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The influence of IT availability and teacher motivation on the learning outcomes of State Vocational School students in Baguala District, Ambon City

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ABSTRACT

The article explores the impact of Digitalization 4.0 and the global pandemic on human civilization, emphasizing the pivotal role of Information Technology (IT) in Vocational Secondary Education. With a focus on State Vocational Schools in Baguala District, Ambon City, the study's objectives include describing IT availability, teacher motivation, and student learning outcomes, as well as investigating the individual and combined influences of IT availability and teacher motivation on student learning outcomes. Conducting research with 112 teachers from SMK Negeri 3 and SMK Negeri 6 Ambon, the study employs probability sampling, questionnaires, and documentation studies. Descriptive and inferential analyses reveal perceived low IT availability (50.90%, average value: 79.08), medium teacher motivation (48.21%, average value: 167.31), and good learning outcomes (69.64%, average value: 75.08). The t-test results demonstrate significant influences of IT availability (X_1) (4.877, 17.80%) and teacher motivation (X_2) (3.692, 11.00%) on student learning outcomes, with a substantial combined effect (27.10%). In conclusion, the research underscores the necessity of enhancing IT availability to foster competent vocational school graduates aligned with the demands of the digital era and evolving employment landscapes. The findings contribute to understanding the dynamic interplay between IT, teacher motivation, and student learning outcomes in the context of Vocational Secondary Education.

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1. Introduction

The world is currently undergoing significant changes in various aspects of life. As we enter the twenty-first century, the era is characterized by rapid progress in science and technology, marking the onset of the information age. The twenty-first century has ushered in unprecedented advancements in science and technology, propelling humanity into the information age [1]. This transformative era is characterized by the rapid integration of digital technologies into various aspects of daily life, reshaping the way we communicate, work, and access information [2]. One compelling argument for this shift lies in the proliferation of the internet and its impact on global connectivity [3], [4]. The World Bank reports a dramatic increase in internet users worldwide from 6.3% of the global population in 2000 to over 63% in 2020 [5]. This surge in connectivity has fostered an interconnected world where information flows at an unprecedented pace, transcending geographical boundaries [6]. The advent of artificial intelligence (AI) stands as another pillar of evidence supporting the claim of significant changes in the twenty-first century [7]. AI has permeated industries ranging from healthcare to finance, revolutionizing processes and decision-making [8].

For instance, in healthcare, AI algorithms analyze vast datasets to identify patterns and make accurate diagnoses, potentially revolutionizing patient care [9]. The exponential growth of AI research and implementation underscores its transformative impact on society, signaling a departure from traditional modes of operation [10]. Furthermore, the rise of renewable energy technologies exemplifies the tangible changes occurring in the twenty-first century. As the global community grapples with the urgent need to address climate change, innovations in renewable energy have gained momentum [11]. Solar and wind power technologies have become increasingly cost-effective, prompting a shift away from fossil fuels. The International Energy Agency (IEA) notes that renewable energy capacity additions hit a record high in 2020 [12], surpassing the total additions of fossil fuel and nuclear power combined [13]. This trend underscores a fundamental restructuring of the global energy landscape, driven by advancements in science and technology [14]. In addition to technological progress, societal shifts underscore the ongoing changes in the twenty-first century. The rise of social media platforms has reshaped communication patterns, influencing public discourse, activism, and even political landscapes [15]. The Arab Spring, Black Lives Matter, and various other movements have leveraged these digital platforms to mobilize and amplify their messages, illustrating the profound impact of technology on sociopolitical dynamics [16]. This societal transformation highlights the interconnectedness of technological advancements and their far-reaching consequences on human interaction and collective action [17].

In this global and digital era, the focus of innovations is directed towards providing easily accessible, intelligent, enlightening, and affordable services. This trend is particularly evident in the field of education, where innovators strive to develop practical, cost-effective, and democratic learning models with a digital and mobile character [18]. Leveraging mobile technology, learning services can be designed following the principle of boundaryless learning, free from spatial and conditional constraints [19]. The ongoing global Covid-19 pandemic has profoundly impacted all sectors of human life, including education. The traditional face-to-face learning approach in classrooms has transitioned to online learning through virtual classes. This shift necessitates adequate support, especially in terms of information technology (IT). Surprisingly, this situation has had a significant positive impact on human life in the digital 4.0 era, compelling a widespread recognition and utilization of technology in various life activities, including education. Ekanayake affirms that teachers acknowledge the utility of ICT in facilitating learning.

They perceive training activities as beneficial for enhancing motivation, knowledge, understanding, and skills in utilizing ICT for learning [20]. Similarly, Hoyer outlines five phases of technology integration in learning, with one phase focusing on preparing the learning environment [21]. However, challenges arise when implementing virtual learning. Some teachers lack the necessary facilities/devices, as do some students who may not possess laptops, personal computers, or Android-based gadgets. Furthermore, proficiency issues in IT and social learning services among teachers and students, coupled with device compatibility problems, hinder effective learning. In the face of these challenges, strategies must be adopted by schools, teachers, and parents to navigate virtual learning successfully. Procuring adequate IT equipment and facilities is crucial, as the effective management of IT availability and teacher motivation is directly linked to student achievement and learning outcomes. Additionally, the pandemic has impacted the motivation of educators involved in distance learning activities, as limited equipment and facilities often lead to a decrease in motivation, raising questions about the potential impact on students' achievements and learning outcomes in such conditions.

Based on observations and interviews with teachers, it was identified that student learning outcomes during the pandemic showed a tendency to decline. This decline is evident in students' readiness and participation in the learning process, and even in the completion of assigned tasks, which tends to be suboptimal. Many students face challenges in completing assignments due to a lack of essential tools such as mobile phones or other supporting devices, along with issues related to data credit or WiFi network access. This situation raises concerns among educators about students' comprehension and assimilation of the provided lesson materials, as well as apprehensions about the final evaluation of learning activities. Motivated by these concerns, the research was initiated with the following objectives: (1) To describe the

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availability of Information Technology (IT) at State Vocational Schools in Baguala District, Ambon City; (2) To describe the motivation levels of teachers at State Vocational Schools in Baguala District, Ambon City; (3) To describe student learning outcomes at State Vocational Schools in Baguala District, Ambon City; (4) To determine the impact of IT availability on student learning outcomes; (5) To assess the influence of teacher motivation on student learning outcomes; (6) To investigate the combined impact of IT availability and teacher motivation on student learning outcomes.

2. Method

This research employs a quantitative approach utilizing simple linear regression analysis and multiple linear regression analysis [22]. The study is conducted at SMK Negeri in Baguala District, Ambon City, comprising SMK Negeri 3 Ambon and SMK Negeri 6 Ambon. The population under investigation includes all teachers at these institutions, totaling 165 individuals. Probability sampling is employed as the sampling technique, and the determined sample size is 112 samples with a 5% error rate based on Isaac and Michael's sample size determination table. To collect data for this research, a questionnaire technique is utilized. Questionnaires are distributed to school principals and teachers to gather information on IT availability and teacher motivation. Additionally, student learning outcomes are obtained through documentation studies.

The variables considered in this research are IT availability (X_1) and teacher motivation (X_2) as independent variables, while student learning outcomes (Y) serve as the dependent variable. This configuration is represented in Fig. 1. The research setting specifically focuses on SMK Negeri 3 Ambon and SMK Negeri 6 Ambon. The questionnaire technique is employed for obtaining data on IT availability and teacher motivation from school principals and teachers, while documentation studies are utilized for assessing student learning outcomes. The identified variables in this study include IT availability (X_1) and teacher motivation (X_2) as independent variables, and student learning outcomes (Y) as the dependent variable, as illustrated in Fig. 1.

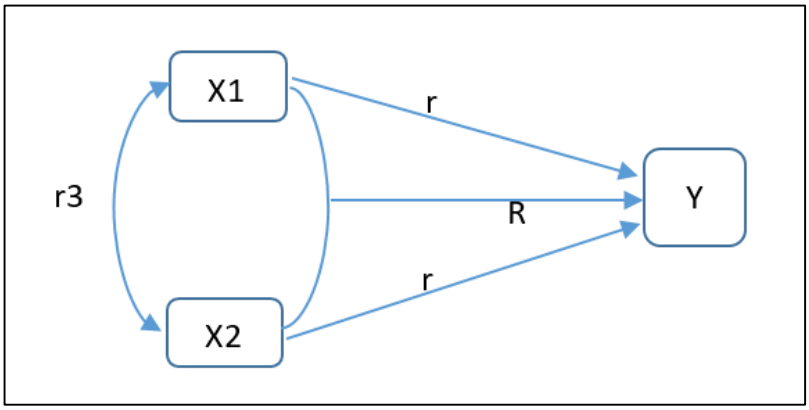

Fig. 1. Relationship Between Research Variables

3. Results and Discussion

3.1. Data Description of IT Availability Variables

A statistical depiction of the data results for the variables IT Availability (X_1), Teacher Motivation (X_2), and Student Learning Outcomes (Y) is presented in the table. The outcomes of this description will be expressed as percentages and criteria for each variable, adhering to Bloom's Method of Grading in Summative Evaluation for variables (X_1) and (X_2). Meanwhile, for variable (Y), ability level categories are employed, as detailed in Table 1.

Table 1. Statistical Description of Variable Data: IT Availability (X_1), Teacher Motivation (X_2), and Student Learning Outcomes (Y)

Size	X_1	X_2	Y
Mean	79.08	167.31	75.08
Variance	84.48	243.18	34.01
Std. Deviation	9.19	13.30	5.83
Minimum Value	55.00	143.00	61.00
Maximum Value	103.00	194.00	86.00
Range	48.00	51.00	25.00

Subsequently, categorize the data for the IT availability variable into very high, high, medium, low, and very low categories. Comprehensive details are available in Table 2. Table 2 illustrates that respondents' responses to the IT availability variable were distributed across categories as follows: 12.50% in the high category, 25.00% in the medium category, 50.90% in the low category, and 11.60% in the very low category.

Table 2. Percentage and Criteria for IT Availability Variable Data

Intervals	Frequency	Percentage (%)	Criteria
≥ 103.50	0	0	Very high
92.00 – 103.40	14	12.50	Tall
80.50 – 91.90	28	25.00	Currently
69.00 – 80.40	57	50.90	Low
< 69.00	13	11.60	Very low
Total	112	100	

3.2. Data Description of Teacher Motivation Variables

The categorization includes very high, high, medium, low, and very low categories. Comprehensive details are available in Table 3. Table 3 presents respondents' responses to teacher motivation, indicating 23.22% in the very high category, 28.57% in the high category, and 48.21% in the medium category. Notably, both the low and very low categories register at 0%.

Table 3. Percentage and Data Criteria for Teacher Motivation Variables

Intervals	Frequency	Percentage (%)	Criteria
184.50 – 194.00	26	23.22	Very high
164.00 – 184.40	32	28.57	Tall
143.50 – 163.90	54	48.21	Currently
123.00 – 143.40	0	0	Low
< 123	0	0	Very low
Total	112	100	

3.3. Data Description of Student Learning Outcome Variables

Categorizing into very good, good, medium, low, and very low groups. Comprehensive details are available in Table 4. Table 4 displays student learning outcomes with 25% falling into the very good category, 69.64% in the good category, and 5.36% in the fair category.

Table 4. Percentage and Criteria for Student Learning Outcome Variable Data

Intervals	Frequency	Percentage (%)	Criteria
80 – 100	28	25.00	Very good
66 – 79	78	69.64	Good
56 – 65	6	5.36	Enough
40 – 55	0	0	Low
30 – 39	0	0	Fail
Total	112	100	

3.4. Analysis of the Effect of IT Availability (X1), Teacher Motivation (X2), and Student Learning Outcomes (Y) Separately

A simple regression test was conducted to analyze the impact of the independent variable X1 on variable Y and the independent variable X2 on variable Y. This analysis was performed using

SPSS at a significance level of α = 0.05. Prior to this, normality and linearity tests were conducted as prerequisite assessments for the simple regression test.

3.5. Hypothesis testing

3.5.1. The Effect of IT Availability on Student Learning Outcomes

H_0 indicates no significant influence of IT availability on student learning outcomes, whereas H_1 suggests a significant influence of IT availability on student learning outcomes. According to Table 5, the correlation coefficient for the relationship between the IT Mastery variable and student learning outcomes is 0.422, equivalent to 17.80%. The ANOVA test yielded an F value of 23.784 with a significance level of 0.000. A significance value below 0.05 indicates that this regression model is suitable for predicting learning outcomes. In the regression coefficient section, the formulated regression equation model is $\hat{Y}$ = 54.406 + 0.268x. This conclusion is supported by the calculated t value of 4.877 with a significance level of 0.00. As the t-table value with df=112 (5%: 1) is 1.6588 and smaller than the calculated t (or tcount > ttable), and the sig value is < 0.05, it can be inferred that the availability of IT significantly affects student learning outcomes.

Table 5. Simple Linear Regression Test Results for IT Availability Variables (X_1) – Student Learning Outcomes (Y)

Variable	Regression Coefficient	t-count	Significance
Constant	54.406	12.458	0.000
X_1	0.268	4.877	0.000
F-hit = 23.784; R = 0.422; R-Square = 0.178			0.000

3.5.2. The Influence of Teacher Motivation on Student Learning Outcomes

H_0 signifies no significant influence of teacher work motivation on student learning outcomes, whereas H_1 indicates a significant influence of teacher work motivation on student learning outcomes. According to the Table 6, the correlation coefficient for the relationship between teacher work motivation variables and student learning outcomes is 0.332, corresponding to 11.00%. The ANOVA test yields an F value of 13.633 with a significance level of 0.000. A significance value below 0.05 suggests that this regression model is appropriate for predicting learning outcomes. In the regression coefficient section, the formulated regression equation model is $\hat{Y}$ = 96.737 + 0.127x. This equation implies that, without any additional value of IT availability, the learning result will be 96.737. This conclusion is further supported by the calculated t value of 3.692 with a significance level of 0.00. As the t-table value with df=112 (5%: 1) is 1.6588 and smaller than the calculated t (or tcount > ttable), and the sig value is < 0.05, it can be inferred that teacher work motivation influences student learning outcomes.

Table 6. Simple Linear Regression Test Results Teacher Motivation Variable (X_2) - Student Learning Outcome Variable (Y)

Variable	Regression Coefficient	t-count	Significance
Constant	96.737	16.799	0.000
X_2	0.127	3.692	0.000
F-hit = 13.633; R = 0.332; R-Square = 0.110			0.000

3.5.3. The Influence of IT Availability and Teacher Motivation on Student Learning Outcomes

The multiple linear regression test was employed to quantify the impact of the independent variables (IT Availability and Teacher Motivation) on the dependent variable (student learning outcomes), as depicted in Table 7. Table 7 illustrates the relationship between IT availability and teacher motivation on student learning outcomes, quantified as 0.520 or 27.10%. This indicates a combined influence of IT Availability and Teacher Motivation on student learning outcomes. To produce students equipped with high life skills for competitiveness in the job market and to broaden their intellectual horizons, the imperative fulfillment of IT availability by educational units is evident, responding to educational advancements in the era of digitalization.

Table 7. Multiple Linear Regression Test Results for IT Availability Variables (X_1) and Teacher Work Motivation (X_2) on Student Learning Outcomes (Y)

Variable	Regression Coefficient	t-count	Significance
Constant	74.899	10.887	0.000
X_1	0.255	4.896	0.000
X_2	0.116	3.725	0.000
F-hit = 20.223; R = 0.520; R-Square = 0.271			0.000

4. Conclusion

The findings of this research reveal that IT availability at State Vocational Schools in Baguala District influences student learning outcomes. Similarly, teacher motivation also impacts student learning outcomes. Furthermore, the combined effects of both IT Availability and Teacher Motivation influence Student Learning Outcomes at State Vocational Schools in Baguala District.

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