

# Integration of Artificial Intelligence (AI) and Cartoon Animation Films in the English Language Learning Process at Elementary School

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## ABSTRACT

English language learning in elementary school requires engaging and contextual media to support children's vocabulary development. This study examined the use of Artificial Intelligence (AI) integrated with the animated series Bluey in English vocabulary learning among sixth-grade students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru. A quantitative pre-experimental design with a one-group pretest-posttest model was employed with 26 sixth-grade students selected purposively because they were the class receiving the AI-supported Bluey-based English instruction. During the treatment, students watched selected episodes of Bluey, engaged with English vocabulary presented through the animated content, and used AI-supported activities to reinforce vocabulary learning through guided practice and feedback. Vocabulary tests were administered before and after the treatment. The data were analyzed using descriptive statistics and a paired-samples t-test with SPSS. The results showed an increase in the mean vocabulary score from 62.88 (SD = 18.23) in the pretest to 80.57 (SD = 11.60) in the posttest. The paired-samples t-test showed a statistically significant difference between the two scores,  $t(25) = 7.723$ ,  $p < .001$ . These findings indicate that the AI-supported use of Bluey was associated with a significant improvement in students' English vocabulary scores. The findings suggest that integrating animated audiovisual content with AI-supported learning activities can provide an engaging supplementary approach to elementary English instruction when implemented with appropriate teacher guidance.

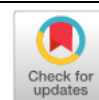
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## INTRODUCTION

English is introduced in elementary education to provide students with foundational language skills for communication in an increasingly globalized world. However, learning a foreign language at the elementary level presents several challenges, particularly limited vocabulary, low confidence in using English, and instructional practices that may remain predominantly teacher- and textbook-centered. These conditions can restrict students' opportunities to engage actively with English and apply new vocabulary in meaningful contexts. Similar challenges were identified at SD IT Imam Syafi'i Cendekia 2 Pekanbaru, where English instruction is expected to be engaging while remaining consistent with the school's integrated Islamic education values. This context highlights the need for instructional approaches that can provide meaningful language exposure, encourage active participation, and remain appropriate for elementary learners.

The development of digital technology has created new possibilities for addressing these challenges through the integration of Artificial Intelligence (AI) and animated audiovisual media. Cartoon animation is particularly relevant to elementary English instruction because moving images, colors, sounds, characters, and storylines can present language in contextualized and potentially more accessible ways. One example is Bluey, an

Australian animated series that provides exposure to authentic English language use and cultural elements that may be relevant to elementary language learning (Arigita-García et al., 2024). Previous research supports the potential of cartoon animation for vocabulary development. Arifani (2020), for example, examined cartoon video-assisted learning and its contribution to incidental vocabulary acquisition among young EFL learners. Similarly, Rizkiyana & Hiarulla (2025) reported that using WordWorld cartoons supported vocabulary learning among fifth-grade students. These findings suggest that animated content can provide meaningful audiovisual input and contextualized exposure to English vocabulary.

AI-based learning technologies, meanwhile, can provide personalized learning materials, immediate feedback, and opportunities for repeated language practice. These affordances may allow students to engage with English at their own pace and practise language without the immediate social pressure that can occur during classroom interaction. Supporting this potential, Seo & Kim (2023) investigated AI chatbot-based activities among elementary English learners and reported benefits for vocabulary abilities and affective aspects of learning. Furthermore, Huang et al. (2022), in a systematic review of chatbot-supported language learning, identified personalization, timely responses, and conversational interaction as potential benefits of educational chatbots. Alhazmi (2024) also highlighted the potential of multimedia-based instruction to improve vocabulary learning and retention, although the findings from undergraduate learners may not directly generalize to elementary students. When integrated, animated content and AI can serve complementary functions: animation provides contextualized audiovisual language input, while AI can support follow-up practice, personalization, and feedback. Nevertheless, further empirical investigation is needed to determine whether combining AI-supported activities with Bluey animation can improve English vocabulary mastery among Indonesian elementary school students.

Previous studies have provided evidence of the potential of digital technologies and AI in elementary language learning. Hasibuan et al. (2025) reported that interactive learning applications, animated videos, and digital educational games can increase students' enthusiasm, support vocabulary comprehension, and encourage active engagement. Hartati et al. (2025), in a literature study examining AI use in elementary students' speaking development, found that AI-based technologies can support language learning through personalized feedback and opportunities for practice. Similarly, Zahara et al. (2023) highlighted the potential of AI to personalize learning materials and automate feedback, while emphasizing the importance of teacher guidance. Amelia et al. (2024) further reported that AI-supported learning media can encourage active engagement and critical thinking among elementary students when implemented with appropriate instructional guidance.

Despite these promising findings, previous studies have generally examined animated media, digital learning applications, or AI as separate instructional resources. Limited attention has been given to their integration, particularly the use of an AI-supported animated series as a medium for English vocabulary learning among elementary school students. Moreover, empirical evidence from Indonesian elementary school contexts remains limited, especially in schools that integrate general education with Islamic educational values. Therefore, the present study investigates the use of AI-supported *Bluey* animated content in English vocabulary learning among sixth-grade students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru. By examining changes in students' vocabulary scores before and after the intervention, this study seeks to provide empirical evidence regarding the potential of combining animated audiovisual input with AI-supported learning activities as a supplementary approach to elementary English instruction.

In the area of animated media, Indah et al. (2023) designed and implemented interactive animation as an English learning medium for children and found that the medium was suitable for introducing vocabulary and sentence patterns. Ratri & Janattaka (2024) developed an AI-assisted animated video medium for the elementary level and reported a high degree of validity and practicality, accompanied by improved student learning outcomes. Similar findings were reported by Wahyuni & Effendi (2026) in the development of an AI-assisted animated video medium integrated with local wisdom. Internationally, Arian &

Taraf (2010), through a pretest-posttest experimental design, demonstrated that learning with authentic cartoon shows significantly improved students' vocabulary and grammar mastery compared to conventional instruction. Taken together, these studies suggest that AI and cartoon animation each contribute positively to language learning, yet studies that examine their integration as a single instructional strategy remain limited.

Although previous studies have shown the potential of AI and animated cartoons separately in language learning at the elementary level, research that specifically and empirically tests the effect of integrating AI and a cartoon animation film in this case, the *Bluey* show into the English learning process at an integrated Islamic elementary school such as SD IT Imam Syafi'i Cendekia 2 Pekanbaru remains very limited. This gap underlies the need for the present study, which quantitatively tests whether the integration of AI and cartoon animation film has a significant effect on improving students' English vocabulary mastery.

Based on the description above, the research question of this study is: "Is there a significant effect of integrating Artificial Intelligence (AI) and cartoon animation film on improving the English vocabulary mastery of sixth-grade students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru?" The research hypotheses are formulated as follows: H0 states that there is no significant effect of integrating AI and cartoon animation film on students' English vocabulary mastery, while Ha states that there is a significant effect of integrating AI and cartoon animation film on students' English vocabulary mastery. This study aims to test this hypothesis through a quantitative approach by comparing students' vocabulary mastery scores before and after the treatment.

## METHOD

### Research Type and Design

This study employed a quantitative approach with a pre-experimental one-group pretest-posttest design. This design involves measuring a single group of participants before and after an instructional treatment without a comparison or control group (Sugiyono, 2017). In this study, students' English vocabulary mastery was measured through a pretest before the intervention and a posttest after the intervention. The treatment consisted of English vocabulary learning activities integrating Artificial Intelligence (AI) with the animated series *Bluey*. The design was selected to examine changes in students' vocabulary mastery following the implementation of the AI-supported animated learning activities. Although the design allows differences between pretest and posttest scores to be examined, the absence of a control group limits the extent to which observed changes can be attributed exclusively to the treatment.

The research design can be represented as follows: O1 X O2, where O1 is the pretest score (before treatment), X is the treatment in the form of learning using the integration of AI and cartoon animation film, and O2 is the posttest score (after treatment). The effect of the treatment was measured by comparing the O1 and O2 scores.

### Population and Sample

The population of this study consisted of all students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru, totaling 420 students, spread across 12 classes from grade I to grade VI, as presented in Table 1.

Table 1. Student Population Data at SD IT Imam Syafi'i Cendekia 2 Pekanbaru

| Grade Level  | Number of Classes | Male Students | Female Students | Total Students |
|--------------|-------------------|---------------|-----------------|----------------|
| I            | 2                 | 36            | 45              | 81             |
| II           | 2                 | 30            | 38              | 68             |
| III          | 2                 | 28            | 32              | 60             |
| IV           | 2                 | 34            | 42              | 76             |
| V            | 2                 | 41            | 35              | 76             |
| VI           | 2                 | 28            | 31              | 59             |
| <b>Total</b> | <b>12</b>         | <b>197</b>    | <b>223</b>      | <b>420</b>     |

The research sample was determined using purposive sampling, a technique of selecting a sample based on specific considerations aligned with the purpose of the study (Sugiyono, 2017). The selected sample consisted of 26 sixth-grade students, chosen on the consideration that students at this level already possess a sufficient basic English vocabulary to have their improvement measured, as well as adequate digital literacy to interact with the AI-supported animated medium.

### Research Procedure and Treatment

The treatment was delivered as an English vocabulary lesson that integrated the Bluey cartoon animation film with AI support, following three stages as presented in Table 2.

Table 2. Stages of the AI and Cartoon Animation Integration Treatment

| Treatment Stage | Activity                                                                                                                                                                           |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-viewing     | The teacher introduces a short clip from an AI-supported Bluey animated episode and presents a list of key vocabulary generated with the help of an AI application before viewing. |
| Whilst-viewing  | Students watch the Bluey animated episode with AI-generated automatic subtitles/translation while completing a vocabulary worksheet.                                               |
| Post-viewing    | Students practice the new vocabulary through an AI chatbot and class discussion, receiving automated pronunciation feedback.                                                       |

Before the treatment was administered, all students completed a pretest to measure their initial vocabulary mastery. After the series of treatments was completed, students completed a posttest of equivalent difficulty to measure the change in vocabulary mastery.

### Research Instrument

The instrument used in this study was an English vocabulary test administered at the pretest and posttest stages, with a maximum score of 100 for each test. The test items were developed based on the vocabulary content contained in the AI-supported Bluey episodes used as the learning medium, covering object vocabulary, daily activities, and simple expressions appropriate to the language development level of sixth-grade elementary school students.

### Data Analysis Technique

The data obtained were analyzed in two stages. First, descriptive statistical analysis was used to calculate the mean and standard deviation (SD) of the pretest and posttest scores, as well as to classify students' scores into the categories of Excellent (90-100), Very Good (80-89), Good (70-79), Fair (60-69), and Poor (<50). Second, inferential statistical analysis was used to test the research hypothesis through a paired-sample t-test with the assistance of SPSS software, in order to examine whether there was a significant difference between the pretest and posttest scores. The obtained t-test value was then compared with the t-table value at a 5% significance level with degrees of freedom ( $df = n-1 = 25$ ). The hypothesis testing criterion was as follows: if the t-test value was greater than the t-table value,  $H_0$  was rejected and  $H_a$  was accepted, meaning there was a significant effect of the treatment given.

## FINDING AND DISCUSSION

### Description of Posttest Scores

Presents the classification of posttest scores of the 26 sixth-grade students after being given the treatment of learning through the integration of AI and cartoon animation film. Based on data an increase in students' scores can be observed after the treatment using the integration of AI and cartoon animation film was administered. Nine students obtained an Excellent score, nine students obtained Very Good, three students obtained Good, and five students obtained Fair, with a total score of 2,095. The mean posttest score was 80.57, with the highest score of 95 (Excellent classification) and the lowest score of 60 (Fair classification). This indicates that students' vocabulary mastery improved after the treatment.

**Comparison of Mean Score and Standard Deviation between Pretest and Posttest**

Table 4. Mean Score and Standard Deviation of the Pretest and Posttest

| Test          | Mean Score | Standard Deviation (SD) |
|---------------|------------|-------------------------|
| Pretest (X1)  | 62.88      | 18.23                   |
| Posttest (X2) | 80.57      | 11.60                   |

The data in Table 4 show that the mean pretest score was 62.88 with a standard deviation of 18.23, while the mean posttest score increased to 80.57 with a standard deviation of 11.60. The decrease in the standard deviation on the posttest also indicates that the distribution of students' scores became more homogeneous after the treatment, meaning the gap in vocabulary mastery among students narrowed.

**Frequency Distribution and Percentage of Pretest and Posttest**

Table 5. Frequency Distribution and Percentage Classification of Pretest and Posttest

| Classification | Score Range | Pretest Frequency | Posttest Frequency | Pretest Percentage | Posttest Percentage |
|----------------|-------------|-------------------|--------------------|--------------------|---------------------|
| Excellent      | 90-100      | 1                 | 9                  | 3.85%              | 34.62%              |
| Very Good      | 80-89       | 5                 | 9                  | 19.23%             | 34.62%              |
| Good           | 70-79       | 8                 | 3                  | 30.77%             | 11.54%              |
| Fair           | 60-69       | 2                 | 5                  | 7.69%              | 19.23%              |
| Poor           | <50         | 10                | -                  | 38.46%             | -                   |
| <b>Total</b>   |             | <b>26</b>         | <b>26</b>          | <b>100%</b>        | <b>100%</b>         |

Table 5 shows that on the pretest, one student (3.85%) obtained an Excellent score, five students (19.23%) obtained Very Good, eight students (30.77%) obtained Good, two students (7.69%) obtained Fair, and ten students (38.46%) fell into the Poor category. After the treatment, the posttest percentages increased significantly: nine students (34.62%) obtained an Excellent score, nine students (34.62%) obtained Very Good, three students (11.54%) obtained Good, five students (19.23%) obtained Fair, and no students fell into the Poor category. This change in distribution reinforces the finding that the integration of AI and cartoon animation film was able to improve students' English vocabulary mastery.

**Paired-Sample T-Test Results**

Table 6. T-Test Results and T-Table Value

| Variable             | T-Test Value | T-Table Value | df |
|----------------------|--------------|---------------|----|
| Pretest and Posttest | 7.723        | 0.781         | 25 |

A t-test was used to test the null hypothesis that there was no significant difference between the pretest and posttest scores. Based on Table 6, the obtained t-test value was 7.723, greater than the t-table value at  $df = 25$ . This indicates a significant difference between students' pretest and posttest results, suggesting that the treatment of learning through the integration of AI and cartoon animation film had a significant effect on students' vocabulary mastery.

**Hypothesis Testing**

This study was conducted to answer the research question: "Is there a significant effect of integrating Artificial Intelligence (AI) and cartoon animation film on improving the English vocabulary mastery of students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru?" with the following statistical hypotheses:

*H<sub>0</sub>: There is no significant effect of integrating AI and cartoon animation film on improving students' English vocabulary mastery.*

*H<sub>a</sub>: There is a significant effect of integrating AI and cartoon animation film on improving students' English vocabulary mastery.*

Based on the test results, a t-test value of 7.723 was obtained with  $df = 25$ , which was greater than the t-table value. It can therefore be concluded that the alternative hypothesis ( $H_a$ ) is accepted and the null hypothesis ( $H_0$ ) is rejected, meaning that the integration of AI and cartoon animation film has a significant effect on improving the English vocabulary mastery of sixth-grade students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru.

## Discussion

The findings of this study provide insight into the effectiveness of integrating AI and cartoon animation film on the English vocabulary mastery of elementary school students, as reflected in the pretest and posttest results of the sixth-grade students. The mean score obtained by students increased from 62.88 on the pretest to 80.57 on the posttest, which falls into the Very Good category. This increase indicates that combining the Bluey cartoon animation with AI support had a positive effect on students' vocabulary mastery after the treatment, and this effect was proven to be statistically significant through the t-test results. The use of cartoon animation, particularly Bluey, aligns with the findings of [Arigita-García et al. \(2024\)](#), who showed that the series not only introduces elements of Australian culture but can also be used as an authentic language learning medium. This is consistent with the researchers' experience in using Bluey for students' vocabulary mastery through authentic pronunciation and intonation.

This finding is further supported by [Arikan & Taraf \(2010\)](#), who, through a pretest-posttest experimental design, found that the use of authentic cartoon shows helped students improve vocabulary and grammar mastery, listening comprehension, as well as motivation and participation in classroom activities. They argue that the combination of animated visuals with authentic spoken English can strengthen learners' understanding and bridge the gap between textbook English and real-life language use. This encouraged the researchers to integrate cartoon animation film as an approach that makes the learning process more enjoyable.

The role of AI in this study further strengthened the learning process through content personalization and automated feedback, in line with the findings of [Hartati et al. \(2025\)](#) as well as [Zahara et al. \(2023\)](#), who emphasized that AI can support the improvement of students' language skills when used under guidance. Based on these findings, the integration of AI and cartoon animation film as a learning treatment has proven effective in helping students improve their English vocabulary mastery, while also making the learning process more engaging and encouraging students' active participation in the classroom.



Picture 1. Briefing for the English teacher



Picture 2. Implementation of the English learning session



Picture 3. Socialization of the English learning program

## CONCLUSION

This study concludes that AI-supported Bluey animated learning activities were associated with improved English vocabulary mastery among sixth-grade students at SD IT Imam Syafi'i Cendekia 2 Pekanbaru. The mean vocabulary score increased from 62.88 in the pretest to 80.57 in the posttest, with a paired-samples t-test indicating a statistically significant difference,  $t(25) = 7.723$ ,  $p < .001$ . These findings suggest that combining animated audiovisual content with AI-supported practice and feedback can provide a useful supplementary resource for vocabulary learning through contextualized language exposure and guided practice. However, the one-group pretest-posttest design without a control group limits the ability to attribute the improvement exclusively to the intervention. Therefore, AI-supported animated materials should complement rather than replace teacher-led instruction. Teacher guidance remains essential to ensure appropriate content, feedback, activities, and screen time for elementary learners. Future research should employ quasi-experimental or true-experimental designs involving larger, more diverse samples and investigate potential benefits for other aspects of English development, including speaking skills and classroom interaction.

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