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The Relationship Between Learning Interest, Intrinsic Motivation, and Practical Learning Outcomes of Network System Administration in Vocational High Schools

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A B S T R A C T

The rapid development of digital technology requires vocational high schools to produce highly competitive graduates. In the Computer and Network Engineering program, Network System Administration (ASJ) is a core subject requiring technical and problem-solving skills through practical learning. Therefore, this study aims to examine the relationship between learning interest and intrinsic motivation with conceptual practice-based learning outcomes in the ASJ subject. A quantitative correlational approach was employed. The sample consisted of 66 eleventh-grade vocational students, selected through purposive sampling. Data were collected using validated questionnaires and case study-based tests, then analyzed using the Spearman rank correlation due to the non-normal distribution of the data. The findings revealed a weak but significant positive relationship between learning interest and practical learning outcomes ($\rho = 0.244$, $p = 0.048$). Conversely, intrinsic motivation showed no significant relationship with learning outcomes ($\rho = 0.171$, $p = 0.170$). In conclusion, while learning interest positively contributes to students' conceptual understanding of network practices, it is not the dominant factor. The results imply that practical learning success in vocational education is also heavily influenced by cognitive abilities, instructional strategies, and learning facilities rather than solely by internal affective factors.

1. Introduction

The rapid development of information technology in the digital era demands significant updates in the educational system, especially in Vocational High Schools (SMK), which have a strategic role in preparing graduates who are ready for the workforce and highly competitive (Ghazy et al., 2025). Vocational education is globally recognized as a critical driver of sustainable development, specifically

in equipping individuals with practical skills that make them employable and innovative in facing modern industrial challenges (Suharno et al., 2020). Furthermore, to overcome various learning difficulties and enhance competencies in vocational high schools, an effective and engaging learning approach is highly required (Ocktavia et al., 2025). Within the Computer and Network Engineering (TKJ) skill program, the Network System Administration (ASJ) subject has become a core competency because it requires students to master technical skills as well as problem-solving abilities through direct practice (Mustaqim et al., 2025). Therefore, the success of ASJ learning is not only measured through cognitive achievements but also through practical learning outcomes that reflect real skills in the configuration, management, and maintenance of network systems (Muharni et al., 2021). The implementation of relevant instructional designs has been proven effective in improving technical and practical skills in various vocational subjects (Setiawan & Widiyanti, 2025).

Practical learning outcomes are influenced by a combination of external and internal factors (Oktaviani et al., 2020). External factors involve teaching methods, classroom environment, access to learning materials, and teacher support, which all play a pivotal role in shaping the educational experience (Heilporn et al., 2021). The use of appropriate learning media and approaches can significantly increase learning motivation and engagement (Ratnasari et al., 2022). Furthermore, creating meaningful and engaging lessons that bridge theoretical concepts with real-world applications is essential for enhancing students' contextual understanding and thinking processes (Sabagh & El Sabagh, 2021). Meanwhile, internal factors such as learning interest and intrinsic motivation act as the main drivers that determine the extent of student engagement (Desmiarni, 2025). Internal components, including enjoyment, self-efficacy, and active participation, significantly affect students' interest and their overarching motivation to learn complex subjects (Reeve & Cheon, 2021). Students with a high interest in the field of computer networks tend to show a desire for exploration and independence in practice (Desmiarni, 2025). Conversely, low interest can decrease the level of involvement and the achievement of technical competencies (Reeve & Cheon, 2021).

Learning motivation, particularly intrinsic motivation, is an important aspect of vocational learning (Putra et al., 2023). Intrinsic motivation encourages students to learn due to curiosity and satisfaction with the learning activity itself. Previous research indicates that intrinsic motivation has a positive correlation with creativity and deep learning outcomes in a vocational education environment (Abdurrahman et al., 2024). Furthermore, well-designed learning environments are capable of bridging the gap between student motivation and their conceptual understanding (Maisaroh et al., 2025). In the context of learning network technology, students who possess high intrinsic motivation are more likely to enjoy the challenges of configuring and troubleshooting network systems. Furthermore, the use of engaging, hands-on pedagogical approaches is crucial for keeping students motivated and helping them build critical technical and collaboration skills needed for the 21st-century workforce (Adipat et al., 2022). It has also been proven that active and immersive learning environments significantly enhance student

engagement and motivation, particularly when dealing with complex practical tasks (Makransky & Petersen, 2021).

Several studies have shown a significant relationship between learning interest, intrinsic motivation, and learning outcomes, both partially and simultaneously. However, most previous research has focused predominantly on cognitive learning outcomes rather than practical results. In fact, in skill-based learning such as ASJ, practical achievements are precisely the main indicator of students' work readiness (Abdullah et al., 2023). Most literature highlights the necessity of practical assessments to truly evaluate a vocational student's competence, as cognitive tests alone cannot measure the hands-on troubleshooting capabilities required by the industry. Therefore, this study is directed to analyze the relationship between learning interest and intrinsic motivation toward practical learning outcomes in the Network System Administration subject in the vocational high school environment. The goal of this research is to provide empirical evidence on how affective factors specifically contribute to practical competencies, thereby offering insights for educators to design more effective vocational training strategies.

2. Methodology

Data Collection

This research employed a quantitative approach with a correlational design aimed to determine the relationship between two independent variables, namely learning interest (X_1) and intrinsic motivation (X_2), and the dependent variable, which is the conceptual practice-based learning outcomes (Y). The research was conducted at a Vocational High School (SMK) involving a population of 108 eleventh-grade students from the Computer and Network Engineering (TKJ) skill program. A purposive sampling technique was utilized to select the respondents, taking into account the equality of competencies among the classes and efficiency in the context of vocational education research. From the population, 66 respondents from two main classes (XI TKJ 1 and XI TKJ 2) were selected as the primary research sample, while an additional class (XI TKJ 3) consisting of 35 respondents was assigned solely for the preliminary instrument tryout phase.

Instrument

The research instruments consisted of two main types: questionnaires and a case study-based test. Questionnaires were distributed to measure students' learning interest (X_1) and intrinsic motivation (X_2). The questionnaire items were structured using a four-point Likert scale, featuring affective and motivational indicators tailored to the characteristics of vocational students. To measure the learning outcomes (Y), a case study-based conceptual understanding test was administered. This test did not directly measure manual skills but evaluated students' conceptual ability to understand and explain network configuration processes logically. Before being utilized for actual data collection, the instruments were tested on the tryout

sample to ensure their validity using the Pearson Product-Moment method and their reliability using Cronbach's Alpha coefficient.

Data Analysis

Data analysis was conducted systematically through several stages to ensure the accuracy of the findings. Initially, a prerequisite analysis was performed, which included a normality test using the Kolmogorov-Smirnov method to ensure data distribution, alongside a linearity test to examine the form of the relationship among the variables. Because the normality test results indicated that the data were not normally distributed ($p < 0.05$), the hypothesis testing could not use parametric statistics. Therefore, the researchers decided that the data must be analyzed using the non-parametric Spearman's Rho correlation technique to accurately determine the significance of the relationship between the affective factors and the learning outcomes. All statistical testing procedures and interpretations were strictly carried out at a standard significance level of $\alpha = 0.05$.

3. Results and Discussion

The data collection process was conducted in October 2025, involving students from the Computer and Network Engineering (TKJ) department at SMKN 1 Purwakarta. Prior to collecting the primary data, the instrument was tested for validity and reliability using a trial sample of 35 students from class XI TKJ 3. Following a successful validity test, the main research data was collected using an online questionnaire distributed via Google Forms to the primary respondents, consisting of 66 students from classes XI TKJ 1 and XI TKJ 2. The questionnaire utilized a 4-point Likert scale (ranging from 1 = Strongly Disagree to 4 = Strongly Agree) without a neutral option to obtain a definitive response regarding the students' perceptions. The questionnaire was divided into two main variables: Learning Interest and Intrinsic Motivation in the Network System Administration (ASJ) subject. The complete list of questions presented to the respondents can be seen in Table 1.

Table 1. Questionnaire Indicators for Learning Interest and Intrinsic Motivation

Variable	No	Statement	Type
Learning Interest	1	I feel enthusiastic when the ASJ practical lesson is about to start.	Positive
	2	I feel time passes so quickly during the ASJ lesson.	Positive
	3	I focus on listening when the teacher explains materials about servers and networks.	Positive
	4	I have a great curiosity about how network systems work.	Positive
	5	I actively try to practice the configurations taught by the teacher.	Positive
	6	For me, studying ASJ is a burden and not enjoyable.	Negative

	7	I often search for additional tutorials or articles about ASJ on the internet.	Positive
	8	I enjoy every process in ASJ practical activities.	Positive
	9	I am lazy when given practical tasks related to network configuration.	Negative
	10	I am interested in pursuing a career in network administration in the future.	Positive
Intrinsic Motivation	1	There is a feeling of pride when I successfully complete a difficult ASJ practical task.	Positive
	2	I study ASJ only because I am afraid of getting bad grades.	Negative
	3	I see network troubleshooting as an interesting challenge.	Positive
	4	The desire to understand ASJ materials comes purely from myself.	Positive
	5	I only do ASJ tasks so the teacher does not get angry at me.	Negative
	6	I enjoy the process of learning ASJ, regardless of the grades I will get later.	Positive
	7	The opportunity to develop new skills is the reason I am serious about studying ASJ.	Positive
	8	I study because I want to become an expert in the network field for personal satisfaction.	Positive

Based on the questionnaire indicators presented in Table 1, the descriptive data was successfully collected from the 66 primary respondents and subsequently tabulated to observe their initial responses toward the practical learning of the Network System Administration subject. The indicators for learning interest primarily focus on the students' enthusiasm, curiosity, and active participation during practical sessions, whereas the intrinsic motivation indicators emphasize their personal satisfaction, pride, and internal drive to master network troubleshooting skills. The collected responses underwent rigorous data processing to map the students' affective profiles accurately. This initial descriptive mapping was crucial to ensure that the data accurately reflected the students' real conditions in the laboratory before the researchers proceeded to conduct further inferential statistical tests and hypothesis evaluations.

Instrument Validity and Reliability

Prior to hypothesis testing, the research instruments were rigorously validated and tested for reliability using a tryout sample of 35 respondents from a separate class. The validity test utilizing the Pearson Product-Moment method ($\alpha = 0.05$, r-table = 0.334) successfully revealed that all 18 statement items (comprising 10 items for learning interest and 8 items for intrinsic motivation) were statistically valid, with r-count values robustly ranging from 0.363 to 0.760. Furthermore, the reliability test utilizing Cronbach's Alpha coefficient demonstrated that both affective instruments were highly reliable and consistent for data collection. Specifically, the learning interest variable scored a high reliability coefficient of 0.776, and the

intrinsic motivation variable scored 0.738. Both values significantly exceeded the universally accepted minimum threshold of 0.70, thereby confirming that the instruments are adequately reliable to accurately measure the intended psychological constructs without measurement bias.

Prerequisite Analysis

A prerequisite analysis is a mandatory statistical procedure conducted prior to the main hypothesis testing to determine the nature of the data distribution collected from the 66 primary respondents. In this study, a normality test was performed utilizing the Kolmogorov-Smirnov method to ascertain whether the data arrays for the independent variables (learning interest and intrinsic motivation) and the dependent variable (learning outcomes) were normally distributed. This step is crucial because the results dictate the appropriate statistical trajectory, determining whether parametric or non-parametric tests should be employed for the subsequent correlation analysis. The detailed outcomes of the Kolmogorov-Smirnov normality test for all variables involved in this research are comprehensively presented in Table 2.

Table 2. Kolmogorov-Smirnov Normality Test Results

Variable	Kolmogorov-Smirnov Statistic	df	Sig. (p)	Description
Learning Interest (X_1)	0.945	66	0.023	Not normal
Intrinsic Motivation (X_2)	0.962	66	0.040	Not normal
Learning Outcomes (Y)	0.918	66	0.008	Not normal

As clearly indicated by the statistical outputs in Table 2, all variables evaluated in this study possess a significance value (p-value) of less than the established alpha level of 0.05 ($p < 0.05$). Specifically, the learning interest variable scored 0.023, intrinsic motivation scored 0.040, and the learning outcomes variable scored 0.008. These figures statistically reveal that the data sets are not normally distributed across the population sample. Consequently, this non-normal distribution strictly violates the fundamental assumption required for parametric statistical analysis. Therefore, to maintain statistical rigor and validity, the researchers appropriately shifted the analytical approach. The subsequent hypothesis testing was thus conducted utilizing the non-parametric Spearman's Rho correlation technique rather than the initially considered parametric Pearson correlation method.

Hypothesis Testing

Following the prerequisite analysis which confirmed the non-normal distribution of the data, the hypothesis testing was systematically executed to answer the core research questions regarding the directional relationship and significance between the independent and dependent variables. Specifically, this test aimed to measure the correlation strength between learning interest (X_1) and learning outcomes (Y),

as well as between intrinsic motivation (X_2) and learning outcomes (Y). The non-parametric Spearman's Rho correlation method was applied to process the responses from the 66 students, providing a robust statistical measure for ordinal and non-normally distributed continuous data. The comprehensive results of these correlation tests, detailing the correlation coefficients and their respective significance levels, are systematically illustrated in Table 3.

Table 3. Spearman's Rho Correlation Test Results

Variable Relationship	Correlation Coefficient (ρ)	Sig. (2-tailed)	Interpretation
$X_1 \leftrightarrow X_2$	0.698	0.000	Strong, significant
$X_1 \leftrightarrow Y$	0.244	0.048	Weak, significant
$X_2 \leftrightarrow Y$	0.171	0.170	Weak, not significant

Based on the comprehensive correlation outputs detailed in Table 3, several statistical inferences can be drawn regarding the variables. First, the correlation coefficient between Learning Interest (X_1) and Learning Outcomes (Y) stands at 0.244 with a calculated significance (2-tailed) of 0.048. Since this p-value is less than 0.05 ($p < 0.05$), it indicates a weak but statistically significant positive relationship, meaning that an increase in student interest slightly correlates with better practical understanding. Conversely, the correlation analysis between Intrinsic Motivation (X_2) and Learning Outcomes (Y) yielded a coefficient of 0.171 with a significance level of 0.170. Because this p-value is considerably higher than the 0.05 threshold ($p > 0.05$), it explicitly reveals that there is no significant relationship between a student's intrinsic motivation and their conceptual practice-based learning outcomes in this specific vocational context.

Discussion of Findings

The discussion of these findings highlights several crucial phenomena in vocational education. The strong and significant relationship between learning interest and intrinsic motivation ($\rho = 0.698$, $p < 0.001$) aligns with Zhou and Zhang (2025), confirming that students with high interest exhibit greater learning satisfaction and a tendency to explore subjects deeply. However, the lack of a significant relationship between intrinsic motivation and learning outcomes can be explained by a ceiling effect. The students' high average score of 86.9 indicates that both highly and lowly motivated students achieved similar results. This homogeneity obscures the relationship between affective factors and student performance, which is consistent with the findings of Ponto (2022).

Furthermore, cognitive and contextual aspects heavily influence student outcomes. Students with robust basic skills and effective learning strategies tend to secure high grades regardless of their intrinsic motivation levels. As demonstrated by Septiawati and Trisnawati (2023), short-term learning strategies and cognitive readiness exert a more substantial impact on learning outcomes than motivational factors in vocational settings. Studies have also highlighted that integrating structured problem-solving modules can substantially elevate both motivation and learning outcomes regardless of the initial affective conditions (Hafni et al., 2025).

Lumapow (2024) also reported that practical experience and access to laboratory facilities dominantly influence student performance. In this context, intrinsic motivation serves primarily to maintain student engagement during the learning process rather than acting as a direct determinant of the final outcome, as emphasized by Wang (2020).

Ultimately, these results confirm that the relationship between affective factors and practical learning outcomes is highly contextual. Success in practical subjects like Network System Administration is determined not only by internal drivers but heavily by external support, such as teaching strategies and practical facilities. This perspective aligns with Villarroel et al. (2024), highlighting the necessity of implementing highly complex authentic evaluations to accurately uncover the impact of motivation and interest on vocational learning outcomes.

4. Conclusion

This study concludes that affective factors possess varying degrees of influence on conceptual practice-based learning outcomes in the Network System Administration subject. Specifically, learning interest demonstrates a positive, albeit weak, contribution to students' practical understanding, indicating that a higher interest slightly encourages better learning achievements. Conversely, intrinsic motivation does not significantly affect practical learning outcomes. The lack of a direct relationship suggests that internal drive alone is insufficient to guarantee practical competence in highly technical subjects. These findings emphasize that success in vocational practical education extends beyond affective characteristics. It is profoundly shaped by cognitive readiness, the quality of instructional strategies, and access to adequate laboratory facilities. Students can achieve high practical outcomes when supported by effective external learning environments, regardless of their initial intrinsic motivation. Therefore, educators should focus on designing interactive learning environments that stimulate students' technical interests while providing comprehensive practical facilities. Future research is highly recommended to explore the impact of authentic, complex practical assessments directly in laboratory settings, as well as to investigate other cognitive and environmental variables that might dominantly influence vocational students' technical proficiencies.

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