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The Influence of Motivation, Interest, Learning Readiness, and Study Facilities on Vocational Student Achievement

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Abstract: Vocational education success depends heavily on multiple interconnected factors that influence student academic performance. This study examines the influence of motivation, interest, learning readiness, and study facilities on student learning outcomes in Computer and Basic Networking courses at SMK Negeri 2 Sungai Penuh. Research employed a quantitative approach with a causal correlational design, involving 71 students selected through proportional stratified random sampling. Data was collected using structured questionnaires and analyzed through path analysis. Results revealed that all independent variables significantly influence learning outcomes, with interest having the strongest impact (standardized coefficient=0.392, $p<0.001$), followed by learning readiness (0.366, $p<0.001$), motivation (0.212, $p<0.001$), and study facilities (0.056, $p<0.05$). Collectively, these variables explain 99.4% of the variance in learning outcomes ($R^2=0.994$). The findings highlight the critical role of student interest in technical subjects and emphasize the importance of a holistic approach that addresses both internal factors (motivation, interest, readiness) and external conditions (facilities). These results suggest that vocational schools should prioritize strategies to enhance student interest through interactive learning methods, ensure adequate learning facilities, and develop comprehensive student readiness programs to optimize educational outcomes.

Keywords: Learning Interest; Learning Motivation; Learning Readiness; Study Facilities; Vocational Education

Introduction

Education is a crucial component in the development of a nation and acts as a systematic process to improve human dignity holistically (Pristiwanti et al., 2022). In Indonesia, education is defined as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential (Abd Rahman et al., 2022). Vocational education, as organized by Vocational High Schools, has become one of the important focuses in the national education system due to its role in preparing skilled workers who are ready to enter the industrial world (Mahande, 2023). However, suboptimal student learning outcomes remain one of the main challenges in the national education system, including in vocational schools (Nasution, 2014). The success of vocational education is not only determined by a relevant curriculum and adequate learning facilities, but also by various internal and external factors that influence student learning processes and outcomes (Basuki, 2022; Siahaan et al., 2023).

Various studies have identified factors that influence student learning outcomes, including the application of learning models (Batubara, 2020; Sukardi & Rozi, 2019; Sumarni & Wardani, 2019; Malla et al., 2018; Syaifullah et al., 2024), learning approaches (Syaifullah et al., 2024), learning methods (Zaus & Krismadinata, 2018; Ronald et al., 2017; Sumadji, 2015), learning media (Suryani & Dhiki, 2020; Aurora &

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Effendi, 2019; Sitompul et al., 2017; Rifdarmon et al., 2023), assessment instruments (Hartina et al., 2020; Hasana, 2017; Pratiwi & Fasha, 2015), and curriculum (Sari, 2019; Chalim, 2018). Among these factors, motivation and interest in learning of vocational students play an important role in the formation of vocational competence (Nugroho, 2022). Motivation to learn is an internal and external drive in students who are learning to make changes in behavior, characterized by the desire to succeed, the drive and needs in learning, and hopes for future achievement. Interest in learning reflects students' tendency and engagement in their chosen vocational field, affecting the intensity and consistency of student involvement in the learning process. Additionally, learning readiness and the availability of adequate facilities are prerequisites for vocational students to keep up with technological developments and industry demands (Alvendri et al., 2023). Rifdarmon et al. (2023) found that learning outcomes of vocational students are influenced by a combination of internal factors (motivation and interest) and external factors (learning facilities) that interact with each other in the learning process.

SMK Negeri 2 Sungai Penuh faces serious problems related to student learning outcomes. Based on observation data from the even semester of class XI in the 2024/2025 school year, out of 242 class XI students, only 42 students (10.01%) reached the KKM in the Basic Computer and Network training course, while 200 students (89.99%) were incomplete. This problem is caused by several main factors: low student learning motivation evidenced by minimal participation in learning; lack of interest in learning because not all students choose majors according to their talents and interests; learning unpreparedness characterized by weak prerequisite abilities; and limited learning facilities such as inadequate computer laboratories and network equipment. The impact includes low mastery of basic competencies, unpreparedness of graduates for information technology industry demands, decreased competitiveness in the labor market, and potential damage to the school's reputation.

Several previous studies have examined these variables individually. Studies on motivation (Datu et al., 2022; Utaminingtyas et al., 2021; Mustiko & Trisnawati, 2021; Hayati & Pahlevi, 2022; Dewi et al., 2023), interest (Amalia, 2021), learning readiness (Fathoni & Sobandi, 2020; Nurkholipah, 2024), and learning facilities (Lestari et al., 2023; Meliyana et al., 2023) have shown positive influences on learning outcomes. However, significant research gaps exist: most studies examine these variables separately rather than integrating all four variables (motivation, interest, learning readiness, and learning facilities) simultaneously in one research model, especially in vocational education contexts; limited studies examine complex interactions between these variables in post-pandemic educational settings; and insufficient research addresses how these variables interact in learning that integrates digital technology with industry needs.

The novelty of this study lies in the comprehensive integration of the four variables in one holistic research model, considering post-pandemic digital era learning dynamics. This research offers novelty in analyzing interactions and direct-indirect effects between variables through path analysis, providing deeper understanding of factors influencing learning outcomes. The specific context of Basic Computer and Network training courses at SMK Negeri 2 Sungai Penuh, with 89.99% incompletion rates, provides unique insights not widely explored in previous studies.

Based on this analysis, this study aims to: (1) analyze the direct effect of learning motivation on learning outcomes, (2) analyze the direct effect of learning interest on learning outcomes, (3) analyze the direct effect of learning readiness on learning outcomes, (4) analyze the direct effect of learning facilities on learning outcomes, and (5) analyze the simultaneous effect of the four variables on student learning outcomes in Basic Computer and Network training courses at SMK Negeri 2 Sungai Penuh.

Method

This research uses a quantitative approach with a causal correlation design to examine the influence of motivation, interest, learning readiness, and learning facilities on student learning outcomes. This approach was chosen because it allows objective analysis of the relationship between variables by involving structured measurement and inferential statistical analysis. The causal design allows researchers to identify the cause-and-effect relationship between the independent and dependent variables, so as to answer the research objectives to analyze the direct and simultaneous effects of the four variables on learning outcomes. In an effort to ensure the research was systematic and purposeful, the study was conducted following a structured methodological flow as illustrated by Figure 1.

The population in this study were all class XI students of SMK Negeri 2 Sungai Penuh, totaling 242 students. Determination of the sample using the Slovin formula with an error rate of 10% to obtain a representative sample size but still efficient in conducting research. The number of samples obtained was 71 students. The sampling technique uses proportional stratified random sampling by considering the representation of each expertise program, so that the sample composition reflects the characteristics of the

population proportionally. Stratification was done based on skill programs to ensure adequate representation of each group of students. This approach strengthens the external validity of the research by reducing selection bias and increasing the generalizability of the research results.

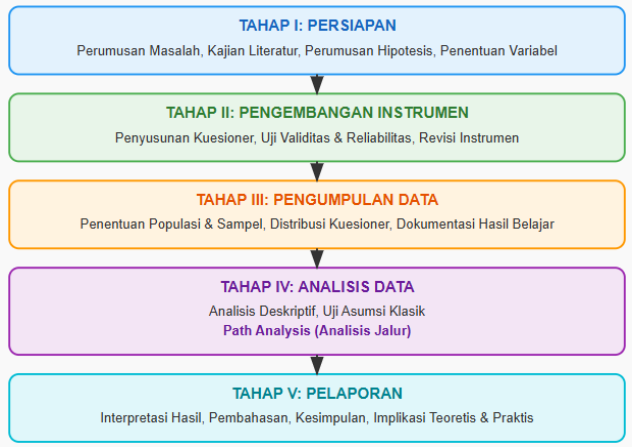

Figure 1. Research Flow

This study used primary data. The research instrument was a structured questionnaire with a 5-point Likert scale measuring four independent variables: learning motivation (indicators: desire to succeed, learning motivation, future expectations), learning interest (indicators: interest, attention, involvement), learning readiness (indicators: physical, psychological, material readiness), and learning facilities (indicators: availability, feasibility, accessibility). The quality of the instrument was validated through expert assessment (content validity) and statistical tests (construct validity) with a minimum Cronbach's Alpha of 0.7 for reliability. A pilot test of the instrument was conducted on 30 non-sample respondents for refinement prior to the main data collection.

Data collection was conducted over a four-week period from March to April 2024 at SMK Negeri 2 Sungai Penuh. The survey was administered in classroom settings during designated class hours, with each questionnaire completion session lasting approximately 30-45 minutes. Prior to data collection, written informed consent was obtained from all participants, and the research ethics approval was secured from the institutional review board.

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Data analysis was conducted in stages, starting with descriptive analysis (mean, median, standard deviation) to describe the characteristics of each variable. Furthermore, classical assumption tests (normality, linearity, and multicollinearity) were conducted as a prerequisite for inferential analysis. Hypothesis testing uses Path Analysis—a statistical technique that extends multiple regression analysis to examine direct and indirect causal relationships among variables in complex theoretical models. SmartPLS (Partial Least Squares Structural Equation Modeling software) version 4 was employed alongside SPSS version 29 to analyze the structural relationships and measurement models. This method was chosen for its ability to test complex theoretical models and visualize causal relationships between variables. The analysis was carried out to test five research hypotheses: the direct and simultaneous effects of the four independent variables on learning outcomes, complemented by analysis of mediation and moderation effects to reveal more comprehensive relationship mechanisms.

Result and Discussion

Result

After collecting research data, then the data obtained on each variable including X1: Motivation, X2: Interest, X3: Learning Readiness, X4: Study Facilities, and Y: Learning Outcomes can be described as shown in Table 1.

Table 1. Descriptive Statistics

Variable	N	Mean	Std. Error	Median	Mode	Std. Devitation	Variance	Range
X1 (Motivation)	71	82.51	1.329	84.00	93	11.202	125.482	52
X2 (Interest)	71	63.63	1.157	63.00	61	9.746	94.978	47
X3 (Learning Readiness)	71	78.14	0.994	78.00	77	8.376	70.151	39
X4 (Study Facilities)	71	67.25	1.171	67.00	63	9.869	97.392	51
Y (Learning Outcomes)	71	71.08	0.833	72.00	68	7.018	49.250	30

The descriptive analysis reveals distinct patterns across variables. Learning motivation (X1) demonstrated the highest mean score (M = 82.51, SD = 11.202), indicating relatively elevated motivation levels among participants. Learning interest (X2) exhibited a moderate mean score (M = 63.63, SD = 9.746), while learning readiness (X3) showed a substantial mean (M = 78.14, SD = 8.376) with relatively low variability. Study facilities (X4) presented a moderate mean (M = 67.25, SD = 9.869). Learning outcomes (Y) achieved a mean of 71.08 with the lowest standard deviation (SD = 7.018), suggesting greater consistency in academic performance compared to other variables. These findings indicate that motivation exhibited the highest average among independent variables, while learning outcomes demonstrated the most consistent distribution across the sample. After obtaining the descriptive statistical data, then the normality test was conducted as shown in Table 2.

Table 2. Normality test Results (Kolmogorov-Smirnov)

		X1	X2	X3	X4	Y
N		71	71	71	71	71
Normal Parameters[a]	Mean	82.51	63.63	78.14	67.25	71.08
	Std. Deviation	11.202	9.746	8.376	9.869	7.018
Most Extreme Differences	Absolute	.081	.085	.058	.052	.082
	Positive	.055	.085	.051	.052	.064
	Negative	-.081	-.047	-.058	-.039	-.082
Kolmogorov-Smirnov Z		.682	.720	.487	.438	.691
Asymp. Sig. (2-tailed)		.741	.679	.972	.991	.725

Based on the data displayed in Table 2, results of the normality test confirmed that all research variables follow normal distribution patterns. All significance values exceeded the 0.05 threshold: X1 (p = .741), X2 (p = .679), X3 (p = .972), X4 (p = .991), and Y (p = .725). The Kolmogorov-Smirnov Z values ranged from 0.438 to 0.720, further supporting normal distribution assumptions. Study facilities (X4) exhibited the highest significance value (p = .991), indicating optimal approximation to normal distribution. These results satisfy the normality prerequisite for subsequent parametric statistical procedures. After obtaining the normality test data, the linearity test was then carried out as shown in Table 3.

Table 3. Linearity Test Result

			F	Sig.
X1 * Y	Between Groups	(Combined)	5.541	.000
		Linearity	30.003	.000
		Deviation from Linearity	5.557	.000
X2 * Y	Between Groups	(Combined)	9.956	.001
		Linearity	84.840	.001
		Deviation from Linearity	9.959	.001
X3 * Y	Between Groups	(Combined)	25.211	.000
		Linearity	710.033	.000
		Deviation from Linearity	1.597	.000
X4 * Y	Between Groups	(Combined)	1.837	.004
		Linearity	55.355	.004
		Deviation from Linearity	1.885	.004

Based on the data displayed in Table 3, result of the linearity test confirmed significant linear relationships between all independent variables and learning outcomes. All linearity significance values were below 0.05: X1→Y (p = .000), X2→Y (p = .001), X3→Y (p = .000), and X4→Y (p = .004). Despite some deviation from linearity, the fundamental linear relationships remained statistically robust, supporting the appropriateness of linear modeling approaches. After obtaining the linearity test data, the multicollinearity test was then conducted as shown in Table 4.

Table 4. Multicollinearity Test Results

		Collinearity Statistics	
Model		Tolerance	VIF
1	X1	.777	3.873
	X2	.266	3.765
	X3	.880	1.137
	X4	.670	4.920

Based on the data displayed in Table 4, result of multicollinearity test indicated acceptable levels of intercorrelation among independent variables. All tolerance values exceeded 0.1 (X1 = .777, X2 = .266, X3 = .880, X4 = .670), and VIF values remained below 10 (X1 = 3.873, X2 = 3.765, X3 = 1.137, X4 = 4.920). While some VIF values approached 5, these levels remain within acceptable statistical parameters, confirming the absence of problematic multicollinearity. After obtaining multicollinearity test data, hypothesis testing is then carried out using Path Analysis through smartpls software as shown in Figure 2 and Table 5.

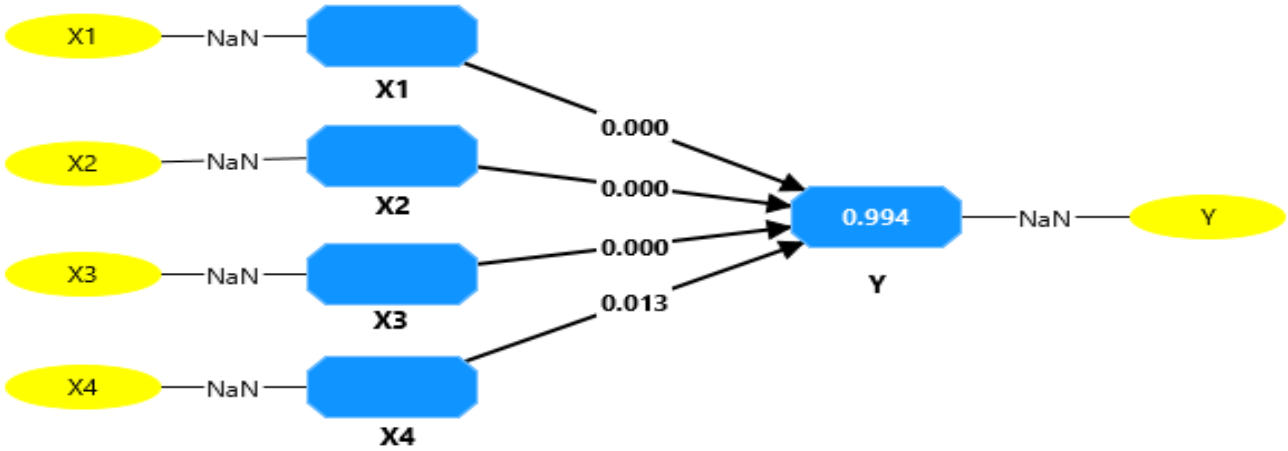

Figure 2. Path Analysis Diagram

Table 5. Hasil Uji Structural Model Assessment

Relationship	Path Coefficient	t-value	p-value	Significance		R^2 Value	R^2 Adjusted	f^2 Value	Effect
				Value	Levels				
X1 → Y	0.212	4.250	0.000	< 0.001	Very Highly Significant	0.994	0.994	0.768	Large
X2 → Y	0.392	5.182	0.000	< 0.001	Very Highly Significant			0.574	Large
X3 → Y	0.366	6.754	0.000	< 0.001	Very Highly Significant			0.750	Large
X4 → Y	0.056	2.483	0.013	< 0.05	Significant			0.255	Medium

Based on the results of Path Analysis in Table 5, the path analysis revealed significant relationships between all independent variables and learning outcomes. Interest (X2) demonstrated the strongest influence (β = 0.392, $p < .001$), followed by learning readiness (X3, β = 0.366, $p < .001$), motivation (X1, β = 0.212, $p < .001$), and study facilities (X4, β = 0.056, $p < .05$). The model exhibited exceptional explanatory power (R^2 = 0.994), accounting for 99.4% of variance in learning outcomes. Effect sizes were large for X1, X2, and X3 ($f^2 > 0.35$), while X4 showed a medium effect (f^2 = 0.255). Datu et al. (2022)

Discussion

Motivation and Learning Outcomes

Learning motivation demonstrated a significant positive effect on learning outcomes (β = 0.212, $p < .001$, f^2 = 0.768), indicating large practical significance. Each unit increase in motivation corresponds to a 0.212-unit improvement in learning outcomes. The relatively high motivation mean (M = 82.51) suggests strong learning drive among vocational students, though optimization remains necessary for enhanced academic achievement. These findings align with Datu et al. (2022), who demonstrated motivation's positive impact on learning outcomes during COVID-19 conditions. Similarly, Utaminingtyas et al. (2021) confirmed that enhanced motivation significantly improves mathematical learning outcomes. Hayati & Pahlevi (2022) emphasized motivation's mediating role between teacher competence, learning facilities, and academic achievement. Despite elevated motivation levels, suboptimal learning outcomes suggest the need for more effective channeling of motivational energy. The identified issue of low learning participation indicates that high motivation has not translated into active engagement, potentially due to insufficient alignment between learning materials and student interests or ineffective pedagogical approaches.

Interest and Learning Outcomes

Learning interest emerged as the most influential factor (β = 0.392, $p < .001$, f^2 = 0.574), despite its relatively moderate mean (M = 63.63). This dominance underscores interest's critical role in academic achievement, Amalia (2021) findings that highly interested students demonstrate superior focus and performance. Nugroho (2022) corroborated these results, highlighting learning interest's crucial role in vocational competence development. The moderate interest levels confirm previously identified challenges regarding major-interest misalignment among students. This mismatch poses significant obstacles to learning outcome optimization, given interest's dominant influence. Therefore, while motivation levels remain high, insufficient interest in chosen vocational fields may constrain academic potential.

Learning Readiness and Learning Outcomes

Learning readiness significantly influenced outcomes ($\beta = 0.366$, $p < .001$, $f^2 = 0.750$), ranking second in importance after interest. The substantial readiness mean ($M = 78.14$) indicates generally adequate preparation for learning participation. These results support Fathoni & Sobandi (2020) findings regarding readiness's positive impact on academic performance. Nurkholipah (2024) confirmed that well-prepared students exhibit superior concentration and comprehension. Mustiko and Trisnawati (2021) revealed readiness's indirect influence through motivational pathways on learning outcomes. However, the gap between high general readiness and suboptimal outcomes suggests inadequate specific preparation for Computer and Basic Networking courses. This aligns with identified prerequisite skill deficiencies, where general readiness may not encompass the technical foundations required for specialized vocational subjects.

Study Facilities and Learning Outcomes

Study facilities demonstrated the weakest, though still significant, influence ($\beta = 0.056$, $p < .05$, $f^2 = 0.255$). The moderate facilities mean ($M = 67.25$) indicates room for improvement in availability and quality. These findings align with Lestari et al. (2023), who confirmed adequate facilities' supportive role in learning processes and outcomes. Meliyana et al. (2023) emphasized that needs-appropriate facilities support learning objective achievement. However, the relatively small facility influence suggests that internal student factors (motivation, interest, readiness) predominantly determine learning outcomes. The modest path coefficient does not diminish facilities' importance but rather indicates that facility limitations (inadequate computer laboratories, network equipment) may represent uniform conditions across students, with outcome variations primarily explained by individual differences in internal factors.

Simultaneous Effects Analysis

The combined influence of all four variables demonstrated exceptional explanatory power ($R^2 = 0.994$), accounting for 99.4% of learning outcome variance. This comprehensive model underscores the necessity of holistic approaches to understanding and improving student achievement, requiring consideration of complex interactions between internal factors (motivation, interest, readiness) and external factors (facilities). These results align with Rifdarmon et al. (2023), who confirmed that vocational student outcomes result from integrated internal and external factor interactions. This research provides robust empirical evidence supporting comprehensive, integrative approaches to enhancing student learning outcomes in vocational education contexts.

Conclusion

Based on the research results, it can be concluded that learning motivation has a positive and significant effect on student learning outcomes with a path coefficient of 0.212 ($p<0.001$) and a large effect ($f^2=0.768$), although its influence is not as great as other variables. Learning interest is proven to be the most dominant factor with the highest path coefficient of 0.392 ($p<0.001$) and a large effect ($f^2=0.574$). Learning readiness becomes the second strongest influencing factor with a path coefficient of 0.366 ($p<0.001$) and a large effect ($f^2=0.750$). Learning facilities have a significant but lowest influence with a path coefficient of 0.056 ($p<0.05$) and a medium effect ($f^2=0.255$). Simultaneously, these four variables have a very strong influence on learning outcomes with an R^2 value of 0.994, which means 99.4% of the variation in student learning outcomes in the Computer and Basic Network course at SMK Negeri 2 Sungai Penuh can be explained by motivation, interest, learning readiness, and learning facilities. This finding affirms the importance of a holistic approach that considers all these factors to improve student learning outcomes.

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Author Contributions

Conceptualization, Desmiarni; methodology, Desmiarni and Waskito; software, Desmiarni; validation, Waskito, Nizwardi Jalinus, and Fadhilah; formal analysis, Desmiarni; investigation, Desmiarni; resources, Desmiarni; data curation, Desmiarni; writing—original draft preparation, Desmiarni and Lasyatta Syaifullah; writing—review and editing, Lasyatta Syaifullah and Waskito; visualization, Desmiarni; supervision, Waskito; project administration, Desmiarni; funding acquisition, Desmiarni. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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