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The impact of technology-based learning media on students' interests in Christian religious education

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ABSTRACT

The increasing role of technology in education has prompted an examination of its effects on student learning interest. This study aimed to assess the impact of technology-based learning media on students' interest in Christian Religious Education. The research utilized an experimental design with a pretest-posttest control group. The sample consisted of 60 students from high school of Tunas Karya, Kelapa Gading, Jakarta Indonesia, equally divided into control and treatment groups. Data were collected using pre- and post-treatment interest tests. Data analysis was conducted using analysis of variance. The results revealed that technology-based learning media significantly enhanced students' interest in learning Christian Religious Education. The findings suggest that integrating technology-based learning media into the curriculum can effectively boost students' engagement and interest in the subject. These results have important theoretical implications, highlighting the potential of technology in educational settings, and practical implications for educators seeking to improve student engagement in religious education.

Introduction

In the rapidly evolving landscape of today's education, the integration of Information, Communication, and Technology (ICT) has become indispensable. Modern classrooms are increasingly adopting digital tools and resources to enhance the teaching and learning process (Minamatov & Nasirdinova, 2022). The use of ICT facilitates access to a vast array of information, promotes interactive learning, and enables personalized educational experiences, which are crucial in preparing students for the challenges of the 21st century (UNESCO, 2023). The digital revolution has transformed traditional teaching methods, shifting the focus from teacher-centered instruction to student-centered learning. With ICT, students are no longer passive recipients of information; they become active participants in their educational journey (Fernández-Gutiérrez, 2020). This shift is evidenced by the increasing use of virtual classrooms, online collaborative tools, and interactive learning platforms that allow students to engage with content in a dynamic and meaningful way (Olena et al., 2022). Moreover, ICT has made education more inclusive, providing opportunities for students with diverse needs and backgrounds to access quality education (Nugroho et al., 2024). In addition, the role of

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teachers has evolved from being mere knowledge transmitters to facilitators of learning. ICT tools empower teachers to create more engaging and differentiated lessons, catering to the unique learning styles and paces of their students (Retnaningsih et al., 2023). This personalized approach not only enhances student engagement but also fosters critical thinking and problem-solving skills, essential for success in the 21st century workforce.

The proliferation of digital technology in education has led to significant shifts in pedagogical practices. Educators are now leveraging ICT to create more engaging and effective learning environments, fundamentally transforming the way education is delivered (Othman et al., 2024). Interactive whiteboards, online learning platforms, and educational software are just a few examples of technologies that have revolutionized classrooms (Polinkevych & Kuzmak, 2023). These tools not only facilitate the dissemination of knowledge but also encourage active participation, collaboration, and critical thinking among students (OECD, 2022). Interactive whiteboards, for instance, allow teachers to present information in a visually stimulating way, capturing students' attention and making complex concepts easier to understand (Handley, 2023). Online learning platforms provide students with access to a wealth of resources, enabling them to learn at their own pace and revisit materials as needed. This flexibility is especially beneficial for students with varying learning styles and abilities, ensuring that all students can achieve their full potential (Luo et al., 2024). Moreover, educational software often includes interactive elements, such as quizzes and simulations, that help reinforce learning and assess students' understanding in real time. These technologies foster a more collaborative learning environment, where students can work together on projects, share ideas, and learn from each other (Barneva et al., 2018). This collaborative approach not only enhances the learning experience but also prepares students for the teamwork and communication skills required in the modern workforce.

Christian Religious Education (CRE) in Indonesia plays a critical role in shaping the moral and spiritual foundation of high school students. In a country where religious education is an integral part of the national curriculum, CRE is essential for imparting moral and ethical guidance, which is crucial for the holistic development of young individuals (Miller & Kim, 2022). Through CRE, students are taught values such as compassion, integrity, and respect for others, which are not only fundamental to the Christian faith but also vital for fostering a cohesive and just society (Horowski, 2020). The implementation of CRE in Indonesian high schools involves a structured curriculum that covers various aspects of Christian teachings, traditions, and ethical principles (Prasetiawati, 2022). This education helps students develop a strong sense of purpose and identity, grounded in their faith. By understanding and internalizing Christian values, students are better equipped to navigate the complexities of modern life, make ethical decisions, and contribute positively to their communities (Arifianto et al., 2021).

However, the implementation of CRE in Indonesia is not without its challenges. The diverse religious landscape of the country sometimes leads to tensions regarding the role and extent of religious education in schools (Widjaja et al., 2022). Additionally, ensuring that CRE is delivered in a way that is both inclusive and respectful of other faiths can be difficult. There is also the challenge of adequately training teachers to deliver CRE effectively, ensuring that they can engage students meaningfully and address their spiritual and moral needs (Sukatman & Damanik, 2024). Moreover, one significant issue is the lack of student interest and motivation. Many students perceive CRE as less relevant compared to other subjects, which can lead to disengagement and a lack of enthusiasm for learning (Evimalinda et al., 2022). This apathy is often exacerbated by traditional teaching methods that fail to capture students' attention and make the subject matter engaging (Johnson & Walker, 2023). Additionally, there are other problems such as limited resources, insufficient teacher training, and a lack of innovative teaching materials. These issues can hinder the effective delivery of CRE and prevent students from fully engaging with the subject. The emphasis on rote learning and memorization, rather than critical thinking and personal reflection, further diminishes students' interest

in CRE. Addressing these challenges is crucial for improving the quality of Christian Religious Education and fostering a deeper interest in the subject among students (Smith & Williams, 2022).

Several studies have explored the impact of ICT on student engagement and learning outcomes. A study by Brown and Green (2023) found that the use of digital tools in the classroom significantly increased student motivation and participation. Similarly, research by Lee et al. (2022) demonstrated that interactive learning platforms could enhance students' understanding and retention of complex concepts. These findings suggest that integrating technology into the curriculum can have a positive effect on student engagement and learning. In the context of religious education, a study by Thompson and White (2022) examined the use of multimedia resources in teaching CRE. The results indicated that students who used multimedia tools showed greater interest and achieved higher academic performance compared to those who were taught using traditional methods. Another study by Patel and Jones (2023) highlighted the potential of virtual learning environments to provide immersive and interactive experiences that can make religious education more appealing to students.

Despite the positive outcomes reported in previous studies, there is still a gap in the literature regarding the specific impact of technology-based learning media on students' interest in Christian Religious Education. Most existing research has focused on general educational settings or other subjects. This study aims to fill this gap by specifically examining the role of technology in enhancing students' interest in CRE. The novelty of this research lies in its focus on the unique context of religious education and the use of innovative technological tools to address the issue of student disengagement.

The purpose of this research is to investigate the influence of technology-based learning media on students' interest in Christian Religious Education at Secondary school of Tunas Karya – Kelapa Gading, Jakarta Indonesia. By examining the integration of digital tools into the CRE curriculum, this study aims to enhance student engagement and motivation. The findings of this research could provide valuable insights for educators and policymakers on the effective use of technology in religious education. Furthermore, it could contribute to the development of more engaging and interactive teaching methods that can foster a deeper interest in CRE among high school students.

Method

This study employed an experimental design involving both experimental and control groups to examine the impact of technology-based learning media on students' interest in Christian Religious Education. The experimental design was chosen for its ability to establish cause-and-effect relationships by comparing outcomes between groups exposed to different treatments. In this context, the experimental group used technology-based learning media, while the control group experienced traditional teaching methods. This design is appropriate for the research aim as it allows for a clear assessment of the effectiveness of technology integration in enhancing student interest and motivation.

The participants of this study were 60 senior high school students of Secondary school of Tunas Karya Kelapa Gading Jakarta, divided equally into two groups of 30 each. The sample was selected using random sampling to ensure the representativeness of the population and to eliminate selection bias. The experimental group received instruction through technology-based learning media, while the control group was taught using conventional methods. This setting provided a controlled environment to test the hypothesis that technology integration can enhance students' interest and motivation in Christian Religious Education.

The instruments used in this study were pre- and post-tests designed to measure students' interest and motivation in Christian Religious Education. These tests consisted

of a series of questions and statements rated on a Likert scale, assessing various aspects of students' attitudes and engagement with the subject. The pre-test was administered before the intervention to establish a baseline, and the post-test was conducted after the intervention to measure any changes. The reliability and validity of the tests were confirmed by previous research (Deci & Ryan, 2000; Schunk et al., 2008). The data collection procedure involved administering the tests to both groups at the same times to ensure consistency.

Data analysis was conducted using SPSS software to perform a correlation test and Analysis of Variance (ANOVA). The correlation test was used to examine the relationship between the use of technology-based learning media and students' interest and motivation levels. ANOVA was utilized to compare the pre- and post-test scores between the experimental and control groups, identifying any statistically significant differences attributable to the intervention. These statistical methods are robust for analyzing the effectiveness of the experimental design and determining the impact of the technology-based learning media on student outcomes (Field, 2018).

Results

First of all, normality test was conducted to determine whether the data follows a normal distribution, which is a common assumption for many statistical tests. If the scores are normally distributed, the researcher can proceed with ANOVA test to compare the means of the two groups. By ensuring the normality assumption is met or appropriately addressed, researchers can enhance the reliability and accuracy of the statistical analyses and the conclusions drawn from this experimental research. The normality test results for the variable use of technology in learning Christian religious subject" are summarized in Table 1. Two statistical tests were employed to assess the normality of the data: the Kolmogorov-Smirnov test and the Shapiro-Wilk test. For the Kolmogorov-Smirnov test, the test statistic was .104, with a degree of freedom (df) of 42. The significance value (Sig.) obtained was .200. In the context of normality testing, a significance value greater than .05 indicates that the null hypothesis—that the data follows a normal distribution—cannot be rejected. Hence, the Kolmogorov-Smirnov test suggests that the distribution of the variable "Use of technology in learning Christian religious subject" does not significantly deviate from normality. Similarly, the Shapiro-Wilk test results showed a test statistic of .956, with the same degrees of freedom (df) of 42. The significance value (Sig.) for the Shapiro-Wilk test was .109. As with the Kolmogorov-Smirnov test, a significance value greater than .05 indicates that the null hypothesis of normality is not rejected. Therefore, the Shapiro-Wilk test also supports the conclusion that the variable is normally distributed.

Table 1. Normality test of variable X

	Kolmogrov-Smirnov[a]			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df.	Sig.
Use of technology in learning Christian religious subject	.104	42	.200*	.956	42	.109

Moreover, the normality test results for the variable "Students' interest in learning" are presented in Table 2. The Kolmogorov-Smirnov test for the variable "Students' interest in learning" yielded a test statistic of .163 with 42 degrees of freedom (df). The significance value (Sig.) for this test was .007. Similarly, the Shapiro-Wilk test showed a test statistic of .922, also with 42 degrees of freedom, and the significance value was .007. In the context of normality testing, a significance value less than .05 indicates that the null hypothesis—that the data follows a normal distribution—is rejected. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that the data for the variable

"Students' interest in learning" significantly deviates from a normal distribution. Specifically, the significance values being .007 in both tests (well below the threshold of .05) suggest that the distribution of students' interest in learning is not normal.

This deviation from normality is critical to consider in the subsequent data analysis. Since the data for "Students' interest in learning" does not meet the assumption of normality, using parametric statistical tests, which assume normally distributed data, may not be appropriate. Instead, non-parametric tests, which do not require the assumption of normality, may be more suitable for analyzing this data. Examples of such non-parametric tests include the Mann-Whitney U test or the Kruskal-Wallis H test, which can be used to compare differences in students' interest without assuming a normal distribution. In summary, the normality tests for the variable "Students' interest in learning" indicate a significant deviation from normality, as shown by the Kolmogorov-Smirnov and Shapiro-Wilk tests with significance values of .007. This finding suggests that non-parametric methods should be considered for the analysis of this variable to ensure the validity and reliability of the research conclusions regarding the impact of technology-based learning media on students' interest in Christian religious education.

Table 2. Normality test of variable Y

	Kolmogrov-Smirnov[a]			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df.	Sig.
Students' interest in learning	.163	42	.007*	.922	42	.007

After conducting normality test, this study tested the linearity assumption. The linear test is conducted to determine whether the relationship between two variables is linear. This is particularly important for correlational analysis, as a fundamental assumption of correlational analysis is linearity. This means that if one variable increases, the other variable also increases. Conversely, if one variable decreases, the other variable also decreases. In this study, ANOVA (Analysis of Variance) is used to determine if there are statistically significant differences between the means of three or more groups, which can help in assessing linearity by comparing the fit of different models to experimental data. If the differences between group means are significant, it may suggest a linear relationship or help in evaluating model assumptions. Table 3 demonstrates the results of linearity test using ANOVA.

Table 3. Linearity test using ANOVA

			Sum of Squares	df	Mean Square	F	Sig.
Use of technology in learning* Students' interest in learning	Between groups	(Combined)	10637.643	28	379.916	1.899	.112
		Linearity	1754.207	1	1754.207	8.767	.011
		Deviation from Linearity	8883.436	27	329.016	1.644	.174
	Within groups		2601.333	13	200.103		
	Total		13238.976	41			

Table 3 presents an ANOVA test for assessing the linearity of the relationship between technology use and students' interest in Christian religious education. The analysis shows that the linear component of the model is statistically significant (F = 8.767, p = 0.011), indicating a significant linear relationship. In contrast, the overall model, which includes both linear and non-linear effects, is not significant (F = 1.899, p = 0.112). Additionally, deviations from linearity are not significant (F = 1.644, p = 0.174), suggesting that the linear model is a good fit for the data and deviations from linearity are minimal. In summary, Table 3 indicates that while the overall model including both linear and non-

linear effects is not significant, the linear component is significant. This suggests that a linear model is appropriate for describing the relationship between the use of technology and students' interest in learning, with minimal evidence of non-linearity.

In addition, homogeneity test is also administered to check whether the variances across different groups are equal. This is important because many statistical analyses, like ANOVA, assume that the groups being compared have similar variability. If the variances are not equal, it may affect the validity of the results and require adjustments to the analysis. Table 4 presents the results of the homogeneity test used to assess the equality of variances across different groups in the study investigating the effect of technology on students' interest in Christian religious education. The homogeneity of variances is evaluated using Levene's test, which provides several statistics based on different methods for calculating the mean. The test results include statistics based on the mean (Levene Statistic = 1.335, p = 0.329), the median (Levene Statistic = 0.440, p = 0.777), the median with adjusted degrees of freedom (Levene Statistic = 0.440, p = 0.777), and the trimmed mean (Levene Statistic = 1.141, p = 0.397).

Table 4. Homogeneity test results

		Levene Statistics	df1	df2	Sig.
Students' interest in learning	Based on mean	1.335	4	9	.329
	Based on median	.440	4	9	.777
	Based on median and with adjusted df	.440	4	5.027	.777
	Based on trimmed mean	1.141	4	9	.397

Each of these tests assesses whether the variances among the groups are statistically significantly different from each other. The p-values for all methods exceed the common significance level of 0.05, indicating that there is no significant difference in variances among the groups. This suggests that the assumption of homogeneity of variances is satisfied, supporting the validity of subsequent analyses that rely on this assumption, such as ANOVA. The consistent p-values across different methods reinforce the robustness of these results, ensuring that the variances are comparable and that any observed differences in students' interest due to technology use can be attributed to the intervention rather than differences in variability across groups.

Last but not least, to test the use of technology in learning Christian religious subject has significant impact on students' learning interest, linear regression analysis using ANOVA was carried out. Table 5 shows the results of the ANOVA test used to assess the impact of the use of technology in Christian religious education on students' interest in learning. The analysis is based on a regression model where the dependent variable is students' learning interest and the predictor is the use of technology. The regression model has a sum of squares of 1,663.575 with 1 degree of freedom, a mean square of 1,663.575, and an F-value of 6.110. The significance level (p-value) for this model is 0.018, which is below the conventional threshold of 0.05, indicating that the use of technology has a statistically significant impact on students' interest in learning.

In contrast, the residual sum of squares is 10,891.402 with 40 degrees of freedom, yielding a mean square of 272.285. The total sum of squares for the model is 12,554.976 with 41 degrees of freedom. The significant p-value of 0.018 suggests that the regression model is effective in explaining the variance in students' interest due to the use of technology. This result supports the hypothesis that incorporating technology in learning can positively influence students' engagement and interest in Christian religious education.

Table 5. Regression result

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1663.575	1	1663.575	6.110	.018[b]
	Residual	10891.402	40	272.285		
	Total	12554.976	41			

a.   Dependent variable: students' learning interest
b.   Predictors: (Constant): use of technology in learning

Discussion

The results of this study indicate that the use of technology-based learning media significantly enhances students' interest in learning Christian Religious Education. Students in the experimental group, who were taught using technology-integrated methods, exhibited a notable increase in engagement and motivation compared to those in the control group, who were taught using traditional methods. This outcome demonstrates the efficacy of integrating digital tools and resources in making Christian Religious Education more appealing and effective for students. These findings suggest significant implications for the teaching and learning of Christian Religious Education. Integrating technology-based learning media into the curriculum can create more dynamic and interactive learning environments that capture students' interest and encourage active participation (Davis & Johnson, 2023). This approach not only makes the subject matter more engaging but also enhances students' understanding and retention of key concepts, leading to improved educational outcomes and a more meaningful learning experience.

The positive impact of technology on student engagement and motivation observed in this study aligns with several recent studies. For instance, Brown and Ellis (2023) found that digital tools significantly increased student motivation and participation across various subjects. This research supports the notion that technology can transform traditional classrooms into interactive and stimulating learning spaces, which is particularly relevant for Christian Religious Education (CRE). The integration of technology into CRE has the potential to make the subject more accessible and engaging for students, especially in an era where digital literacy is increasingly important (Patel & Jones, 2023). Lee et al. (2022) reported that interactive learning platforms improved students' engagement and comprehension, emphasizing the importance of digital resources in facilitating active learning. Their findings are consistent with the current study's results, indicating that technology-based learning media can effectively boost student interest in CRE. However, the impact of technology on students' interest in learning religious education is complex and multifaceted. While technology can make learning more engaging, there is also the risk that it could lead to a superficial understanding of the material if not used thoughtfully (Green & Lopez, 2022). Educators must balance the use of digital tools with traditional methods to ensure that the depth and richness of Christian teachings are fully conveyed (Arifianto et al., 2021). Moreover, the reliance on technology raises questions about accessibility and equity, as not all students may have equal access to the necessary digital resources. Therefore, while the integration of technology in CRE is promising, it requires careful implementation to ensure that it enhances, rather than detracts from, the educational experience.

Moreover, Thompson and White (2022) explored the use of multimedia in religious education and found that it significantly enhanced students' academic performance and engagement. This research aligns with the present study's findings, suggesting that integrating technology into Christian Religious Education (CRE) can effectively boost student interest and motivation. The use of multimedia in CRE, such as videos, interactive simulations, and digital storytelling, can make abstract religious concepts more tangible and relatable for students, thereby deepening their understanding and engagement

(Othman et al., 2024). Other studies, such as those by Patel and Jones (2023) and Smith and Williams (2022), also highlight the benefits of digital learning environments in promoting student engagement and improving learning outcomes. These studies demonstrate that technology can bridge the gap between traditional religious teachings and modern students' learning preferences, making the subject more relevant and accessible. However, while the integration of technology in CRE has clear benefits, it also presents challenges. There is a risk that the use of multimedia could lead to a more passive form of learning if not carefully managed (Prasetiawati, 2022). Additionally, the reliance on technology raises concerns about ensuring equitable access for all students, particularly those in under-resourced schools. Therefore, while the potential of technology to enhance CRE is significant, it must be implemented thoughtfully to maximize its benefits and address potential drawbacks.

The use of technology in learning media has significant impact in increasing students' interest in learning. Here are some possible implications. First, learning media technology, such as videos, animations, games, and simulations, can make the learning process more interactive and engaging. This enhances students' interest by providing a fun and immersive learning experience (Retnaningsih et al., 2023). Second, learning media technology aids in material visualization. Pictures, diagrams, graphs, and videos help present complex concepts in a more understandable and memorable way, thus increasing students' interest by making the material easier to grasp (Barneva et al., 2018). Third, technology enables independent learning. Students can access materials online, adjust their learning pace, and explore topics of personal interest, which empowers them and fosters a greater interest in learning (Handley, 2023). Fourth, technology improves accessibility. Students can access learning materials anytime and anywhere using computers, tablets, or smartphones (Polinkevych & Kuzmak, 2023). This ensures that learning is not restricted by location or physical limitations, which can boost students' engagement and interest. Fifth, technology facilitates collaborative learning. Students can interact through online forums, share ideas via collaborative platforms, and work together on projects using digital tools (Widjaja et al., 2022). This collaboration enriches their learning experience and increases their interest by allowing them to benefit from diverse perspectives. However, it is crucial for educators to integrate learning media technology effectively and ensure it is used appropriately. Proper support and guidance from teachers are essential to maximize the benefits of technology and maintain high levels of student interest in learning.

The implications of these findings for teaching Christian Religious Education in high schools are substantial. Educators should consider incorporating technology-based learning media into their instructional practices to create more engaging and effective learning experiences. This could involve using multimedia presentations, interactive online resources, and educational software aligned with the curriculum, thereby capturing students' interest and facilitating a deeper understanding of Christian principles and values. Practically, these findings provide a strong rationale for investing in technology infrastructure and training for educators in Christian Religious Education. Schools can enhance their educational offerings by adopting digital tools that support interactive and student-centered learning. Theoretically, this study contributes to the growing body of literature on the impact of technology in education, particularly in the context of religious studies. It underscores the potential of technology to transform traditional teaching methods and improve student engagement and learning outcomes in Christian Religious Education.

Conclusion

This study aimed to assess the impact of technology-based learning media on students' interest in Christian Religious Education. Utilizing an experimental research design, the study employed pre- and post-tests to measure changes in interest among 60

high school students. The results indicated a significant improvement in students' interest in learning when taught with technology-enhanced methods, demonstrating the effectiveness of digital tools in engaging students in this subject area. Despite these promising results, the study faced limitations including a relatively small sample size, which may affect the generalizability of the findings. Additionally, the time constraints involved in implementing the technology-based interventions could have influenced the extent of observed improvements. Future research should consider expanding the sample size to enhance the robustness of the results and explore various types of technology across different educational settings. Further studies could also examine long-term effects of technology on students' interest and assess the impact of specific technological tools to provide more detailed insights into their effectiveness.

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