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The Use of AI-Generated Comic Strips Based on Indonesian Local Culture to Enhance Students' Vocabulary Achievement: A Study at the Eighth Grade Students of SMP Negeri 4 Semarang

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ABSTRACT

Vocabulary mastery remains a major obstacle for Indonesian junior high school EFL learners, who often struggle to understand and use English words in meaningful contexts because instruction still relies heavily on memorization and translation. This study investigated whether AI-generated comic strips based on Indonesian local culture (Kecak Dance, Tenun Ikat, and Wayang Kulit) could enhance eighth-grade students' vocabulary achievement. A pre-experimental one-group pretest-posttest design was employed involving 32 students of class VIII A at SMP Negeri 4 Semarang in the 2025/2026 academic year, using a 25-item multiple-choice vocabulary test (Cronbach's Alpha = 0.880). The mean score increased from 45.00 in the pretest to 75.75 in the posttest. Because the pretest data were not normally distributed (Shapiro-Wilk, Sig. = 0.000), a Wilcoxon Signed Rank Test was applied, yielding an Asymp. Sig. (2-tailed) of 0.000 ($p < 0.05$), with all 32 students showing improvement and none regressing. These findings indicate that AI-generated comic strips grounded in familiar local-cultural themes significantly improved students' vocabulary achievement by combining visual storytelling, contextual exposure, and culturally relevant content, supporting Dual Coding Theory and Multimedia Learning Theory. The study implies that culturally responsive,

technology-assisted visual media can serve as an effective alternative medium for vocabulary instruction in EFL classrooms.
Keywords: AI-generated comic strips, artificial intelligence, EFL vocabulary learning, Indonesian local culture, vocabulary achievement

Introduction

English functions as an international language used in education, technology, science, and global communication, and in Indonesia it is taught as a foreign language beginning at the junior high school level. Despite years of formal instruction, many students still experience difficulties in developing English proficiency, especially vocabulary mastery. Vocabulary is a fundamental component of language learning because it supports learners in understanding information, expressing ideas, and communicating effectively. Limited vocabulary also hinders the development of reading, writing, listening, and speaking skills, making it one of the major barriers to English achievement among EFL learners (Ayu Cleverisa et al., 2022).

Vocabulary learning challenges are often caused by limited exposure to English, insufficient meaningful practice, and instructional methods that provide few opportunities to use vocabulary in context (Nation, 2022). Many classrooms continue to emphasize memorization and translation, which help students recognize words but are less effective in developing communicative vocabulary knowledge. As a result, learners often forget new words and struggle to use them appropriately in sentences (Nation, 2022). Therefore, vocabulary instruction should provide meaningful contextual activities that actively involve students with new words (Nation, 2022). This study focuses on four parts of speech, namely nouns, verbs, adjectives, and adverbs, because organizing vocabulary according to word function improves students' understanding of sentence structure and vocabulary retention.

Creative learning media are needed to overcome these challenges. Comic strips have attracted attention because they combine visual elements, short texts, and storytelling to present vocabulary in meaningful contexts, enabling students to infer meanings through contextual clues. Digital comic strips have been shown to improve vocabulary mastery while creating enjoyable and motivating learning experiences (Utami et al., 2025).

Recent technological developments, particularly generative artificial intelligence, provide additional opportunities to create engaging instructional materials. Generative AI enables teachers to produce flexible and creative text, images, and multimedia that support meaningful learning experiences (Olga et al., 2023). AI based learning media also offer interactive and contextualized learning opportunities (Nurwahyuningsih et al., 2025). However, AI implementation should consider students' backgrounds and experiences to ensure learning remains meaningful and relevant. Integrating Indonesian local culture into AI generated comic strips allows students to connect English vocabulary with familiar environments, traditions, and experiences, while simultaneously promoting cultural awareness.

Related Literature

Vocabulary knowledge involves not only understanding word meanings but also recognizing word forms, usage, and relationships among words. Effective vocabulary acquisition requires repeated exposure in meaningful contexts rather than isolated

memorization (Nation, 2022). Meaningful input strengthens vocabulary learning (Barcroft, 2015), contextualized instruction improves vocabulary retention (Nguyen, 2022), and interactive collaborative activities further enhance vocabulary achievement by creating meaningful learning experiences (Artaninda et al., 2025).

Visual media effectively support vocabulary learning by combining verbal and visual information. According to Dual Coding Theory, learners process verbal and visual information simultaneously, leading to stronger comprehension and memory (Paivio, 2008). Multimedia Learning Theory also explains that learning becomes more effective when text and visuals are meaningfully integrated (Mayer, 2020). Consistent with these theories, visually rich digital media have been shown to increase students' motivation and participation in English learning (Listianingsih et al., 2023).

Comic strips provide contextual language exposure by presenting vocabulary naturally through conversations and stories, enabling students to infer meanings from characters, actions, and situations. This contextual presentation improves comprehension, retention, motivation, reading skills, and overall engagement (Syafitri et al., 2026).

Generative AI offers opportunities to create personalized and interactive learning materials tailored to students' needs. Technology supported digital storytelling also provides multimodal input that enhances vocabulary acquisition (Nami & Asadnia, 2024). Nevertheless, AI should remain a pedagogical tool that supports rather than replaces teachers by assisting in generating story ideas and visual prompts for instructional media.

Culture and language are closely interconnected, and incorporating local culture into English learning creates familiar contexts that improve motivation, participation, comprehension, and engagement. In this study, Indonesian local culture is represented through traditional performances, local traditions, and cultural stories embedded in AI generated comic strips to support vocabulary learning while strengthening students' cultural awareness (Amalia et al., 2026).

Although previous studies have examined comic strips, digital learning media, and artificial intelligence separately, limited research has investigated AI generated comic strips based on Indonesian local culture for vocabulary learning among junior high school students. This study addresses this gap by examining the effectiveness of AI generated comic strips based on Indonesian local culture in improving the vocabulary achievement of eighth grade students at SMP Negeri 4 Semarang during the 2025/2026 academic year. The study is expected to contribute to the development of technology based English learning media that integrate AI generated visual materials with culturally relevant content for junior high school EFL learners.

Hypotheses

This study proposes the following hypotheses to determine whether AI-generated comic strips based on Indonesian local culture produce a significant difference in students' vocabulary achievement before and after treatment: (H_0) there is no significant difference in students' vocabulary achievement before and after being taught using AI-generated comic strips based on Indonesian local culture; (H_1) there is a significant difference in students' vocabulary achievement before and after being taught using AI-generated comic strips based on Indonesian local culture.

Methods

This study employed a quantitative pre experimental one group pretest posttest design (O_1 X O_2), where O_1 represented the pretest measuring students' initial vocabulary achievement, X referred to the treatment using AI generated comic strips based on Indonesian local culture, and O_2 represented the posttest measuring vocabulary achievement after treatment. This design was selected because it involved a single group without a control group and examined the effect of a new instructional medium in an authentic classroom setting (Creswell & Creswell, 2017). The findings therefore indicate within group improvement rather than causal superiority over other instructional methods.

The independent variable was AI generated comic strips based on Indonesian local culture, while the dependent variable was students' vocabulary achievement measured through pretest and posttest scores. The participants were 32 eighth grade students of class VIII A at SMP Negeri 4 Semarang in the 2025/2026 academic year selected through purposive sampling because they met the research criteria and had sufficient prior English knowledge.

Data were collected using a 25 item multiple choice vocabulary test assessing word meaning, contextual recognition, and appropriate usage across nouns, verbs, adjectives, and adverbs. The instrument was developed through indicator selection, item construction, and a try out test. Item validity was analyzed using Pearson Product Moment Correlation in SPSS 27 with Sig. < 0.05 as the criterion. Of 35 items, 27 were valid and 25 were selected for the final instrument. Reliability analysis using Cronbach's Alpha produced a coefficient of 0.880, indicating high internal consistency and confirming the instrument was reliable for measuring vocabulary achievement.

Table 1. Distribution of Vocabulary Test Items

No.	Vocabulary Aspect	Indicator	Total Items
1	Noun	Students are able to identify nouns related to Indonesian cultural objects, places, characters, and elements presented in the comic strips.	7
2	Verb	Students are able to identify and understand verbs related to actions or activities in the comic strips.	6
3	Adjective	Students are able to identify adjectives used to describe characteristics, conditions, or cultural elements in the comic strips.	6
4	Adverb	Students are able to identify adverbs related to time, place, manner, or situations in the context of the stories.	6
	Total		25

Source: Developed by the researcher based on the vocabulary classification proposed by Nation (2013); item numbers were determined from the try-out results.

Data collection began with school permission and coordination with the English teacher. A try out test was administered to class VIII B to establish instrument validity and reliability, followed by a pretest for class VIII A. Students then received three treatment sessions using AI generated comic strips based on Indonesian local culture before completing the same 25 item posttest. Pretest and posttest scores were compared to measure improvement.

Data were analyzed using SPSS version 27 through descriptive statistics, the Shapiro Wilk normality test for samples below 50, and hypothesis testing using either the Paired Sample T Test or the Wilcoxon Signed Rank Test, with Sig. < 0.05 indicating a significant difference.

Findings and Discussion

Findings

This study involved 32 students of class VIII A at SMP Negeri 4 Semarang in the 2025/2026 academic year, using a one-group pretest-posttest design to investigate whether AI-generated comic strips based on Indonesian local culture could enhance students' vocabulary achievement. The comic strips, developed using ChatGPT, presented three Indonesian cultural themes — Kecak Dance, Tenun Ikat, and Wayang Kulit — through which vocabulary was introduced in contextual situations supported by visual illustration and cultural content. Research activities proceeded from a try-out test in class VIII B, through the pretest, three treatment sessions (one for each cultural theme), and finally the posttest in class VIII A, as summarised in Table 2.

Table 2. Research Activities

Class	Date	Activity	Description
VIII B	Monday, 11 May 2026	Try-out Test	Administration of the try-out test to examine instrument validity and reliability.
VIII A	Monday, 18 May 2026	Pretest	Initial vocabulary test before treatment.
VIII A	Monday, 18 May 2026	Treatment 1	Vocabulary learning through the AI-generated comic strip: Kecak Dance.
VIII A	Tuesday, 19 May 2026	Treatment 2	Vocabulary learning through the AI-generated comic strip: Tenun Ikat.
VIII A	Tuesday, 26 May 2026	Treatment 3	Vocabulary learning through the AI-generated comic strip: Wayang Kulit.
VIII A	Tuesday, 26 May 2026	Posttest	Final vocabulary test after treatment.

Prior to the main research, a try-out test comprising 35 multiple-choice items was administered to class VIII B. Item validity, analysed using Pearson Product Moment

Correlation in SPSS 27, identified 27 valid and 8 invalid items; to avoid redundant coverage of the same indicators, 25 valid items representing all vocabulary indicators proportionally were retained for the final instrument. Reliability analysis using Cronbach's Alpha produced a coefficient of 0.880, well above the 0.70 threshold, confirming that the instrument had high internal consistency and was suitable for measuring vocabulary achievement (Table 3).

Table 3. Result of Instrument Analysis

Analysis	Result	Interpretation
Validity	27 valid items out of 35 items	Items were acceptable
Reliability	Cronbach's Alpha = 0.880	Highly reliable

The pretest, administered before treatment, showed that most students still had limited vocabulary achievement: many were unable to accurately identify word meanings or interpret vocabulary in contextual situations. Scores ranged from 40 to 52, with a mean of 45.00 (SD = 4.429, N = 32), indicating that students needed a more engaging and contextual medium to support vocabulary learning. Following the three treatment sessions using AI-generated comic strips based on Indonesian local culture, the posttest — using the same 25 items — showed a marked improvement: scores ranged from 56 to 92, with a mean of 75.75 (SD = 8.374, N = 32), an increase of 30.75 points over the pretest mean. Table 4 summarises these descriptive statistics.

Table 4. Descriptive Statistics of Pretest and Posttest Scores

Test	N	Minimum	Maximum	Mean (SD)
Pretest	32	40	52	45.00 (4.429)
Posttest	32	56	92	75.75 (8.374)

Most students demonstrated a clearer understanding of vocabulary meaning and greater accuracy in identifying words presented in context after the treatment, suggesting that the AI-generated comic strips based on Indonesian local culture were effective in enhancing eighth-grade students' vocabulary achievement at SMP Negeri 4 Semarang. Because the number of participants was fewer than 50, a Shapiro-Wilk normality test was conducted to determine the appropriate hypothesis-testing procedure; the pretest data were not normally distributed (Sig. = 0.000), while the posttest data were normally distributed (Sig. = 0.164), as shown in Table 5. Since the assumption of normality was not met for both measurements, the non-parametric Wilcoxon Signed Rank Test was selected to compare the pretest and posttest scores.

Table 5. Normality Test Results (Shapiro-Wilk)

Test	Statistic (df = 32)	Sig.
Pretest	Shapiro-Wilk	0.000
Posttest	Shapiro-Wilk	0.164

The Wilcoxon Signed Rank Test showed 32 positive ranks (students whose posttest scores exceeded their pretest scores), no negative ranks, and no ties, with a mean rank of 16.50 and a sum of ranks of 528.00 (Table 6). This indicates that every one of the 32 students achieved a higher score on the posttest than on the pretest, without exception.

Table 6. Wilcoxon Signed Ranks (Posttest – Pretest)

Ranks	N	Mean Rank	Sum of Ranks
Negative Ranks	0	–	–
Positive Ranks	32	16.50	528.00
Ties	0	–	–
Total	32		

The Wilcoxon Test Statistics produced an Asymp. Sig. (2-tailed) value of 0.000. Following the decision criterion that a significance value below 0.05 leads to rejection of the null hypothesis, H_0 was rejected and H_1 was accepted, confirming a statistically significant difference between students' vocabulary achievement before and after being taught using AI-generated comic strips based on Indonesian local culture.

Discussion

The findings demonstrate a significant improvement in students' vocabulary achievement after learning through AI generated comic strips based on Indonesian local culture. The mean score increased from 45.00 to 75.75, and the Wilcoxon Signed Rank Test confirmed a significant difference (Asymp. Sig. = 0.000, $p < 0.05$). Before treatment, students experienced difficulties understanding word meanings, usage, and contextual vocabulary, highlighting the need for meaningful vocabulary instruction beyond memorization (Setyaningrum et al., 2026).

The improvement supports Dual Coding Theory (Paivio, 2008) and Multimedia Learning Theory (Mayer, 2020), as vocabulary was presented through both visual illustrations and written dialogue, enabling students to process information through verbal and visual channels simultaneously (Adi & Ambarini, 2025; Ambarini et al., 2024, 2025). The integration of Indonesian local culture, including Kecak Dance, Tenun Ikat, and Wayang Kulit, further strengthened learning by connecting new vocabulary with familiar experiences, consistent with previous studies (Sumardiyani & Ambarini, 2025; Nurhartanti & Ambarini, 2024; Azka & Ambarini, 2023; Utami et al., 2026; Ambarini et al., 2021). Generative AI, represented by ChatGPT, supported the efficient creation of story ideas and visual prompts while visual storytelling and cultural relevance remained the primary factors influencing vocabulary gains (Laveresa et al., 2024).

The study was limited by its one group design and single class sample, reducing generalizability. Future studies should involve larger samples, control groups, longer treatments, and other language skills (Ambarini et al., 2026). Overall, AI assisted culturally relevant visual media provide an engaging and contextual approach to vocabulary instruction (Ambarini et al., 2018, 2019; Suciati & Ambarini, 2018).

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Conclusion

This study examined the effectiveness of AI generated comic strips based on Indonesian local culture in improving the vocabulary achievement of eighth grade students at SMP Negeri 4 Semarang during the 2025/2026 academic year using a pre experimental one group pretest posttest design involving 32 students. After instrument validation, with 27 of 35 try out items found valid and a final 25 item instrument achieving a Cronbach's Alpha of 0.880, the pretest mean score was 45.00, indicating limited vocabulary mastery. Following three treatment sessions featuring Kecak Dance, Tenun Ikat, and Wayang Kulit, the posttest mean increased to 75.75. The Wilcoxon Signed Rank Test confirmed a statistically significant improvement (Asymp. Sig. = 0.000, $p < 0.05$), with all students showing progress. These findings indicate that AI generated comic strips integrating visual storytelling, contextual learning, and Indonesian local culture effectively improved vocabulary achievement and can serve as an alternative instructional medium for junior high school English learning (Alfianto & Ambarini, 2020; Ma & Ambarini, 2023; Putri & Ambarini, 2025)..

Suggestions

English teachers are encouraged to use AI generated comic strips to support contextual vocabulary learning. Students should actively engage with the visual materials and practice vocabulary in meaningful contexts. Schools should provide facilities that encourage technology based instructional media (Ambarini et al., 2025; Hasanah et al., 2023; Prayogo et al., 2021; Rahmawati & Ambarini, 2023). Future research should involve larger samples, longer treatments, control groups, and other language skills..

References

Artaninda, P. S., Setyaji, A., & Ambarini, R. (2025). Integrating the 'Snakes and Ladders' Board Game with Collaborative Learning to Enhance Young Learners' Vocabulary. *English Learning Innovation*, *6*(1), 124–133. https://doi.org/10.22219/englie.v6i1.39372

Ayu Cleverisa, S., Sahiruddin, S., & Perdhani, W. C. (2022). The Correlation between EFL Students' Vocabulary Mastery and Their Reading Ability. *Jurnal Pendidikan : Riset Dan Konseptual*, *6*(3), 487. https://doi.org/10.28926/riset_konseptual.v6i3.555

Ambarini, R., Sumardiyani, L., Utami, H. R., & Zahraini, D. A. (2025). *ENHANCING ENGLISH VOCABULARY THROUGH TOY THEATER : GAMIFICATION AND CULTURE IN*. *10*(1), 31–42.

Arikunto, S. (2018). *Dasar-Dasar Evaluasi Pendidikan*. Bumi Aksara.

Alfianto, C. N., & Ambarini, R. (2020). The implementation of Word Cookies apps to improve vocabulary mastery of students at Semarang 2: Literature review. *Edelweiss: Journal of Innovation in Educational Research, 1*(3), 1–8. https://doi.org/10.62462/edelweiss.v1i3.9

Amalia, D. R., Ambarini, R., & Wahyuni, S. (2026). The effect of video clips and role play on students' listening and speaking skills. *English Learning Innovation, 7*(2), 533–548. https://doi.org/10.22219/englie.v7i2.44960

Ambarini, R., Hidayat, N., Utami, H. R., & Zahraini, D. A. (2025). Teaching English through Islamic values and technology: Evaluating Toy Theater's impact in Islamic

education. *Journal of English Teaching and Linguistic Issues (JETLI), 4*(1). https://doi.org/10.58194/jetli.v4i1.1950

Barcroft, J. (2015). Vocabulary in Language Teaching. *Vocabulary in Language Teaching*, 1–36. https://doi.org/10.4324/9781315679549

Cohen, L., Manion, L., & Morrison, K. (2018). Research Methods in Education. *Research Methods in Education*. https://doi.org/10.4324/9781315456539

Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications. https://books.google.co.id/books?id=335ZDwAAQBAJ

Insam, V., & Sadji Evenddy, S. (2022). The Influence of Using Digital Comic Strips on the Vocabulary Mastery of Eighth Graders at SMPN 6 Cilegon. *Jurnal Ilmiah Pendidik Indonesia*, *4*(1), 27–37.

Listianingsih, W., Setyaji, A., & Ambarini, R. (2023). The Effect of Padlet in Collaborative Learning of " Kurikulum Merdeka " to Improve Students ' Writing Ability in Recount Text. *Eternal: English Teaching Journal*, *14*(2), 126–145.

Mayer, R. (2020). Multimedia Learning. *Multimedia Learning*. https://doi.org/10.1017/9781316941355

Nami, F., & Asadnia, F. (2024). Exploring the effect of EFL students' self-made digital stories on their vocabulary learning. *System*, *120*. https://doi.org/10.1016/j.system.2023.103205

Nation, I. S. P. (2022). *Learning Vocabulary in Another Language* (3rd ed.). Cambridge University Press.

Nguyen, T. C. D. (2022). the Impact of Context on Efl Learners' Vocabulary Retention. *European Journal of Foreign Language Teaching*, *6*(2). https://doi.org/10.46827/ejfl.v6i2.4295

Nurwahyuningsih, P., Erna, N., & Nurianti, H. S. (2025). *The Potential of Artificial Intelligence in Developing Cultural Context of English Learning Materials : A Review Study*. *8*(2), 723–729.

Olga, A., Tzirides, A. O., Saini, A., Zapata, G., Searsmith, D., Cope, B., Kalantzis, M., Castro, V., Kourkoulou, T., Jones, J., Silva, R., Whiting, J., & Kastania, N. P. (2023). *Generative AI: Implications and Applications for Education*. https://doi.org/10.48550/arXiv.2305.07605

Paivio, A. (2008). Mental Representations: A dual coding approach. *Mental Representations: A Dual Coding Approach*, 1–322. https://doi.org/10.1093/acprof:oso/9780195066661.001.0001

Hasanah, A. U., Ambarini, R., & Shiang, G. Y. (2023). An analysis of learning activities for problem based learning in the procedure text lesson plan. *PRIMER: Jurnal Ilmiah Multidisiplin, 1*(5), 503–513. https://doi.org/10.55681/primer.v1i5.192

Ma, S., & Ambarini, R. (2023). Error analysis on students' writing task of personal letters. *MARAS: Jurnal Penelitian Multidisiplin, 1*(2). https://doi.org/10.60126/maras.v1i2.53

Prayogo, G., Ambarini, R., & Sukmaningrum, R. (2021). The comparison of cultural values analysis of *Joker* and *Marlina si Pembunuh dalam Empat Babak* and its contribution to cross cultural understanding teaching. *LINC ED: Linguistics and Education Journal, 1*(1), 1–29. https://doi.org/10.26877/lej.v1i1.9398

Putri, S. K., & Ambarini, R. (2025). Enhancing vocabulary acquisition with fairy tale audio in English lesson at SMAN 1 Mayong Jepara. *Jejak Digital: Jurnal Ilmiah Multidisiplin, 1*(5), 3286–3292. https://doi.org/10.63822/y6jz2n36

Rahmawati, L. F., & Ambarini, R. (2023). The correlation between vocabulary mastery and grammar mastery to reading comprehension of students of SMPN 1 Karangawen. *Metta Jurnal Penelitian Multidisiplin Ilmu, 2*(4), 2149–2156. https://melatijournal.com/index.php/Metta/en/article/view/490

Santoso, L. A., Ambarini, R., & Wahyu Widiyanto, M. (2025). Enhancing Vocabulary and Academic Achievement through Group Learning among Primary School EFL Learners a Study at a Primary School in Semarang. *Linguistic, English Education and Art (LEEA) Journal*, *8*(3), 283–304. https://doi.org/10.31539/leea.v8i3.15429

Syafitri, A. L., Ambarini, R., & Yulianti, F. (2026). Improving junior high school students' listening comprehension in English learning through Spotify podcast application. *English Learning Innovation, 7*(2), 549–561. https://doi.org/10.22219/englie.v7i2.45147

Utami, H. R., Sumardiyani, L., Zahraini, D. A., & Ambarini, R. (2025). Addressing the gap between language literacy and physical education: A bilingual Socratic play based inquiry model for vocabulary and grammar development. *Jurnal Penelitian Multidisiplin Bangsa, 2*(7), 1199–1210. https://ejournal.amirulbangunbangsapublishing.com/index.php/jpnmb/article/view/656