



Enhancing Students' Vocabulary Mastery Through Big City Adventure Game in Junior High School English Learning

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ABSTRACT

Purpose of the study: This study aimed to determine whether the use of the computer game Big City Adventure was effective in developing students' vocabulary mastery, especially noun vocabulary, among eighth-grade students of SMP Muhammadiyah Palopo in the 2013/2014 academic year.

Methodology: This study used a pre-experimental design with one-group pre-test and post-test. The population consisted of 20 eighth-grade students, and total sampling was applied. Instruments included vocabulary tests (50 noun vocabulary items), questionnaires (10 Likert-scale items), computer, LCD projector, dictionary, and the Big City Adventure computer game as learning media.

Main Findings: The findings showed significant improvement in students' vocabulary mastery after treatment. The pre-test mean score was 4.99, while the post-test mean score increased to 8.38. Most students moved from poor and fair categories to good, very good, and excellent categories. Students also gave positive responses toward learning vocabulary using the computer game.

Novelty/Originality of this study: This study introduced Big City Adventure as an interactive computer game for teaching noun vocabulary in junior high school. Unlike conventional memorization methods, this approach combined visual learning, student engagement, and enjoyable gameplay, helping reduce boredom and increase motivation, interest, and vocabulary retention in English learning.

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1. INTRODUCTION

Vocabulary is one of the most fundamental components in learning English because it becomes the basis for mastering the four major language skills, namely listening, speaking, reading, and writing. Without sufficient vocabulary mastery, students will experience difficulties in understanding texts, expressing ideas, participating in conversations, and producing written work effectively [1]-[3]. Vocabulary serves as the core of language competence since communication cannot occur properly without words. In junior high school level, vocabulary learning becomes an essential stage because students are still in the process of building their basic English competence. Therefore, teachers are required to provide effective and attractive learning strategies that can help students improve their vocabulary mastery systematically and meaningfully [4], [5].

In reality, many students still face serious problems in learning English vocabulary, particularly in memorizing and understanding noun vocabulary [6], [7]. Students often feel that vocabulary learning is difficult, monotonous, and boring because it is commonly taught through conventional methods such as memorization, repetition, and dictionary use without involving interactive learning media. This condition reduces students' motivation and interest in learning English [8]-[10]. As a result, students tend to become passive during the learning process and show low achievement in vocabulary tests. This problem was also found among the eighth-grade students of SMP Muhammadiyah Palopo, where many students showed low motivation to study English and lacked enthusiasm in learning vocabulary, especially because they were reluctant to memorize words and open dictionaries during classroom activities.

The development of technology in education provides opportunities for teachers to integrate digital media into classroom instruction to create more engaging learning environments. One of the technological tools that can be utilized is computer games [11], [12]. Computer games are considered effective learning media because they combine entertainment, visual stimulation, challenge, and interaction, which can increase students' attention and motivation. In language learning, computer games can function not only as recreational activities but also as instructional tools that facilitate vocabulary acquisition [13]. Through games, students can learn while playing, making the learning process more enjoyable and less stressful. This condition supports meaningful learning because students tend to remember vocabulary better when they are emotionally engaged in the activity [14].

One of the computer games that can be applied in vocabulary learning is Big City Adventure. This game is a hidden-object game in which players are required to identify and find various objects displayed on the screen. Most of the objects presented in the game are nouns, making it highly relevant for vocabulary learning purposes, especially for beginner learners [15], [16]. Students are challenged to recognize object names, understand their meanings, and associate them with visual representations. This visual and contextual learning process helps strengthen memory retention and improves vocabulary comprehension. In addition, the game provides enjoyable challenges that can reduce boredom and create a more relaxed classroom atmosphere, allowing students to participate actively in the learning process [17].

The use of Big City Adventure as a teaching medium is expected to solve the problem of low vocabulary mastery among students by transforming passive learning into active participation. Through this game, students are not only exposed to new vocabulary items but are also encouraged to interact, collaborate, and compete positively during classroom activities [18], [19]. The use of computer games can stimulate students' curiosity and create intrinsic motivation to learn English. Furthermore, the game supports the teacher's role in presenting vocabulary in a more concrete and interesting form, especially for noun vocabulary that can be directly visualized. This approach is considered suitable for junior high school students who generally respond better to visual and interactive learning strategies than to traditional memorization methods [20]-[22].

Based on these conditions, this study focuses on investigating whether the use of the computer game Big City Adventure is effective in developing students' vocabulary mastery among eighth-grade students of SMP Muhammadiyah Palopo. This research is important because it provides an alternative teaching strategy for English teachers in improving students' vocabulary learning outcomes. The findings are expected to contribute to the development of innovative English teaching practices, particularly in the integration of educational technology and game-based learning at the junior high school level [23], [24].

Several previous studies have discussed vocabulary improvement through various learning methods. Jasmaruddin found that students' vocabulary improved significantly through the use of word lists, as indicated by the increase in mean scores from pre-test to post-test. Muhammad Solihin reported that computer games were effective in teaching vocabulary to elementary school students, showing substantial improvement after treatment. Muliana also found that students' vocabulary developed effectively through card guessing games at the senior high school level [25], [26]. Although these studies proved that vocabulary can be improved through different media and strategies, most of them focused on general computer games, word lists, and card games without specifically examining hidden-object computer games such as Big City Adventure at the junior high school level. This indicates a research gap regarding the effectiveness of specific interactive visual games for noun vocabulary mastery among eighth-grade students [27], [28].

The novelty of this study lies in the use of Big City Adventure as a specific hidden-object computer game to improve students' noun vocabulary mastery. Unlike previous studies that mostly applied conventional vocabulary games or general computer-based activities, this research integrates visual object recognition, contextual learning, and interactive gameplay simultaneously [29]. The focus on noun vocabulary through direct object identification provides a more concrete learning experience for students. In addition, the implementation at the eighth-grade junior high school level offers new empirical evidence regarding the effectiveness of this game-based learning strategy in improving vocabulary acquisition among adolescent learners in formal classroom settings.

The implication of this study is expected to provide practical contributions for English teachers, students, and future researchers [30]. For teachers, the findings may serve as a reference for selecting innovative and enjoyable instructional media in vocabulary teaching. For students, the use of computer games can increase

motivation, engagement, and confidence in learning English. For schools, this approach supports the integration of technology-based learning in classroom practice. Meanwhile, for future researchers, this study can become a foundation for developing broader investigations related to digital game-based learning, vocabulary mastery, and interactive English teaching strategies in different educational contexts [31].

The urgency of this research is strongly related to the need for improving students' English competence in the modern educational era, where language proficiency and digital literacy are equally important. Traditional vocabulary teaching methods often fail to address students' learning preferences in the digital generation, resulting in low motivation and poor learning outcomes [32]. Therefore, innovative approaches such as computer game-based learning are urgently needed to create meaningful and effective instruction. Investigating the effectiveness of *Big City Adventure* is essential to provide empirical evidence that supports the implementation of enjoyable, technology-assisted learning strategies capable of improving vocabulary mastery and fostering students' long-term interest in English learning.

Based on the background, research gap, novelty, and urgency presented above, this study is guided by the following research questions: (1) How effective is the use of the computer game *Big City Adventure* in improving students' noun vocabulary mastery among eighth-grade students of SMP Muhammadiyah Palopo? (2) How is the implementation of *Big City Adventure* conducted during vocabulary learning activities in the classroom? and (3) How do students respond to the use of *Big City Adventure* as a game-based learning medium in English vocabulary instruction? These research questions are formulated to investigate the effectiveness of the game in vocabulary learning and to obtain a comprehensive understanding of students' engagement and learning experiences through technology-assisted instruction.

2. RESEARCH METHOD

2.1. Research Design

This study employed a pre-experimental research design using one-group pre-test and post-test design [33]. This design was selected because the researcher intended to measure the effectiveness of using the computer game *Big City Adventure* in improving students' vocabulary mastery before and after treatment. In this design, students were first given a pre-test (Y1) to identify their initial vocabulary ability. After that, treatment (X) was conducted through vocabulary learning activities using the computer game *Big City Adventure* for five meetings. Finally, a post-test (Y2) was administered to measure students' vocabulary development after the treatment. The effectiveness of the treatment was determined by comparing the results of the pre-test and post-test. This design is appropriate for identifying the direct influence of instructional treatment on students' learning outcomes.

2.2. Subject/Sample

The population of this study consisted of all eighth-grade students of Junior High School Muhammadiyah Palopo in the 2013/2014 academic year. There was only one class consisting of 20 students. Since the total number of students was relatively small and manageable, the researcher applied total sampling technique, where all members of the population were selected as the research sample. Therefore, the sample of this study included all 20 students of the eighth grade. This sampling technique was chosen to ensure that the research results represented the entire population accurately and to avoid sampling bias.

Table 1. Population and Sample of the Study

Class	Population	Sampling Technique	Sample
Eighth Grade	20 Students	Total Sampling	20 Students

2.3. Source of Data and Data Collection Technique

The primary source of data in this study was obtained directly from students' vocabulary test scores and questionnaire responses [34]. The vocabulary test scores were collected through pre-test and post-test to measure students' vocabulary mastery before and after treatment. Meanwhile, the questionnaire was distributed after the treatment to identify students' responses and perceptions toward the use of *Big City Adventure* in vocabulary learning.

The data collection technique consisted of four stages. First, the researcher administered the pre-test to determine students' prior knowledge of vocabulary. Second, the researcher conducted treatment for five meetings using *Big City Adventure* as the learning media. During the treatment, students were introduced to noun vocabulary presented in the game, divided into groups, and guided to play and discuss the vocabulary items. Third, the researcher administered the post-test to evaluate vocabulary improvement after treatment. Fourth, a questionnaire consisting of 10 Likert-scale statements was distributed to collect students' opinions regarding the effectiveness and attractiveness of the game-based learning process.

2.4. Research Instrument

The instruments used in this study were vocabulary tests and questionnaire sheets [35]. The vocabulary test consisted of 50 items focusing on noun vocabulary in the forms of translating words and matching words. Each correct answer was scored one point. The pre-test was intended to assess students' initial vocabulary mastery, while the post-test measured students' vocabulary achievement after receiving treatment.

In addition, the researcher used a questionnaire consisting of 10 statements with five response options based on Likert Scale, namely Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1). This questionnaire aimed to identify students' attitudes and responses toward the use of Big City Adventure in learning vocabulary. Supporting tools such as a computer, LCD projector, dictionary, and the Big City Adventure game application were also used during the treatment process to facilitate classroom instruction.

Table 2. Research Instruments

Instrument	Purpose	Number of Items
Pre-test	Measure initial vocabulary mastery	50
Post-test	Measure vocabulary improvement	50
Questionnaire	Measure students' responses	10

The instruments used in this study consisted of a pre-test, post-test, and questionnaire. The pre-test was administered to measure students' initial vocabulary mastery before the implementation of the *Big City Adventure* game, while the post-test was used to evaluate students' vocabulary improvement after the treatment. Both tests consisted of 50 items designed to assess students' understanding of noun vocabulary. In addition, a questionnaire containing 10 items was distributed to obtain students' responses and perceptions toward the use of the game as a learning medium in vocabulary instruction.

2.5. Data Analysis Technique

The data were analyzed using descriptive quantitative analysis. First, students' correct answers from both pre-test and post-test were scored using the following formula:

$$\text{Score} = (\text{Students' Correct Answer} / \text{Total Number of Items}) \times 10$$

The students' scores were then classified into seven categories: Excellent (9.6–10), Very Good (8.6–9.5), Good (7.6–8.5), Fairly Good (6.6–7.5), Fair (5.6–6.5), Poor (3.6–5.5), and Very Poor (0–3.5).

Next, the mean score was calculated to determine the average achievement of students in both tests using the formula:

$$M = \frac{\sum X}{N} \quad \dots(1)$$

Where:

M = Mean score

$\sum X$ = Total score

N = Number of students

The standard deviation was also calculated to determine score distribution. Finally, the t-test was used to determine the significance of the difference between pre-test and post-test results. The hypothesis testing criteria were: if t-count > t-table, the null hypothesis (H0) was rejected and the alternative hypothesis (H1) was accepted, indicating that Big City Adventure significantly improved students' vocabulary mastery.

2.6. Research Procedure

The research procedure was conducted systematically in several stages [36]. First, the researcher prepared the research instruments, including vocabulary tests, questionnaire sheets, computer devices, LCD projector, dictionaries, and the Big City Adventure game. Second, the researcher administered the pre-test to assess students' initial vocabulary ability.

Third, the treatment was conducted for five meetings. In each meeting, the researcher introduced specific noun vocabulary items found in the game, explained how to play the game, divided students into four groups, and guided them during gameplay. Students identified hidden objects, discussed difficult vocabulary, and concluded the lesson together with the researcher. This interactive learning process aimed to improve vocabulary mastery through visual recognition and enjoyable activities.

Fourth, after all treatments were completed, the researcher administered the post-test to evaluate students' vocabulary development. Finally, the questionnaire was distributed to measure students' perceptions and responses toward the use of the computer game. The collected data were then analyzed statistically to determine the effectiveness of the treatment.

3. RESULTS AND DISCUSSION

3.1. Students' Vocabulary Achievement Before and After Treatment

Equations should be placed at the center of the line and provided consecutively with equation numbers in parentheses flushed to the right margin, as in (1). The use of Microsoft Equation Editor or MathType is preferred. This study aimed to determine the effectiveness of using the computer game Big City Adventure in improving students' vocabulary mastery at the eighth-grade students of Junior high school Muhammadiyah Palopo. The data were obtained through pre-test, treatment, post-test, and questionnaire. The vocabulary tests focused on noun vocabulary, particularly objects commonly found in the game, such as animals, fruits, transportation, classroom tools, human body parts, and daily objects. The results showed a significant improvement in students' vocabulary mastery after the implementation of the treatment using the computer game.

The pre-test was administered before the treatment to identify students' initial vocabulary mastery. The results showed that students still had low vocabulary achievement. The total score of the pre-test was 99.8 with a mean score of 4.99. The highest score obtained by students was 7.4, while the lowest score was 2.6. These findings indicate that most students had difficulties in understanding and remembering English vocabulary, especially noun vocabulary. Many students were still unable to translate simple words correctly and had limited familiarity with vocabulary used in daily communication. This condition reflects that conventional vocabulary learning methods were not sufficiently effective in motivating students to learn vocabulary actively.

Table 3. Students' Mean Score in Pre-test and Post-test

Component	Pre-test	Post-test
Mean Score	4.99	8.38

Based on Table 3, it can be seen that there was a substantial increase in students' vocabulary mastery after the treatment. The post-test was administered after five meetings of treatment using Big City Adventure. The total score increased to 167.6 with a mean score of 8.38. The highest score in the post-test reached 9.8, while the lowest score increased significantly to 7.4. This result proves that students showed better understanding and retention of vocabulary after learning through the computer game. The visual support, repetition, and interactive nature of the game contributed to helping students recognize and remember vocabulary more effectively.

The improvement can also be seen from the distribution of score classifications. In the pre-test, there were 3 students (15%) categorized as very poor, 9 students (45%) as poor, 5 students (25%) as fair, and only 3 students (15%) as fairly good. No students reached the good, very good, or excellent categories. This finding indicates that students' vocabulary mastery before treatment was still unsatisfactory and required instructional improvement.

Table 4. Rate Percentage of Students' Scores in Pre-test

Classification	Score Range	Frequency	Percentage
Excellent	9.6–10	0	0%
Very Good	8.6–9.5	0	0%
Good	7.6–8.5	0	0%
Fairly Good	6.6–7.5	3	15%
Fair	5.6–6.5	5	25%
Poor	3.6–5.5	9	45%
Very Poor	0–3.5	3	15%

After the treatment, the score classification changed significantly. In the post-test, there were 2 students (10%) categorized as excellent, 5 students (25%) as very good, 12 students (60%) as good, and only 1 student (5%) as fairly good. No students remained in the fair, poor, or very poor categories. This result demonstrates that the use of Big City Adventure successfully shifted students' performance from low achievement categories to higher academic performance categories.

Table 5. Rate Percentage of Students' Scores in Post-test

Classification	Score Range	Frequency	Percentage
Excellent	9.6–10	2	10%
Very Good	8.6–9.5	5	25%
Good	7.6–8.5	12	60%
Fairly Good	6.6–7.5	1	5%
Fair	5.6–6.5	0	0%
Poor	3.6–5.5	0	0%
Very Poor	0–3.5	0	0%

These findings indicate that computer game-based learning created a more engaging classroom atmosphere. Students became more motivated and participated actively because the game transformed vocabulary learning into an enjoyable activity rather than a memorization burden. Students were able to associate words directly with visual objects shown in the game, which improved comprehension and memory retention.

3.2. Test of Significance and Students' Responses

To determine whether the improvement was statistically significant, the researcher calculated the t-test after finding the mean score and standard deviation. The mean deviation (Md) was calculated using the following formula:

$$M_d = \frac{\sum D}{N} \quad \dots(2)$$

Where:

Md = Mean deviation

$\sum D$ = Total deviation score

N = Number of students

The calculation showed that the mean deviation was 3.39, indicating a considerable difference between pre-test and post-test results. Furthermore, the t-test result showed that the t-count was higher than the t-table value at the significance level of 0.05. This means that the null hypothesis (H0) was rejected and the alternative hypothesis (H1) was accepted. Therefore, it can be concluded that the use of the computer game Big City Adventure significantly improved students' vocabulary mastery.

This significant improvement occurred because the game provided direct visual representation of vocabulary items. Students learned nouns not only through written words but also through images and active searching processes [37]. This aligns with learning theories stating that students learn better when they are actively involved and emotionally engaged in the learning process. The hidden-object system in Big City Adventure also strengthened repetition and recall, which are important elements in vocabulary acquisition.

In addition to test results, the questionnaire also showed positive student responses toward the use of the game. Most students agreed that learning vocabulary through Big City Adventure was more enjoyable, less stressful, and easier to understand than traditional methods. They reported that the game increased their motivation to participate in class and helped them remember new vocabulary faster [38]. Students also stated that working in groups during gameplay improved collaboration and classroom interaction.

The positive perception from students confirms that computer games can serve as effective instructional media rather than mere entertainment [39]. The combination of visual learning, challenge, feedback, and interactive participation created a supportive learning environment. This finding supports the argument that technology-based learning media can improve both academic achievement and learning motivation simultaneously.

The findings of this study are consistent with several previous studies. Jasmarrudin found that vocabulary mastery improved significantly through the use of vocabulary lists, showing that repeated exposure to words helps students retain vocabulary better. Pattahudin [40] also reported that computer games were effective in improving vocabulary learning because students became more motivated and actively engaged during the learning process. Similarly, Martha Prasetya [41] found that guessing card games improved vocabulary mastery by increasing students' participation and interest in learning English.

However, although those studies successfully improved vocabulary mastery, most of them used traditional word lists, guessing games, or general computer games without specifically utilizing hidden-object computer games such as Big City Adventure. The present study fills this gap by applying a more specific visual-based computer game that directly connects objects with vocabulary recognition. This provides a stronger contextual learning experience, especially for noun vocabulary. Thus, the gap lies in the specificity of the media and the learning mechanism used for vocabulary acquisition [42].

The novelty of this study lies in the integration of Big City Adventure as a hidden-object computer game for vocabulary teaching at the junior high school level. Unlike general vocabulary exercises, this game allows students to connect words with concrete visual objects while engaging in interactive gameplay. This approach creates a stronger cognitive connection between vocabulary and meaning, which improves retention and comprehension [43], [44]. The use of this specific game in formal classroom instruction provides new empirical evidence regarding the effectiveness of visual-interactive learning strategies in English vocabulary teaching.

The implication of this study is highly relevant for English teachers and schools. Teachers can use computer games as alternative media to make vocabulary learning more effective and enjoyable. Schools can support technology-based learning by providing facilities such as computers and projectors to improve classroom instruction. For students, this method reduces anxiety and boredom while increasing motivation and confidence in learning English. Furthermore, this study contributes to the development of game-based learning practices in English education, especially in vocabulary instruction for junior high school students.

Despite the positive findings, this study has several limitations. First, the study only involved one class consisting of 20 students, so the generalizability of the findings is limited. Second, the research focused only on noun vocabulary, which means the effectiveness of Big City Adventure for other vocabulary types such as verbs, adjectives, or idioms was not examined. Third, the research used a pre-experimental design without a control group, so external variables could not be fully controlled. Future researchers are encouraged to conduct studies with larger samples, control groups, and broader vocabulary categories to obtain more comprehensive findings regarding computer game-based vocabulary learning.

4. CONCLUSION

Based on the results of the study, it can be concluded that the use of the computer game Big City Adventure was effective in improving the vocabulary mastery of the eighth-grade students of Junior high school Muhammadiyah Palopo. This was proven by the significant increase in students' mean score from 4.99 in the pre-test to 8.38 in the post-test, as well as the improvement in score classifications from mostly poor and fair categories to good, very good, and excellent categories after the treatment. The t-test result also showed that the calculated value was higher than the t-table value, indicating that the alternative hypothesis was accepted and the null hypothesis was rejected. In addition, students gave positive responses toward the use of the game, stating that it made vocabulary learning more interesting, enjoyable, and easier to understand. Therefore, Big City Adventure can be considered an effective and innovative learning medium for teaching English vocabulary, particularly noun vocabulary, at the junior high school level.

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI)-assisted technologies were used in the preparation, analysis, or writing of this manuscript. All stages of the research process, including data collection, data analysis, interpretation of results, and manuscript preparation, were conducted entirely by the authors without the assistance of any AI-based tools.

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