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The Significance of School Digitalization in Elementary Education: Empirical Evidence from Regression Analysis

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ABSTRACT: School digitalization is the process of integrating technology and digital devices into the education system which is important for the development of the world of education and improving the quality of learning. However, the lack of teacher skills in utilizing learning technology and the lack of ICT-based learning media are the main challenges for schools in improving the quality of education. Therefore, this study aims to determine the effect of school digitalization on the quality of education in elementary schools. This study uses a quantitative research method with a sample of 37 respondents. The study was conducted at UPT SDN 01 Bukit Gemuruh, UPT SDN 01 Sumamukti, and UPT SDN 01 Bumi Dana. Data collection techniques used questionnaires and observations. This study uses simple regression analysis and T-test for hypothesis testing. The results of the study show that the school digitalization variable has a positive and significant effect on the quality of education. This is indicated by the results of the Sig. Value of $0.012 \leq 0.05$, and the $t_{calculated}$ value is greater than the t_{table} value, which is $2.653 \geq 2.030$. The coefficient of determination value is 16.7%. This means that school digitalization plays an important role in improving the quality of education in elementary schools, although the determination value is relatively small. Efforts made to overcome the problem of school digitalization include conducting training for teachers in understanding ICT and funding to improve ICT-based learning media in schools. These results are expected to provide evaluation materials for teachers, principals, and local governments in implementing school digitalization more optimally.

Keywords: education quality; elementary school; school digitalization.

ABSTRAK: *Digitalisasi sekolah adalah proses integrasi teknologi dan perangkat digital ke dalam sistem pendidikan yang penting untuk pengembangan dunia pendidikan serta peningkatan kualitas pembelajaran. Namun, kurangnya keterampilan guru dalam memanfaatkan teknologi pembelajaran dan minimnya media pembelajaran berbasis TIK menjadi tantangan utama bagi sekolah dalam meningkatkan kualitas pendidikan. Oleh karena itu, penelitian ini bertujuan untuk mengetahui pengaruh digitalisasi sekolah terhadap kualitas pendidikan di sekolah dasar. Penelitian ini menggunakan metode penelitian kuantitatif dengan sampel sebanyak 37 responden. Penelitian dilakukan di UPT SDN 01 Bukit Gemuruh, UPT SDN 01 Sumamukti, dan UPT SDN 01 Bumi Dana. Teknik pengumpulan data menggunakan angket dan observasi. Penelitian ini menggunakan analisis regresi sederhana dan uji T untuk pengujian hipotesis. Hasil penelitian menunjukkan bahwa variabel digitalisasi sekolah berpengaruh positif dan signifikan terhadap kualitas pendidikan. Hal ini ditunjukkan oleh hasil nilai Sig. sebesar 0,012 ≤ 0,05, serta nilai $t_{\_hitung}$ lebih besar dari $t_{\_tabel}$ yaitu 2,653 ≥ 2,030. Nilai koefisien determinasi adalah 16,7%. Artinya, digitalisasi sekolah berperan penting dalam meningkatkan kualitas pendidikan di sekolah dasar, meskipun nilai determinasi relatif kecil. Upaya yang dilakukan untuk mengatasi permasalahan digitalisasi sekolah meliputi pelatihan bagi guru dalam memahami TIK serta pendanaan untuk meningkatkan media pembelajaran berbasis TIK di sekolah. Hasil ini diharapkan dapat menjadi bahan evaluasi bagi guru, kepala*

sekolah, dan pemerintah daerah dalam mengimplementasikan digitalisasi sekolah secara lebih optimal.

Kata Kunci: *digitalisasi sekolah; kualitas pendidikan; sekolah dasar.*

INTRODUCTION

Indonesia, like many other developing countries, faces challenges in its education system. With a large and diverse population spread across thousands of islands, ensuring quality education for all students is daunting. The government has taken steps to expand access to formal education for all children. However, there are still gaps in quality and resources between urban and rural schools, especially in remote areas and low-income communities (Mujiburrohman & Putri, 2025). The lack of qualified teachers and outdated curricula pose significant challenges to the education system's effectiveness (Hambabi et al., 2024).

In addition, educational institutions struggle as teachers struggle to keep up with technological developments where teachers lack the knowledge and skills necessary to effectively utilize technology (Schmidt & Tang, 2020). This results in a gap in digital literacy among educators, a digital divide between educators and children. Without the necessary support and resources, teachers may struggle to incorporate technology in meaningful ways that enhance student engagement and learning outcomes (Rashid & Asghar, 2016). Schools should prioritize improving their technology infrastructure and providing teacher training on how to effectively integrate technology into student learning to bridge this gap and ensure students' full engagement in digital learning (Barakabitze et al., 2019). To equip teachers with the knowledge and skills needed to effectively integrate technology into their teaching practices, schools should invest in ongoing professional development (Nooruddin & Bhamani, 2019; Stevenson et al., 2016).

Nevertheless, the Indonesian government has made efforts to improve the quality of education through equal access to education and free education (Romlah et al., 2023). One of the ways to equalize access to education is by using educational technology in learning activities evenly across all regions. With the rapid advancement of technology in Indonesia, schools can provide students with access to a variety of resources and combine digital and traditional devices to the maximum. As students become more technologically savvy, educators need to adapt their teaching methods to suit the evolving needs of their students. Technology also enables independent learning, allowing students to explore subjects at their own pace and take responsibility for their education (Artawan, 2024). The shift towards digitalization in schools allows for greater flexibility in educators' teaching methods and the ability to personalize the learning experience for each student.

The term "digitalization of schools" describes the trend of greater use of technology and digital resources in the classroom (Frolova et al., 2020). Classroom technology encompasses a variety of tools, including digital whiteboards, tablets, and laptops, and also incorporates instructional applications and web-based materials (Kalimullina et al., 2021). The goal of school digitalization is to increase student engagement, facilitate personalized learning, and prepare students for

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the digital age (Crittenden et al., 2019). Teachers can better tailor learning to students' unique interests, abilities, and learning styles by leveraging digital resources in the classroom. Students in rural areas or those with physical or mental disabilities who are unable to attend regular schools may also benefit from the adoption of school digitization (Rakha, 2023). With access to a variety of resources and devices, teachers can personalize instruction, provide targeted interventions, and offer differentiated learning opportunities (Smale-Jacobse et al., 2019). This flexibility and customization can help students reach their full potential and achieve academic success.

This is in line with the Indonesian Government's program through the Ministry of Education and Culture in the context of developing school digitalization, especially in the outermost, most disadvantaged, and disadvantaged (3T) areas. In addition, the efforts made by the Indonesian government are to create a policy for the Program Sekolah Penggerak or PSP at the school level (Khofifah & Syaifudin, 2023). This policy is regulated in the Decree of the Minister of Education, Culture, Research, and Technology of the Republic of Indonesia, Number 162/M/2021, concerning the Sekolah Penggerak Program (Kemdikbudristek, 2021). The Sekolah Penggerak Program incorporates a school digitalization program that leverages digital platforms to reduce complexity, boost efficiency, and stimulate creativity, particularly among teachers (Zamjani et al., 2020). The goal of school digitalization is to increase the capacity of teachers and principals through a variety of digital platforms and to promote the delivery of automated, quick, and open services. The platforms include the Teacher Platform: Competency Profile and Development, Educator Platform: Learning, School Resource Platform, and Educational Reporting Platform (Patilima, 2021).

Despite the enormous benefits of technology for the world of education, many schools in Indonesia do not have access to basic resources and technology, which hinders the learning process and limits opportunities for students (Febrianto et al., 2020; Rahiem, 2020). Researchers conducted preliminary studies in several schools, revealing that some still lack basic educational technology facilities for learning. This problem will impact students' low interest in learning at school. Previous research confirms that low participation rates in rural, border, and remote areas stem from limited access to educational infrastructure and limited opportunities to attend school (Wulakada, 2024). A further issue is limited internet access due to the location of the school in a hilly area, where internet connectivity is limited. Lack of access can exacerbate the pre-existing educational picture and prevent students from engaging comprehensively in digital learning opportunities (Kulal et al., 2024). Thus, internet connectivity presents a significant challenge in many schools, especially in low-lying areas (Dridi et al., 2020). Smooth and stable internet connectivity can have an impact on the results of student independence in learning (Dedyerianto, 2020).

Literature review related to the author's research confirms that implementing school digitalization is essential to improve learning and foster creative and innovative talents in students (Sutarsih et al., 2024). Furthermore, school digitalization can increase student engagement, facilitate customized

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learning experiences, and expand access to more resources (Crittenden et al., 2019; Haleem et al., 2022). Suman (2023) also supports this, stating that the use of technology in education has shown increased student engagement and motivation. This is because interactive and multimedia-rich learning can make learning more fun and relevant to students' lives. Meanwhile, according to Nelga et al. (2022), school digitalization can improve the quality of learning by utilizing virtual learning with flexible delivery of materials. Adilah & Suryana (2021) assert that the implementation of various strategies enhances the quality of education. The implemented strategy involves strategic management, encompassing environmental analysis, program formulation, implementation, and evaluation.

Thus, the implementation of school digitalization is an important thing to study considering the increasing development of the era in the use of technology and information. To realize the success of school digitalization, all stakeholders, both the central government, local governments, educational institutions, the general public, and private education actors, must collaborate to improve the quality of education (Alifah, 2021). Therefore, improving the quality of education must continue to be pursued to achieve the expected educational goals, which are based on structured and systematic changes that produce quality input, processes, and outputs (Syukri et al., 2019). With quality education, it can provide an effective and efficient learning environment and methods to develop students' full potential.

Based on the description above, to gain a comprehensive understanding of new or ongoing research. This study focuses on the implementation of school digitalization through the Program Sekolah Penggerak which aims to improve the quality of education evenly. Thus, the purpose of this study is to determine how much influence school digitalization has in improving the quality of education in elementary schools that have become Sekolah Penggerak. Thus, the results of this study are expected to contribute to the implementation of school digitalization in Indonesia, especially for principals, teachers, and local governments to be more qualified and inclusive.

RESEARCH METHODS

Researchers use a quantitative approach because it focuses on the systematic collection and analysis of numerical data to test the relationship between specified variables (hypothesis) and measure the relationship (Sugiono, 2015). The study was conducted in all Sekolah Penggerak in Way Tuba District, Way Kanan Regency, Lampung Province. The schools are UPT SDN 01 Bumi Dana, UPT SDN 01 Sumamukti, and UPT SDN 01 Bukit Gemuruh. The schools were used as research objects because they were included in the Program Sekolah Penggerak which was also a school with inadequate facilities and needed research to determine the impact of school digitalization. The research population was 37 respondents, while the research sample used a total sample of the population. The total sample was used by the researcher because the population was relatively small and the researcher wanted to make generalizations with a very small error

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(Sugiono, 2020). The sample consisted of 37 respondents including 34 teachers and three principals at each school.

Questionnaires are used because they can make it easier for researchers to obtain data more efficiently, measurably, and objectively. The research questionnaire uses a closed questionnaire to collect data from each participant. The author designed a closed questionnaire by limiting respondents to one answer based on their respective characteristics (Sugiono, 2015). Meanwhile, observations are used to support questionnaire data and conduct observations based on the completeness of educational facilities in each school (Sugiono, 2015). This is because data collection techniques play an important role in obtaining research data or information that follows research objectives. The author includes a Likert measurement scale and various question references in the questionnaire, which are adjusted to school conditions and other data collection techniques.

As for the analysis of research data, the author uses the inferential statistical analysis method. The author uses a simple linear regression test in the inferential statistical analysis method, first conducting a prerequisite test. The prerequisite test uses the normality test and the linearity test. The normality test aims to find out whether the samples used in this study come from a normally distributed population or vice versa and uses the Kolmogorov-Smirnov formula with an Asymp value. Sig. Of $\alpha = 0.05$ or 5% (Machali, 2018). The linearity test is carried out to determine whether the regression line between variable X and variable Y forms a linear line or not. If the line is not linear, the simple linear regression analysis cannot be continued (Sugiono, 2020). With the provision that if the linear significance value is ≤0.05, the linear decision rule applies, which means that there is a linear relationship between the independent variable and the dependent variable, and a simple regression analysis can be carried out.

In this research hypothesis test, the T-test is used to determine the influence of the two variables, while the determination test (R^2) is used to determine the magnitude of the influence between the independent variable and the dependent variable (Sugiono, 2020). The following is the decision-making hypothesis:

> H_a: "There is a positive and significant influence between school digitalization and the quality of education."
>
> H_o: "There is no positive and significant influence between school digitalization and the quality of education".

RESULTS AND DISCUSSION

Results

Before conducting data analysis, the questionnaire was first tested for validity to determine the accuracy or validity of an instrument. The validity test in this study showed that the questionnaire on school digitalization and education quality had all valid item numbers and could be used in the study.

In the reliability test, Cronbach's alpha formula is used as a reliable instrument for decision-making. Decision makers state that an instrument is

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reliable if its Cronbach's alpha value exceeds 0.7, and vice versa (Machali, 2018). Meanwhile, the results of the reliability test show that *the Cronbach alpha value* for all variables is above 0.8 with a good category. So, the measurement instruments for the two questionnaire variables are reliable. By looking at these results, questions about each variable concept can be processed in the next stage. The following are the results of the reliability test on the two variables.

Table 1. School Digitalization Reliability Test

Alpha Cronbach	N Number of Items
.884	19

Table 2. Reliability Test of Educational Quality

Alpha Cronbach	N Number of Items
.864	23

Table 3. Sample Based on School

		Frequency	Percent	Valid Percentage	Cumulative Percentage
Legitimate	SDN 01 Bukit Gemuruh Primary School Unit	13	35.1	35.1	35.1
	SDN 01 Bumi Dana Primary School Unit	11	29.7	29.7	64.9
	SDN 01 Sumamukti	13	35.1	35.1	100.0
	Total	37	100.0	100.0	

Based on the table above, UPT SDN 01 Bukit Gemuruh has 13 respondents or 35.1% of the total sample. In UPT SDN 01 Bumi Dana there are 11 respondents with a percentage of 29.7%. In UPT SDN 01 Sumamukti there are 13 respondents or 35.1%.

Table 4. One-Sample Kolmogorov - Smirnov Test

		School Digitalization	**Quality of Education**
N		37	37
Normal, b	Means	46.54	64.1081
	Standard Deviation	7,687	7.40039
The Most Extreme Difference	Absolute	.131	.127
	Positive	.131	.127
	Negative	-.073	-.086
Test Statistics		.131	.127
Asymptomatic. Sig. (2-tailed)		.112c	.135c

In this normality test, the author uses the Kolmogorov-Smirnov formula by checking the Asymp. Sig. value. For the significance value in the normality test, α = 0.05. The school digitalization variable produces an Asymp. Sig. value of 0.112,

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which means it is smaller than 0.05. The Asymp. Sig. value for the education quality variable is 0.135, which means it is smaller than 0.05. This can be interpreted as the research sample has normally distributed data.

Table 5. Anova Linearity

				Sum of Squares	df	Mean Square	F
Quality of Education* School Digitalization	Inter Group	(Combined)	1310.401	20	65,520 people	1,586 people	.177
		Linearity	330,000	1	330,000	7,986	.012
		Deviation from Linearity	980.401	19	51,600 people	1,249 years	.330
	In Group		661,167 people	16	41,323 people		
	Total		1971.568	36			

The linearity test requires a sig. value of less than 0.05 which indicates a linear relationship between the two variables. The results of the study showed a Sig. value of 0.330. When compared with the provisions above, namely Sig. (0.000 ≤ 0.05) then it can be concluded that the two variables have linear regression or there is a linear relationship and can be continued to simple linear regression analysis.

Table 6. Regression Coefficient

Model		Unstandardized Coefficient		Standard Coefficient	T	Signature
		B	Standard Error	English		
1	(Constant)	45,777	7.002		6,538	.000
	School Digitalization	.394	.148	.409	2,653	.012
a. Dependent Variable: Quality of Education						

With the provisions that have been determined previously, we can interpret the meaning and model of the simple regression equation from the data above. The following is the formula for the simple linear regression equation in this study:

$Y = a + bX$
$Y = 45.777 + 0.394\ X$

The following is an explanation of the results of the regression equation above which has been interpreted as: If the school digitalization variable experiences an additional increase of 1 point, then there will be an increase in the education quality variable. Meanwhile, if the school digitalization variable is worth 0, then the education quality is 45.777.

Hypothesis Testing

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The results in Table 6 above show a calculated t value of 2.653 and a t table value of 2.030 with a significance level value of 0.05 and degrees of freedom (df) = nk - 1 = 37 - 1 - 1 = 35.

The basic guidelines for making decisions on this T-test involve checking the Sig. 0.05 value and the $_{\text{calculated t-value}}$, Coefficient of determination (R^2).

Table 7. Model Summary

Model	R	R Square	Adjusted R Squared
1	.409a	.167	.144
a. Predictors: (Constant), School Digitalization			

The model summary table above reveals a coefficient value of 0.167, which indicates a correlation level of 16.7% between the school digitalization variable and the education quality variable.

Discussion

The hypothesis test in this study employs the T test and the determination coefficient (R2), based on the results of the previous study. This test was carried out using SPSS Statistics 26 on the school digitalization variable (X) obtained a $t_{calculated}$ value ≥ t_{table}, which is 2.653 ≥ 2.030, and the Sig. value is 0.012 ≤ 0.05. Therefore, based on the processed data, the results indicate the rejection of H_0 and acceptance of H_a. This interpretation shows that the school digitalization variable has a positive and significant effect on the quality of education variable. These results have a positive impact on improving the quality of education in schools in the form of utilizing digital platforms to support improving teacher competence or administration, using Information and Communications Technology (ICT) based learning media in learning, and interactive learning between teachers and students.

This study is in line with several previous studies. Adila & Rodiyah (2024)support this by emphasizing that school digitalization encourages the development of basic needs, access to education, and increased knowledge. The digitalization of schools enhances the efficacy and efficiency of learning, as educators can utilize diverse online resources and streamline the management of academic data. (Ristiana et al., 2023). Furthermore Timotheou et al., (2023) revealed that school digitalization is very significant and has an impact on various improvements in school components, namely learning, teaching, and implementation of school policies. This study shows a positive impact on students' knowledge, skills, and attitudes that can improve student learning outcomes. In addition, school digitalization affects the effectiveness of teachers in developing digital literacy through various activities such as metacognition, reflection, and blended learning. Educators who are literate in digital technology play an important role in improving the quality of education (Wohlfart & Wagner, 2023). Thus, school digitalization plays a very important role in improving the quality of education.

The school digitalization program is a government effort to accelerate the digitalization process in schools and increase the dynamics and efficiency of school

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administration and teaching and learning activities while continuing to monitor the development process (Rahmah, 2023). The government through the Program Sekolah Penggerak has implemented school digitalization as a crucial intervention to improve the quality of education in every school. This is because PSP plays a role in facing the era of globalization by carrying out digital transformation in every school through school digitalization (Ristiana et al., 2023). The first step is to improve the quality of teachers and principals. This is because principals and teachers are key factors in the implementation of quality education (Budiharso & Tarman, 2020). Teacher and principal training can also improve teacher competency in IT. One of them is that teachers become more active in providing interesting and interactive learning by utilizing digital technology. Teacher training that follows teacher competencies and qualifications will provide good learning between theory and practice (Hammerness & Klette, 2015). In addition, technology also allows educators to adapt their teaching methods to better meet the diverse needs of their students.

Although school digitalization affects the quality of education, based on table 7. the R Square value is 0.167 which shows that the magnitude of the relationship between the school digitalization variable and the education quality variable is 16.7%. This value shows a relatively small relationship between the school digitalization variable and the quality of education. Thus, it can be said that school digitalization only explains a small part of the other factors that affect the quality of education more broadly. Therefore, further research is needed on these other factors that have a significant influence on improving the quality of education. In addition, this is also caused by the less-than-optimal implementation of school digitalization which has an impact on improving the quality of education.

In implementing school digitalization, the most important thing is the digital facilities and infrastructure in the school. In implementing school digitalization, access to adequate internet facilities, digital platforms, and ICT-based learning media is needed to support the Sekolah Penggerak Program. Based on the results of observations, the three schools in the last few years have received ICT equipment assistance from the government. The support includes a smart TV, an LCD projector, a modem router, a Chromebook, a learning table, and an active salon. The government is facilitating the implementation of school digitalization. In the era of globalization, the utilization of ICT-based media significantly influences teaching and learning. Consequently, to enhance the quality of learning, educators must possess proficiency in utilizing ICT-based learning media in their instruction (Agus & Andriana, 2020). This aligns with prior studies indicating that ICT-based learning media enhances the ease, engagement, and interactivity of learning, hence improving educational quality (Anshori, 2018; Rejeki et al., 2020)).

However, the ICT facilities and infrastructure across all three schools are inadequate relative to the student population. A viable way to address this difficulty is to augment educational financing and emphasize the integration of technology in schools (Atabek, 2020; Barakabitze et al., 2019). Another challenge is the lack of skills and knowledge of teachers in using ICT-based learning media.

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According to Ferri et al. (2020) Professional development options assist educators in remaining informed about emerging technology and optimal practices in digital learning, allowing them to adjust to the changing educational environment. Through ongoing training and support, schools can help teachers use digital devices and resources efficiently and effectively in the classroom, thereby maximizing student achievement.

Furthermore, establishing fair access to technology can mitigate the disparity between urban and rural schools, guaranteeing that all children possess an equal opportunity for success (Gorski, 2017). These issues are exacerbated by limited infrastructure, lack of IT skills among teachers, and economic disparities for students who are less able to afford the hardware or internet access needed for distance learning (Tempur, 2024). This technological integration aims to furnish educators and learners with a more interactive and engaging educational environment (Hunter, 2015).

Based on the results of the study, which used documentation and observation as supporting data sources, UPT SDN 01 Bukit Gemuruh, UPT SDN 01 Bumi Dana, and UPT SDN 01 Sumamukti implemented school digitalization through participation in various school activities. In addition, schools have used various digital platforms to accelerate digital transformation so that learning is more optimal. The platforms used by schools are the Merdeka Mengajar Platform, or PMM; SIMPKB; ARKAS; education report cards; Belajar.id accounts; and others. Sekolah Penggerak encourage teachers to learn and understand the PMM application. The Merdeka Mengajar platform serves as an important resource for administrators and educators, facilitating their teaching, professional growth, and accountability (Sari et al., 2022). In addition, educators employ PMM, SIMPKB, and Belajar.id accounts to increase their skills and understanding of implementing autonomous curriculum in educational institutions (Sakdiah et al., 2023). Therefore, all parties involved in the digitalization of schools, including the government, schools, principals, teachers, and students play an important role in this process. This is what makes a significant contribution to improving the quality of education in terms of input, process, and output.

CONCLUSION

Based on the description above, the results of the study on the variable of school digitalization have a positive and significant influence on the quality of education at UPT SDN 01 Bukit Gemuruh, UPT SDN 01 Bumi Dana, and UPT SDN 01 Sumamukti. This is evidenced by the results of data analysis using simple regression analysis tests and T-tests to test the established hypotheses to support this. The results show that school digitalization affects the Sig. value of 0.012 ≤ 0.05 and the calculated t value is greater than the t table value, which is 2.653 ≥ 2.030. The magnitude of this influence can be clarified by looking at the coefficient of determination value of 0.167 or 16.7%. However, this meaning indicates a relatively small relationship between the variable of school digitalization and the quality of education. This shows that other factors contribute to improving the quality of education outside of school digitalization. In school digitalization, the

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school driving program plays an important role in providing support for schools such as ICT-based learning media and conducting teacher and principal training related to the use of ICT in learning more efficiently and effectively. However, the results of observations from the three schools indicate the need for further attention such as the ICT-based learning media is still low compared to the number of students or teachers available. Then, the lack of teacher skills in using technology is a challenge for schools in providing interactive learning. This has an impact on monotonous learning and causes low student learning outcomes if not addressed immediately. Therefore, stakeholders must conduct structured evaluations such as surveys to improve the quality of ICT-based learning media and provide training to teachers on how to use ICT devices more effectively. Thus, teachers delivering learning materials are carried out more interactively by utilizing ICT learning media which will have an impact on improving the quality of education more evenly.

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