcome of competence acquisition alone.

This study also offers important implications for vocational education. Vocational institutions should move beyond conventional competence-oriented instruction by creating adaptive learning environments that encourage reflective, experiential, workplace simulation, and problem-based learning to strengthen students' adaptive learning capacity.

Furthermore, industry-based learning programs should expose students to dynamic and uncertain workplace situations to strengthen learning agility and improve long-term career adaptability.

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