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THE INFLUENCE OF TECHNOLOGY USE IN LEARNING AND LEARNING MOTIVATION ON THE LEARNING OUTCOMES OF 10TH-GRADE STUDENTS AT SMKN 2 TULUNGAGUNG

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ABSTRACT-Vocational High Schools (SMK) aim to produce skilled, competent graduates who are ready to enter the workforce. One strategic effort to improve the quality of education in SMKs is through the integration of technology into the learning process. However, in practice, the use of technology in classrooms remains suboptimal despite the availability of facilities. Several factors hinder its effectiveness, including low student motivation, limited ability to operate technology efficiently, and technical issues such as unstable internet connections and inadequate devices. This study aims to examine the influence of technology use and learning motivation on the academic achievement of tenth-grade students at SMKN 2 Tulungagung. A quantitative correlational approach was employed, involving a population of 740 students and a proportionally selected sample of 260 students from each class. Data were collected through questionnaires and academic records, then analyzed using validity and reliability tests, classical assumption tests, and both simple and multiple linear regression with t-tests and F-tests to test the hypotheses. The results indicate that both technology use and learning motivation have a positive partial effect on students' academic achievement, and simultaneously, both variables also have a significant influence, as shown by significance values below 0.05.

Keywords: Instructional Technology, Learning Motivation, Learning Outcomes

I. INTRODUCTION

In recent The technological revolution has driven fundamental changes across various sectors of life, including the field of education, which is now required to rapidly adapt to digital developments. The use of technology in classrooms is no longer a trend but has become a fundamental necessity to enhance the effectiveness and quality of learning processes. With the emergence of various digital devices and platforms, technology enables broader and more flexible access to information, allowing for more interactive, personalized, and responsive learning models tailored to individual student needs [1]. It also opens up space for more contextual and collaborative learning innovations. However, despite this great potential, there are still serious challenges that must be addressed, such as digital disparities across regions, limited educational infrastructure, and low levels of digital literacy and competence among both teachers and students in Indonesia [2]. Therefore, a strategic and comprehensive approach is needed to ensure that digital transformation in education takes place in an equitable, inclusive, and sustainable manner.

Learning motivation is a fundamental element in achieving effective, meaningful, and sustainable learning processes. Both intrinsic motivation arising from within the student, such as curiosity, interest in the subject matter, or a desire to achieve and extrinsic motivation driven by external factors such as teacher support, rewards, or the influence of the learning environment play important roles in shaping students' learning attitudes and behaviors [3]. In the context of technology-based learning, motivation becomes a key factor that determines how optimally students can utilize technological tools. Highly motivated students are more enthusiastic about exploring materials through digital media, taking initiative in accessing online learning resources, and adapting to various technological platforms as learning aids. Conversely, less motivated students tend to be passive, easily distracted, and struggle to use technology productively. This

illustrates that the success of technology integration in education cannot be separated from systematic efforts to build and maintain student motivation. Therefore, learning strategies that combine technology with approaches that support students' psychological needs such as a sense of autonomy, social connectedness, and goal achievement are crucial for creating engaging learning experiences that foster active participation and improve learning outcomes.

Teachers play a central role in the successful integration of technology into the learning process, particularly in enhancing student motivation and engagement. The effective use of technology in education is not solely determined by the availability of devices or infrastructure, but also by how well teachers can manage, adapt, and integrate technology with relevant and contextual pedagogical strategies. Previous studies have shown that limited digital skills among teachers remain a major barrier to implementing effective technology-based learning [4]. This highlights that digital competence must go hand in hand with strong pedagogical understanding, especially in designing lessons that promote active participation, stimulate motivation, and support 21st-century skills such as critical thinking, collaboration, effective communication, and creativity [5]. Therefore, systematic efforts are needed to strengthen teacher capacity through training programs that focus not only on technical aspects of technology use but also on its application in real teaching contexts. In this way, teachers are not merely technology users but become active facilitators in creating adaptive, relevant, and transformative learning experiences in line with the demands of the times.

Nonetheless, the reality on the ground still shows that traditional, teacher-centered, and one-way teaching methods continue to dominate educational practices at various levels. Conventional approaches such as passive lectures without meaningful interaction are increasingly seen as inadequate in the digital era, which demands active student participation and critical thinking [6]. These methods tend to reduce learning interest, hinder creativity, and weaken students' motivation. This situation signals a strong need for a paradigm shift toward more adaptive, interactive, and personalized learning approaches aligned with students' needs and characteristics. In this context, the proper use of educational technology can serve as a strategic solution. Technology is no longer merely a supporting tool but has evolved into a bridge that strengthens the connection between students and learning materials. Through features such as concept visualization, interactive simulations, and project-based learning models, technology fosters more concrete, contextual, and engaging learning experiences. It also facilitates differentiated instruction, enabling each student to learn according to their cognitive style, learning pace, and individual interests. This approach is considered effective in boosting both intrinsic motivation such as curiosity, satisfaction in achievement, and exploratory drive and extrinsic motivation such as teacher recognition, peer support, or environmental incentives. When technology integration is aligned with students' needs, the learning process becomes more meaningful and inclusive. The impact is seen not only in increased student participation but also in improved academic performance [7].

A similar issue exists at SMKN 2 Tulungagung, where the availability of adequate technological facilities has not been matched by high levels of student enthusiasm or active participation in technology-supported learning[8]. Although the school is equipped with computers, internet access, and other learning devices, their use remains suboptimal. Technical issues such as unstable internet connections, frequent device malfunctions, and minimal technical support and maintenance are major obstacles to the smooth implementation of technology-based learning [9]. This situation has a direct impact on students' academic achievement, with the average score recorded at 65.3 still below the minimum competency threshold. Additionally, student engagement in interactive, collaborative, and technology-based learning activities is relatively low, resulting in poor comprehension of the learning material [10]. The lack of integration between pedagogical strategies and the potential of technology remains a critical challenge that needs urgent attention. At SMKN 2 Tulungagung, the presence of technology has not yet been fully aligned with instructional approaches that enhance learning effectiveness. Therefore, improving the quality of education requires a comprehensive approach, starting with continuous infrastructure improvements such as enhancing internet stability and maintaining digital learning tools. Equally important is strengthening teachers' competencies in digital literacy and technology-based teaching strategies [11]. Teachers must be equipped to design interactive, contextual, and collaborative learning experiences, ensuring that technology truly serves as a tool that facilitates meaningful and active learning processes. On the other hand, fostering a supportive learning environment that promotes exploration, creativity, and emotional engagement is also essential for successful learning transformation [12].

With the synergy between infrastructure development, teacher competence, and a conducive learning environment, the integration of technology at SMKN 2 Tulungagung is expected to provide significant contributions to enhancing both student motivation and academic achievement. Nevertheless, the potential for optimizing the use of educational technology at this institution remains considerably high and has not yet been fully harnessed. Despite the availability of essential facilities such as computer laboratories, stable internet access points, and various digital learning tools their implementation in daily instructional practices has not reached a level that produces transformative impacts on learning outcomes [13]. In fact, many of these resources remain underutilized, either due to

technical constraints or the absence of clear pedagogical frameworks that guide their effective application. Meanwhile, the institutional commitment to digital transformation is relatively strong, as demonstrated by internal school policies that support technology-based education and the allocation of resources intended to sustain the shift toward more modern instructional models 14]. This support structure should ideally serve as a catalyst for innovation, encouraging the development of learning designs that are more adaptive, student-centered, and aligned with the demands of 21st-century competencies. practices in response to 21st-century demands.

The current situation thus presents an important momentum for the school to reevaluate and strengthen its strategy in leveraging technological resources, particularly by aligning them with the actual learning needs and characteristics of students. By doing so, the school has a great opportunity to create learning experiences that are not only more engaging and participatory but also contextually meaningful and relevant to students' everyday lives 15]. This approach repositions technology from merely a supporting instrument to a central driver of pedagogical transformation, one that fosters deeper cognitive engagement, promotes critical and creative thinking, and nurtures collaborative learning environments. When the integration of digital tools is carefully designed and implemented based on a thorough understanding of learner diversity such as different cognitive styles, learning speeds, and personal interests it enhances inclusivity and personalization in education, allowing each student to reach their full potential.

Moreover, such a comprehensive and responsive integration of technology can increase both intrinsic and extrinsic motivation among students. Intrinsically, it stimulates curiosity, satisfaction from achievement, and a desire for continuous exploration, while extrinsically, it provides recognition, peer support, and encouragement from the broader learning environment [16]. As a result, not only does this enhance student engagement and participation during the learning process, but it also contributes to long-term improvements in academic performance and learning independence. In the long run, if supported by continuous infrastructure upgrades, sustained teacher development programs, and the cultivation of a supportive and innovative school culture, these efforts will contribute to building an educational ecosystem that is dynamic, future-oriented, and capable of adapting to the rapidly evolving challenges and expectations of the digital era.

II. RESEARCH METHOD

This study employed a quantitative approach with a correlational research design. The quantitative method was chosen because the research aims to measure and analyze the relationship between two independent variables technology use in learning and learning motivation and a dependent variable, namely students' academic achievement. The correlational approach was utilized to determine whether a relationship exists and to what extent the strength of the relationship between these variables, both partially and simultaneously. This approach allows the researcher to obtain objective and measurable data, thus enabling the findings to be more broadly generalized.

The design of this research follows an explanatory approach, which not only aims to describe existing phenomena but also to explain causal relationships between the studied variables through hypothesis testing. This approach is in line with the research objective: to analyze the influence of technology use and learning motivation on students' learning outcomes. In other words, this study does not stop at identifying correlations, but systematically investigates the extent and magnitude of the contribution of each independent variable technology use and learning motivation toward the dependent variable, namely the academic performance of 10th-grade students at SMKN 2 Tulungagung. The choice of this design also considers the importance of obtaining empirical evidence to formulate strategic recommendations for the school in enhancing academic performance through effective technology integration and improved learning motivation. This explanatory design is expected to provide a more comprehensive picture of the causal mechanisms among variables, allowing the results to be practically and applicably used in educational settings. This research focuses on three main variables. The first is technology use in learning (X1), which measures how extensively technology is utilized by teachers and students in the teaching and learning process. Indicators of this variable include the frequency of digital device use, types of devices such as computers, projectors, and online learning applications, as well as students' perceptions of accessibility, usability, and effectiveness of technology in supporting their understanding of learning materials. Measuring this variable is important to describe the level of technology integration in daily learning activities. The second variable is learning motivation (X2), which comprises two main dimensions: intrinsic and extrinsic motivation. Intrinsic motivation refers to internal student drives such as personal interest, curiosity, or satisfaction in understanding the material. Extrinsic motivation includes external stimuli such as parental expectations, rewards, peer competition, and social or environmental pressures. Both aspects are considered significant in determining students' engagement in the learning process. The third variable is students' learning outcomes (Y), which serves as the dependent variable in this study. Learning outcomes are measured quantitatively based on students' academic scores in the informatics subject, which reflects their understanding of the taught material. Informatics was selected as a measurement indicator because

it directly relates to technology use, making it a relevant parameter in assessing the interconnection between variables.

The population of this study includes all 10th-grade students at SMKN 2 Tulungagung in the 2024/2025 academic year, totaling 740 students. Given the large and heterogeneous population, the sampling technique used was stratified random sampling—a method that selects samples randomly while ensuring proportional representation across strata (in this case, each class). From the population, 260 students were chosen as the sample, with 13 students taken from each class to maintain proportionality. This technique was selected to ensure the sample is representative of the population.

Data collection was conducted using two primary methods: questionnaires and documentation. The questionnaire was used to measure the two independent variables technology use and learning motivation. The instrument was structured using a 4-point Likert scale, with options: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree. This scale was chosen to facilitate student responses based on their experience and perception of the learning process. Meanwhile, learning outcome data were obtained from school academic records, specifically students' scores in the informatics subject, as a representation of academic achievement.

Before the instruments were used for main data collection, the questionnaire underwent validity and reliability testing to ensure measurement quality. Validity was tested using the Pearson Product Moment correlation, aimed at identifying how well each item represented the intended construct or variable. Items with correlation coefficients above the critical value (r-table) at a given significance level were considered valid. Only these valid items were retained in the final questionnaire. Reliability was measured using Cronbach's Alpha to assess internal consistency within each variable. Results showed that alpha values exceeded the minimum standard (≥ 0.70), indicating a high level of instrument reliability. With tested validity and reliability, the instrument was confirmed to generate stable, accurate, and trustworthy data for analysis.

After data collection, the next stage involved data analysis. Prior to conducting the main analysis, classical assumption tests were performed, including tests for normality, multicollinearity, heteroscedasticity, and linearity. The normality test assessed whether the data distribution was normal, the multicollinearity test ensured that there were no strong correlations among independent variables, the heteroscedasticity test checked for constant variance of errors, and the linearity test verified whether a linear relationship existed between the variables. Secara The main analysis applied both simple and multiple linear regression techniques. Simple linear regression was used to examine the individual influence of each independent variable on the dependent variable, such as the effect of technology use or learning motivation on learning outcomes. Meanwhile, multiple linear regression tested the simultaneous effect of both independent variables on students' academic achievement. Hypothesis testing was conducted using the t-test to assess partial significance and the F-test to evaluate joint significance. A significance level of 5% ($\alpha = 0.05$) was used, and all analyses were performed using the latest version of SPSS to ensure calculation accuracy. Overall, the research procedures were implemented through several systematic stages: (1) identifying the problem and formulating research questions, (2) developing the theoretical framework and hypotheses, (3) designing and validating instruments, (4) collecting data, (5) conducting quantitative data analysis, and (6) drawing conclusions and preparing the final report. All stages were carried out in adherence to research ethics and ensured that participants understood the study's objectives and procedures.

Through this carefully designed methodology, the study aims to provide a comprehensive understanding of the extent to which technology use and learning motivation influence the learning outcomes of 10th-grade students at SMKN 2 Tulungagung, and to offer an empirical basis for developing more effective and student-centered educational strategies.

III. RESULTS AND DISCUSSION

This study aimed to investigate the extent to which the integration of technology in classroom instruction and students' learning motivation contribute to the academic performance of 10th-grade students at SMKN 2 Tulungagung. Recognizing the growing significance of digital tools in education and the crucial role of motivation in fostering meaningful learning experiences, the research sought to empirically explore how these two variables influence learning outcomes within the context of vocational education. To ensure the accuracy and reliability of the findings, two primary data collection methods were employed: the administration of online questionnaires and the documentation of academic records. The questionnaires, distributed via Google Forms, were designed to measure students' perceptions and experiences related to the use of educational technology and their level of learning

motivation. Meanwhile, academic performance data were obtained from official school records, specifically focusing on students' grades in the Informatics subject, which was selected as a representative measure due to its direct association with digital literacy and technology use in learning.

The study involved a sample of 260 students drawn from a total population of 740 10th-grade students. A proportional random sampling technique was utilized to ensure that each class was adequately represented in the sample, thereby enhancing the generalizability of the results and minimizing potential sampling bias. This method allowed for the equitable inclusion of students across diverse learning environments and academic backgrounds within the school. The research was conducted over a five-week period, from April 25 to May 31, 2025, encompassing all necessary phases including the development and validation of research instruments, pilot testing, questionnaire dissemination, and systematic data documentation. Conducting the study at the end of the second semester was strategically beneficial, as it captured students' learning experiences over a full academic period and allowed for data collection under stable academic conditions. By aligning the research timeline with the culmination of semester learning activities, the study was able to gather more accurate reflections of students' cumulative academic efforts and technological engagement.

The results of data analysis revealed that both the use of technology in learning and learning motivation significantly influenced students' academic achievement, both partially and simultaneously. To validate these findings, hypothesis testing was conducted using both simple and multiple linear regression analyses, processed with IBM SPSS version 29. This analytical tool was used to ensure scientific accuracy, objectivity, and accountability. Prior to regression analysis, the data were tested through a series of classical assumption tests to ensure the regression model met statistical requirements. Normality testing assessed whether the data followed a normal distribution; multicollinearity testing ensured no strong correlation between independent variables; heteroscedasticity testing evaluated the stability of residual variances; and linearity testing confirmed the linear relationships among variables. All tests indicated that the dataset fulfilled the necessary assumptions, validating the regression model as a sound basis for interpreting the influence of technology use and learning motivation on students' academic performance. These findings underscore the importance of both independent variables in improving educational quality, especially in today's digital era, which demands the integration of technology and adaptive learning approaches.

In the first simple linear regression analysis, the significance value obtained was 0.043, which is below the conventional threshold of 0.05. With a calculated t-value of 2.038 exceeding the critical t-table value of 1.969, the statistical results confirm a significant positive influence of technology use on students' learning outcomes. This suggests that when digital tools such as interactive multimedia, e-learning platforms, and web-based educational applications are effectively integrated into the instructional process, students are more likely to demonstrate improved academic performance. The implication is that technology does not merely serve as a supplementary tool, but as a transformative medium that reshapes how learners engage with content.

This empirical evidence is consistent with Richard E. Mayer's Cognitive Theory of Multimedia Learning, which posits that learning is most effective when verbal and visual inputs are combined to facilitate deeper cognitive processing. Digital media, when designed appropriately, can support dual-channel processing, reduce extraneous cognitive load, and foster meaningful learning experiences by allowing students to construct mental representations of abstract concepts. Furthermore, the findings are also reinforced by Siemens and Downes' Connectivism Theory, which highlights the role of technology in extending learning beyond traditional boundaries by connecting learners to vast networks of information and social interaction. Through this lens, knowledge is distributed across digital platforms and acquired through interaction with diverse nodes of information, fostering collaborative, contextualized, and experiential learning.

Therefore, with well-planned instructional design and thoughtful integration of technology, the learning environment becomes more dynamic and conducive to conceptual understanding. The evidence suggests that the strategic use of educational technology not only supports the transmission of content but also cultivates active engagement, critical thinking, and autonomous learning factors that are crucial for improving learning outcomes in the 21st-century educational context.

The second simple linear regression analysis demonstrated that learning motivation also had a significant effect on learning outcomes. A significance value of 0.003 (< 0.05) and a t-count of 2.981, exceeding the t-table value of 1.969, indicate that both intrinsic and extrinsic motivation meaningfully contribute to academic performance. Intrinsic motivation, such as the desire to achieve, curiosity, and personal satisfaction, along with extrinsic motivation, including encouragement from teachers, parents, and the environment, are critical in encouraging students to be more active and consistent in their studies. These findings are supported by Keller's ARCS model (Attention, Relevance, Confidence, Satisfaction), which highlights that learning motivation is influenced by the environment's ability to attract attention, establish relevance, build confidence, and offer satisfaction. In the context of technology-based learning, these ARCS components can be facilitated through interactive, contextual, and responsive learning designs tailored to student needs. Technology enables engaging and

relevant content delivery, provides instant feedback for confidence-building, and creates satisfying learning experiences. Thus, highly motivated students are more likely to participate actively, take initiative in problem-solving, and develop independent learning habits, all of which ultimately lead to better and more sustainable academic achievement. Therefore, integrating the ARCS model into technology-based learning design can be an effective strategy to improve student motivation and academic performance.

Furthermore, the results of multiple linear regression analysis, conducted to examine the simultaneous influence of technology use and learning motivation on student achievement, confirmed that these two variables jointly have a significant effect. A significance value of 0.003 (< 0.05) and an F-count of 5.823 greater than the F-table value of 3.03 reinforce the conclusion that both variables collectively contribute to students' academic success. This means that effective integration of technology in learning, when supported by strong motivation, creates a more effective and meaningful learning environment that encourages optimal learning outcomes. The synergy between cognitive aspects (technology and material) and affective components (motivation) demonstrates that learning success depends not only on the tools used but also on students' mental readiness and willingness to engage actively. This finding is consistent with [10], who found that the combination of internet-based media and learning motivation significantly impacts academic performance in vocational students.

Therefore, enhancing the use of educational technology must be accompanied by strategies to boost student motivation to achieve a more optimal and sustainable learning process. Theoretically, these findings align with Deci and Ryan's Self-Determination Theory, which emphasizes that fulfilling basic psychological needs autonomy, competence, and relatedness can foster intrinsic motivation. When technology is used to support autonomous learning such as through self-paced materials, adaptive learning platforms, or digital exploration students feel more empowered and engaged in their learning. In this context, the TPACK framework (Technological Pedagogical Content Knowledge) by Mishra and Koehler becomes highly relevant, highlighting the need for synergy between technology, pedagogy, and content. Without proper integration of these three components, technology use risks becoming merely a technical tool with limited impact on understanding and achievement. Overall, this research illustrates that technology use and learning motivation are two interdependent components in creating high-quality and effective learning environments. Both variables significantly influence student learning outcomes, individually and collectively. When students have access to adequate educational technology and are driven by strong intrinsic and extrinsic motivation, their academic achievement tends to improve significantly. This suggests that the success of technology integration in education depends not only on sophisticated tools but also on students' mental readiness and intrinsic drive to learn. Technology serves as a facilitator, but without motivation, its potential becomes underutilized. Therefore, psychological aspects such as learning motivation must be prioritized in designing technology-based learning strategies. The combination of accessible technology and strong motivation can create a more productive, adaptive, and achievement-oriented learning environment.

Educational institutions must move beyond simply using technology and adopt a learner-centered approach that prioritizes student motivation. This involves creating supportive environments that foster autonomy, relevance, and engagement, while aligning learning materials with students' interests and goals. Teachers play a key role as motivators who provide personalized feedback to build confidence and resilience. When technology is integrated within this motivational framework, it enhances active learning and transforms students into empowered participants, leading to more meaningful, equitable, and future-ready education.

IV. CONCLUSION

Based on the data analysis and discussion, it can be concluded that both the use of technology and students' learning motivation significantly influence the learning outcomes of 10th-grade students at SMKN 2 Tulungagung. This highlights that integrating technology into the learning process when supported by strong motivation can create a more effective, efficient, and relevant educational experience in line with the demands of the digital era.

Individually, both variables show significant effects. The use of technology, as shown by a t-test significance value of 0.043, enhances understanding, supports independent learning, and increases en-gagement through tools like LMS, educational videos, and interactive apps. Similarly, learning motivation with a significance value of 0.003 acts as a strong in-ternal driver, where motivated students demonstrate better persistence, goal-setting, and learning strate-gies that contribute to improved academic achieve-ment.

Furthermore, the F-test results (significance value 0.003) confirm that the combination of technology use and learning motivation has a simultaneous and interactive effect on student outcomes. This suggests that technology becomes most impactful when paired with instructional approaches that actively foster student motivation. Therefore, improving learning outcomes requires not just technological readiness but also efforts to cultivate students' psychological readiness through personalized, contextual, and student-centered strategies.

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