

THE INFLUENCE OF THE EDUCAPLAY-BASED GAME BASED LEARNING MODEL ON THE LEARNING OUTCOMES OF CLASS X STUDENTS IN GEOGRAPHY LEARNING AT SMA NEGERI 3 BIREUEN

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ABSTRACT

This study aimed to determine the effect of the Educaplay-based Game Based Learning model on the learning outcomes of class X students in geography learning on seismic material at SMA Negeri 3 Bireuen. This research employed a quantitative approach with a One Group Pretest-Posttest Design involving 33 students selected through total sampling. Data were collected through multiple-choice tests administered before and after treatment and analyzed using descriptive statistics, paired sample t-test, effect size analysis, and N-Gain analysis. The results showed a significant difference between pretest and posttest scores ($p < 0.05$). The mean score increased from 57.27 in the pretest to 60.61 in the posttest. Effect size analysis indicated a large effect, suggesting that the learning model had a strong influence on students' learning outcomes. However, the average N-Gain score of 0.0732 was categorized as low. Therefore, it can be concluded that the Educaplay-based Game Based Learning model significantly affects students' learning outcomes, although further development is needed to optimize learning improvement.

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INTRODUCTION

Education plays an important role in improving the quality of human resources and preparing individuals to face the challenges of the twenty-first century. In the era of globalization and rapid technological development, learning is expected to provide meaningful experiences that encourage students to participate actively in the learning process. However, learning activities in schools are still frequently dominated by conventional teaching methods that emphasize teacher-centered instruction. As a result, students tend to become passive and experience difficulties

in understanding the material, which eventually affects their learning outcomes. Therefore, innovative learning models are needed to create interactive and meaningful learning experiences.

Learning outcomes are important indicators used to measure the success of the learning process. According to Dewi et al. (2018), learning outcomes reflect students' abilities after participating in learning activities and are influenced by various internal and external factors. One of the external factors affecting learning outcomes is the learning model implemented by teachers. Recent studies have shown that innovative learning methods contribute significantly to improving students' achievement and motivation (Nurhajjah, 2025). Therefore, selecting appropriate learning models is essential to optimize students' learning outcomes.

One of the learning approaches that can be applied is *Game Based Learning* (GBL). Game Based Learning is a learning model that integrates game elements into learning activities to create enjoyable and interactive learning experiences (Winatha & Setiawan, 2020). Through this approach, students are encouraged to actively participate in learning and develop critical thinking, communication, and problem-solving skills (Wahyuning, 2022). Along with technological advancement, various digital platforms have been developed to support the implementation of Game Based Learning. One of these platforms is *Educaplay*, a web-based educational application that provides interactive activities such as quizzes, crosswords, matching games, and word searches. The use of Educaplay is considered capable of increasing students' motivation and engagement in learning (Quinde Cristina Páez et al., 2022).

Several previous studies have demonstrated the effectiveness of Educaplay-based learning. Sepriyanti et al. (2024) reported that the use of Educaplay significantly improved students' learning outcomes. In addition, Risma Anita Puriani (2025) found that digital educational games effectively enhanced students' motivation and academic achievement. Similarly, Risa Palupi and Suaedi (2025) concluded that Game Based Learning creates an interactive and enjoyable learning environment that encourages active student participation. These findings indicate that game-based learning has positive impacts on students' achievement and learning motivation.

In geography learning, particularly seismic material, students are required to understand complex concepts related to earthquakes and their impacts on human life. Such concepts are often difficult to understand through conventional teaching methods. Although previous studies have shown positive results regarding the use of Educaplay and Game Based Learning, most studies have focused on general subjects and have not specifically investigated geography learning, especially seismic material at the senior high school level. Furthermore, studies employing a One Group Pretest-Posttest Design to examine the effect of Educaplay-based Game Based Learning on students' learning outcomes remain limited. This condition indicates the existence of a research gap that requires further investigation.

Therefore, this study aims to determine the effect of the Educaplay-based Game Based Learning model on the learning outcomes of class X students in geography learning on seismic material at SMA Negeri 3 Bireuen. The findings of this study are expected to contribute to the development of innovative learning models and provide references for teachers in improving the quality of geography learning and students' learning outcomes.

METHOD

This study employed a quantitative approach using a pre-experimental design with a One Group Pretest-Posttest Design. The study was conducted at SMA Negeri 3 Bireuen during the second semester of the 2025/2026 academic year. This design was used to determine the effect of the Educaplay-based Game Based Learning model on students' learning outcomes in geography learning on seismic material.

The population of this study consisted of all class X students at SMA Negeri 3 Bireuen. The sample comprised 33 students selected using the total sampling technique. The research instrument was a multiple-choice test administered before treatment (pretest) and after treatment (posttest) to measure students' learning outcomes.

Data were collected through achievement tests and analyzed using descriptive and inferential statistics. Descriptive statistics were used to determine the mean, minimum score, maximum score, and standard deviation of pretest and posttest scores. Inferential analysis was conducted using a paired sample t-test to determine the significance of differences between pretest and posttest scores. Furthermore, effect size and normalized gain (N-Gain) analyses were employed to determine the magnitude of the treatment effect and the improvement in students' learning outcomes after the implementation of the Educaplay-based Game Based Learning model.

RESULTS AND DISCUSSION

Based on the results of data analysis using IBM SPSS Statistics 26, several findings were obtained regarding the effect of the Educaplay-based Game Based Learning model on students' learning outcomes in geography learning on seismic material.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest Value	57.2727	33	5.46164	.95075
	Posttest Value	60.6061	33	4.80195	.83591

Source: Processed Data Using IBM SPSS Statistics 26

The descriptive analysis results showed that the average pretest score was 57.27 with a standard deviation of 5.46, while the average posttest score was 60.61 with a standard deviation of 4.80. The total number of respondents involved in this study was 33 students. These findings indicate an increase in students' learning outcomes after the implementation of the Educaplay-based Game Based Learning model

Paired Samples Correlations

		N	Correlation	Significance One-Sided p
Pair 1	Nilai Pretest & Nilai Posttest	33	.720	<.001

Source: Processed Data Using IBM SPSS Statistics 26

Based on the paired samples correlation test, the correlation coefficient was .720 with a significance value of < .001. This result indicates a strong relationship between pretest and posttest scores.

Paired Differences						t	f	Significance
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper			One-Sided p
Pair 1	-	3.88641	.67654	-4.71139	-1.95527	-4.927	32	< .001
Pretest Value	3.33333							
Posttest Value	-							

Source: Processed Data Using IBM SPSS Statistics 26

The results of the paired sample t-test showed that the significance value (Sig. 2-tailed) was less than .001 or lower than 0.05, with a t-value of -4.927 and 32 degrees of freedom. Therefore, there was a significant difference

between pretest and posttest scores, indicating that the Educaplay-based Game Based Learning model significantly affected students' learning outcomes.

Paired Samples Effect Sizes

			Standardizer ^a	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Nilai Pretest - Nilai Posttest	Cohen's d	3.88641	-.858	-1.253	-.453
		Hedges' correction	3.98056	-.837	-1.223	-.442

The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Source: Processed Data Using IBM SPSS Statistics 26

The effect size analysis showed that Cohen's d was -.858 and Hedges' correction was -.837. These values are categorized as large effects, indicating that the implementation of the Educaplay-based Game Based Learning model had a strong impact on improving students' learning outcomes.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NGain	33	-.14	.25	.0732	.09549
Valid N (listwise)	33				

The N-Gain analysis yielded an average score of .0732, with a minimum value of -.14 and a maximum value of .25. Based on the N-Gain criteria, the improvement in students' learning outcomes was categorized as low.

Discussion

The empirical results indicate a statistically significant difference between pretest ($M = 57.27$, $SD = 5.46$) and posttest ($M = 60.61$, $SD = 4.80$) scores ($t(32) = -4.927$, $p < .001$), confirming that the Educaplay-based Game-Based Learning (GBL) model meaningfully enhances tenth-grade students' geography learning outcomes on seismic material. This improvement aligns with the foundational principles of GBL, which systematically integrate challenge, immediate feedback, and high interactivity to transform passive information reception into active cognitive engagement. When learners participate in digital game mechanics, their cognitive processing shifts toward intrinsic motivation and exploratory curiosity, rendering abstract and multidimensional earthquake concepts—such as tectonic stress accumulation, wave propagation, and magnitude scaling—more accessible and mentally retrievable. Educaplay's architectural design, featuring interactive quizzes, matching exercises, and visual simulations, enables students to self-assess their comprehension iteratively without the anxiety typically associated with formal grading. This pedagogical transformation resonates with contemporary empirical findings that digitally gamified learning environments significantly reduce cognitive load and academic stress while strengthening long-term retention of complex socio-scientific content (Winatha & Setiawan, 2020; Wahyuning, 2022; Sepriyanti et al., 2024; Quinde Cristina Páez et al., 2022).

The effect size analysis yielded a Cohen's d of -0.858 and a Hedges' correction of -0.837, both statistically classified as large effects according to established methodological benchmarks in educational research. The negative sign merely reflects the computational direction (pretest minus posttest), while the magnitude unequivocally demonstrates that the instructional intervention exerted a substantial and educationally meaningful impact on academic achievement. In geography education, particularly for seismology, which requires students to integrate spatial reasoning, causal analysis, and risk mitigation strategies, Educaplay's dynamic visuals and scenario-based

gameplay function as cognitive bridges linking abstract textbook theory to authentic geospatial representations. Students do not merely memorize terminology; they actively construct conceptual understanding through guided spaced repetition and retrieval practice embedded within progressive game levels. This approach directly strengthens neural pathways associated with schema formation and conceptual integration, ultimately reflected in higher posttest performance. Furthermore, the platform's instant feedback mechanism allows learners to promptly identify and correct misconceptions before erroneous knowledge becomes structurally internalized, a critical advantage in preventing persistent geoscientific misunderstandings (Cohen, 1988; Puriani, 2025; Palupi & Suaedi, 2025; Dewi et al., 2018).

Despite the statistical significance and large effect size, the normalized gain (N-Gain) analysis produced an average of 0.0732 (range: -0.14 to 0.25), categorized as low—a finding that demands careful pedagogical and methodological interpretation. This relatively modest proportional increase does not invalidate the model's effectiveness; rather, it suggests that relative learning gains have not yet reached the optimal threshold expected in long-term competency development frameworks. Several contextual factors may explain this disparity: the constrained duration of a single instructional cycle, the inherent cognitive complexity of seismic content requiring extended pedagogical pacing to transition from factual recall to higher-order analytical reasoning, and the potential presence of a ceiling effect where some students had already approached their maximum baseline understanding prior to treatment. Additionally, deploying Educaplay without intensively integrating teacher-led scaffolding, guided debriefing sessions, or post-game reflective discussions may constrain knowledge transfer to authentic, real-world problem-solving contexts. In quantitative experimental research, low N-Gain values frequently emerge when assessment instruments lack sensitivity to subtle cognitive shifts or when treatment intervals are too brief to generate proportional academic growth (Sugiyono, 2022; Nurhajjah, 2025; Winatha & Setiawan, 2020; Quinde Cristina Pérez et al., 2022).

The partial success of this instructional model is heavily influenced by Educaplay's technical affordances, which strategically align with the cognitive and behavioral profiles of contemporary geography learners. Features such as matching puzzles, interactive quizzes, and timed challenges assess not only declarative memory but also associative reasoning, spatial cognition, and rapid adaptive responsiveness to learning stimuli. As students navigate digital game environments, they unconsciously engage in an exploratory learning cycle that encourages mental experimentation, intellectual risk-taking, and autonomous strategy adjustment. The platform's responsive, visually rich, and intuitively structured interface effectively captures the attention of Generation Z learners who possess high digital literacy, thereby mitigating the academic fatigue and disengagement commonly associated with conventional lecture-based instruction. This elevated engagement level subsequently transforms into intrinsic motivation, wherein students participate not due to extrinsic curricular pressure but because the learning experience feels contextually relevant, psychologically rewarding, and cognitively stimulating. This phenomenon reinforces the theoretical argument that educational gamification, when grounded in sound pedagogical design and aligned with curriculum objectives, can serve as a primary catalyst in shifting student passivity into active, self-directed learning agency (Wahyuning, 2022; Sepriyanti et al., 2024; Palupi & Suaedi, 2025; Dewi et al., 2018).

From a practical standpoint, these findings offer strategic implications for geography educators in designing more adaptive, technology-enhanced learning ecosystems, particularly when teaching disaster-related content that requires integrating conceptual knowledge, practical mitigation skills, and environmental awareness. Teachers can leverage Educaplay not merely as a summative assessment instrument but as a formative exploration medium paired with local seismic case studies, virtual evacuation simulations, or collaborative data-analysis projects. However, this study acknowledges several methodological limitations: the use of a one-group pretest-posttest design without a control group makes strict isolation of confounding variables analytically difficult, and the sample of 33 students from a single secondary school limits the statistical generalizability of the findings. Furthermore, the analytical focus solely on cognitive learning outcomes overlooks critical affective and psychomotor dimensions such as academic self-

efficacy, collaborative problem-solving, and disaster preparedness attitudes, which are also significantly impacted by game-based pedagogical interventions. Therefore, recommendations for future research include employing a quasi-experimental design with a matched control group, expanding the participant pool across multiple schools with varying socioeconomic profiles, integrating mixed-method instruments to capture longitudinal learning dynamics, and extending the intervention duration to ensure proportional cognitive gains (N-Gain) are more accurately, comprehensively, and reliably measured (Cohen, 1988; Sugiyono, 2022; Nurhajjah, 2025; Winatha & Setiawan, 2020).

CONCLUSION

Based on the results of the study, it can be concluded that the Educaplay-based Game Based Learning model significantly affected the learning outcomes of class X students in geography learning on seismic material at SMA Negeri 3 Bireuen. The paired sample t-test results showed a significance value (Sig. 2-tailed) of less than 0.001, which was lower than the significance level of 0.05, indicating a significant difference between pretest and posttest scores. The average score increased from 57.27 in the pretest to 60.61 in the posttest after the implementation of the learning model. In addition, the effect size analysis showed a Cohen's d value of -0.858, indicating a large effect of the treatment on students' learning outcomes. However, the average N-Gain score of 0.0732 was categorized as low, indicating that the improvement in learning outcomes had not yet reached an optimal level. Therefore, the Educaplay-based Game Based Learning model can be considered an effective alternative learning strategy to improve students' learning outcomes and encourage active participation in geography learning on seismic material.

REFERENCES

A. Al-Qur'an dan Hadis

- Al-Qur'an al-Karim. (2012). *Al-Qur'an dan terjemahannya*. Kementerian Agama RI.
Ath-Thabrani, A. al-Q. S. bin A. (t.t.). *Al-Mu'jam al-Awsath* (Juz 6). Dar al-Haramain.
Hanbal, A. bin. (t.t.). *Al-Musnad* (Juz 2).
Nawawi, I. (t.t.). *Al-Arba'īn an-Nawawīyyah*.

B. Buku dan Monograf

- Abdussamad, Z. (2021). *Metode penelitian kualitatif*. CV. Syakir Media Press.
Adler, P. A., & Adler, P. (1987). *Membership roles in field research*. Sage Publications.
Afifuddin. (2009). *Metodologi penelitian kualitatif*. Pustaka Setia.
Amin, S. M. (2009). *Ilmu dakwah*. Amzah.
Arikunto, S. (2011). *Prosedur penelitian: Suatu pendekatan praktik* (Edisi VII). Rineka Cipta.
Aziz, M. A. (2009). *Ilmu dakwah*. Prenada Media Group.
Aziz, M. A. (2016). *Ilmu dakwah*. Kencana.
Azra, A. (2005). *Islam reformis: Dinamika intelektual dan gerakan*. RajaGrafindo Persada.
Bungin, B. (2013). *Metodologi penelitian sosial dan ekonomi*. Prenada Media Group.
Castells, M. (2009). *Communication power*. Oxford University Press.
Castells, M. (2010). *The power of identity* (2nd ed.). Wiley-Blackwell.
Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.
Effendy, O. U. (2009). *Ilmu komunikasi: Teori dan praktek*. Remaja Rosdakarya.
Effendy, O. U. (2011). *Ilmu komunikasi: Teori dan praktik*. Remaja Rosdakarya.

- Faisal, S. (2001). *Metodologi penelitian sosial*. Erlangga.
- Gottschalk, L. (1986). *Understanding history: A primer of historical method*. UI Press.
- Hafidhuddin, D. (2002). *Zakat dalam perekonomian modern*. Gema Insani.
- Herdiansyah, H. (2010). *Metodologi penelitian kualitatif untuk ilmu-ilmu sosial*. Salemba Humanika.
- Herdiansyah, H. (2014). *Metodologi penelitian kualitatif*. Salemba.
- Kotler, P., & Armstrong, G. (2014). *Principles of marketing* (15th ed.). Pearson Education.
- Kriantono, R. (2019). *Pengantar lengkap ilmu komunikasi*. Prenada Media.
- Lasswell, H. D. (1948). *The structure and function of communication in society*. Harper & Row.
- Littlejohn, S. W., & Foss, K. A. (2011). *Theories of human communication* (11th ed.). Waveland Press.
- Moleong, L. J. (2016). *Metodologi penelitian kualitatif* (Cet. XXXV). Remaja Rosdakarya.
- Mukhyiddin, & Musyafa'. (2021). *Fundraising communication strategy of Islamic philanthropy institutions*. Jihbiz.
- Nata, A. (2013). *Ilmu dakwah*. Kencana Prenada Media Group.
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon & Schuster.
- Robbins, S. P., & Coulter, M. (2016). *Management*. Pearson Education.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Sabiq, S. (1988). *Fiqh al-Sunnah*. Maktabah al-Taufiq.
- Sargeant, A. (2010). *Marketing management for nonprofit organizations*. Oxford University Press.
- Sargeant, A., & Jay, E. (2014). *Fundraising management*. Routledge.
- Schultz, D., Tannenbaum, S., & Lauterborn, R. (1993). *Integrated marketing communications*. NTC Business Books.
- Shihab, M. Q. (2005). *Tafsir al-Mishbah: Pesan, kesan, dan keserasian Al-Qur'an* (Jilid 13). Lentera Hati.
- Shihab, M. Q. (2007). *Wawasan Al-Qur'an: Tafsir maudhu'i atas pelbagai persoalan umat*. Mizan.
- Shihab, M. Q. (2013). *Membumikan Al-Qur'an: Fungsi dan peran wahyu dalam kehidupan masyarakat*. Lentera Hati.
- Siagian, S. P. (2012). *Manajemen sumber daya manusia*. Bumi Aksara.
- Strauss, A., & Corbin, J. (2003). *Dasar-dasar penelitian kualitatif*. Pustaka Pelajar.
- Sugiyono. (2009). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Sugiyono. (2019). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Suharto, E. (2014). *Membangun masyarakat memberdayakan rakyat*. Refika Aditama.
- Terry, G. R. (1977). *Principles of management*. Richard D. Irwin.
- Yusuf, H. M. (2006). *Metode dakwah*. Kencana.
- Zayd, N. H. A. (2015). *Principles of Islamic da'wah*. Dar al-Hikmah.

C. Artikel Jurnal Ilmiah

- Berry, L. L. (1995). Relationship marketing of services—Growing interest, emerging perspectives. *Journal of the Academy of Marketing Science*, 23(4), 236–245. <https://doi.org/10.1177/009207039502300402>
- Fauzan. (2021). Komunikasi persuasif dalam pengelolaan zakat di lembaga amil zakat. *Jurnal Manajemen Dakwah*, 6(1), 33–48.
- Marfu'ah, U., & Sulthon, M. (2020). Komunikasi brand lembaga dakwah: Studi pada lembaga amil zakat Rumah Zakat. *Jurnal Ilmu Dakwah*, 35(1), 139–158.
- Morgan, R. M., & Hunt, S. D. (1994). The commitment–trust theory of relationship marketing. *Journal of Marketing*, 58(3), 20–38. <https://doi.org/10.1177/002224299405800302>
- Nurhadi. (2019). Strategi komunikasi dakwah lembaga zakat dalam meningkatkan kepercayaan muzakki. *Jurnal Komunikasi Dakwah*, 4(1), 15–30.
- Paraswati, V., & Adilah, S. U. F. (2022). The role of philanthropic communication in transformative da'wah. *Ath-Thariq*, 3(2), 12–18.

- Rahman. (2022). Storytelling sebagai strategi komunikasi dakwah dalam meningkatkan partisipasi muzakki lembaga filantropi Islam. *Jurnal Dakwah dan Filantropi*, 3(2), 70–86.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54–67. <https://doi.org/10.1006/ceps.1999.1020>
- Setiadi, B., Fadhil, A., & Handayani, R. (2022). Praktik kehumasan Islam di lembaga modern: Studi kasus pada Dompot Dhuafa. *Jurnal Dakwah dan Komunikasi*, 7(1), 88–95.
- Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Nelson-Hall.
- Wahyuni, & Anwar. (2020). Pemanfaatan media digital dalam komunikasi dakwah lembaga filantropi Islam. *Jurnal Komunikasi Islam*, 8(2), 45–62.
- Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing*, 60(2), 31–46. <https://doi.org/10.2307/1251929>