

AN UNDERGRADUATE THESIS

**THE EFFECT OF USING ANDROID-BASED ENGLISH
CROSSWORD PUZZLES IN IMPROVING VOCABULARY
MASTERY AT SMP NEGERI 5 TINAMBUNG**



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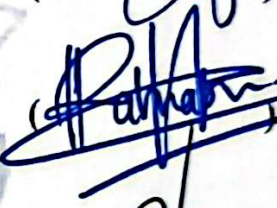
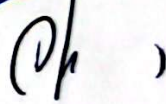



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ABSTRAK

Muh. Ikhwan Mubarak: Keefektifitan Penggunaan Teka Teki Silang Berbasis Android Dalam Peningkatan Penguasaan Kosakata Siswa Kelas 2 di SMP Negeri 5 Tinambung . Skripsi. Tinambung: Fakultas Keguruan dan Ilmu Pendidikan, Universitas Sulawesi Barat, 2025.

Penelitian ini bertujuan untuk: (1) menggunakan Media Pembelajaran Crossword Puzzle berbasis Android untuk Kelas VIII C SMP Negeri 5 Tinambung Tahun Ajaran 2024/2025. Mengetahui keefektifan Media Pembelajaran Crossword Puzzle berbasis Android. Mengetahui penilaian siswa mengenai penggunaan Media Pembelajaran Crossword Puzzle berbasis Android. Penelitian ini menggunakan desain pre-experimental dengan metode kuantitatif. Teknik simple random sampling digunakan untuk memilih 14 siswa dari populasi sebanyak 68 siswa. Instrumen penelitian melibatkan tes pilihan ganda dan matching untuk menilai penguasaan kosakata, sedangkan kuesioner digunakan untuk mengetahui tanggapan siswa terhadap teka teki silang. Hasil dari kedua instrumen tersebut dianalisis untuk mengetahui keefektifan antara teka teki silang dan penguasaan kosa kata siswa kelas 2 di SMP Negeri 5 Tinambung. Penelitian ini mengungkapkan beberapa temuan. Pertama, teka-teki silang meningkat setelah melakukan treatment. Kedua, penguasaan kosa kata siswa meningkat setelah melakukan treatment. Terakhir, hasil penelitian menunjukkan adanya keefektifan yang signifikan penguasaan kosakata dengan menggunakan metode teka-teki silang siswa kelas kedua di SMPN 5 Tinambung, keefektifan tersebut berdasarkan tabel t perbandingan antara $>(10,78 > 2.160)$ dengan menggunakan rumus degree of freedom.

Kata kunci: teka teki silang, penguasaan kosa kata, efek teka silang terhadap penguasaan kosakata.

ABSTRACT

Muh. Ikhwan Mubarak: The Effectiveness of Using Android-Based Crossword Puzzles in Improving Vocabulary Mastery of 2nd-Grade Students at SMP Negeri 5 Tinambung. Thesis. Tinambung: Faculty of Teacher Training and Education, West Sulawesi University, 2025.

This study aims to investigate the effect of crossword puzzles on vocabulary mastery of 2nd-grade students at SMPN 5 Tinambung, where the researcher administered tests, treatments, and questionnaires to students in English language learning. This study employed a pre-experimental design with a quantitative approach. Simple random sampling was used to select 14 students from a population of 68 students. The research instruments involved multiple-choice tests and matching tests to assess vocabulary mastery, while questionnaires were used to determine students' responses to crossword puzzles. The results of both instruments were analyzed to determine the effectiveness of crossword puzzles on vocabulary mastery of 2nd-grade students at SMPN 5 Tinambung. This study revealed several findings. Firstly, crossword puzzles increased after treatment. Secondly, students' vocabulary mastery improved after treatment. Lastly, the results showed a significant effectiveness of vocabulary mastery using crossword puzzle method among 2nd-grade students at SMPN 5 Tinambung, based on the t-table comparison ($10.78 > 2.160$) using the degree of freedom formula.

Keywords: crossword puzzles, vocabulary mastery, effect of crossword puzzles on vocabulary mastery.

CHAPTER I

INTRODUCTION

A. Background

Vocabulary mastery is one of the fundamental aspects in learning English. Adequate vocabulary allows students to understand texts, express ideas, and communicate effectively both orally and in writing. Thornbury (2002:13) emphasized that without adequate vocabulary mastery, communication becomes very limited even though someone understands grammatical structures. Therefore, the development of learning strategies and media that can improve vocabulary mastery is very important, especially at the Junior High School (SMP) level where students are at the early stages of learning a foreign language more formally.

As happened at SMP Negeri 5 Tinambung, where students had difficulty in mastering English vocabulary. This is often seen from students' dependence on digital dictionaries in completing simple tasks, as well as students' low interest in memorizing and understanding new vocabulary. The lack of vocabulary owned by students not only hinders their reading and writing skills, but also has an impact on their speaking and listening skills.

In today's digital era, the use of technology as a learning medium is a necessity as well as an opportunity to increase the effectiveness of the teaching and learning process. One interesting approach is the development of an Android-based learning application, which is interactive, flexible, and easily accessible to students. One form of learning media that can be developed is a crossword puzzle, which has been proven to improve memory, strengthen the relationship between words and meanings, and make the learning process more enjoyable (Njoroge, Ndung'u & Ganthigia, 2013).

Android-based crossword puzzles can be an alternative solution to help students develop their English vocabulary mastery independently and interestingly. This media not only stimulates cognitive abilities, but also motivates students to continue

learning because it is presented in the form of a challenging game. In addition, the integration of technology in learning is also in line with the Merdeka Belajar curriculum which encourages the use of digital media as well as project-based learning and student interests.

Based on these problems, it is important to develop an Android-based Crossword Puzzle learning media that is specifically designed to improve English vocabulary mastery at SMP Negeri 5 Tinambung. This study aims to analyze the effectiveness of the Android-based Crossword English Puzzle in improving students' vocabulary mastery and English language skills.

B. Problem Identification

Based on the preliminary study, several problems were found in the learning process.

1. How effective is the use of crossword puzzles in improving students English vocabulary mastery at SMP Negeri 5 Tinambung?
2. How do students respond to the use of crossword puzzles in English learning?

C. Problem Limitation and Formulation

1. Problem Limitation

Based on the above background which explains how crossword puzzles can improve students' vocabulary in learning, the problem limitation in this study will focus on the effect of using crossword puzzles in improving students' vocabulary. This research problem will be limited to the use of crossword puzzles in improving students' English skills, and students' responses to the use of crossword puzzles in improving their vocabulary.

2. Research Formulation

- a) How effective is the use of crossword puzzles in improving English vocabulary comprehension among secondary school students?
- b) How do students respond to the use of crossword puzzles in English learning?

D. Research Objectives

The objectives of this study are to determine

- 1) The use of crossword puzzles enrich students' vocabulary
- 2) Students' English vocabulary acquisition before and after the application of crossword puzzles

E. Benefits of Research

1. Theoretical Benefits

Theoretically, this research can be a reference for researchers who have similar cases or further research on the Effectiveness of Crossword Puzzle in Improving Vocabulary.

2. Practical Benefits

a. For the Department of Educational Technology and Curriculum

With this research, it is hoped that it can contribute ideas for the department and find out the extent of the influence of the application of learning media carried out.

b. For Teachers

This research is expected to be useful for English teachers in improving the quality of students' vocabulary learning so that the teaching and learning process is easier and more enjoyable.

c. For students

This research is expected to provide additional knowledge for students to more easily remember vocabulary with this Crossword method.

d. For Researchers

This research is expected to provide an overview of students' knowledge about teaching media. So that later they can further evaluate how big the role of learning media is for students during the learning process.

e. Other researchers

The results of this study can be an additional reference for other researchers who are interested in conducting research related to Crossword media.

CHAPTER II

LITERATURE REVIEW

A. Previous Related Studies

Previous studies related to this study:

Nurul Puspita Nurlaily Sabiqoh (2017) in her research entitled Teaching Vocabulary by Using Crossword Puzzle. This research is about teaching vocabulary by using crossword puzzle in the first semester of seventh grade students of MTs. The purpose of this study is to describe the process of teaching vocabulary by using crossword puzzle, to describe the problems of teachers and students in the teaching and learning process. In this study, the researcher used descriptive qualitative research. The researcher used purposive sampling technique to determine the sample. The researcher chose class VII C as a sample consisting of 30 students. In collecting data, the researcher used three types of instruments, namely: observation, interviews, and questionnaires. The researcher used three main data analysis: namely data reduction, data presentation and drawing conclusions or verification. From the data analysis, the researcher found in teaching vocabulary by using crossword puzzles in MTs are as follows: First, the teaching and learning process by using crossword puzzles went well, the classroom atmosphere was that students seemed active in class but some of them seemed less responsive. Second, the teacher got some problems. They are: Teachers have difficulties to handle the class because students make themselves too crowded, wrong teaching methods, and demanding to share some vocabulary words in the meeting but students can only master some of them. The third, students have some problems in learning vocabulary, they are: students find teacher's explanation boring, and they think learning vocabulary as knowing the main meaning of new words which are only obtained from textbooks or from teachers, so it is difficult for them to use words based on the right context. (Puspita & Sabiqoh, 2017)

Sitti Sabrina Mohamad, Djuna Lamondo, Lilan Dama, Margaretha Solang, Herinda Mardin, Muh. Nur Akbar (2024) in their research entitled THE EFFECT OF CROSSWORD PUZZLE MEDIA ON STUDENTS' LEARNING

OUTCOMES IN THE RESPIRATORY SYSTEM MATERIAL This research is an experimental research that aims to determine whether the use of crossword puzzle media can improve learning outcomes in the respiratory system material of class XI IPA 3 at SMA Negeri 4 Gorontalo City. This research uses a quantitative descriptive statistical research type. The design used is one-group design pre-test post-test. The population in this study was class XI IPA 3 of SMA Negeri 4 Gorontalo City with a total of 30 students. The data collection method used interview and test guidelines. The data analysis technique used was descriptive statistical analysis and inferential statistical techniques. Based on the results of research and data analysis on the comparison of statistical values, comparison of learning outcome categories, and comparison of completion levels as well as the results of inferential statistical analysis have proven an increase in student learning outcomes of class XI IPA 3 SMA Negeri 4 Kota Gorontalo. The results of descriptive research show that the average value of student learning outcomes before using crossword puzzles is 35.33 and after using crossword puzzles 82.33. Furthermore, based on the results of statistical analysis for student learning outcomes, it shows that the tcount obtained is 0.027 with a significance level of 0.05 so that $0.027 > 0.05$. This shows that there is a difference between student learning outcomes before using crossword puzzles and after using crossword puzzles of class XI IPA 3 at SMA Negeri 4 Kota Gorontalo. (Biologi et al., 2024)

Yusuf Wijaya, Moh. Hanafi (2022) in his research entitled THE EFFECTIVENESS OF CROSSWORD GAMES IN MASTERING ENGLISH VOCABULARY FOR STUDENTS OF BHINEKA UNIVERSITY. This study aims to evaluate the effectiveness of crossword puzzle games in improving vocabulary mastery of second semester students in the English Language Education Department at Bhinneka PGRI University, Tulungagung, during the 2022/2023 academic year. Quantitative research with a pre-experimental design was used in this study. The researcher used a purposive sampling technique to determine the sample. Second semester students of the English Department were used as a sample consisting of 13 students. In data collection, the researcher used a questionnaire, and based on data analysis, the t value was found to be -3.442, while the critical t value at the 0.05 significance level was not exceeded. In addition, the two-tailed

significance value (Sig.) was determined at 0.00, which is lower than 0.05, indicating that the null hypothesis (H_a) is accepted. This result shows that the crossword puzzle game has significance on students' vocabulary mastery. This is supported by the improvement score, where the average score increased from 49.09 in the pre-test to 62.27 in the post-test. Overall, this finding shows a positive increase in students' vocabulary mastery after the treatment. In addition to the statistical findings, the researcher found that the implementation of the crossword puzzle game as a teaching method in the classroom was effective in improving students' vocabulary mastery in learning English. (Kosa et al., 2023)

B. Theoretical Framework

1. Vocabulary

a. Definition of *Vocabulary*

To clearly understand what is meant by vocabulary, the researcher proposes to explain the definition of vocabulary. According to Oxford University Press (2008:495) vocabulary is (1) all words known or used by someone, (2) all words in a language, (3) a list of words and their meanings, especially in books for learning foreign languages.

According to Webster's printed dictionary (Webster:1983:2946), vocabulary is a list of words and others such as dictionaries or glossaries and all words used in a language or by a group of people etc. According to Longman's contemporary English dictionary (Longman 1995:240) vocabulary is all words known by someone, a learner or user of words in a particular language a list of words with explanations of their meanings, in a book for learning a foreign language.

Both in Dahriani (2005:6) define that (1) Vocabulary is the concept and function of language words, which are studied comprehensively so that they become part of the child's understanding. spend and then, read and write vocabulary. (2) Vocabulary is words that contain meaning, when heard or seen, even though they are not produced by the individual himself to communicate with others.

According to Hornby (2000:1331) vocabulary is (1) all the words known or used by someone, (2) all the words in a particular language, (3) the words that people use when discussing a particular subject, (4) a list of words and their meanings, especially in foreign language learning books. Vocabulary is the variety/richness of words that a language has (Soedjito et al., 2011:3).

For the purposes of this booklet, we define vocabulary as knowledge of words and the meanings of words in spoken and printed language in productive and receptive agriculture. More specifically, we use vocabulary to refer to the types of words that students must know in order to be able to read increasingly demanding texts. We begin by taking a closer look at why developing this kind of vocabulary is important for reading comprehension.

b. Types of Vocabulary

Introductory vocabulary consists of words that you understand when you hear or read them, but which you do not usually use in speaking and writing. Harmer (1991:159) distinguishes two types of vocabulary, active vocabulary and passive vocabulary. According to him, active vocabulary is vocabulary that students learn and are expected to be able to use. On the other hand, passive vocabulary on the other hand, passive vocabulary refers to words that students will recognize when they meet but may not be divided into four types as follows:

- 1) Oral vocabulary consists of words that are used actively in conversation. There are words that easily appear in someone's conversation. The more often someone says words, the easier the words will be pronounced on their tongue.
- 2) Writing vocabulary is words that are easily included in the vocabulary of someone's speaking fingers.
- 3) Listening vocabulary is a collection of words that someone responds to with meaning and is understood when talking about others.
- 4) Reading vocabulary is words that someone responds to in writing others.

c. Principles of Vocabulary Teaching and Learning

There are many principles in vocabulary teaching and learning as follows. objectives, needs, presentation of situations, meaningful presentation, presentation in context, inference procedures (guessing) in vocabulary learning, techniques in teaching and learning vocabulary.

According to Wallace in Darasari, Eliza (2008:1011) shows that the main principles of teaching and learning vocabulary are as follows a. Teaching Objectives should know the meaning of the words taught

1) Objectives

Teachers must know the meaning of the words taught

2) Quantity

The number of new words that students must have and must be clear.

3) Needs

The importance of choosing words given by teachers to students, it is a selection process based on course objectives, the objectives of each lesson, background and language used.

4) Frequent exposure and repetition

A number of repetitions are needed until there is evidence that students learn the target words

5) Meaningful presentation

In presenting vocabulary lessons, students must have a clear and specific understanding of what is meant by the target words. words refer or symbolize. The presentation must be perfect, meaningful and unambiguous.

6) Presentation of situations

The way words are presented must be appropriate to the student's situation.

7) Presenting in Context

Through reading materials, new words or foreign words can be presented as a medium in teaching vocabulary.

8) Learning Mother Tongue Vocabulary in the Target Language

In teaching target words, teachers should use mother tongue words as a tool to compare similarities and differences in words

9) Guessing Procedure in Vocabulary Learning

Guessing is one way to learn vocabulary. it directs students to think about the meaning of the words being taught.

d. Vocabulary Teaching and Learning Techniques

According to Wallacein Muhbubah, (2005:10) classifies vocabulary teaching techniques for beginner classes as follows:

- 1) Let students see some words introduced in the first year exam book, words that represent nouns, verbs, adjectives, and other types of words. For young learners, emphasis is placed on simple words such as animals, fruits, etc. in nouns. Simple everyday verbs, color names, characteristics of people in adjectives, etc. that are easy for children to understand.
- 2) Displaying actual objects.
- 3) Show some pictures, especially pictures drawn by students
- 4) Definitions in English examples, using vocabulary that students already know.

2. Crossword Puzzle

a. Crossword Puzzle Concept

Crossword puzzles have been proposed as an alternative game in teaching and learning. Dhand (2008: 55) defines crossword puzzles as puzzles with a set of boxes that must be filled with words/numbers, one letter/number for each box. Synonyms or definitions of words are given with numbers that correspond to the

numbers in the boxes. Letters/words are inserted into the pattern of numbered boxes as answers to clues.

According to Moursund (2007: 8) crossword puzzles are popular puzzle games where in each case, the goal of the puzzle solver is to solve a particular mentally challenging problem or complete a particular mentally challenging task. Crossword Puzzle is one of the learning methods developed from active learning strategies, this method is classified by Melvin Silberman (2012) in active learning part four, namely "how to learn not to forget". According to Tarigan in the Setyawan journal (2015), crossword puzzle media can improve vocabulary mastery with modifications according to student characteristics, because the richer the vocabulary, the easier it will be to absorb and understand the learning material (Setyawan, 2015). In other words, crossword puzzle media can be used in learning as an alternative media for learning English vocabulary. Crossword puzzles usually consist of questions for horizontal and descending answers. This media is very easy to use by educators, and can be used at all levels, both beginners, intermediate or advanced, besides that the material can also be selected according to learning objectives (Amalia & Hidayat, 2018). Thus, educators can adjust what theme will be used in the development of this media and it is expected to be a tool so that the expected message or information can be conveyed. Crossword Puzzle is an active learning media that helps students capture thoughts and ideas of material and high creativity (Nirmalasari et al., 2013).

According to Hisyam (2020), crossword puzzles are one of the media that can be used as a good and fun learning strategy without losing the essence of ongoing learning. Crossword puzzles are generally known to the public because this Crossword puzzle game is easy both in mass media and books in particular (Stovia & Firmansyah, 2020). Referring to the statement above, crosswords are a game by playing filling in empty spaces in the form of boxes with letters to form a word that matches the instructions for the question. Crossword puzzles are a form of game that is often found/published in magazines or newspapers. Crosswords, which were originally only to fill spare time, can be used as a medium for practicing questions for students. Crosswords can be played/filled individually or in groups.

b. Procedure for Using Crossword Puzzles

According to Melvin Silberman (2012), the procedure for using crossword puzzles is as follows :

- 1) The first step is to explain several important terms or names related to the subjects that have been taught.
- 2) Create a simple crossword puzzle, including as many elements of the lesson as possible.
- 3) Create guiding words to fill in the crossword puzzle. Use the following types:
 - a) A short definition
 - b) A category that matches the element
 - c) An example
 - d) An antonym
- 4) Distribute the puzzle to students, either individually or in groups.
- 5) Set a time limit. Give awards to individuals or teams with the most correct answers.

c. Advantages of Crossword Puzzles

The advantages of crossword puzzles are as follows.

- 1) Can be useful for sharpening the brain, reasoning, training logic, and patience so that it will facilitate the process of transferring knowledge to students.
- 2) By filling in crossword puzzles, students must remember the meaning of words and how to spell them correctly.
- 3) Many crossword puzzles use definitions as clues, so students learn synonyms and antonyms without realizing it.
- 4) Crossword puzzles force students to write words correctly according to the number of boxes available.
- 5) Can activate students in learning activities.

- 6) Can improve students' thinking and concentration skills.
- 7) Can make it easier for students to remember the lesson material presented.
- 8) Students learn to understand words in a certain context, not just memorize them separately.
- 9) Can eliminate students' boredom during teaching and learning activities
- 10) Compared to the usual memorization method, crossword puzzles provide challenges and a sense of achievement when students successfully complete them.

d. Crossword Puzzle Lesson

Although crossword puzzles have many advantages in improving students' vocabulary, there are also some disadvantages that need to be considered :

- 1) Limited to Known Words
- 2) Focus on Written Form, Not Sentence Usage
- 3) Does Not Always Promote Deep Understanding of Meaning
- 4) Can Be Frustrating for Students with Limited Vocabulary
- 5) Doesn't Emphasize Pronunciation
- 6) Each answer to a crossword puzzle has letters that are continuous

e. Crossword Puzzle Process

Crossword puzzles in learning, especially to improve students' vocabulary, go through several systematic stages. The following are the steps in the process of using crossword puzzles:

1. Planning and Preparation

Before crossword puzzles are used in learning, teachers or researchers must make the following preparations:

- a) Determining Learning Objectives: For example, improving English vocabulary mastery on a particular theme (for example, "animals", "jobs", or "daily activities").
- b) Choosing or Making Crossword Puzzles:
 - i. Can be made yourself using tools such as puzzlemaker or WordMint.

- ii. Make sure the words used are appropriate to the students' ability level.
- c) Adjusting Instructions and Challenges:
 - i. Instructions can be in the form of definitions, synonyms, antonyms, or examples of use in sentences.
 - ii. Determining the level of difficulty, for example whether to use picture instructions for beginner students or descriptive instructions for more advanced students.

2. Implementation in Learning

When crossword puzzles are used in class, several steps that can be applied are:

- a) Instruction and Introduction:
 - i. The teacher explains the rules of the game and how to fill in the crossword puzzle.
 - ii. If necessary, the teacher provides an example or demonstrates the first one or two questions.
- 1) Independent or Group Learning:
 - i. Students can work on the crossword puzzle individually or in small groups.
 - ii. The teacher can give a time limit to complete the puzzle.
- 2) Discussion and Reflection:
 - i. After the puzzle is finished, the teacher and students discuss the answers together.
 - ii. The teacher provides additional explanations if there are words that are difficult for students to understand.
 - iii. Students can be asked to use the words that have been learned in sentences.

3) Evaluation and Measurement of Results

After students work on the crossword puzzle, an evaluation is carried out to see its impact on increasing vocabulary. This evaluation can be in the form of:

- a) Vocabulary Test: The teacher gives a quiz or test to measure how many words students have learned after playing the crossword puzzle.
 - b) Observation of Student Engagement: Seeing whether students are more active and enthusiastic in learning vocabulary compared to the usual method.
 - c) Student Reflection: Students can be asked to write or talk about their experiences using crossword puzzles in learning.
- 4) Follow-up
- a) If students still have difficulty, the teacher can provide additional exercises or crossword puzzles with a lower level of difficulty.
 - b) If its effectiveness is proven to be high, crossword puzzles can be used as a routine learning method in improving students' vocabulary.

By following this process, crossword puzzles can be an effective tool in language learning, especially in improving vocabulary mastery in a fun and interactive way.

f. Theoretical explanation

Crossword puzzles are an effective interactive learning tool in improving students' vocabulary. Here is a brief explanation of the theory:

1. Retrieval Practice

Students are required to remember words that match the instructions given. This process of remembering, or retrieval practice, has been shown to improve long-term memory skills and strengthen vocabulary mastery.

2. Word Contextualization

The instructions in crossword puzzles often provide context, so that students not only memorize words separately, but also understand the use of words in certain sentences or situations. This helps them understand synonyms, antonyms, and nuances of word meaning.

3. Improving Critical Thinking Skills

To solve crossword puzzles, students need to analyze, synthesize, and evaluate the information provided, which indirectly also improves linguistic and critical thinking skills.

With this approach, crossword puzzles not only make the learning process fun, but are also effective in enriching students' vocabulary.

3. Android

a. Android Definition

Android is a Linux-based operating system designed for touchscreen mobile devices such as smartphones and tablets. According to Nugroho (2010:2), Android is an open source operating system and provides a platform for developers to create applications that can expand the functions of mobile devices. In line with that, Wahana Komputer (2011:3) stated that Android is an operating system developed by Google and is open, so anyone can develop applications and distribute them through the Google Play Store.

Furthermore, according to Priyanto (2012:5), Android has advantages in terms of flexibility and ease in application development, because it provides various Application Programming Interfaces (APIs) that make it easy for developers to create interactive and innovative applications. This makes Android a popular operating system and is widely used in the world of education as an effective digital learning medium.

With its open, flexible nature, and supported by a wide developer community, Android provides great opportunities in the development of interactive learning media, including educational game-based applications such as crosswords designed to improve students' vocabulary mastery.

b. Advantages of Android

The advantages of Android according to Zuliana and Irwan Padli (2013) are:

1. Complete (complete platform)

Developers can take a comprehensive approach when developing the Android platform. Android is a secure operating system and provides many tools to build software and create opportunities for application developers.

2. Android is open (Open Source Platform)

Android is based on Linux which is open so it can be easily developed by anyone.

3. Free Platform:

Android is a free platform for developers. There is no cost to pay a license or royalty fees. Android software as a complete, open, free platform, and other information can be downloaded for free by visiting the website <http://developer.android.com>.

4. A popular operating system.

c. Lesson of Android

Some weaknesses found in the Android platform related to the performance of crossword puzzle game applications include:

1. Device Fragmentation

Android is used by various brands and models of devices with different hardware specifications. This causes inconsistencies in application performance, especially in terms of processing speed, screen resolution, and interface responsiveness.

2. Non-Uniform Operating System Versions

Many Android devices run different versions of the OS. As a result, certain features of the application may not be supported or may not function optimally on older OS versions, which can cause errors or crashes.

3. Suboptimal Memory Management

Some Android devices, especially low-end ones, have limited RAM capacity. Crossword puzzle games that require memory to store game states, graphics, and animations may lag or force close.

4. Limited User Interface (UI) Compatibility

Differences in screen size and resolution between devices can affect the appearance of the application's UI. In crossword puzzle games, this can cause the layout of letters, puzzle boxes, or navigation buttons to be disproportionate or unresponsive.

5. Battery Power Consumption

The use of sound effects and animations in this educational game can increase power consumption, especially on devices with low power efficiency. This discourages users from playing for long periods of time, reducing the effectiveness of learning.

6. Limitations of Special Features

Some Android devices do not support certain features such as vibration, high-quality background sound, or speech recognition. These features are often used to enhance the gaming experience in educational applications.

d. Android Based Crossword Puzzle

Android-based Crossword Puzzle is a learning media in the form of an Android-based application by adapting Crossword Puzzle for basic English lessons for Class 8A of SMP Negeri 5 Tinambung. This learning media is an innovation of practical learning media so that it can be used by students anywhere and anytime as a learning resource. This Crossword Puzzle contains English vocabulary practice questions in the form of crossword puzzles.

4. Response

Response is an answer, especially an answer to a question or questionnaire; any type of behavior whether visible or hidden or unclear; is something that is very general and is the most frequently used term in psychology, usually related to the assignment of traits.

In learning, students' responses to stimuli (eg, questions, materials, or learning activities) can be categorized into several types depending on the approach used. In general, responses in learning can be divided into three main types:

1. Cognitive Response

Related to the process of thinking and understanding. Examples answering questions, making summaries, analyzing texts, solving math problems. Indicators :

- a. Answering questions correctly.
- b. Explaining concepts or ideas logically.
- c. Connecting material to previous experiences or knowledge.
- d. Analyzing problems and providing solutions.
- e. Creating summaries, concept maps, or conclusions.
- f. Demonstrating understanding through quizzes or tests.

2. Affective Response

Related to attitudes, interests, emotions, and values that students have towards the subject matter. Examples showing interest in the lesson, stating agreement/disagreement with an opinion, showing enthusiasm when learning. Indicators:

- a. Shows interest during the learning process.
- b. Gives full attention when the teacher explains.
- c. Actively asks or responds to opinions.
- d. Shows a positive attitude towards the material or teacher.
- e. Complies with class rules and demonstrates cooperation.
- f. Expresses opinions politely and openly.

3. Psychomotor Response

Related to physical skills or real actions carried out in the learning process.

Examples: writing, drawing, conducting experiments, playing musical instruments. Indicators:

- a. Perform practical tasks according to procedures.
- b. Use tools or materials correctly.
- c. Assemble, draw, or create products according to instructions.
- d. Demonstrate proper motor coordination.
- e. Complete specific projects or skills on time.

a. Respond in Learning

Respond in learning refers to how learners actively engage with, answer, or react to instructional prompts, questions, or learning materials. Active responding is a key element in effective learning, as it increases participation, engagement, and retention of knowledge.

b. Types and Roles of Responding in Learning

Stimulus-Response Learning: In behavioral theories, response learning is when a learner forms a direct association between a stimulus and a specific response, often through repetition and reinforcement. This is contrasted with place learning, which is more cognitive and context-based. The dominance of response learning versus place learning can depend on factors like training amount, environment, and emotional state.

1. Behaviorism Theory

Focuses on observable and visible behavior. The main concept is Stimulus → Response. Response is defined as a direct reaction to environmental stimuli that can be reinforced through rewards or punishments. Types of responses according to behaviorism:

Positive response: Students answer correctly → are given praise or a reward.

Negative response: Students answer incorrectly → are given correction or light punishment.

Automatic response (habit): The result of repeating stimulus-response.

Example is a student memorizes the multiplication table. With continuous reinforcement, he can automatically answer " $5 \times 6 = 30$ " without thinking for long.

2. Cognitive Theory

Focuses on internal mental processes such as thinking, remembering, and problem solving. Response is considered a product of the thinking process, not just an automatic reaction and is influenced by perception, understanding, and previous experiences. Types of responses according to cognitivism:

Reflective response: Students analyze first before answering.

Schema-based response: Response based on prior knowledge.

Metacognitive response: Students are aware of their own way of thinking (thinking about thinking).

Example is when asked to explain why $1/2$ is greater than $1/3$, students think logically and provide an explanation based on their understanding of the concept of fractions.

3. Constructivism Theory

The focus is on students building their own knowledge through experience. Responses are considered the result of an active process of building meaning. Diverse and unique because each student has different experiences and understandings. Types of responses according to constructivism:

Individual response : Each student may give a different answer or view of a problem.

Exploratory response : Students try various approaches or hypotheses.

Collaborative response: Responses that emerge from discussion and social interaction.

Example is in a group project, students design a water purifier. Each group provides different responses and solutions based on the results of their experiments.

g. Hypothesis

Based on the previous explanation above, the researcher formulates an alternative hypothesis as follow :

H1 : The use of crossword puzzle enrich students vocabulary mastery

H0 : The use of crossword puzzle does not enrich students vocabulary mastery.

CHAPTER V

CONCLUSION AND SUGGESTION

A. Conclusion

Based on the data from the T-Test analysis, it can be said that the use of crossword puzzles can improve students' vocabulary mastery at SMP Negeri 5 Tinambung. There is a significant increase in students' vocabulary mastery achievement using crossword puzzles. The results showed that students' Post-Test scores were higher than students' Pre-Test scores. H₀ (Null Hypothesis) is rejected and H₁ (Alternative Hypothesis) is accepted. This means that the use of crossword puzzles in the experiment improves students' vocabulary. There is a positive effect of using crossword puzzles in improving students' vocabulary skills.

B. Suggestion

Based on the results of the research that has been conducted, the researcher provides several suggestions as follows:

1. For English Teachers

English teachers are advised to use interesting and fun learning media, such as crossword puzzles in the vocabulary learning process. This media not only helps students expand their vocabulary, but also increases their learning motivation. The use of crossword puzzles can be a creative alternative to avoid boredom in class, as well as encourage students to be more active and involved in the learning process.

2. For Students

Students are expected to be more active and enthusiastic in participating in learning activities, especially when given media such as crossword puzzles. They should not only do it because of assignments, but also use the game as a means to increase vocabulary and deepen their understanding of English. With consistency and sufficient practice, students will find it easier to master new vocabulary.

3. For Further Researchers

The researcher hopes that the results of this study can be a reference for further research in the same field. The next researcher can develop crossword

puzzle media with variations in design, topics, or integration of digital technology to be more in line with the development of the times and the characteristics of today's students.

Advantages and Disadvantages of Crossword Puzzles as a Vocabulary Learning Medium

Advantages:

- Crossword puzzles improve students' memory and understanding of new vocabulary through repetition and context.
- This media is fun and challenging, creating a positive and interactive learning atmosphere.
- Helps improve critical thinking and problem-solving skills as students try to find the right answer.
- Can be used as a light evaluation tool that indirectly measures vocabulary mastery.
- Increases student participation in class activities, both individually and in groups.

Disadvantages:

- Requires more preparation time from teachers to create or adapt puzzles to the subject matter.
- Students with low vocabulary mastery may have difficulty completing puzzles, which can lower their self-confidence.
- Not all students like this type of activity, especially if they are not used to puzzles or language games.
- If not properly supervised, this activity can become just a game without a clear learning objective.

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