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THE EFFECTS OF THE CAKE MOBILE APPLICATION ON STUDENTS' MOTIVATION AND ENGLISH LEARNING OUTCOMES: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

This study aims to examine the effect of the CAKE application on students' motivation and learning outcomes in English language learning. The integration of mobile-assisted language learning applications has become increasingly important in enhancing students' engagement and achievement in English learning. However, empirical evidence on their effectiveness in secondary education remains limited. This study employed a quantitative approach with a quasi-experimental nonequivalent control group design. The participants consisted of 64 students divided into an experimental group and a control group. Data were collected through a motivation questionnaire and learning outcome tests administered before and after the intervention. The findings indicate that students who used the CAKE application showed higher improvement in both motivation and learning outcomes compared to those who received conventional instruction. The improvement in the experimental group was categorized as moderate, while the control group showed a low level of improvement. These results demonstrate that the CAKE application has a significant positive effect on students' learning engagement and academic performance. The CAKE application is an effective technology-based learning tool for enhancing students' motivation and learning outcomes in English learning. This study contributes to the development of digital learning media research by providing empirical evidence of the effectiveness of mobile-assisted language learning applications in secondary education.

Keywords: Cake Application, EFL Learning, Learning Motivation, Learning Outcomes, Mobile Learning

INTRODUCTION

The rapid development of digital technology has transformed learning practices across various levels of education. The integration of technology in education not only functions as a medium for delivering instructional content but also plays a crucial role in enhancing students' engagement and learning motivation (Bates, 2019; Teräs, 2022). From the perspective of Self-Determination Theory proposed by (Deci & Ryan, 2000), students' motivation increases when they experience autonomy, competence, and relatedness in the learning process. Learning environments that provide meaningful and interactive experiences have been shown to significantly enhance student engagement(Reeve, 2012;

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Ryan & Deci, 2020) . Therefore, the utilization of digital-based learning technologies has become an essential strategy in creating student-centered learning environments that are relevant to the demands of the 21st century (Hockly, 2018; L. dos S. Silva et al., 2019);

In the context of English language learning, motivation is a crucial factor influencing students' success. Learning a foreign language requires sustained practice, active participation, and persistence (Lightbown & Spada, 2013). (Dörnyei, 2001)emphasizes that students with high motivation tend to be more engaged, more willing to use the target language, and more resilient when facing learning challenges. Conversely, low motivation can significantly hinder the development of students' language competence (Lamb, 2017; Ushioda, 2011). However, in practice, English language instruction in schools is still often dominated by conventional and less interactive teaching methods, which contribute to low student motivation (Harmer, 2007; Karlina, 2022). According to (Sardiman, 2011), learning motivation is the overall driving force within students that initiates, directs, and sustains learning activities. Students with high motivation typically demonstrate persistence, interest, and active engagement in the learning process (Schunk, 2012).

Low learning motivation has direct implications for students' learning outcomes.(Keller, 2010), through the ARCS model (Attention, Relevance, Confidence, Satisfaction), explains that learning experiences that are engaging, relevant, and provide a sense of achievement can enhance both motivation and academic performance. Several studies have shown a positive relationship between learning motivation and students' academic achievement, indicating that increased motivation contributes to improved learning outcomes (Pintrich, 1990; Schunk, 2012; Wigfield & Eccles, 2000). Therefore, it is important not only to enhance students' motivation but also to understand how motivation contributes to the learning outcomes they achieve.

One emerging approach in language learning is Mobile-Assisted Language Learning (MALL), which utilizes mobile technology to support flexible, interactive, and contextual learning(Burston, 2015; Kukulska-Hulme & Shield, 2008a). The use of mobile applications enables students to learn independently, engage in repeated practice, and access learning materials anytime and anywhere (Godwin-Jones, 2017; Stockwell, 2010) Previous research has demonstrated that mobile-based learning can enhance students' motivation, engagement, and learning outcomes (Hwang & Fu, 2019; Sung et al., 2016) .Furthermore, the integration of digital media and innovative approaches such as game-based and collaborative learning has been shown to improve student participation and understanding in English language learning (Artikasari & Salam, 2017; Julianti & Salam, 2020; Sholeha & Salam, 2016; Tiur Maria & Karolina, 2023)

One mobile application that has gained attention in English language learning is the CAKE application. This application offers various features, including authentic conversation videos, speech recognition-based pronunciation practice, and listening exercises that support contextual and autonomous learning (Tawali & Kamarudin, 2022) Previous studies have indicated that the use of the CAKE application can improve speaking skills, vocabulary mastery, and students' learning motivation (Hamdani et al., 2022; Haque & Permanasari, 2025; Juliana, 2024; Wilson & Sutrisno, 2022). However, empirical studies that comprehensively examine the effect of the CAKE application on both students' motivation

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and learning outcomes simultaneously, as well as the relationship between these two variables, particularly in the context of Madrasah Aliyah, remain limited.

Based on the above discussion, this study not only focuses on improving motivation and learning outcomes separately but also examines the relationship between the two variables. High motivation is assumed to play a role in enhancing students' learning outcomes through increased engagement and learning intensity. Therefore, it is important to empirically investigate whether improvements in students' motivation during the learning process contribute to improved learning outcomes.

To address this gap, this study aims to analyze the effect of using the CAKE application on students' motivation and learning outcomes in English language learning. Specifically, this study seeks to answer the following research questions: (1) Is there a difference in students' learning outcomes before and after using the CAKE application? (2) Is there a difference in students' motivation before and after using the CAKE application? and (3) Is there a relationship between the improvement in students' motivation and the improvement in their learning outcomes after learning using the CAKE application?

This study employs a quasi-experimental design with a nonequivalent control group, as random assignment of participants is not feasible in natural classroom settings (Fraenkel et al., 2012; Creswell, 2013). This design is appropriate for educational research because it allows for the examination of causal relationships in real-world contexts without disrupting existing classroom structures (Shadish et al., 2002). Furthermore, it enables a direct comparison between students who receive the intervention and those who experience conventional instruction, thereby providing valid and practical empirical evidence regarding the effectiveness of the CAKE application in enhancing students' motivation and learning outcomes. Thus, the use of a quasi-experimental design is not only practically appropriate but also methodologically relevant to address the research problem, as it enables the researcher to evaluate the effectiveness of the CAKE application in improving students' motivation and learning outcomes within authentic classroom conditions.

METHODS

This study employed a quantitative approach using a quasi-experimental design with a nonequivalent control group to examine the effect of the CAKE application on students' motivation and learning outcomes in English language learning. The participants consisted of 64 students from Madrasah Aliyah, divided into an experimental group and a control group, each comprising 32 students. The study was conducted over four instructional meetings, with each session lasting approximately 90 minutes. Both groups received the same learning materials, including daily conversations, vocabulary development, and basic grammar, aligned with the existing curriculum. The experimental group was taught using the CAKE application, where students engaged in activities such as watching authentic conversation videos, practicing pronunciation using speech recognition features, and completing listening and vocabulary exercises, followed by guided discussion and reflection facilitated by the teacher. In contrast, the control group received conventional instruction through teacher-centered explanations, textbook-based activities, and limited interactive media.

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Data were collected using a learning motivation questionnaire and a learning outcome test administered as pretest and posttest. The motivation questionnaire consisted of 20 items based on indicators such as attention, persistence, interest, and engagement, measured using a 5-point Likert scale, while the learning outcome test included multiple-choice and short-answer questions scored on a scale of 0–100. The instruments were tested for validity using Pearson Product Moment correlation and for reliability using Cronbach's Alpha coefficient, with values above 0.70 indicating acceptable internal consistency. Data analysis was conducted using IBM SPSS Statistics, including normality testing, paired sample t-tests to examine within-group differences, and independent sample t-tests to compare posttest results between groups. N-Gain analysis and effect size calculations were also performed to determine the magnitude of improvement and the strength of the treatment effect. Furthermore, linear regression analysis was employed to examine the relationship between students' motivation and learning outcomes, as well as to determine the extent to which motivation contributes to variations in students' academic performance after the intervention.

RESULTS

Analysis of Student Learning Motivation

A learning motivation questionnaire was administered to students during the pretest and posttest stages in both groups: the control class and the experimental class. The pretest was conducted to determine students' learning motivation levels before the treatment, while the posttest was conducted after the learning process had begun. In the experimental class, learning used the Cake application, while in the control class, learning was conducted conventionally. The pretest and posttest results were then analyzed to determine the effect of using the Cake application on students' learning motivation.

The learning motivation instrument was first tested for validity and reliability before being used in the study. Validity was assessed using Pearson correlation, while reliability was assessed using Cronbach's Alpha coefficient. Testing was conducted on all respondents, consisting of students from the control and experimental classes. After the instrument was declared valid and reliable, learning motivation data were analyzed using descriptive statistics and independent sample t-tests to determine differences in learning motivation between the two classes.

The results of the validity test using the Pearson Product Moment technique on 64 respondents showed that the r table value at a significance level of 5% with df = 62 was 0.244. Based on the calculation results, all statement items (P01–P19) had a calculated r value greater than the r table. Thus, it can be concluded that all statement items in the learning motivation instrument were declared valid and suitable for use as a research data collection tool.

Table 1. Reliability statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.833	19

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Based on the results of the reliability testing conducted, a Cronbach's Alpha value of 0.833 was obtained for a total of 19 items. This value is greater than 0.600 (0.833 > 0.600), thus it can be concluded that the learning motivation instrument is reliable. Therefore, it can be concluded that the learning motivation instrument has a high level of internal consistency and is suitable for use as a data collection tool in research. A learning motivation questionnaire was administered to both the control and experimental groups before and after the intervention. Prior to analysis, the instrument was confirmed to be valid and reliable. All items met the validity criteria (r > 0.244), and the reliability coefficient (Cronbach's Alpha = 0.833) indicated a high level of internal consistency. This suggests that the instrument was appropriate for measuring students' learning motivation.

Next, the student questionnaire scores were tested using a normality test to determine the data distribution. The following are the results of the normality test on the student questionnaire scores:

Table 2. Normality Test of Control Class & Experimental Class

Tests of Normality							
	Class	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
Score	1	.125	32	.200*	.980	32	.787
	2	.102	32	.200*	.973	32	.586
	3	.118	32	.200*	.956	32	.218
	4	.108	32	.200*	.975	32	.660

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The normality test results showed that all data were normally distributed (p > 0.05), allowing the use of parametric statistical tests. A paired sample t-test revealed that both groups experienced significant improvement in learning motivation after instruction. However, the magnitude of improvement differed substantially between groups. The control group showed only a slight increase (mean difference = -2.469, p = 0.023), indicating that conventional instruction had a limited impact on motivation. In contrast, the experimental group demonstrated a much greater increase (mean difference = -19.719, p < 0.001), suggesting that the use of the CAKE application significantly enhanced students' motivation. Based on these results, the research data meets the assumption of normality, so that further analysis can be carried out using parametric statistical tests, namely the t-test (Independent Sample t-test) to determine the effect of using the Cake application on students' learning motivation.

A Paired Sample t-test was conducted to determine whether there was a difference in student learning motivation between the pretest and posttest scores in each class, namely the control class and the experimental class. This test was used because the data being compared came from the same respondents before and after the treatment. The decision-

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making criteria were if the Sig. (2-tailed) value <0.05, then there was a significant difference, whereas if the Sig. (2-tailed) value >0.05, then there was no significant difference.

Table 3. Difference Test of Pretest Posttest Motivation of Control Class & Experimental Class

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control pretest-Control posttest	-2,469	5,858	1,036	-4,581	-.357	-2,384	31	.023
Pair 2	Experimental pretest-Experimental posttest	-19,719	4,609	.815	-21,380	-18,057	-24,203	31	.000

Based on the results of the Paired Sample t-test, in the control class, the Sig. (2-tailed) value was 0.023 < 0.05 with a calculated t value of -2.384. This indicates that there is a significant difference between the pretest and posttest scores in the control class, although the increase is relatively small with a mean difference value of -2.469.

Meanwhile, in the experimental class, the Sig. (2-tailed) value was 0.000 < 0.05 with a t-count value of -24.203. These results indicate that there is a very significant difference between the pretest and posttest scores in the experimental class, with a mean difference value of -19.719, which indicates a much greater increase in learning motivation after being given treatment using the Cake application.

Thus, it can be concluded that both the control and experimental classes experienced changes in learning motivation. Furthermore, an Independent Sample t-test was conducted to determine whether there was a difference in learning motivation between the control and experimental classes after being given the learning treatment. This test was used to compare the average of two unpaired groups, namely the control and experimental classes. The decision-making criteria were if the Sig. (2-tailed) value <0.05, then there was a significant difference between the two groups.

Table 4. Difference test between control class & experimental class

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper

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Learning outcomes	Equal variances assumed	4,833	.032	-15,905	62	.000	-15,219	.957	-17,131	-13,306
	Equal variances not assumed			-15,905	53,532	.000	-15,219	.957	-17,137	-13,300

Thus, it can be concluded that both the control and experimental classes experienced changes in learning motivation. Furthermore, an Independent Sample t-test was conducted to determine whether there was a difference in learning motivation between the control and experimental classes after being given learning treatment. This test was used to compare the average of two unpaired groups, namely the control and experimental classes. The decision-making criteria were if the Sig. (2-tailed) value was <0.05, then there was a significant

difference between the two groups. Based on the results of the Levene's Test for Equality of Variances, a significance value of 0.032 <0.05 was obtained, which indicated that the variances of the two groups were not homogeneous. Therefore, the interpretation of the t-test results refers to the Equal variances not assumed row.

The t-test results show that the Sig. (2-tailed) value is 0.000 < 0.05 with a calculated t-value of -15.905. This indicates that there is a significant difference between student learning motivation in the control class and the experimental class. In addition, the mean difference value of -15.219 indicates that the average learning motivation score in the experimental class is higher than that in the control class.

Further analysis using an independent sample t-test confirmed a significant difference between the two groups after the intervention ($p < 0.001$). The experimental group achieved substantially higher motivation scores than the control group. This finding indicates that the CAKE application not only improves motivation but does so more effectively than conventional teaching methods. In practical terms, the interactive features of the application appear to foster greater student engagement and active participation in learning.

Analysis of English Learning Outcomes

The analysis of English learning outcomes in this study aims to determine the effect of using the Cake application on improving student learning outcomes. Learning outcome data was obtained through tests administered to students before and after the learning process in the control and experimental classes. The pretest was administered to determine students' initial abilities before the treatment was administered, while the posttest was administered to determine students' learning outcomes after participating in the learning process.

Next, the obtained learning outcome data was analyzed using several stages of statistical testing. The first stage was conducting prerequisite analysis tests, including a normality test to determine whether the data were normally distributed. After the data were declared to meet the normality assumption, the analysis continued with hypothesis testing

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using a paired sample t-test to determine differences in learning outcomes before and after the learning process in each class, and an independent sample t-test to determine differences in learning outcomes between the control and experimental classes.

In addition, improvements in student learning outcomes were also analyzed using the N-Gain calculation to determine the level of improvement that occurred after the learning process. Furthermore, to determine the extent of the influence of the Cake application on student learning outcomes, an effect size calculation was performed using Cohen's formula.

Table 5. Normality test of learning outcome values

Test of Normality							
	Class	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
Score	Pretest Control	.150	32	.065	.939	32	.070
	Postest Control	.178	32	.011	.958	32	.249
	Experimental Pretest	.145	32	.083	.951	32	.153
	Post-test Experiment	.156	32	.045	.956	32	.208

a. Lilliefors Significance Correction

Based on the results of the Shapiro–Wilk test, all pretest and posttest data in the control class (conventional media) and the experimental class (CAKE media) had a significance value greater than 0.05, so it can be concluded that the English learning outcomes data in both classes were normally distributed. Thus, the data met the assumption of normality and can be continued with parametric statistical tests, paired sample tests. The analysis of learning outcomes followed a similar procedure. The normality test confirmed that the data met the assumptions for parametric analysis. Results from the paired sample t-test indicated that both groups improved significantly after instruction. However, the improvement in the experimental group was considerably higher than in the control group.

Table 6. Pretest-Posttest difference test of learning outcome scores of the control class & experimental class

Paired Sample Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Control Pretest - Control Posttest	-9,531	15,100	2,669	-14,975	-4,087	-3,571	31	.001
Pair 2	Experimental Pretest-	-28,437	13,645	2,412	-33,357	-23,518	-11,789	31	.000

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	Experimental
	Posttest

Based on the results of the paired sample t-test, it was found that both the control and experimental classes experienced significant improvements in learning outcomes after the learning process. However, the test only showed a difference in scores before and after the treatment in each class. To determine whether there was a difference in learning outcomes between the class using conventional media and the class using CAKE media, further analysis was conducted using an independent sample t-test.

The Influence of Application Use on Motivation and Learning Outcomes

An independent sample t-test was used to compare the average learning outcomes between two different groups: the control class and the experimental class. This test aimed to determine whether the use of CAKE media significantly impacted students' English learning outcomes compared to the use of conventional media. Therefore, the results of this test will provide a clearer picture of the effectiveness of CAKE media in improving student learning outcomes.

To determine the differences in learning outcomes between the control and experimental classes, an independent sample t-test was conducted. Prior to the analysis, a homogeneity of variance test was performed using Levene's Test. The test results showed a significance value of 0.127 (p > 0.05), indicating that the variances of both groups were homogeneous. This can be seen in the following table:

Table 7. Test of differences in learning outcomes between the control class & the experimental class

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Learning outcomes	Equal variances assumed	2,394	.127	-8,395	62	.000	-20,625	2,457	-25,536	-15,714
	Equal variances not assumed			-8,395	56,396	.000	-20,625	2,457	-25,546	-15,704

The results of the independent sample t-test showed a t value of -8.395 with degrees of freedom df = 62 and a significance value of p = 0.000 (p < 0.05). These results indicate that there is a statistically significant difference between student learning outcomes in the control class and the experimental class. The mean difference value of -20.625 indicates that

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the average student learning outcomes in the experimental class are higher than those in the control class. In addition, the 95% confidence interval is in the range of -25.536 to -15.714, which indicates that the average difference between the two groups is within that range and strengthens the significance of the differences found.

Furthermore, to determine the level of improvement in student learning outcomes after participating in the learning process, the N-Gain test was used. The N-Gain calculation is used to determine the extent of improvement in student abilities from before learning (pretest) to after learning (posttest). Through this analysis, the effectiveness of the learning process implemented in both the control and experimental classes can be determined.

The N-Gain calculation in this study refers to the concept proposed by Richard(Hake RR, 1999)which states that the N-Gain value is used to measure the level of improvement in student learning outcomes after participating in a learning process. The N-Gain value is then categorized into three levels: high, medium, and low. Thus, the N-Gain analysis can provide an overview of the level of improvement in student learning outcomes after implementing learning using the Cake application compared to learning using conventional methods.

Table 8. Average N-Gain Values

Class	Number of Students	Average N-Gain	Category
Control	32	0.13	Low
Experiment	32	0.51	Currently

Based on the summary table of the N-Gain calculation results, it is known that the average N-Gain in the control class was 0.13, which is included in the low category. This indicates that the increase in student learning motivation in the control class after the learning was not very significant. Meanwhile, the average N-Gain in the experimental class was 0.51, which is included in the medium category. This indicates that there was a better increase in student learning motivation in the experimental class after the implementation of learning using the Cake application.

Thus, it can be concluded that the increase in students' learning motivation in the experimental class was higher than in the control class, so that the use of the Cake application provided a better increase in students' learning motivation. In addition to using N-Gain analysis, this study also used effect size calculations to determine the extent of the influence of Cake application use on student learning outcomes. Effect size is a statistical measure used to indicate the extent of the influence of a treatment in an experimental study.

The effect size calculation in this study used the Cohen's d formula proposed by Jacob Cohen. This calculation reveals the strength of the Cake app's influence on improving student learning outcomes. The effect size values were then interpreted into several categories: small, medium, and large. With this effect size analysis, the results not only demonstrate differences in learning outcomes between the two classes but also illustrate the strength of the influence of the use of technology-based learning media on improving student learning outcomes.

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Based on the effect size calculation using Cohen's d, the d value was 0.54. This value is in the range of 0.50–0.80, making it categorized as moderate. This indicates that the use of the Cake application had a fairly strong influence on increasing student learning motivation in the experimental class compared to the control class.

The Relationship Between Motivation and English Learning Outcomes

A simple linear regression analysis was conducted to examine the relationship between students' learning motivation and their English learning outcomes after using the Cake application. The analysis aimed to determine the extent to which learning motivation predicts students' achievement in English within a technology-assisted learning context.

The results revealed a very strong positive relationship between learning motivation and English learning outcomes, as indicated by a correlation coefficient (R) of 0.961. This suggests that students with higher levels of motivation tend to achieve better learning outcomes.

To further illustrate the strength and accuracy of the regression model, the summary of the analysis is presented in Table 9.

Table 9. Model summary of the relationship between learning motivation and English learning outcomes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.961	0.924	0.923	3.656

Note: Independent variable = Learning motivation; Dependent variable = English learning outcomes.

As shown in Table 9, the R Square value of 0.924 indicates that 92.4% of the variance in students' English learning outcomes can be explained by learning motivation, while the remaining 7.6% is attributed to other factors not included in this study. The Adjusted R Square value (0.923) confirms the stability of the model after controlling for sample size and the number of predictors. Furthermore, the standard error of the estimate (3.656) suggests a relatively low level of prediction error, indicating that the model provides a good fit to the data.

The regression analysis also demonstrated that learning motivation significantly predicts students' English learning outcomes ($p < 0.001$). The regression coefficient ($\beta = 0.889$) indicates that increases in motivation are associated with corresponding improvements in learning outcomes. Additionally, the constant value (6.025) reflects a baseline level of achievement when motivation is minimal. The positive direction of the coefficient confirms a direct and proportional relationship between the two variables.

However, the very high R Square value should be interpreted with caution, as it may indicate that other relevant variables were not included in the model. Despite this limitation, the findings clearly demonstrate that learning motivation plays a crucial role in enhancing students' English learning outcomes, particularly in the context of mobile-assisted language learning using the Cake application.

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DISCUSSION

This study aimed to examine the effect of the CAKE application on students' learning motivation and learning outcomes in English learning. The findings indicate that the use of the CAKE application significantly enhances students' motivation compared to conventional instruction. The magnitude of improvement observed in the experimental group was substantially higher, suggesting that technology-based learning environments play an important role in fostering student engagement and active participation.

From a practical perspective, the moderate effect size (d = 0.54) indicates that the CAKE application has a meaningful impact in real classroom contexts, beyond mere statistical significance. This implies that mobile-assisted learning tools can contribute to noticeable improvements in students' motivation and learning outcomes, although the effect remains moderate. Therefore, the use of the CAKE application should be integrated with other instructional strategies to further optimize learning effectiveness.

These findings can be explained through Self-Determination Theory (Ryan & Deci, 2020) which emphasizes the importance of autonomy, competence, and relatedness in enhancing motivation. The CAKE application supports autonomous learning by enabling students to access materials flexibly, while repeated practice and immediate feedback strengthen their sense of competence. Additionally, the use of authentic and contextual learning content enhances students' engagement and perceived relevance, thereby increasing intrinsic motivation.

The results are also consistent with the ARCS motivation model (Keller, 2010), which highlights attention, relevance, confidence, and satisfaction as key components of effective learning. The multimedia features of the CAKE application, including videos, pronunciation exercises, and listening activities, successfully capture students' attention and provide meaningful learning experiences. This supports the argument that interactive digital media can significantly enhance learning motivation.

From the perspective of Mobile-Assisted Language Learning (MALL), the findings reinforce previous studies (Burston, 2015; Hwang & Fu, 2019), which demonstrate that mobile applications facilitate flexible, repeated, and contextualized language practice. Such flexibility increases students' exposure to the target language, which is essential for language acquisition (Nation, 2001)

However, the regression analysis revealed a very high R Square value (0.924), indicating that motivation explains a large proportion of the variance in students' learning outcomes. While this suggests a strong relationship, the result should be interpreted cautiously. In real educational contexts, learning outcomes are influenced by multiple factors, such as prior knowledge, instructional quality, and learning environment. Therefore, the high R Square value may reflect overlapping variables, measurement limitations, or potential bias. Future studies are recommended to include additional variables to obtain a more comprehensive model.

This study also has several limitations. The sample size was relatively small and limited to a single educational context, which may affect generalizability. The duration of the

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intervention was relatively short, potentially limiting the observation of long-term effects. In addition, the use of self-reported motivation data may introduce response bias.

Despite these limitations, the findings provide important pedagogical implications. The integration of mobile learning applications such as CAKE can enhance students' motivation and learning outcomes, particularly when combined with interactive and student-centered teaching approaches. Teachers are encouraged to incorporate technology-based tools to create more engaging and meaningful learning experiences.

In conclusion, the CAKE application is an effective tool for improving students' motivation and learning outcomes in English learning. However, its effectiveness should be understood within a broader educational context, and further research is needed to explore its long-term impact and applicability across different learning environments.

CONCLUSION

Based on the results of the study and data analysis, it can be concluded that the use of the CAKE application has a positive and significant effect on students' motivation and English learning outcomes. First, the use of the CAKE application contributes to a significant increase in students' learning motivation, as reflected in the improvement of motivation scores after the implementation of the application. Second, students who learned using the CAKE application demonstrated higher learning outcomes compared to those who experienced conventional instruction. Third, the level of improvement in learning outcomes in the experimental group was categorized as moderate and higher than that of the control group, indicating the effectiveness of the application in supporting the learning process. Furthermore, the effect size analysis revealed a moderate effect, suggesting that the CAKE application provides a meaningful contribution to enhancing both motivation and learning outcomes in practical classroom settings.

From a pedagogical perspective, these findings imply that the integration of mobile-assisted learning applications such as CAKE can serve as an effective strategy to create more engaging, interactive, and student-centered learning environments. Teachers are encouraged to incorporate technology-based learning tools to support students' autonomy, increase engagement, and provide opportunities for repeated and flexible practice in language learning.

However, this study is not without limitations. The sample size was relatively small and limited to a single educational context, which may affect the generalizability of the findings. In addition, the duration of the intervention was relatively short, and the use of self-reported instruments may introduce potential bias. Therefore, future research is recommended to involve larger and more diverse samples, extend the duration of the intervention, and include additional variables that may influence learning outcomes, such as prior knowledge, learning strategies, and instructional quality.

In conclusion, the CAKE application can be considered an effective technology-based learning tool for enhancing students' motivation and English learning outcomes. Nevertheless, its implementation should be supported by appropriate instructional strategies and further empirical investigation to maximize its effectiveness in various educational contexts.

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