

The effectiveness of using crossword puzzle games to improve vocabulary mastery of the 7th grade students of SMP Muhammadiyah 2 Kalasan

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ABSTRACT

Vocabulary mastery plays an important role in learning English. The role of a teacher is important in helping students achieve their goals because acquiring sufficient number of vocabularies is a basic requirement for mastering English. This study aims to investigate the effectiveness of using crossword puzzles to improve vocabulary mastery. This research was conducted at SMP Muhammadiyah 2 Kalasan. This research was conducted using an experimental design, especially a quasi-experiment using a quantitative approach. The population used in this study was the seventh-grade students of SMP Muhammadiyah 2 Kalasan. The sample used in this study was class 7 students of SMP Muhammadiyah 2 Kalasan totaling 36 people consisting of 2 classes, namely class 7d as the control class and class 7e as the experimental class. The instruments used in this study were test questions in the form of multiple-choice as many as 20 test items. Data collection techniques in this study used pretest, treatment, and posttest. The results of this study stated that the use of crossword puzzles could effectively increase vocabulary mastery of the students. From the results of SPSS calculations, the scores obtained by the experimental class after the treatment was carried out were higher than before. So from the hypothesis test, it was found that the value of Sig was 0.00 which was < 0.05 and thus the H_0 was not accepted, and H_a was accepted. It means that media Crossword Puzzle (X) affects mastery of English vocabulary (Y). Therefore, the use of crossword puzzle influenced the increment of English vocabulary mastery among the seventh-grade students of SMP Muhammadiyah 2 Kalasan.

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1. Introduction

The ability to use language effectively is essential for learning English. To learn and teach effectively, students need to have a comprehensive knowledge of the English language and comprehend its meaning. Students should be able to understand language verbally and in writing if they have the mastery of vocabulary. Adjectives, verbs, and nouns are introduced to the students. Mastering vocabulary well will make language mastery better as well. It will be simpler to understand what you hear and read if you have a lot of vocabulary. As for students from grade 7 at

SMP Muhammadiyah 2 Kalasan, there are still many students who find it difficult to learn English. This formal English subject is still considered difficult to them. The lack of knowledge related to vocabulary in English makes it difficult for them to understand and learn the English language. When they join an English class, especially when the teacher introduce new vocabularies, they find it difficult to recognize a sufficient number of new English words. A teacher is important in helping students to achieve their goals because mastering a sufficient number words in the vocabulary is a basic requirement for learning English. Because of this, the researcher in this study concentrated on the effect of using crossword puzzles to improve vocabulary knowledge.

According to Zhang (2018), the success of vocabulary learning, apart from being determined by teaching techniques and learning media, is also influenced by learning motivation and learning strategies. Referring to Puspitarini & Hanif (2019), the function of a learning media is to resolve various obstacles when the learning process is conducted in the classroom and it is as a software or hardware tool that makes it easier to convey material to students conducted by the teacher, thus a learning media can make the learning process more efficient and effective. Saxena, Nesbitt, Pahwa, and Mill (2009) state that crossword puzzle is a very interesting word game and many people enjoy this game. Therefore, students will always compete to be able to find the right answer so that it will provide positive scores for students and achievers so that healthy competition will emerge. A high sense of togetherness will enable students to answer the crossword puzzle and other students in the group will also know the correct answer.

This is reinforced by the existence of a research journal on a similar topic. The research design used a pre-experimental design method using a one-group pretest-posttest technique using a quantitative approach. The research has a significant effect on students' vocabulary mastery before and after being taught by using a crossword puzzle teaching strategy (Silalahi et al., 2019). The next research was carried out by Orawiwatnakul (2013) stated that the result showed that learning vocabulary through crosswords for Thai students was one of the best ways to improve their vocabulary. It is effective for students to learn a language through a crossword puzzle. Mastery of vocabulary is one aspect of mastering English as a foreign language. In learning the four language skills, vocabulary is one of the basic aspects that must be mastered. Word knowledge is necessary for learning the four language skills since they will not be able to do all four skills without vocabulary. Students practice their language skills more effectively the more vocabulary they have mastered. Having additional word lists in their memory can improve their ability to speak clearly and effectively in English (Jambari, et al., 2021). As a result, someone who has learned a sufficient amount of language will find it easier than others who lack it. Vocabulary is a collection of words that make up a language. Words are the fundamental building elements of language, according to Brown (2001). And this implies that a language's most important component is its words. Other features of language would not exist without words.

According to research conducted by O'Dell, Read, and McCarthy (2000) that vocabulary may be viewed as a key area in language education and that examinations are necessary to evaluate the learners' progress in acquiring vocabulary and determine whether their vocabulary knowledge is sufficient to suit their communication demands. Vocabulary assessment seems straightforward in the sense that word lists are readily available to provide a basis for selecting a set of words to be tested. These test items are easy to write and to score, and they make efficient use of testing time. Multiple-choice items in particular have been commonly used in standardized tests. A professionally produced multiple-choice vocabulary test is highly reliable and distinguishes learners effectively according to their level of vocabulary knowledge.

Tests containing items such as those illustrated above continue to be written and used by language teachers to assess students' progress in vocabulary learning and to diagnose areas of weakness in their knowledge of target-language words, i.e. the language which they are learning. Some studies have indicated that the use of crossword puzzle significantly improved the vocabulary mastery of the language learners. For example the research by Ekayanti and Thohir (2019) demonstrated that after using this crossword puzzle, students' vocabulary mastery significantly improved. Another second research by Sitompul and Juliana (2020) demonstrated that in each test, students' achievement increased. In pre-test for the experimental class, the students had 62.67 score and increased to 76.83 in post-test. The t-count was greater than t-table ($0.234 > 0.05$) and Sig. (2-tailed) 0.000 less than alpha: 0.05. Based on the quantitative results, H_a was accepted and H_o was

rejected. It was concluded that there was an effect of puzzle games on students' vocabulary achievement for non-English students.

The third research by Sadiyah, Septiani, and Kareviati (2019) showed that in the pretest, the mean score of the experimental group was 41.83, and in the post-test it was 75.67 after the treatment using crossword puzzle. It means that teaching English vocabulary using a crossword puzzle is an effective media to improve students' vocabulary. The fourth research was by Panjaitan and Amanarsih (2020). Based on the results of their research, it was shown that using puzzle games can make students more interested and motivated in learning. In conclusion, puzzle game is effective to increase students' interest and vocabulary.

Vocabulary teaching is one of the essential things in language learning. Without vocabulary knowledge, they will not be able to express and write their ideas using grammar and arrange them into sentences with meaning. In teaching vocabulary, the teacher must lead with the correct technique. The teacher can create an activity that can be applied in the classroom. Games can be an alternative way to help teachers teach children vocabulary. This will make the learning situation more enjoyable. Among the ways to increase student's vocabulary, the writers chose a crossword game to study in this research.

Three research questions guided the study:

1. Can the Crossword Puzzle media increase students' vocabulary in learning English Vocabulary among the grade 7 students of SMP Muhammadiyah 2 Kalasan?
2. How effective is the using of crossword puzzle learning media in mastering English vocabulary among the grade 7 students of SMP Muhammadiyah 2 Kalasan?
3. Is there any difference between students who use crossword puzzles and students who do not use them?

To answer the research questions the researchers formulate the hypothesis as follows:

1. Null Hypothesis (H₀): "There is no significant increase in students' vocabulary after being taught using crossword puzzles".
2. Alternative Hypothesis (H_a): "There is a significant increase in students' vocabulary after being taught using crossword puzzles".

2. Method

This research was conducted using an experimental design, specifically a quasi-experimental plan using a quantitative approach. A quasi-experiment was proposed to examine the causal relationship between crossword puzzle play and vocabulary mastery. The author used two sample classes during this research included in one of the quasi-experimental characteristics.

In this study, the writers set one of the two selected classes as the experimental class, used as the treatment group, and another as the control class, which was used as the comparison group. Pre-test and post-test observations were given for each condition. The determination of the class used as the experimental class and the control class was not chosen randomly. It was based on their teacher's assessment. Then, the experimental class was treated by using a crossword game, while the control class was treated without using a crossword game.

2.1. Population and Sample

A population is a large group of individuals who have the same general characteristics. According to (Sugiyono, 2010). The population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by the researcher to be studied and then drawn conclusions. So it can be concluded that a population is a group of subjects that are the center of attention that contains information that is known and has certain characteristics in common and has been determined to draw conclusions. The population used in this present study were all the grade 7 students of SMP Muhammadiyah 2 Kalasan, Kalasan, Sleman.

A sample is part of the population that is used as a representative of the subject to be studied. Therefore, a sample must have the characteristics of the population. The sample used for this research was the seventh-grade students of SMP Muhammadiyah 2 Kalasan totaling 36 people. The writer employed a technique called purposive sampling to choose the sample. The purposive sampling technique was determined by certain considerations.

2.2. Research Instrument

Use Research instruments are tools or facilities used by researchers in collecting data. Furthermore, structured data is an important material that will be used to answer problems, to look for something that will be used for purposes and to prove hypotheses. The purpose of this study was to measure the effect of a given treatment. The tools used in this measurement are called research instruments. The instrument is first outlined in the form of an instrument grid which is listed as follows:

2.3. Test questions

The English vocabulary test questions in this study were in the form of multiple choice. The learning achievement test contains questions according to simple English material with basic competence in spelling English vocabulary. The calculation of the English vocabulary test instrument uses a measurement scale of type 0-1 or the Guttman scale. A score of 1 in the item is given to students who answer correctly and if they answer incorrectly, they are given a score of 0.

2.4. Data Collecting Technique

If the researcher does not know the data collection technique, the researcher will not get the data that fulfills the standard. Sugiyono (2013) states that the technique of data collection is the most important step in research. In contrast, the main goal of the research is to get the data. The data collection techniques used in this study are:

a. Pre-test

The aim was to find the mean scores of students' vocabulary mastery before the treatment was given. The teacher gave a vocabulary test consisting of 20 questions to each individually. After the students had finished the work, answer sheets were collected and scored. The pretest was given to both control group and experimental group.

b. Treatment

The students were taught by using the Crossword Puzzle as the teaching media. Treatment was given for several meetings. The teacher introduced crossword puzzle games to students. The teacher elaborated the regulations to play a crossword puzzle game. The teacher divided the students into several groups; each group consisted of two students. The teacher gave the crossword puzzle game sheets to each group. Each group solved the crossword puzzle game sheets provided. Then the answer sheets were collected. After that the teacher and students discussed the answers. The treatment was only given to the experimental group, while the control group was taught without using the crossword puzzle.

c. Post Test

After the treatment was carried out, it was continued with a post-test to determine whether there was a difference between the mean scores of the pre-test and post-test. The teacher gave a vocabulary test consisting of 20 questions to each student. After the students had finished the work, the answer sheets were collected and scored. After the researcher collected the data, the data was analyzed using three tests, namely: normality test, homogeneity test, and hypothesis testing.

3. Findings

In this section, the researchers explain the findings of the research and the researchers include a discussion of several previous research theories, as well as the implications and limitations of this research.

3.1. Instrument Validity Test

Before the instrument is tested on students, it is first consulted with expert (a person who has an expertise in the English study). A validity test is used to measure the validity an instrument. An instrument or questionnaire is said to be valid if the questions on the instrument or questionnaire can reveal something that will be measured by the instrument (Ghozali, 2018). The significance test is carried out by comparing the r-count with the r-table score. If the r-count is higher than that of the r-table and the score is positive, then the item, question, or variable is declared valid. And if the r-count is smaller than that of the r-table, then the item, question, or variable is declared invalid. The validity used in this study is content validity.

Table 1: Validity Test

Question Item	r _{count}	r _{table}	Description
Q1	0,652	0,361	Valid
Q2	0,556	0,361	Valid
Q3	0,533	0,361	Valid
Q4	0,615	0,361	Valid
Q5	0,396	0,361	Valid
Q6	0,639	0,361	Valid
Q7	0,480	0,361	Valid
Q8	0,665	0,361	Valid
Q9	0,519	0,361	Valid
Q10	0,558	0,361	Valid
Q11	0,650	0,361	Valid
Q12	0,559	0,361	Valid
Q13	0,599	0,361	Valid
Q14	0,427	0,361	Valid
Q15	0,472	0,361	Valid
Q16	0,380	0,361	Valid
Q17	0,432	0,361	Valid
Q18	0,589	0,361	Valid
Q19	0,537	0,361	Valid
Q20	0,664	0,361	Valid

Table 1 shows the correlation coefficient score for each test item with a score greater than that of the r-table (0.36). If r-count > r-table, the question is valid and can be tested to the respondents.

3.2. Reliability Test

The results of the reliability test based on the α -Cronbach formula is obtained as follows:

Tabel 2: Reliability Test

Intrument Test	Coefficient Reliability	Critical Score	Description
Question Test	0,876	0,7	Reliable

After the instrument was tested for validity, the next step was to examine its reliability. The instrument reliability test was carried out using the Cronbach Alpha reliability test. Based on the test results, the researchers obtained a score of $\alpha = 0,876$. These figure indicates that the instruments used in this study have a very high level of reliability. The calculation is obtained through the computer assistance program SPSS version 17.

3.3. Normality test

The normality test is used to test whether the research data is normal or not. The formula used to test the normality of the data is the Kolmogorov-Smirnov formula. The data tested were pretest and posttest data in the experimental and control classes. In the calculation with this formula, if the resulting index (P) > 0.05 (α : 5%), then the data in this study is normally distributed (Nurgiyantoro et al, 2004).

Data analysis using SPSS version 17 produces an index that can indicate whether the data is normally distributed or not. The summary of normality test results can be seen in the Table 3.

Table 3: Normality Test

Class	P	Description
Pretest Experimental Class	0,599	P > 0,05 = Normal
Pretest Control Class	0,750	
Posttest Experimental Class	0,679	
Posttest Control Class	0,593	

Table 3 shows that the index obtained from the normality test of the experimental class pretest data is $0.599 > 0.05$ ($\alpha: 5\%$), and $0.750 > 0.05$ ($\alpha: 5\%$) is obtained from the control class pretest data. Meanwhile, from the posttest data normality test, the experimental class obtained an index of $0.679 > 0.05$ ($\alpha: 5\%$) and $0.593 > 0.05$ ($\alpha: 5\%$) from the control class posttest data. Because all calculations produce an index > 0.05 ($\alpha: 5\%$), it can be stated that the data used in this study is **normally distributed**.

3.4. Homogeneity Test

In addition to testing whether or not the distribution is normal in the sample, it is also necessary to test for homogeneity, whether or not the variance of the samples taken from the same population is uniform. After the homogeneity of variance test was carried out using SPSS version 17, the data were as follows.

Table 4. Homogeneity Test

Class	F _{count}	F _{table}	P	Description
Pretest Experimental Class	0,087	4,130	0,770	F_h < F_t = Homogen
Pretest Control Class				
Posttest Experimental Class	0,889		0,352	
Posttest Control Class				

Table 4 shows that the F_{count} (F_c) obtained from the homogeneity test of variance from the pretest and post-test is **0.087** and **0.889** which are smaller than F_{table} (F_t) **4.130**, so it can be said that the distribution of the pretest and post-test data is **homogeneous**.

3.5. The Difference Between The Experiment and Control Class

The independent t-test is an analysis technique to determine the difference in vocabulary mastery between the experimental and control classes. The results of the independent t-test of pretest and post-test calculations for the experiment and control classes using the SPSS version 17 program and the summary of the results of the independent t-test of pretest and post-test calculations for the experiment and control classes is in the Table 5.

Table 5: Group Statistics

Treatment Group		N	Mean	Std. Deviation
Pre Test	Experimental	18	68.89	8.670
	Control	18	67.22	8.440
Post Test	Experimental	18	79.72	8.824
	Control	18	68.61	7.823

It can be seen from the data presented in Table 5 and Table 6 that there are differences in the results from the sig data (2-tailed) before and after being given treatment. From these results, it can be concluded that there is a difference in vocabulary mastery between the experimental and control classes after being given a post-test because of the score of sig (2-tailed) $0.000 < 0.05$ meaning that there is a difference because the sig score < 0.05 .

Table 6: **Independent Sample Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		f	sig	t	df	Sig. (2-tailed)
Pre test	Equal variances assumed	.087	.770	.584	34	.563
	Equal variances not assumed			.584	33.976	.563
Post test	Equal variances assumed	.889	.352	3.998	34	.000
	Equal variances not assumed			3.998	33.518	.000

3.6. The Influence of Crossword Puzzle Toward The Vocabulary Improvement of The Experiment Class

The Paired t-test is an analysis technique to determine the influence of vocabulary mastery between the experimental and control classes. The summary of the calculation results of the Paired T-Test of pretest and post-test of the experimental and control classes are listed in the Table 7.

Table 7 **Paired Sample Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Post Test Experimental	79.72	18	8.824	2.080
	Pre Test Experimental	68.89	18	8.670	2.043
Pair 2	Post Test Control	68.61	18	7.823	1.844
	Pre Test Control	67.22	18	8.440	1.989

Table 8 **Paired Sample Correlations**

		N	Correlation	Sig.
Pair 1	Post Test Experimental & Pre Test Experimental	18	.669	.002
Pair 2	Post Test Control & Pre Test Control	18	.896	.000

Table 9 **Paired Sample Test**

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Post Test – Pre Test Experimental	10.833	7.123	1.679	6.453	17	.000
Pair 2	Post Test – Pre Test Control	1.389	3.760	.886	1.567	17	.135

It can be seen from the data presented in Table 7, 8 and Table 9 that the results of the Sig data are affected (2-tailed) before and after the treatment. From these results, it can be concluded that there is an effect on vocabulary mastery in the experimental class after being given a treatment because the score of sig. (2-tailed) $0.000 < 0.05$. While the score of sig. (2-tailed) in control class has no effect because of the score of sig. (2-tailed) $0.135 > 0.05$. So, from these data, it can be concluded that the crossword puzzle media influences students' vocabulary mastery in the experimental class because the score of sig. (2-tailed) $0.000 < 0.05$.

3.7. Hypothesis Testing

To answer the research questions, the researchers proposed two hypothesis, the null hypothesis and the alternative hypothesis. The null hypothesis (H₀) says "There is no significant increase of students' vocabulary after being taught using crossword puzzles". The alternative hypothesis (H_a) says "There is a significant increase of students' vocabulary after being taught using crossword puzzles". The results of the H₀ test was rejected and H_a was accepted which means there was a significant effect on students' vocabulary mastery before and after being taught using a crossword puzzle as the teaching media. It can be seen from the Table 10.

Table 10 Paired Sample Test

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Post Test – Pre Test Experiment	10.833	7.123	1.679	6.453	17	.000
Pair 2	Post Test – Pre Test Control	1.389	3.760	.886	1.567	17	.135

It can be seen from the data presented on Table 10 that there is a significant effect on students' vocabulary mastery before and after being taught using a crossword puzzle because the score of sig. < 0.05 . Ghazali (2018) states that the t-test is used to determine each independent variable on the dependent variable. If t-count $>$ t-table or the significance score of t-test < 0.05 , it is concluded that individually the independent variable has a significant effect on the dependent variable.

4. Discussion

This section contains the discussion of the findings based on the problem formulations.

4.1. Increasing students' vocabulary through crossword puzzles in learning English vocabulary for 7th graders at SMP Muhammadiyah 2 Kalasan.

Saxena, Nesbitt, Pahwa, and Mill (2009) state that crossword puzzle is a very interesting word game and many people enjoy this game. Therefore, students will always compete to be able to find the right answer so that it will provide positive scores for students and achievers so that healthy competition will emerge. A high sense of togetherness will be able to answer the crossword puzzle and other students in the group will also know the correct answer.

Based on the results of hypothesis testing using the t-test as presented on Table 10 that the crossword puzzle media can increase students' vocabulary in learning English vocabulary among the 7th-grade students at SMP Muhammadiyah 2 Kalasan. There is a significant increase in the final test score as can be seen from the data from the t-data. The crossword puzzle media increases students'

vocabulary in learning English Vocabulary for 7th-grade students at SMP Muhammadiyah 2 Kalasan.

This present study corroborates the previous study conducted by Sisilahi et al., (2019) on the similar topic, where they used a pre-experimental design method in the form of a one-group pretest-posttest design using a quantitative approach. Their study shows a significant improvement on students' vocabulary mastery before and after being taught using a crossword puzzle. Another study by Anwar and Efransyah (2018) used quantitative approach and pre-experimental research design conducted in one class. They state that teaching English vocabulary using crossword puzzle game is effective to improve the students' vocabulary. This present study also produces similar findings as that of Anwar and Efransyah (2018).

4.2. Crossword puzzle media is effective to improve English vocabulary of 7th-grade students of SMP Muhammadiyah 2 Kalasan.

The use of crossword puzzle media is effective for learning English vocabulary. There is difference in score between the average of pre-test and the post-test in the experimental class. The total score on the post-test has a higher score than the total score on the pre-test. Meanwhile, the total post-test score in the control class is lower than in the experimental class. Thus, the use of crossword puzzle learning media is effective for improving English vocabulary among 7th-grade students of SMP Muhammadiyah 2 Kalasan.

A previous study by Panjaitan and Amanarsih, (2020) on the similar topic, used a class action research method approach. Based on the result of the research there was an increase in students' vocabulary skills in each cycle. Using puzzle games can make students more interested and motivated in learning. In conclusion, puzzle game is effective to increase students' vocabulary. Research conducted by Orawiwatnakul (2013) shows that learning vocabulary using crossword puzzles for Thai students is one of the best ways to increase their vocabulary. It is considered as an effective learning media for students to learn vocabulary.

The crossword puzzle game is defined as an effective game for the vocabulary teaching process carried out in the classroom. Crossword puzzle provides many advantages. Students in this crossword game can maintain an interaction relationship with their peers and this game enables the teacher to add variety to lessons and increase student motivation. This crossword game can bring the target language to life and makes students who are not active become more active. This crossword game makes students learn foreign languages easily and without stress, and students can positively participate, especially in their efforts to improve their students' English (Manullang et al., 2020). The research by Sadiyah, Septiani, and Kareviati, (2019) shows that teaching English vocabulary using a crossword puzzle was effective media to improve students' vocabulary. The reserach by Sitompul and Juliana, (2020) also proved that the use of crossword puzzle can increase the students' vocabulary mastery which is similar to the finding of this present study.

5. Conclusions

From the research that has been conducted regarding the effectiveness of using Crossword Puzzle learning media on the mastery of English vocabulary among the seventh grade students of SMP Muhammadiyah 2 Kalasan, there is an influence and difference in learning achievement between the ones taught using crossword puzzle media and those taught with conventional teaching. It can be seen from the results of the final test that the average score of the experimental class was 79.72, while the average score of the control class was 68.61. From the results of the hypothesis testing analysis using a t-test, it is known that the sig score of the experimental class is smaller than that of the control class. This is shown from the data paired t-test by SPSS. Then H_0 was rejected, and H_a was accepted. Thus, there is a different impact between the class that uses the crossword puzzle media and the conventional class in learning English vocabulary because the average post-test score of the experimental class is greater than that of the control class. So, it can be concluded that the use of crossword puzzle media in learning English vocabulary for 7th-grade students of SMP Muhammadiyah 2 Kalasan is effective.

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