ETDC Indonesian Journal of Research and Educational Review
Volume 5, No. 4, 2026, pp 2362 - 2370
e–ISSN 2809-3682
p–ISSN 2809-7505

https://doi.org/10.51574/ijrer.v5i4.5008

Industrial Practice and Communication Skills: Work Readiness of Electronic Engineering Education Students

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Article Info

Article history:

Received April 30, 2026
Accepted July 08, 2026
Published July 11, 2026

Keywords:

Communication Skills;
Engineering Education Students;
Industrial Practice;
Work Readiness.

ABSTRACT

This study examines the effect of industrial practice and communication skills on the work readiness of students in the Electronic Engineering Education Department at Universitas Negeri Makassar, Indonesia. Work readiness is a crucial outcome of higher education, particularly for students preparing to enter the professional workforce, yet prior studies have rarely modeled industrial practice and communication skills jointly within a single regression framework in the vocational-engineering context. A quantitative ex-post facto design was employed, drawing on the entire population of 47 fourth-year students who had completed their industrial internship, using a validated four-point Likert-scale questionnaire (15 items per variable). Data was analyzed through multiple linear regression in IBM SPSS Statistics 29, following tests of validity, reliability, and classical assumptions. The results show that (1) industrial practice has a positive and significant partial effect on work readiness ($t = 2.165$, sig. $= 0.034 < 0.05$); (2) communication skills have a positive and significant partial effect on work readiness ($t = 3.580$, sig. $= 0.001 < 0.05$); and (3) industrial practice and communication skills simultaneously and significantly affect work readiness ($F = 86.529$, sig. $= 0.001 < 0.05$), jointly explaining 78.8% of the variance in work readiness (Adjusted $R^2 = 0.788$), with communication skills exerting the more dominant influence ($b = 0.709$) relative to industrial practice ($b = 0.240$). These findings suggest that vocational teacher-education curricula should integrate structured industrial-practice programs with deliberate communication-skills training to strengthen graduate employability.

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1. INTRODUCTION

The rapid pace of globalization and technological advancement has significantly transformed the demands of the labor market (Wadley, 2021). University graduates today are expected not only to master academic content but also to possess practical skills and effective communication abilities (Mainga et al., 2022; Wadley, 2021). Work readiness has become a critical aspect of higher education, as it reflects an individual's capacity to adapt, contribute, and compete within a dynamic professional environment

(Enstroem & Schmaltz, 2024). Consequently, students as prospective members of the workforce need to be equipped with a combination of technical (hard) skills and non-technical (soft) skills, particularly communication skills that support professional interaction (Munir, 2022).

Alongside the rapid expansion of the industrial sector, the demand for competent human resources continues to grow. Industry requires personnel who possess not only theoretical knowledge but also applied skills relevant to workplace needs (Poláková et al., 2023). Within this context, higher education institutions play a strategic role in producing graduates who are professional, adaptive, and work-ready (Dlamini & Dlamini, 2026; O'Reilly & Guidat, 2024). One such effort is the implementation of practice-based learning, such as industrial-practice programs, which integrate academic learning with real-world work experience (Ikejiaku & Tembo, 2023).

The Electronic Engineering Education Study Program at Universitas Negeri Makassar, for instance, has implemented industrial practice as part of its curriculum. This activity takes place in an industrial setting for approximately three months and is designed as a form of contextual learning that gives students the opportunity to apply theory learned in the classroom while gaining authentic work experience. Through a dual-education approach that links universities with industry, students are expected to develop their technical and professional competencies more optimally.

Nevertheless, the implementation of industrial practice still faces several constraints. Some students demonstrate limited prior experience, low self-confidence, and restricted initiative in taking advantage of learning opportunities in the workplace. These conditions may hinder the optimal benefit of industrial practice for improving work readiness. In fact, work readiness is shaped not only by technical experience but also by mental preparedness and the ability to communicate effectively in a professional environment.

A few studies indicate that industrial practice has a significant influence on students' work readiness, improving applied understanding, technical skills, and readiness to enter the workforce (Anati et al., 2025; Naseer et al., 2025; Setyadi et al., 2021). In addition, communication skills are widely recognized as an important factor influencing work readiness. The ability to convey ideas, work within teams, and interact professionally provides added value for graduates facing labor-market competition. As part of soft skills, communication skills encompass the ability to adapt, solve problems, make decisions, and manage organizational tasks, all of which contribute to individual work readiness (Mwita et al., 2023; Siddique, 2022).

Even so, a gap remains between the work readiness of university graduates and the demands of industry, particularly regarding practical experience and communication skills. Many graduates have trouble entering the workforce or adapting during the early stages of their careers because these two aspects have not been optimally mastered (Brunhaver et al., 2021; Turner & Holdsworth, 2023). This gap points to the need to strengthen the integration of academic learning, practical experience, and soft-skills development within the higher-education process.

Prior research has typically examined the influence of industrial practice and communication skills on work readiness separately (Moore & Morton, 2017; Rifai et al., 2025; Teng et al., 2019), and few studies have simultaneously modeled both variables using multiple regression within the specific context of electronic engineering education. Preliminary observations of 2022-cohort Electronic Engineering Education students who had completed industrial practice revealed a perceived improvement in skills and work-readiness following the program, suggesting that industrial practice and communication skills jointly play an important role in shaping students' work readiness. This study addresses that gap by examining the partial and simultaneous effects of industrial practice and communication skills on the work readiness of electronic engineering education students. The findings are expected to contribute to the development of a higher-education curriculum that is more responsive to industry needs and to strengthen the synergy between universities and the world of work in producing competent, competitive graduates.

Building upon this background, the research questions guiding this study are as follows: (1) Does industrial practice affect the work readiness of electronic engineering education students? (2) Do communication skills affect the work readiness of electronic engineering education students? (3) Do industrial practice and communication skills simultaneously affect the work readiness of electronic engineering education students? Correspondingly, this study aims to (1) analyze the effect of industrial practice on the work readiness of electronic engineering education students; (2) analyze the effect of communication skills on the work readiness of electronic engineering education students; and (3) analyze the simultaneous effect of industrial practice and communication skills on the work readiness of electronic engineering education students.

2. METHOD

This study used a quantitative approach with an ex-post facto method. This method was chosen because the independent variables in this study, industrial practice and communication skills, are events that had already occurred prior to the research being conducted. Multiple linear regression analysis was used to examine the effect of the independent variables on the dependent variable, both partially and simultaneously.

The population of this study comprised all 2022-cohort students of the Electronic Engineering Education Study Program who had completed their industrial internship, totaling 47 students. Given the relatively small population size, this study employed a total sampling (census) technique, in which every member of the population was included as a respondent.

Table 1. Research Population

Class	Number of Students
PTA A	30 students
PTA B	17 students
Total	47 students

The independent variables consisted of industrial practice (X1) and communication skills (X2), while the dependent variable was students' work readiness (Y). Data were collected using a questionnaire based on a four-point Likert scale (1 = Strongly Disagree to 4 = Strongly Agree). Each variable was measured using 15 statement items, as summarized in Table 2.

Table 2. Research Instrument Grid

Variable	Indicators	Items
Industrial Practice (X1)	Perceived benefits of the internship, job-related knowledge, job skills, work attitude and mentality	15
Communication Skills (X2)	Communication ability, building positive relationships, problem solving, activity planning	15
Work Readiness (Y)	Rational consideration, adequate competence, work motivation, adaptive competence	15

Data analysis included: (1) descriptive statistics; (2) classical assumption tests, comprising normality (Kolmogorov-Smirnov), linearity, multicollinearity, and heteroscedasticity tests; and (3) hypothesis testing through multiple linear regression analysis using the equation:

$$Y = a + b_1X_1 + b_2X_2 + \varepsilon$$

where Y denotes work readiness, a is the constant, b1 and b2 are the regression coefficients, X1 is industrial practice, X2 is communication skills, and ε is the error term. Data was processed using IBM SPSS Statistics 29.

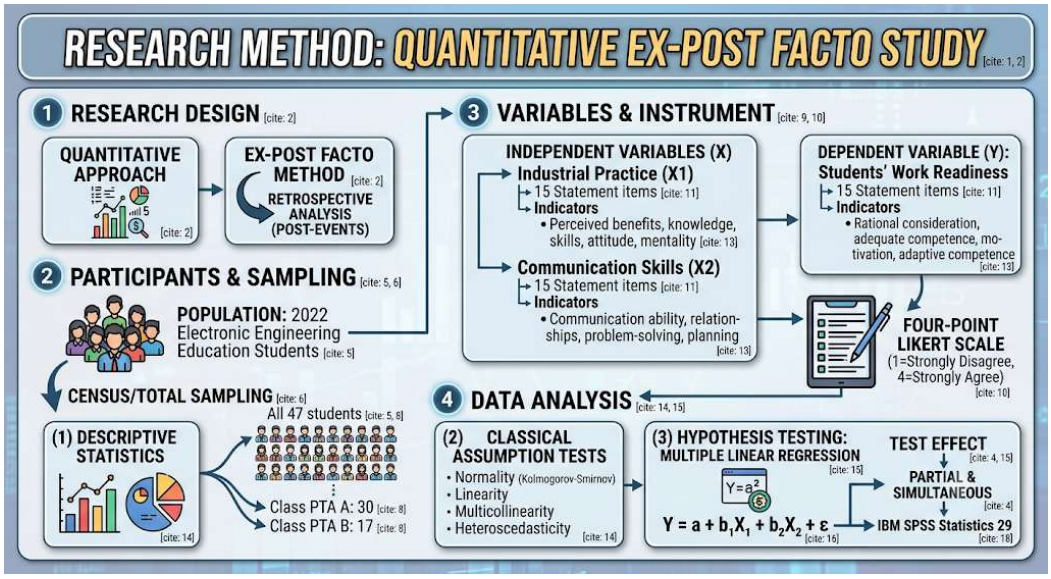

Figure 1. Quantitative Approach with an Ex-Post Facto Method

3. RESULTS AND DISCUSSION

Results

Validity and Reliability Test

Validity was assessed using Pearson product-moment correlation, with the criterion r-count > r-table (0.372). The results showed that all 45 statement items across the three

variables were valid. Reliability was assessed using Cronbach's Alpha, with the criterion $\alpha > 0.60$; all variables met this criterion, as summarized in Table 3.

Table 3. Summary of Validity and Reliability Tests

Variable	Valid	Invalid	Cronbach's Alpha	Category
Industrial Practice (X1)	15	0	0.883	Reliable
Communication Skills (X2)	15	0	0.945	Reliable
Work Readiness (Y)	15	0	0.950	Reliable

Descriptive Analysis

Descriptive statistical analysis showed that the industrial practice variable had a mean score of 51.53 (moderate category), communication skills had a mean of 50.02 (moderate category), and work readiness had a mean of 51.00 (moderate category), as detailed in Table 4.

Table 4. Descriptive Statistics and Category Distribution

Variable	Mean	SD	Low	Moderate	High
Industrial Practice (X1)	51.53	5.21	21.3%	38.3%	40.4%
Communication Skills (X2)	50.02	6.23	36.2%	27.7%	36.3%
Work Readiness (Y)	51.00	6.03	31.9%	31.9%	36.3%

Classical Assumption Tests

The Kolmogorov-Smirnov normality test produced a significance value of $0.200 > 0.05$, indicating that the data were normally distributed. The linearity test showed a Deviation from Linearity value of $0.182 > 0.05$ for X1 and $0.124 > 0.05$ for X2, indicating linear relationships between variables. The multicollinearity test yielded a Tolerance value of $0.507 > 0.10$ and a VIF of $1.974 < 10$, indicating no multicollinearity. The Glejser heteroscedasticity test produced significance values of 0.204 for X1 and 0.190 for X2, both > 0.05, indicating the absence of heteroscedasticity. All classical assumption tests were satisfied, confirming that the regression model was appropriate for use.

Multiple Linear Regression Analysis

The multiple linear regression analysis produced the equation: $Y = 3.148 + 0.240X1 + 0.709X2 + e$. The constant of 3.148 indicates that if both independent variables were zero, work readiness would be at 3.148. Coefficient X1 (0.240) indicates that each one-unit increase in industrial practice raises work readiness by 0.240 units. The coefficient of X2 (0.709) indicates a more dominant effect, whereby each one-unit increase in communication skills raises work readiness by 0.709 units.

Hypothesis Testing

A partial t-test was conducted to examine the effect of each independent variable on the dependent variable; results are presented in Table 5.

Table 5. Results of the Partial T-Test

Variable	t-value	Sig.	Decision
Industrial Practice (X1)	2.165	0.034	H1 accepted
Communication Skills (X2)	3.580	0.001	H2 accepted

Industrial practice (X1) obtained a significance value of 0.034 < 0.05, so H1 was accepted: industrial practice has a positive and significant effect on students' work readiness. Communication skills (X2) obtained a significance value of 0.001 < 0.05, so H2 was accepted: communication skills have a positive and significant effect on students' work readiness.

Table 6. Results of the Simultaneous F-Test and Coefficient of Determination

Model	F-value	Sig.	R	R^2	Adj. R^2
Industrial Practice & Communication Skills → Work Readiness	86.529	0.001	0.893	0.797	0.788

The F-test produced an F-value of 86.529 with a significance of 0.001 < 0.05, so H3 was accepted: industrial practice and communication skills simultaneously have a significant effect on students' work readiness. The Adjusted R^2 value of 0.788 indicates that the two variables jointly contribute 78.8% to the variance in work readiness, while the remaining 21.2% is explained by other variables outside the model.

Discussion

Effect of Industrial Practice on Work Readiness

The results confirm that industrial practice has a positive and significant effect on students' work readiness (sig. = 0.034 < 0.05). This finding is consistent with the view that industrial practice is a critical activity for enhancing student quality and preparing students to enter the workforce, as it provides authentic experience, technical skills, discipline, and a professional work attitude (Jackson et al., 2023; Sobri et al., 2023). It also aligns with Maharani and Firmansyah (2026), who demonstrated that industrial practice significantly affects work readiness, such that more optimal experience gained during the internship corresponds with higher work readiness among students.

Effect of Communication Skills on Work Readiness

Communication skills were found to have a positive and significant effect on students' work readiness (sig. = 0.001 < 0.05). The regression coefficient for communication skills (0.709), which is more dominant than that of industrial practice (0.240), indicates that interpersonal ability is the primary determinant of work readiness in this sample. This finding is supported by Herlina (2025) and other relevant studies showing that communication skills help students convey ideas, collaborate within teams, and adapt to the professional work environment (Dias-Oliveira et al., 2024; Schmidt et al., 2023).

Simultaneous Effect

Simultaneously, both variables were shown to have a significant effect on work readiness (F = 86.529; sig. = 0.001 < 0.05). The Adjusted R^2 value of 0.788 indicates that the combination of industrial practice and communication skills contributes 78.8% to students' work readiness. This reinforces the view of Suroto et al. (2024) that the synergy between field experience and effective communication ability forms the foundation of optimal work readiness, a conclusion further corroborated by Wilopo et al. (2025).

Taken together, these findings suggest that although industrial practice remains an important predictor of work readiness, communication skills play the more decisive role within this sample. This implies that vocational and engineering-education curricula should not treat industrial-practice placements as a sufficient condition for employability on their own but should deliberately embed structured communication-skills training, such as presentation practice, teamwork-based projects, and workplace-simulation activities, alongside field placements. Such integration may help narrow the gap between graduate competencies and the demands of industry noted in the introduction. As this study relied on a single cohort of 47 students from one study program, the generalizability of the specific coefficient estimates to other institutions, or engineering disciplines should be interpreted with appropriate caution.

4. CONCLUSION

This study demonstrates that both industrial practice (X1) and communication skills (X2) serve as critical determinants of work readiness (Y) among electronic engineering education students at Universitas Negeri Makassar. The inferential statistics reveal that industrial practice exerts a positive and statistically significant direct effect on student preparedness (sig. = 0.034 < 0.05) and underscores the vital role of experiential learning in aligning academic outputs with industry demands. Similarly, communication skills exhibit a highly significant positive influence on work readiness (sig. = 0.001 < 0.05), highlighting the indispensable nature of interpersonal proficiencies in professional environments. When evaluated simultaneously, the joint integration of industrial practice and communication skills yields a robust predictive framework for student readiness (F = 86.529; sig. = 0.001 < 0.05), accounting for an impressive 78.8% of the total variance (Adjusted R^2 = 0.788). These findings empirically validate the necessity of bridging technical-experiential exposure with robust soft-skill competencies to optimize graduate outcomes in engineering education.

To capitalize on these insights, a multi-stakeholder approach is imperative for enhancing graduate transition into the workforce. Students must proactively engage in maximizing industrial internship opportunities while systematically refining their communication capabilities. Concurrently, higher education institutions should strategically reinforce collaborative partnerships with industrial sectors and structurally integrate comprehensive soft-skills development within the engineering curriculum. Finally, given that 21.2% of the variance in work readiness remains unexplained by the current model, future research is highly encouraged to explore additional exogenous

variables. Expanding the research scope by employing larger, more diverse cohorts across multiple institutions and various engineering disciplines would significantly enhance the generalizability and robustness of these pedagogical implications.

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