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Project-based learning and vocational students' employability, self-confidence, and career adaptability through field work practice readiness

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ABSTRACT

This study examined the contribution of Project-Based Learning (PjBL) to employability, self-confidence, and career adaptability, with Field Work Practice (FWP) readiness as a mediator. A quantitative causal-associative design involved 120 Grade XII students from seven vocational programs selected through purposive sampling. Data were collected using five-point Likert questionnaires and analyzed using PLS-SEM in SmartPLS 4. PjBL significantly predicted FWP readiness ($\beta = 0.478$, $p < 0.001$), employability ($\beta = 0.412$, $p < 0.001$), self-confidence ($\beta = 0.380$, $p < 0.001$), and career adaptability ($\beta = 0.414$, $p < 0.001$). FWP readiness partially mediated employability ($\beta = 0.087$, $p = 0.043$), self-confidence ($\beta = 0.120$, $p = 0.014$), and career adaptability ($\beta = 0.122$, $p = 0.005$). Integrating PjBL with workplace preparation strengthens vocational students' career-related competencies.



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Introduction

Vocational education plays a strategic role in preparing graduates with technical, interpersonal, and adaptive competencies for successful school-to-work transitions (McQuinn, 2023; Muliadi et al., 2025). However, the mismatch between vocational education outcomes and labor-market expectations remains a critical concern, as technical competence alone does not guarantee employment readiness. Contemporary workplaces require communication, collaboration, problem-solving, confidence, and adaptability to technological and organizational change. Accordingly, employability, self-confidence, and career adaptability represent complementary resources that enable students to perform occupational tasks and manage changing career demands. Recent evidence similarly identifies adaptability, self-confidence, communication, creativity, problem-solving, and critical thinking as important determinants of vocational students' employability (Pratama et al., 2026; Santri & Sholihin, 2026).

Project-Based Learning (PjBL) is particularly relevant to these demands because it engages students in authentic, collaborative, and problem-oriented activities resembling workplace practices. Through planning, decision-making, teamwork, problem-solving, and tangible project outcomes, students apply technical and interpersonal competencies while developing autonomy and confidence. These experiences may strengthen employability through transferable skills, self-confidence through successful task completion, and career adaptability through exposure to complex and changing problems. This experiential orientation is especially

relevant in vocational education, where learning outcomes depend on students' ability to transfer classroom competencies to occupational contexts (Alfianto et al., 2019; Kvasková et al., 2023). Previous studies also associate PjBL with employability, work readiness, technological literacy, and industry preparation (Eckhardt, 2024; Ferdian et al., 2025; Kristiana et al., 2025; Oliver Sr, 2025).

Field Work Practice (Praktik Kerja Lapangan [PKL]) further connects school-based learning with authentic occupational environments. Field Work Practice Readiness differs from workplace experience itself because it reflects students' mental, technical, and attitudinal preparedness to function effectively in professional settings. Such readiness may enable students to transfer competencies developed through PjBL into workplace learning, making it a plausible mechanism linking classroom experiences with career-related outcomes. Previous evidence associates internship and work-based learning with work readiness and career adaptability, while career adaptability is also positively related to readiness for employment (Eze et al., 2026; Zeng et al., 2026). These findings support the conceptual connection between workplace preparedness and broader occupational and adaptive resources (Amish, 2025; Bochoti et al., 2026; Kenny et al., 2022; Peng et al., 2024).

Despite this evidence, the literature remains fragmented. Previous studies have separately examined PjBL and employability or work readiness, workplace learning and career adaptability, and other predictors of vocational students' career development. Consequently, limited evidence explains whether PjBL is simultaneously associated with multiple occupational and psychosocial outcomes through workplace readiness. In particular, the mediating role of Field Work Practice Readiness in the relationships between PjBL and Employability, Self-Confidence, and Career Adaptability remains insufficiently examined within a unified model among Indonesian vocational high school students (Mahfud et al., 2022; Wang et al., 2022; Zeng et al., 2024). Examining this mechanism may clarify how classroom learning is translated into career-related resources for workforce entry (Buyukcolpan & Karacan Ozdemir, 2025; Tentama et al., 2024).

Therefore, the novelty of this study lies in testing an integrated model that positions Field Work Practice Readiness as a mediator between PjBL and Employability, Self-Confidence, and Career Adaptability among Grade XII vocational students. This model integrates pedagogical experience, workplace preparedness, and career-related resources rather than examining them separately (Nikander et al., 2022; Silva & Gamboa, 2014; Tentama & Anindita, 2020). Given the cross-sectional design, these relationships are interpreted as structural associations rather than definitive causal effects. Accordingly, this study examines the direct associations of PjBL with Field Work Practice Readiness and the three career outcomes and tests the mediating role of Field Work Practice Readiness using PLS-SEM, providing empirical evidence for strengthening the alignment between vocational learning and workplace preparation (Hummel et al., 2018; Santana-Vega et al., 2023).

Method

Research Design and Setting

This study employed a quantitative, causal-associative, explanatory research design with a cross-sectional approach to examine the direct and indirect contributions of Project-Based Learning (PjBL) to vocational students' employability, self-confidence, and career adaptability through Field Work Practice Readiness as a mediating variable. The proposed relationships were examined simultaneously within an integrated structural model using Partial Least Squares Structural Equation Modeling (PLS-SEM). The study was conducted at SMK Negeri 1 Sarolangun, Jambi Province, Indonesia, during May–June 2026. The school was selected because it had implemented PjBL in its instructional activities, systematically organized Field Work Practice (Praktik Kerja Lapangan, PKL), and offered seven vocational programs representing diverse technical and occupational fields. Importantly, the targeted Grade XII students had completed their PKL experience, enabling them to provide informed evaluations of PjBL implementation, workplace readiness, employability, self-confidence, and career adaptability.

Participants and Sampling

The target population comprised 280 students enrolled at SMK Negeri 1 Sarolangun. Participants were selected using purposive sampling, a non-probability sampling technique, because the structural model required respondents with direct experience of both PjBL and workplace practice. The inclusion criteria were: (1) Grade XII students who had completed at least one semester of PKL, (2) students who had actively participated in PjBL-based learning, and (3) students who were actively enrolled at the school during data collection. Based on these criteria, 120 Grade XII students from seven vocational programs were included: Geomatics Engineering (n = 17), Building Information Modeling and Design (n = 6), Electrical Power Installation Engineering (n = 14), Computer and Network Engineering (n = 30), Light Vehicle Engineering (n = 15), Motorcycle Business Engineering (n = 28), and Visual Communication Design (n = 10). The sample size was considered adequate

for PLS-SEM analysis because it exceeded the minimum sample requirement specified in the original research protocol.

Measures and Instrumentation

Data were primarily collected using a structured self-report questionnaire comprising five constructs: PjBL, Field Work Practice Readiness, Employability, Self-Confidence, and Career Adaptability. All items were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Secondary data consisting of students' official PKL scores were obtained from school records and used to provide an objective contextual description of students' workplace performance.

The PjBL construct represented students' perceptions of the quality of project-based instruction they had experienced. Its conceptualization integrated the Gold Standard PjBL framework, the content–process–product perspective, and motivational dimensions of project learning. The instrument initially consisted of 27 items encompassing pedagogical, technical, and psychological dimensions. Field Work Practice Readiness was operationalized as students' preparedness to enter and function in an authentic workplace environment and was initially assessed using 27 items covering mental readiness, technical competency readiness, and work-attitude readiness.

Employability was conceptualized as a multidimensional set of competencies enabling vocational students to enter, function effectively in, and develop within the labor market. The 24-item instrument encompassed technical competence, professional communication and teamwork, problem-solving ability, and professional work ethics and attitudes. Self-Confidence was assessed using 21 items representing technical, social, and adaptive confidence in occupational settings. Career Adaptability was measured using 24 items based on the four dimensions of the Career Adapt-Abilities Scale: concern, control, curiosity, and confidence, reflecting students' psychosocial resources for managing career development, occupational transitions, and changing workplace demands.

Instrument Validation and Pilot Testing

Instrument development followed a systematic process involving theoretical review, construct operationalization, development of dimensions and indicators, item formulation, expert assessment, revision, content-validity analysis, and reliability testing. Content validity was evaluated by three experts from Universitas Negeri Padang with expertise in vocational and technological education research methodology, PjBL and vocational Field Work Practice, and career psychology and employability. Expert judgments were quantified using Aiken's V. All items across the five instruments achieved Aiken's V values of at least 0.67, corresponding to high-to-very-high content validity, and wording revisions recommended by the experts were incorporated before empirical testing.

Following expert validation, a pilot test involving 30 Grade XII students from SMK Negeri 4 Sarolangun was conducted. These students had characteristics comparable to those of the main study participants but were recruited from a different school to prevent contamination of the primary sample. Item validity was evaluated using item-total Pearson product-moment correlations, with $r > 0.361$ at the 5% significance level used as the validity criterion for the pilot sample ($n = 30$). Internal consistency was assessed using Cronbach's alpha. Items failing to satisfy the predefined psychometric criteria were designated for revision or elimination before administration to the main study sample.

Data Collection

Primary data were obtained directly from the 120 participating students through the validated questionnaire after they had completed their Field Work Practice. The cross-sectional administration generated quantitative scores for PjBL, Field Work Practice Readiness, Employability, Self-Confidence, and Career Adaptability. The five-point response format comprised strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). In addition to questionnaire responses, official PKL performance records were obtained from SMK Negeri 1 Sarolangun as secondary data. These records were used as contextual information alongside students' perceived workplace readiness rather than as an additional latent variable in the structural model.

Data Analysis

Data were analyzed using PLS-SEM with SmartPLS 4 following sequential measurement- and structural-model evaluation. The constructs were specified using reflective measurement. Prior to model estimation, the dataset was examined for completeness and missing values. The measurement model was evaluated using indicator loadings (≥ 0.70), average variance extracted ($AVE > 0.50$), composite reliability (> 0.70), and Cronbach's alpha (> 0.70). Discriminant validity was assessed using the heterotrait–monotrait ratio ($HTMT < 0.90$), while potential collinearity was evaluated using the variance inflation factor ($VIF < 5.0$).

The structural model was subsequently evaluated using path coefficients (β), coefficient of determination (R^2), and effect size (f^2). Effect sizes were interpreted using thresholds of 0.02, 0.15, and 0.35 for small, medium, and large effects, respectively. Statistical significance was determined through bootstrapping with 5,000 subsamples, using bias-corrected and accelerated (BCa) estimates, two-tailed testing, and a 95% confidence interval. A structural relationship was considered statistically significant when $t > 1.96$ or $p < 0.05$.

Finally, mediation analysis was performed to determine whether Field Work Practice Readiness transmitted the contribution of PjBL to Employability, Self-Confidence, and Career Adaptability. Specific indirect effects, direct effects, and total effects were estimated using the same bootstrapping procedure. An indirect effect was considered significant when its 95% confidence interval did not include zero or when $p < 0.05$. Mediation was classified as partial when both the direct and indirect effects were statistically significant and as full when the indirect effect was significant while the corresponding direct effect was not significant. This analytical strategy enabled the study to estimate not only whether PjBL was associated with the three career-related outcomes, but also the extent to which these relationships operated through students' readiness for authentic workplace practice.

Results and Discussions

The PLS-SEM analysis was conducted in two stages: assessment of the measurement model and evaluation of the structural model. The measurement model was examined using indicator loadings, internal consistency reliability, convergent validity, discriminant validity, collinearity, and model fit. The structural model was subsequently evaluated using the coefficient of determination (R^2), effect size (f^2), direct effects, total effects, and specific indirect effects. Statistical significance was assessed through bootstrapping with 5,000 subsamples at a significance level of 0.05.

Table 1. Field Work Practice Performance of Students Across Vocational Programs

Vocational Program	n	Mean	Minimum	Maximum	Category
Geomatics Engineering	17	86.56	80.00	90.50	Good
Building Information Modeling and Design	6	82.38	76.25	86.25	Good
Electrical Power Installation Engineering	14	86.20	80.00	91.75	Good
Computer and Network Engineering	30	88.03	80.00	96.00	Good
Light Vehicle Engineering	15	82.30	60.00	100.00	Good
Motorcycle Business Engineering	28	82.61	78.25	90.25	Good
Visual Communication Design	10	83.35	65.75	98.50	Good
Overall	120	84.95	60.00	100.00	Good

Note. Field Work Practice refers to Praktik Kerja Lapangan (PKL).

Table 1 presents the students' actual Field Work Practice performance across the seven vocational programs. The overall mean score was 84.95, indicating that students generally achieved a good level of workplace performance. Computer and Network Engineering recorded the highest mean score ($M = 88.03$), whereas Light Vehicle Engineering showed the lowest mean ($M = 82.30$). Nevertheless, all programs remained within the "Good" category. The widest score range was observed in Light Vehicle Engineering (60.00–100.00), indicating greater variation in individual workplace performance, while Building Information Modeling and Design exhibited a relatively narrower distribution (76.25–86.25). Overall, these results provide contextual evidence that the participants had generally achieved the competency standards established for Field Work Practice.

Table 2. Measurement Model Assessment: Indicator Reliability, Internal Consistency, and Convergent Validity

Construct	Indicators	Loading Range	Cronbach's α	rho_A	CR	AVE
Project-Based Learning (PjBL)	X1–X7	0.829–0.872	0.935	0.936	0.947	0.718
Field Work Practice Readiness (FWPR)	M1–M5	0.817–0.889	0.896	0.903	0.923	0.707
Employability	Y1.1–Y1.6	0.864–0.883	0.937	0.938	0.950	0.761
Self-Confidence	Y2.1–Y2.6	0.833–0.900	0.937	0.942	0.950	0.761
Career Adaptability	Y3.1–Y3.7	0.800–0.896	0.943	0.949	0.954	0.746

Note. CR = composite reliability; AVE = average variance extracted; FWPR = Field Work Practice Readiness.

The measurement model demonstrated satisfactory reliability and convergent validity. All indicator loadings ranged from 0.800 to 0.900, exceeding the recommended threshold of 0.70 and confirming adequate indicator reliability. Cronbach's alpha values ranged from 0.896 to 0.943, while composite reliability values ranged from 0.923 to 0.954, demonstrating strong internal consistency across all constructs. The AVE values ranged from 0.707 to 0.761, indicating satisfactory convergent validity. Employability and Self-Confidence demonstrated the highest AVE values (0.761), whereas Field Work Practice Readiness showed the lowest (0.707), which remained well above the acceptable criterion. These results confirmed that all constructs were sufficiently reliable and valid for subsequent structural model analysis.

Table 3. Discriminant Validity, Collinearity, and Model Fit Assessment

Assessment	Relationship / Index	Value	Recommended Criterion	Interpretation
Discriminant validity (HTMT)	PjBL ↔ FWPR	0.519	< 0.90	Established
	Employability ↔ FWPR	0.410	< 0.90	Established
	Employability ↔ PjBL	0.531	< 0.90	Established
	Self-Confidence ↔ FWPR	0.466	< 0.90	Established
	Self-Confidence ↔ PjBL	0.529	< 0.90	Established
	Self-Confidence ↔ Employability	0.463	< 0.90	Established
	Career Adaptability ↔ FWPR	0.478	< 0.90	Established
	Career Adaptability ↔ PjBL	0.563	< 0.90	Established
	Career Adaptability ↔ Employability	0.384	< 0.90	Established
	Career Adaptability ↔ Self-Confidence	0.294	< 0.90	Established
Collinearity (VIF)	All indicators	2.043–4.135	< 5.00	No critical collinearity
Model fit	SRMR – Saturated Model	0.054	< 0.08	Acceptable
	SRMR – Estimated Model	0.064	< 0.08	Acceptable
	d_ULS – Saturated Model	1.444		
	d_ULS – Estimated Model	2.031		
	d_G – Saturated Model	0.816		
	d_G – Estimated Model	0.830		
	Chi-square – Saturated Model	516.211		
	Chi-square – Estimated Model	522.540		
	NFI – Saturated Model	0.848	Closer to 1.00	Acceptable
	NFI – Estimated Model	0.846	Closer to 1.00	Acceptable

Note. HTMT = heterotrait–monotrait ratio; VIF = variance inflation factor; SRMR = standardized root mean square residual; NFI = normed fit index; PjBL = Project-Based Learning; FWPR = Field Work Practice Readiness.

Table 3 demonstrates satisfactory discriminant validity, acceptable collinearity, and adequate overall model fit. All HTMT values ranged from 0.294 to 0.563, remaining below the 0.90 threshold and confirming that the five latent constructs were empirically distinct. The indicator-level VIF values ranged from 2.043 to 4.135, indicating no critical multicollinearity. Furthermore, the SRMR values for the saturated (0.054) and estimated (0.064) models were below 0.08, while the corresponding NFI values were 0.848 and 0.846. Collectively, these results support the adequacy of the measurement model and justify proceeding with the structural model assessment.

Table 4 integrates the explanatory power and effect sizes of the structural model. PjBL explained 22.9% of the variance in Field Work Practice Readiness, whereas PjBL and Field Work Practice Readiness jointly explained 27.4% of Employability, 29.7% of Self-Confidence, and 33.7% of Career Adaptability. Career Adaptability therefore exhibited the highest explained variance among the three primary outcomes. Regarding effect sizes, PjBL showed its largest contribution to Field Work Practice Readiness ($f^2 = 0.297$), followed by Career Adaptability ($f^2 = 0.199$), Employability ($f^2 = 0.180$), and Self-Confidence ($f^2 = 0.158$). In contrast, Field

Work Practice Readiness showed smaller effect sizes for Employability ($f^2 = 0.035$), Self-Confidence ($f^2 = 0.069$), and Career Adaptability ($f^2 = 0.075$). These findings indicate that PjBL constituted the more substantial predictor within the structural model, while Field Work Practice Readiness provided additional explanatory contribution to all three career-related outcome.

Table 4. Explanatory Power and Effect Sizes of the Structural Model

Endogenous Construct	R ²	Adjusted R ²	Variance Explained (%)	Predictor	f ²	Effect
Field Work Practice Readiness	0.229	0.222	22.9	PjBL	0.297	Moderate
Employability	0.274	0.262	27.4	PjBL	0.180	Moderate
				FWPR	0.035	Small
Self-Confidence	0.297	0.285	29.7	PjBL	0.158	Moderate
				FWPR	0.069	Small
Career Adaptability	0.337	0.326	33.7	PjBL	0.199	Moderate
				FWPR	0.075	Small

Note. R² = coefficient of determination; f² = effect size; PjBL = Project-Based Learning; FWPR = Field Work Practice Readiness.

Table 5. Direct, Indirect, and Total Effects of PjBL on Student Career Outcomes

Structural Relationship	Direct Effect (β)	Indirect Effect (β)	Total Effect (β)	t-value ¹	p-value ¹	95% CI ¹	Mediation/Decision
PjBL to FWPR	0.478		0.478	6.869	<0.001	[0.329, 0.600]	Significant
PjBL to Employability	0.412	0.087	0.499	2.022	0.043	[0.002, 0.170]	Partial mediation
PjBL to Self-Confidence	0.380	0.120	0.499	2.449	0.014	[0.034, 0.227]	Partial mediation
PjBL to Career Adaptability	0.414	0.122	0.536	2.799	0.005	[0.039, 0.212]	Partial mediation
FWPR to Employability	0.181		0.181	2.108	0.035	[0.003, 0.338]	Significant
FWPR to Self-Confidence	0.250		0.250	2.787	0.005	[0.071, 0.425]	Significant
FWPR to Career Adaptability	0.255		0.255	3.052	0.002	[0.073, 0.408]	Significant

Note. FWPR = Field Work Practice Readiness; β = standardized path coefficient; CI = confidence interval. ¹For the three mediated PjBL–outcome relationships, the t-values, p-values, and confidence intervals refer to the specific indirect effects; for the remaining relationships, they refer to the corresponding direct effects. Bootstrapping was performed using 5,000 subsamples.

Table 5 summarizes the principal hypothesis-testing results and provides evidence for both the direct and mediated contributions of PjBL. PjBL significantly predicted Field Work Practice Readiness ($\beta = 0.478$, $p < 0.001$), Employability ($\beta = 0.412$, $p < 0.001$), Self-Confidence ($\beta = 0.380$, $p < 0.001$), and Career Adaptability ($\beta = 0.414$, $p < 0.001$). Field Work Practice Readiness also significantly predicted Employability ($\beta = 0.181$, $p = 0.035$), Self-Confidence ($\beta = 0.250$, $p = 0.005$), and Career Adaptability ($\beta = 0.255$, $p = 0.002$). More importantly, the specific indirect effects of PjBL through Field Work Practice Readiness were significant for Employability ($\beta = 0.087$, $p = 0.043$), Self-Confidence ($\beta = 0.120$, $p = 0.014$), and Career Adaptability ($\beta = 0.122$, $p = 0.005$). Because both the corresponding direct and indirect effects remained significant, Field Work Practice Readiness demonstrated partial mediation across all three outcome pathways. The largest total effect was observed for Career Adaptability ($\beta = 0.536$), followed by Employability and Self-Confidence (both $\beta = 0.499$), indicating that the combined direct and mediated contribution of PjBL was strongest for students' capacity to adapt to future career demands.

The findings indicate that Project-Based Learning (PjBL) was positively associated with Field Work Practice Readiness ($\beta = 0.478$, $p < 0.001$), with a moderate effect size ($f^2 = 0.297$). PjBL explained 22.9% of the variance in readiness ($R^2 = 0.229$), suggesting that authentic projects, collaborative tasks, and contextual problem-solving provide meaningful preparation for workplace demands. Through these activities, students practice organizing work, assuming responsibility, applying technical knowledge, and responding to occupational problems, thereby

narrowing the gap between classroom learning and workplace expectations. Nevertheless, the moderate R^2 indicates that 77.1% of the variance in readiness remains attributable to factors outside the model, such as prior occupational experience, individual characteristics, school support, and workplace exposure. Thus, PjBL should be regarded as an important but not exclusive correlate of workplace readiness, consistent with evidence emphasizing the broader role of experiential and career-related learning in preparing students for employment (Negru-Subtirica & Pop, 2016; Qingfeng et al., 2024; Šverko & Babarović, 2016).

PjBL was also significantly associated with Employability ($\beta = 0.412$, $p < 0.001$), Self-Confidence ($\beta = 0.380$, $p < 0.001$), and Career Adaptability ($\beta = 0.414$, $p < 0.001$), with moderate effect sizes ($f^2 = 0.180$, 0.158 , and 0.199 , respectively). These relationships can be understood through distinct but complementary mechanisms. Authentic projects develop employability by requiring technical application, communication, teamwork, and problem-solving, whereas successful completion of challenging tasks provides mastery experiences that may strengthen students' confidence in their occupational capabilities. At the same time, managing uncertainty, making decisions, and adapting project strategies may cultivate resources relevant to career adaptability. Accordingly, PjBL appears to function as more than an instructional method by providing experiential conditions associated with both occupational and psychosocial development. However, given the cross-sectional design, these findings indicate structural associations rather than definitive causal effects (Landgrebe et al., 2024; Musabekova et al., 2014; Tomac et al., 2026).

Field Work Practice Readiness was positively associated with Employability ($\beta = 0.181$, $p = 0.035$), Self-Confidence ($\beta = 0.250$, $p = 0.005$), and Career Adaptability ($\beta = 0.255$, $p = 0.002$). However, the corresponding effect sizes were small ($f^2 = 0.035$, 0.069 , and 0.075), indicating that statistical significance should not be interpreted as a strong substantive contribution. The largest association was observed with Career Adaptability, suggesting that mental, technical, and attitudinal preparedness for workplace practice may be particularly relevant to students' capacity to manage occupational transitions and changing career demands. This interpretation is consistent with previous evidence showing positive relationships between career adaptability and work readiness, including the correlation of $r = 0.603$ reported by Ayuni and Nio (2025). Nevertheless, because the present data were collected cross-sectionally, the temporal direction between workplace readiness and career adaptability cannot be established, and reciprocal relationships remain possible (Ambiel et al., 2018; Setiyawan et al., 2025; Zeng et al., 2022).

A key finding was the significant indirect association of PjBL with Employability ($\beta = 0.087$, $p = 0.043$), Self-Confidence ($\beta = 0.120$, $p = 0.014$), and Career Adaptability ($\beta = 0.122$, $p = 0.005$) through Field Work Practice Readiness. Because the corresponding direct effects of PjBL remained significant and operated in the same direction, the pattern supports complementary partial mediation. Importantly, the indirect effects were considerably smaller than the direct effects, indicating that workplace readiness explains only part of the association between PjBL and the three outcomes. The strongest indirect pathway was observed for Career Adaptability, although its magnitude remained modest. These findings therefore suggest that PjBL may be associated with career-related resources both directly and through workplace preparedness, while other mechanisms not examined in the present model are also likely to contribute. This interpretation is consistent with evidence that experiential learning, workplace preparation, and psychosocial adaptation represent interconnected rather than mutually exclusive processes in students' career development (Bhakti et al., 2025; Ismail et al., 2016; Wibowo et al., 2020).

Career Adaptability showed the highest explained variance ($R^2 = 0.337$) and the largest total association with PjBL ($\beta = 0.536$), compared with Self-Confidence ($R^2 = 0.297$; total effect $\beta = 0.499$) and Employability ($R^2 = 0.274$; total effect $\beta = 0.499$). Although these differences are relatively modest and should not be overstated, they indicate that Career Adaptability was the outcome most strongly represented by the proposed model. This pattern suggests that authentic project experiences combined with workplace preparedness may be particularly relevant to students' concern, control, curiosity, and confidence in managing future occupational demands. At the same time, the R^2 values indicate that substantial proportions of variance in all three outcomes remain unexplained, underscoring the likely importance of additional personal, educational, family, and labor-market factors. Practically, the findings support closer alignment between PjBL and structured preparation for Field Work Practice, while broader interventions such as career guidance and reflective workplace learning should be considered complementary strategies rather than direct implications tested by the present model. This interpretation is consistent with research emphasizing career adaptability as an important resource for navigating educational and occupational transitions (Ojala et al., 2023; Parmentier et al., 2021; Xiao et al., 2024).

Conclusions

This study concludes that Project-Based Learning is positively associated with vocational students' Field Work Practice Readiness, Employability, Self-Confidence, and Career Adaptability. Field Work Practice Readiness partially mediates the relationships between Project-Based Learning and the three career-related outcomes, indicating that workplace preparedness represents one mechanism through which project-based learning is associated with students' occupational and psychosocial resources. Career Adaptability showed the highest explained variance ($R^2 = 0.337$), although the moderate explanatory power of the model indicates that substantial variation remains attributable to factors beyond those examined. Given the cross-sectional design, these findings should be interpreted as structural associations rather than definitive causal effects. Practically, vocational schools may strengthen the alignment between authentic project-based instruction and systematic preparation for Field Work Practice to support students' employability, confidence, adaptability, and transition from school to employment.

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