



Contents lists available at [Journal IICET](https://journal.iicet.org)
Jurnal EDUCATIO (Jurnal Pendidikan Indonesia)
ISSN: 2476-9886 (Print) ISSN: 2477-0302 (Electronic)
Journal homepage: <https://jurnal.iicet.org/index.php/jppi>



Impact of digital literacy and interpersonal communication on prospective teacher readiness of automotive engineering education

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Article Info

Article history:

Received Sept 27th, 2024
Revised Oct 24th, 2024
Accepted Nov 09th, 2024

Keyword:

Career
Digital literacy
Interpersonal communication
Prospective teacher readiness

ABSTRACT

Digital literacy equips prospective teachers with essential information and communication technology (ICT) skills, while interpersonal communication enables them to interact effectively with students and the community. However, the impact of these skills on the readiness of prospective teachers, especially in the Automotive Engineering Education Study Program, has not been widely studied. This study attempts to examine how digital literacy influences students' readiness to become teachers in this study program. A quantitative approach was used in this study, the data collection process used the help of an online questionnaire with a population of 2019 and 2020 PTO students with a sample determined by the Slovin method of 62 students. The results showed an R² value of 0.389, which means 38.9% of the variance in teacher readiness can be explained by digital literacy. In addition, a positive correlation ($R = 0.623$) is shown in the relationship between variables. Meanwhile, the coefficient B of digital literacy is 0.373. This indicates that as the digital literacy and interpersonal communication skills of PTO students of Semarang State University increase, their readiness to become teachers also increases. The conclusion from this study is that digital literacy and interpersonal communication have a significant effect on the readiness of prospective teachers of PTO students of Semarang State University.



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Introduction

Indonesia, as a developing country, continues to face significant challenges in its education system. The primary issues include a persistent gap in both quality and accessibility. Despite ongoing efforts, only 25% of schools meet the minimum teacher service standards, and teacher competency test scores remain well below expectations. Infrastructure disparities between urban and rural areas further exacerbate these educational inequalities. Leadership plays a crucial role, but regional autonomy has led to inconsistent decision-making, impacting the effectiveness of educational policies. Additionally, Indonesia struggles with low reading interest and poor performance in global educational assessments.

The Program for International Student Assessment (PISA) 2022 report indicates a slight improvement in Indonesia's education ranking, with a rise of 5-6 positions since 2018. However, the country still lags behind the global average, highlighting the need for collective, nationwide efforts to address these challenges and enhance

education sector in Indonesia (Damayanti & Puspasari, 2022). The standard of education plays a critical role in determining the quality of human resources, especially as we enter the 21st century, where competitiveness hinges on the reliability and expertise of these resources (Iskandar et al., 2020).

Quality education is inseparable from the role of competent educators. Educational reforms, such as curriculum renewal, facility improvements, and the adoption of creative teaching methods, cannot achieve maximum impact without the involvement of qualified teachers. The interaction between teachers and students, characterized by reciprocal relationships, is essential to achieving shared educational goals (Sumardi, 2016); Iskandar, R. (2024)..

In the digital era, the readiness of prospective educators is not only limited to pedagogical and psychological competencies. It now requires proficiency in digital literacy and strong communication skills. One indicator of the success of prospective teacher students in mastering and developing readiness to become teachers in the 21st century is by developing important skills that teachers must master in facing 21st century education, including developing digital technology literacy skills (M. Abdullah & Osman, 2010). Entering the 21st century, it is expected that the role of teachers is very important in developing students' competencies, especially in this technological field. Along with the rapid development of technology, teachers are required to utilize technology in improving learning for students. Related to this 21st century education, education students must of course be equipped with gaining skills about digital literacy (Kurnia et al., 2019).

Digital literacy is not only obtained in lectures, but must be applied to student learning. According to Julia et al. (2017) that the 21st century is characterized by digitalization in various aspects of life including in the field of education, considering that now attendance, books, resources, assignments, and other aspects make more use of technological advances. Research conducted by Nugraha (2019) showed that computer literacy has no positive effect on the teaching ability of economics teachers. Therefore, students must have good digital literacy skills to be ready to become future teachers.

Digital literacy, the ability to use information and communication technology (ICT) effectively, is essential for future educators to meet the demands of future teaching. Research shows that digital literacy significantly influences teaching readiness by enhancing ICT skills and improving interpersonal communication, which is crucial for engaging students and the wider community (Damayanti & Puspasari, 2022); (Listiaji & Subhan, 2021). Therefore, it is imperative for higher education institutions to incorporate digital literacy and communication skills into their educational practices to better prepare future teachers to face the challenges of modern education.

Communication skills are one of the skills that prospective educators need to master in order to be able to convey knowledge clearly and easily to students. In line with research conducted by Akuegwu et al., (2011) which shows that communication skills in education students have a low level of significance $t = -4.719$, $p < .05$ and the hypothesis is rejected. Therefore, it is necessary to improve communication skills.

As prospective educators, of course, they have skills, one of which is skills in speaking or communicating interpersonally. Interpersonal communication in the world of education is known as a way to bring students closer to be able to recognize the weaknesses and strengths of students during learning (T. Abdullah & Rubini, 2015). Thus, changes in students' self-behavior in learning can gain useful knowledge and student creativity. Interpersonal communication is carried out by prospective educators who must make it easier for students to understand the material so that learning can be useful and applied in everyday life.

With the application of interpersonal communication, prospective educators will have a high level of quality, especially in communication. Pontoh, (2013) in Damayanti & Puspasari, (2022) defines interpersonal communication as communication between several people directly, which can provide reinforcement in the presence of actors who can record the reactions of others directly, both verbally and nonverbally. Meanwhile, Orebiyi & Orebiyi, (2011) state that interpersonal communication is verbal or nonverbal communication between two or more people. Dharmayanti, (2013) also argues that it is necessary to provide interpersonal skills training to vocational students, one of which is interpersonal communication skills to prepare students to enter and compete in the world of work. At this time, not everyone can communicate well. In communication, there is a stimulus or stimulus that can affect the message conveyed and is easily understood by students. There are several communication roles that involve many people in understanding various responses in order to obtain responses both internally and externally (Maulani et al., 2024); (Rizal & Abdullah, n.d.).

The main purpose of this study is to explore the impact of digital literacy and interpersonal communication on the teaching readiness of prospective teachers in the Automotive Engineering Education Study Program at Semarang State University. Specifically, this journal aims to analyze how digital literacy affects students' readiness to become effective teachers and examine the role of interpersonal communication skills in their

teaching readiness. In addition, it also investigates the combined effects of digital literacy and interpersonal communication on students' overall readiness to pursue a teaching career in automotive engineering.

Method

This study utilizes quantitative methods. As defined by Sugiyono (2019), quantitative research involves the systematic investigation of a specific population or sample using research instruments for data collection and statistical analysis to test predefined hypotheses. In this context, the population refers to the entire group of individuals or objects selected by researchers for the purpose of generalization and conclusion drawing (Sugiyono, 2019). For this study, the population comprised 160 students enrolled in the Automotive Engineering Education Study Program (PTO). For this study, the population consisted of 160 students enrolled in the Automotive Engineering Education Study Program (PTO) class of 2019 and 2020.

The sample, as described by Sugiyono (2019), is a subset of the population that shares the characteristics of populations. In this study, proportional random sampling was employed, where sample members were selected randomly from the population without considering specific strata within it. This method guarantees that every individual in the population has an equal opportunity to be chosen as part of the sample, preserving the sample's representativeness of the entire population.

To determine the sample size, the Slovin formula was applied as follows:

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

Description:

N = number of sample

N = number of population

e = percentage of allowance for tolerable sampling error.

Given a total population of 160 students in the Automotive Engineering Education Study Program and a margin of error of 10%, the sample size was calculated as:

$$n = \frac{N}{1 + Ne^2} = \frac{160}{1 + 160 (0.1^2)} = 61.53 \approx 61$$

Thus, the sample size was rounded to 62 students. Proportional random sampling is used to emphasize that each concentration in the population has an equal chance of being represented, with the number of samples in each concentration calculated proportionally. Because it uses proportional random sampling technique, sampling from the population is done randomly without regard to the strata in the population.

Table 1 <Categories of Likert Scale>

Aspect	Score
Strongly agree	4
Agree	3
Diasgaree	2
Strongly disagree	1

Data collection is done through the use of questionnaires, in which participants are given a series of questions or statements that they must answer (Sugiyono, 2019). This study used a closed questionnaire format, which asked participants to select the option that most accurately represented their opinion by marking (✓) their choice. The questionnaire was administered online using the help of Google Form. This method allows for quick data collection, making it easier for respondents to complete. After administering the questionnaire within 3 weeks the required data was collected. During data collection, there were some difficulties such as the length of the data collection process due to not being able to meet directly with the sample and only being able to follow up through online messages. The collected data were then analyzed using a Likert scale, as outlined in Table 1, and the research framework is depicted in Figure 1.

This research uses instrument trials which include validity and reliability tests. The validity test assesses the accuracy of the measuring instrument, determining whether the measuring instrument accurately captures the variable under study. Data is considered valid if the significance level is less than 0.05, otherwise it is invalid (Nurhasanah, 2016). The reliability test checks the consistency of measurement, with a Cronbach alpha value of 0.60 as the reliability threshold. An alpha value above 0.60 indicates reliable data (Nurhasanah, 2016). SPSS 21 was used for this test.

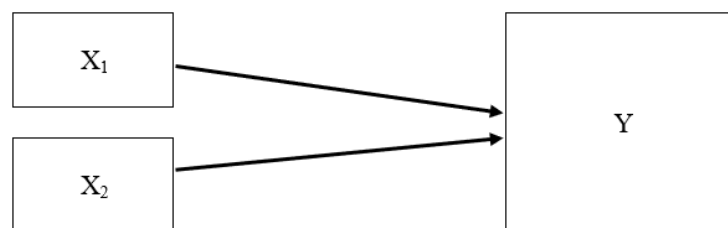


Figure 1 < Research Thinking Framework >

Information:

X_1 = digital literacy, X_2 = interpersonal communication, Y = teacher readiness, $\rightarrow$ = effect of X on Y .

The validity of the 34 statement items was processed and assessed using SPSS 21 software, and all items were found to be valid. The purpose of the validity test is to ensure that the questions in the questionnaire effectively capture the variables in question. In this study, a variable is considered valid if the Pearson correlation coefficient, when compared to the total score, exceeds the critical value of r table (Schober et al., 2018). As for the reliability test, the digital literacy variable (X_1) achieved a reliability value of 0.808, well above the accepted threshold of 0.60, which indicates strong internal consistency. Likewise, the interpersonal communication variable (X_2) recorded a reliability score of 0.774, further validating the reliability of the data. (Lee et al., 2018).

Data analysis includes classical assumption tests and hypothesis testing. The normality test tests whether the data distribution resembles a normal distribution, with a significance level below 0.05 indicating an abnormal distribution. The heteroscedasticity test tests the residual variance in the regression model, using scatterplots to detect patterns. If the scatterplots do not show a clear pattern, then the data is free from heteroscedasticity (Nurhasanah, 2016). Hypothesis testing was conducted using simple linear regression to analyze the impact of digital literacy (X_1) and interpersonal communication (X_2) on PTO students' teaching readiness (Y). SPSS 21 was also used for data analysis.

Results and Discussions

Digital literacy encompasses the capacity to proficiently and critically explore, assess, and produce information using various digital technologies. It includes not just the technical expertise required to operate digital tools but also the cognitive and social abilities necessary to comprehend and engage in digital spaces (Pangrazio et al., 2020). In contrast, interpersonal communication is the process through which people share information, emotions, and meaning through both verbal and non-verbal cues. This skill is essential for establishing and nurturing relationships, whether in personal or professional settings (Abed et al., 2023).

Descriptive Statistics

According to Ghazali (2016) descriptive statistics provide an overview or description of data seen from the average value (mean), standard deviation, variance, maximum, minimum, sum, range, kurtosis and skewness (distribution skewness). Meanwhile, according to Sugiyono (2016) explains that descriptive statistics are statistics used to analyze data by describing or describing the data that has been collected as it is without intending to make general conclusions or generalizations. Descriptive analysis in this study was used to provide an overview of the distribution of research results for each variable, namely digital literacy, interpersonal communication and readiness to become a teacher. each variable consists of several indicators developed into a questionnaire instrument. In the calculation of descriptive analysis for this study which has 3 variables using the help of the IBM SPSS version 21 program, the data obtained in Table 2.

Tabel 2 <Descriptive Statistics>

	N	Minimum	Maximum	Mean	Std. Deviation
Digital Literacy	62	33.00	48.00	41.9355	3.63440
Interpersonal Communication	62	25.00	40.00	34.7097	3.09090
Prospective Teacher Readiness	62	32.00	48.00	43.0806	3.97656
Valid N (listwise)	62				

The table above shows that of the 34 questions given on the digital literacy variable, the highest score is 48 and the lowest score is 33 with an average digital literacy skill of 41.9 in the very high category. In the interpersonal communication variable, the highest score is 40 and the lowest score is 25 with an average interpersonal communication skill of 34.7 in the high category. While the readiness to become a teacher with

the highest score is 48 and the lowest score is 32. The average readiness of students to become teachers of 43.08 is in the high category.

Validity Test

The validity of the 34 statement items was processed and assessed using SPSS 21 software, and all items were found to be valid. The purpose of the validity test is to ensure that the questions in the questionnaire effectively capture the variables in question. In this study, a variable was considered valid if the Pearson correlation coefficient, when compared to the total score, exceeded the critical value of *r* table (Schober et al., 2018).

For this study, with a sample size of 62 students, the *r* table value at the 5% significance level (0.05) is 0.246. This means that any item with a Pearson correlation greater than 0.246 is considered valid. According to the findings, all 34 indicators have been validated, as their Pearson correlation coefficients range from 0.300 to 0.667. Since all of these values are above the *r* table threshold of 0.246 at the 0.05 significance level, the items are confirmed as valid measures for the variable in question (Schober et al., 2018).

This validation process is essential to ensure that the data collected is reliable and accurate for subsequent analysis. The purpose of the reliability test is to assess the consistency and stability of the questionnaire. The reliability analysis carried out on the variables studied gave strong results, as shown by the Cronbach's Alpha value obtained from the reliability statistics table.

Tabel 3 <Result of reliability statistics>

Variable	Cronbach's Alpha	N of Items
X ₁	0.808	12
X ₂	0.774	10
Y	0.884	12

The digital literacy variable (X₁) achieved a reliability score of 0.808, well above the accepted threshold of 0.60, indicating strong internal consistency. Likewise, the interpersonal communication variable (X₂) recorded a reliability score of 0.774, further validating the reliability of the data. In addition, the readiness to become a teacher variable (Y) showed an even higher Cronbach's Alpha value of 0.884, well above the minimum required value of 0.60. This indicates that the measurement of this variable is highly reliable, with the items used to assess it consistently reflecting the underlying construct. These results indicate that the data collected for these variables are reliable, meaning that the items used in the questionnaire consistently measure the intended construct, giving confidence in the validity of the research findings.

Normality Test

The normality test results indicate that the Asymptotic Significance (Asymp. Sig.) value exceeds the significance threshold of 0.05 (5%). Because the *p*-value is above 0.05, we do not reject the null hypothesis of normality. This finding suggests that the data is normally distributed. (Massey, 1951)

Tabel 4 < Result of One-Sample Kolmogorov-Smirnov test >

Aspects	Values
N	62
Test Statistic	0.075
Asymp. Sig. (2-tailed)	0.200 ^{c,d}

Regression analysis

The results of the simple linear regression test, as shown in Table 5, provide insight into the relationship between digital literacy (X₁), interpersonal communication (X₂), and teacher readiness (Y). The regression equation derived from the table is $Y = 11.761 + 0.373X_1 + 0.452X_2$. The constant value of 11.761 indicates that in the absence of both digital literacy and interpersonal communication, the baseline readiness of students to become teachers is 11.761. The unstandardized coefficients reveal that for each unit increase in digital literacy (X₁), teacher readiness increases by 0.373, while each unit increase in interpersonal communication (X₂) results in a 0.452 increase in teacher readiness. Both coefficients are statistically significant, with *p*-values of 0.011 for digital literacy and 0.009 for interpersonal communication, indicating that these variables significantly contribute to predicting teacher readiness (Boscardin, 2010).

These results align with study by Iskandar (2024) that suggests digital literacy plays a crucial role in teaching information literacy, particularly concerning ICT integration policies in education. In terms of organizational

and administrative aspects, digital literacy helps prospective teachers understand internet ethics in learning and the regulations that govern it. Additionally, in the area of professional teacher development, digital literacy provides knowledge on how to use digital media to articulate constructive ideas about teaching.

Further research by Rizal et al (2022) shows that digital literacy positively influence on teacher readiness, with a reported effect size of 91.16%. A study by Luh et al (2023) found that digital literacy improves student competence by enhancing their ability to make business decisions through the learning process. Safitri et al (2019) also demonstrated that interpersonal communication positively influences the teaching readiness of students during their field experience at STIKIP PGRI Banjarmasin, as evidenced by high ability of students to communicate effectively, reducing misunderstandings and conflicts. Lastly, research by Herfina et al (2022) indicates a direct positive and significant relationship between transformational leadership, interpersonal communication, and outcomes like Organizational Citizenship Behavior (OCB) and job satisfaction.

In the summary model, an R value of 0.623 indicates a moderate positive correlation between the independent variables and teacher readiness. The R Square value of 0.389 shows that around 38.9% of the variance in teacher readiness is attributable to the combined influence of digital literacy and interpersonal communication. The adjusted R Square, which is slightly lower at 0.368, accounts for the number of predictors and reinforces that the model fits the data well. The standard error of the estimate, at 3.162, reflects the average deviation of the observed values from the regression line, underscoring the model's predictive accuracy (Boscardin, 2010).

Tabel 5 < Simple linear regression test output and summary model >

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	11.761	5.134		2.291	0.026
	X ₁	0.373	0.142	0.341	2.619	0.011
	X ₂	0.452	0.167	0.351	2.698	0.009
Model	R	R Square		Adjusted R Square		Std. Error of the Estimate
1	0.623 ^a	0.389		0.368		3.162

Heteroscedasticity Test (Glejser Test)

Table 6 presents the results of the heteroscedasticity test using the Glejser method. This test determines whether the variance of the residuals in the regression model remains consistent across different levels of the independent variables. The table provides details on the unstandardized and standardized coefficients, t-values, and significance levels for the constant (intercept) and the independent variables, digital literacy (X₁) and interpersonal communication (X₂). The constant (intercept) has a value of 5.060 with a standard error of 3.349, which is not statistically significant ($p = 0.136$). This suggests that the baseline level of heteroscedasticity, without considering the effects of digital literacy and interpersonal communication, is not significant (Godfrey, 1996).

For the digital literacy variable (X₁), the unstandardized coefficient is 0.051 with a standard error of 0.093. The t-value stands at 0.553, with a significance level of 0.582. Given that the significance level is well above 0.05, we can conclude that there is no indication of heteroscedasticity associated with digital literacy. This suggests that variations in digital literacy do not significantly impact the variance of the residuals, thereby reinforcing the reliability of the regression model that includes this variable (Godfrey, 1996).

Similarly, the interpersonal communication variable (X₂) has an unstandardized coefficient of -0.141 with a standard error of 0.109. The t-value is -1.293, and the significance level is 0.201. Like digital literacy, the significance value for interpersonal communication is also above 0.05, indicating no evidence of heteroscedasticity related to this variable. This suggests that fluctuations in interpersonal communication do not significantly influence the variance of the residuals in the model (Godfrey, 1996).

In correlation with the linear regression results discussed earlier, the absence of heteroscedasticity for both digital literacy (X₁) and interpersonal communication (X₂) confirms the stability and reliability of the regression model. This means that the coefficients obtained in the linear regression model where digital literacy and interpersonal communication significantly predicted teacher readiness are not compromised by uneven variance in the data (Godfrey, 1996). Therefore, the relationships identified in the regression analysis can be considered robust and valid for interpreting the influence of these variables on teacher readiness.

Tabel 6 < Result of heteroscedasticity test output (Glejser test) >

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.060	3.349		1.511	0.136
	X ₁	0.051	0.093		0.553	0.582
	X ₂	-0.141	0.109		-1.293	0.201

Based on the research results, the amount of Adjusted R Square is 0.389 or 38.9%. This means that 38.9% of the readiness to become a teacher variable can be explained by the digital literacy and interpersonal communication variables. While the remaining 61.1% is explained by other factors outside the model or there is a simultaneous influence of digital literacy and interpersonal communication on readiness to become a teacher in Automotive Engineering Education students at Semarang State University.

The digital literacy variable has a positive coefficients B value of 0.373 with a Sig. value of $0.011 < 0.05$. So it can be concluded that there is a positive and significant influence between digital literacy on readiness to become a teacher in Automotive Engineering Education students at Semarang State University. These results indicate that when students' digital literacy skills increase, their readiness to become teachers in the 21st century will also increase. The results of this study are in line with the results of previous research conducted by (Yulianisa et al., 2018) which show that the digital literacy variable has a positive effect on readiness to become a teacher which is expressed by a value of 91.16%.

Facing the era of globalization, everything has changed with changes in the field of technology and communication, especially in the world of education, therefore human resources are needed who are responsive to the development of Information and Communication Technology, namely a 21st century teacher candidate, including having to master digital literacy skills. As said by Dewi Ayuningrum in an interview that "prospective 21st century teachers must have digital literacy skills because if not, teachers may be replaced by technology (Nisa, 2020). Although technology is growing rapidly, the role of teachers should not be lost because teachers make technology a learning tool and learning resource."

For the interpersonal communication variable, it has a positive coefficients B value of 0.452 with a Sig. value of $0.009 > 0.05$. So it can be concluded that there is a positive and significant effect between interpersonal communication variables on readiness to become teachers in Automotive Engineering Education students at Semarang State University. The results of this study are in line with research conducted by Noorhayati, (2012) in her thesis, the difference lies in the independent variables, namely teaching skills and soft skills conducted at Yogyakarta State University. The results obtained that the effect of communication skills on readiness to become a teacher shows that there is a positive and significant effect with rx_2y of 0.563, x_2y 0.317 and t count $6.398 > t$ table 1.9869.

This is because communication skills for readiness to become a teacher in the 21st century are very important to determine the quality of the learning process, because in learning a 21st century teacher must be able to transfer knowledge and all competencies related to it, as part of the educational process for students. So, if students of the Department of Automotive Engineering Education, Semarang State University have high communication skills, it will improve their readiness to become a teacher in the 21st century.

In addition to the above results, this study also has limitations in its implementation, these limitations are: 1) The results of the study are highly dependent on the honesty of the respondents in answering the research questionnaire This study has limitations in the data collection process; 2) The study involved a limited number of research subjects, namely 62 students. So that the results cannot be generalized to a large number of subject groups; 3) The conceptual framework used in this study only connects variables that are thought to have a relationship with the dependent variable, so there is still the possibility of other variables that have not entered the conceptual framework.

Conclusions

The results showed that digital literacy and interpersonal communication had a significant effect on readiness to become a teacher in the Automotive Engineering Education study program at Semarang State University. The linear regression equation is $Y = 11.761 + 0.373X_1 + 0.452X_2$. A moderate positive correlation is indicated by an R value of 0.623, with an R^2 value of 38.9%. The implication of this study is that students of the Automotive Engineering Education study program at Semarang State University can improve their digital

literacy and interpersonal communication skills to better prepare themselves for their teaching careers. During this research, the author realized that there were several limitations experienced and could be several factors that could be considered for future researchers to further refine their research.

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