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The Effect of Pop-up Dictionary Tools for Vocabulary Learning Aid in the *Language Reactor* Chrome Web Extension

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ABSTRACT

Language applications to learn vocabulary have gained a lot of interest in the past years, including "Language Reactor", a Chrome web extension-based application. This extension offers learning language through movies or videos using dual subtitles and a pop-up dictionary. Previous studies on the Pop-up dictionary tools showed the benefits of vocabulary learning aids integrated with reading skills. In contrast, the research about the benefit of Pop-up dictionary for vocabulary learning aids integrated with listening skills is limited. This research aimed to know the effect of Pop-up dictionary tools in "Language Reactor" for vocabulary learning aid that integrated with listening skills. Using a quasi-experimental research design, the population was divided into two groups, with the experimental group using "Language Reactor" and the control group using "GOM Player"to view the video materials. Pretests in the form of vocabulary tests were administered before the four-meeting experiment in a public senior high school in Indonesia, followed by posttest for both groups. Because the data obtained show an unpaired sample size, the Independent Samples T-test was used to analyze the data. The result revealed that the significant value (2-tailed) was 0.522, indicating that there was no positive effect on the use of the Pop-up dictionary in the "Language Reactor" Chrome extension as a vocabulary learning aid. This demonstrates that using technology in the classroom does not always enhance learning. Therefore, carefully choosing the technology to use for learning vocabulary in the classroom is suggested, particularly when integrated with different language skills.

1. INTRODUCTION

The growth of technology has considerably increased access to varied materials and language learning tools, notably for learning English as a second language. This improvement has encouraged the creation of new techniques for language learning, such as the use of Web Extension language learning applications. One example is the "Language Reactor", formerly known as "Language Learning with Netflix," which offers multimedia language learning tools in the form of movies or videos. This plugin includes features targeted at improving vocabulary learning such as dual subtitles and pop-up dictionaries. Previous studies have demonstrated the potential of "Language Reactor" in improving vocabulary learning (Alm, 2021; Dizon & Thanyawatpokin, 2021; Gouleti et al., 2020; and Turkmen, 2020), with a focus on the effect of dual subtitles on this process. Furthermore, the researchers' focused on the use of pop-up dictionaries, mainly for improving reading skills (Alharbi, 2016; Cohen et al, 2017; Liu & Lin, 2011). Despite these findings, there is limited research on the use of pop-up dictionaries in the Language Reactor. As a result, the current study aims to bridge this gap by investigating the potential benefits of Language Reactor's pop-up dictionary tools as vocabulary learning aids. Therefore, the researcher conducted an experimental study on the effectiveness of pop-up dictionary aids for vocabulary learning in the "Language Reactor" Chrome web extension.

2. LITERATURE REVIEW

2.1. Vocabulary

The understanding of words and their definitions is described generally as vocabulary. There are so many studies regarding vocabulary and its importance in learning languages. McCarthy (1990) states that most language teachers are crucial to any language course. Additionally, a previous study by Erkaya and Drower (2012) states that vocabulary is one of the most important components in learning a new language. The greater the students' vocabulary, the easier it will be for them to understand the lesson. Beglar and Nation (2014) also mention that lexical knowledge is essential as a component of communicative language proficiency. To get a grip on the target language, the learners must learn and comprehend vocabulary because it is essential for learning a language such as English. Furthermore, Hatch and Brown (1995) define words based on their functional domains, also known as parts of speech, which are divided into two classes: the major class (nouns, verbs, adjectives, and adverbs) and the additional class (pronouns, prepositions, conjunctions, and interjections). This study focused on the major class of vocabulary.

2.2. Vocabulary Learning

According to Zhang and Li (2011), learning vocabulary is basic in a second language study. Lexical knowledge helps to build proficiency in language skills, such as listening, reading, writing, and speaking. Furthermore, Hatch and Brown (1995, p. 368) outline five crucial steps in vocabulary learning to optimize the learning process. These steps include getting resources for commonly encountering words, understanding the word form, getting the word meaning, combining word form and meaning in memory, and making use of the words.

2.3. Chrome Web Extensions as Learning Media

Chrome is a fast, secure, free web browser. Google Chrome is easy to use and can be installed on both Windows and Macintosh computers. This browser supports extensions, which are small software that students can use to customize their internet experience (McMahon et al., 2021). *Browser extensions* are programs that run within a web browser's context (security sandbox) of a web browser (Mehta, 2016). There are several advantages of using Chrome applications, including the ability to quickly install an application without restarting the computer or browser, having apps always available if we sync across multiple computers, and having apps that are easy to find and open using the app launcher. Thanks to their numerous advantages, Chrome extensions can also be used to provide digital resources in classes and students' learning media. Teachers can incorporate these tools into classroom activities and encourage students to use learning features (Ok & Rao, 2019). Moreover, one of the valuable extensions to learning a new language through watching movies and videos is called Language Reactor. This extension helps students to learn a new language more effectively and enjoyably by watching movies and series in their native language.

2.4. Language Reactor as Language Learning Extension

Experimenting with dual subtitles while watching a video or a movie is a modern technique for a bilingual to improve their language learning. Gouleti et al., (2020) claim that open-source applications or Google Chrome extensions that allow for the simultaneous presence of two sets of subtitles in the video's original language and the viewers' main language have grown in popularity over the previous decade. The "Language Reactor" extension aligns with these trends by offering dual subtitles in the viewers' target language and native language, thereby supporting language learning through multimedia content. Additionally, the extension serves as a language learning tool by providing audio-visual content from Netflix and YouTube channels. It includes features such as a pop-up dictionary, word highlighting, and memorization support, contributing to effective language learning.

2.5. The Advantages of Using Pop-up Dictionary as Vocabulary Aid for Students

The use of a dictionary in learning English has existed for decades. However, as technology has advanced to its greatest potential, the use of dictionaries in EFL classes has also improved. In agreement, Kramsch and Anderson (1999) state that the growth of a machine-dictionary has caught the interest of many people due to its remarkable potential and increasing prevalence and breadth of applications. Some examples of machine-dictionary type are the Type-in and Pop-up dictionaries that majorly used as an aid (Liu & Lin, 2011). According to Oxford Dictionary, pop-up dictionary is named after the word 'pop-up', meaning appear or occur suddenly. Pop-up dictionaries enable learners to bring up definitions adjacent to or above any given word in a text by double-clicking on it. Language Reactor is among the applications offering pop-up features for learning foreign languages, aligning with the progressive trends.

2.6. The Benefits of Language Reactor in Teaching Vocabulary

In one of her studies, Katemba (2020) suggests that teachers should implement an engaging and appealing teaching technique, and parents should encourage and urge their children to learn. She also mentions that schools want teachers to be comfortable with technology, particularly in the classroom, making tools like Language Reactor potentially valuable for vocabulary instruction. Aside from being an extension, Language Reactor can be used in formal classrooms to teach vocabulary through movies or videos. Watching Netflix shows is thought to be beneficial for learning new terms, vocabulary, and language usage (Turkmen, 2020). He also claims that language learners learn casual language usage, such as slang, cultural differences, vocabulary, and grammar, by watching movies or films. Since this extension offers many functions and add-ons or plugins that focus on the learner's knowledge of the language they are learning or their target language, such as a pop-up dictionary that contains the literal translation of the word that the users click and some sentences that use the word. This can aid learners in learning vocabulary from native speakers' actual conversations.

2.7. Previous Studies on the Use of Pop-up Dictionary as Vocabulary Learning Aids

There are several studies focusing on the use of pop-up dictionaries as vocabulary learning aids. Alharbi's (2016) study demonstrated distinct outcomes for four groups: the pop-up dictionary, type-in dictionary, paper-based dictionary, and no dictionary group. From this study, the pop-up dictionary group exhibited the shortest vocabulary time, the longest vocabulary and text reading time, and the highest number of "look-ups" compared to other groups. The pop-up dictionary group also outperformed other dictionary groups in reading comprehension and vocabulary learning, and the pop-up dictionary group demonstrated the most positive attitudes toward dictionary use.

Prior research conducted by Liu and Lin (2011) aimed to look at how technology "might" have changed the long-standing teaching methods of using book dictionaries by identifying the learning processes associated with different dictionaries. The study's outcomes demonstrated that all dictionary aids enhance vocabulary learning but did not significantly impact comprehension. Furthermore, the pop-up dictionary exhibited notably superior efficiency in facilitating vocabulary learning compared to the other aids. Additionally, the results indicated that the group using the pop-up dictionary learned words significantly more rapidly in terms of vocabulary learning efficiency than the comparison group.

Cohen et al., (2017) also conducted a study on the effectiveness of pop-up English language glossary in large-scale tests for EL (English Learners) students in grades 3 and 7. The outcomes presented a mixed picture; the 3rd graders displayed a minimal inhibitory effect on the English Language Assessment and mathematic assessment, whereas the 7th graders using the pop-up dictionary exhibited a benefit in the English Language Assessment.

In the research above, the researchers were more focused on vocabulary learning integrated with reading skills. However, in this research, the researcher will more focus on vocabulary learning integrated with listening skills through watching video materials in Language Reactor extension.

2.8. Research Hypotheses

Based on the formulation of the problem and theoretical studies that have been described above, the formulated hypotheses are:

1. Null Hypothesis (H_0): There is no positive significant effect on the use of a pop-up dictionary in the "Language Reactor" Chrome extension as a vocabulary learning aid.
2. Alternative Hypothesis (H_a): There is a positive significant effect on the use of a pop-up dictionary in the "Language Reactor" Chrome extension as a vocabulary learning aid.

3. METHOD

This study used a quasi-experimental study with a posttest-only control group design. This study was carried out in a public senior high school in Indonesia. The research participants were selected by using cluster random sampling selection based on the results of the homogeneity test, which were collected from their classes of eleventh-grade students. Based on the results of ANOVA, the population was homogeneous. As a result, the participants were chosen from the two classes with the closest mean score. Class A was chosen as the experimental group, while Class B was chosen as the control group. The researcher administered treatment to each group four times over the course of four weeks during the experiment. The experimental group was taught using Language Reactor, while the control group was taught using GOM Player. Before administering the pos-test, the researcher analyzed the test items in the form of a meaning recall test for their validity, reliability, and difficulty index. This test was administered to a class that did not belong to the experimental and control group. The try-out test included 40 items of multiple-choice questions. The results of the validity, reliability test, and difficulty index showed out of 40 items, only 30 items met the criteria. Subsequently, the post-test was administered to both the experimental and control groups after the completion of the treatment. Independent Samples T-test was administered to analyze the post-test score in order to know the effect of pop-up dictionaries on students' vocabulary learning in the "Language Reactor" web extension.

4. RESULTS AND DISCUSSION

4.1. Results

After the experiment was done for four meetings, the post-test was administered to both the experimental and control groups at the end of the meetings. The students were given 30 minutes to do the post-test, which has 30 items of multiple choices. The post-tests were then analyzed using the Independent Samples T-Test in SPSS version 20 to know whether there is a significant effect on the use of a pop-up dictionary for students' vocabulary learning. An independent sample t-test was performed to compare the mean scores for a measurement taken two different times.

Before doing the analysis, the data taken must be normally distributed. The normality of the data was assessed in SPPS by using the Explore option on the Descriptive Statistics menu. In this research, the post-test scores were the ones being assessed. The data is called normal when the significant value is greater than 0.05. The results showed that the post-tests were normally distributed and did not violate any assumptions.

Table1.
The Result of Normality Test of Post-Test

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class1	Statistic	df	Sig.	Statistic	df	Sig.
Post-Test Scores	XI8	,100	36	,200*	,946	36	,080
	XI9	,149	35	,049	,957	35	,181

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The sample size for each group is less than 50. To conduct a normality test with a sample size of less than 50, the Saphiro-Wilk test is used. Based on the table above, the Saphiro-Wilk significance of the post-test normality of XI 8 is .080, which defines the lower bound of the true significance and it means the data is normal. However, the Shapiro-Wilk significance of XI 9 is .181 (Sig. value more than 0.05), suggesting the data is also normally distributed. After the data is normally distributed, the next analysis would be the Independent samples t-test. To perform the independent samples t-test, the data were analyzed by comparing the mean in the Compare Mean menu and then clicking Independent Samples T-test. The two variables, which are the pre-and post-test scores of the experimental and control groups, were the ones being analyzed.

Table 2.
Group Statistics Table of the Post-Test Scores

Group Statistics

	Class1	N	Mean	Std. Deviation	Std. Error Mean
Post-Test Scores	XI8	36	61.333	15.0940	2.5157
	XI9	35	63.657	15.3277	2.5909

Table 1.
The Result of Independent Samples T-Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Post-Test Scores	Equal variances assumed	.109	.743	-.644	69	.522	-2.3238	3.6105	-9.5265	4.8788
	Equal variances not assumed			-.643	68.867	.522	-2.3238	3.6112	-9.5283	4.8807

Referring to the "Group Statistics" output table above, the sample data for class XI8 is 36 students, while class XI9 is 35. The average post-test score or Mean for class XI8 was 61.333, while it was 63.657 for class XI9. According to descriptive statistics, there is a difference in the average post-test scores between classes XI8 and XI9.

The following "Independent Samples Test" output table can be used to determine if the differences in the post-test results of the two classes are significant or not. The Sig. result for Levene's Test for Equality of Variances based on the output is 0.743, which is larger than 0.05, indicating that the data variance between classes XI8 and XI9 is homogeneous or the same. As a result, the values in the "Equal Variances Assumed" table inform the interpretation of the Independent Samples Test output table. The Sig. (2-tailed) is 0.522, which is more than 0.05, as determined by the "Independent Samples Test" output table in the "Equal Variances Assumed" section. If the Sig. (2-tailed) is larger than 0.05, there is no significant difference in the average between groups A and B. As a consequence, there is no significant difference between the experimental and control groups' post-test scores. Meanwhile, the "Mean Difference" value is -2.3238, as seen in the output table above. This figure represents the difference, between the average post-test scores of students in class XI8 and those of students in class XI9. This demonstrates that there is a negative difference between the experimental and control groups' post-test score values. The control group had a greater mean value than the experimental group in this example, with a mean difference of -2.3238. This demonstrates that not every learning with technology improves students' learning achievement. This, of course, contradicts the assumptions that technology can be utilized successfully in all areas for language acquisition (Ghanizadeh et al., 2015; Chang et al., 2018) and that using technology in the classroom could enhance learning (Katemba, 2020).

To know the importance of the research finding is to calculate the 'effect size'. Effect size commonly used to compare groups is *partial eta squared* and *Cohen's d*. The significant value, according to Cohen (1988), is d.2, which means small effect,.5, which means medium effect, and .8, which means large effect. The formula for *eta squared* to calculate the effect size is as follows.

$$Eta\ squared = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

$$\text{E}ta\ squared = \frac{(-0.644)^2}{(-0.644)^2 + (36+35-2)}$$

$$= \frac{0{,}414}{0.414 + (69)}$$

$$= \frac{0{,}414}{68.586}$$

= 0.006

From the data of *eta squared* above, it can be concluded that the effect size was 0.006, indicating a very small effect with a substantial difference in the post-test scores obtained before and after the experiment from both the experimental and control groups.

4.2. Discussion

The analysis of the data collected through L2 vocabulary tests revealed that no significant effect was observed between the mean scores of the control and experimental groups, as the Independent Samples T-test revealed that the significant value (2-tailed) was greater than 0.05. Despite this, the two groups failed to achieve a meaningful effect in vocabulary learning when implementing different treatments. The outcome, on the other hand, revealed that the result of the control group appeared to be more significant than the one of the experimental group, with the experimental group having a mean score of 61.333 and the control group having a mean score of 63.657.

The findings of this study are consistent with prior research that demonstrated no significant effect of using a pop-up dictionary on vocabulary learning (Mohavedi & Shourkaee, 2019). According to the findings of the Tabata-Sandom (2016) study, the online pop-up for unfamiliar terms may limit the ability of emerging L2 readers to completely absorb authentic online literature, which is consistent with the current study toward watching video.

Based on this study, one of the factors that make using pop-up dictionaries for learning vocabulary while watching videos less effective is that students have trouble coordinating visual information (via video) while also processing auditory information (via audio). This factor is consistent with the findings of Alm's (2021) research, which found that 55% of participants had trouble processing visual and aural information at the same time. Another factor that makes pop-up dictionaries ineffective is the speed at which students read video scripts, which they believe is too fast. Thus, they requested that the video playback speed be reduced from normal to 0.5x in order to follow the information of the video being played. This phenomenon is practically in line with the results of Alm's (2021) research, which stated that 52% of participants had difficulties tracking the video playback pace.

The results of several studies regarding Language Reactor reveal that the most advantageous feature as a vocabulary learning medium is its dual subtitles feature (Alm, 2021; Dizon & Thanyawatpokin, 2021; Gouleti et.al, 2020), while for research the use of a pop-up dictionary to learn vocabulary through watching films or videos is still limited. The use of pop-up dictionaries as a medium for learning vocabulary focuses more on students' reading abilities and shows significant results compared to the use of other dictionaries (Alharbi, 2016; Liu & Lin, 2011; Cohen et al, 2017). In this study, the use of pop-up dictionary tools in the Language Reactor extension through watching videos did not affect vocabulary learning aid. The results of this study indicated that both groups had no effects, although the control group had higher mean scores than the experimental group. One of the reasons for the negative effects of the group experiment is the use of Language Reactor for the first time, difficulty using some Language Reactor features (Alm, 2021); difficulty processing visual and auditory information simultaneously (Alm, 2021) as well as the participants' second language proficiency because they are still in the intermediate level and still need to use their native language subtitles to understand new words in the video material (Dizon & Thanyawatpokin, 2021). Further research on the usage of pop-up dictionaries in Language Reactor as a vocabulary aid is required in the future focusing on different language skills or using Language Reactor as an informal learning tool so that the learners can explore and benefit from the extension.

5. CONCLUSIONS AND SUGGESTIONS

According to the result of the data analysis, using the Pop-up dictionary in the Language Reactor Chrome web extension on students' vocabulary has no significant effect, with a fall in the mean score between the experimental and control group post-test scores. It was proved by the result of the Independent Samples T-test of the post-test result from the experimental and control group that the value was more than 0.05 with an effect size of 0.006, a mean of a very small effect. This means that there was no significant positive difference in the mean

scores between the experimental and control groups. In other words, there was no significant effect on the use of a pop-up dictionary in the "Language Reactor" Chrome Web extension as a vocabulary learning aid.

Even though this study found no positive influence on the use of the Pop-up dictionary on the Language Reactor Chrome web extension, it does not rule out the possibility of using Language Reactor as a learning media for students focusing on other language skills because Language Reactor has many features that can support foreign language learning. It is also suggested that teachers encourage students to use Language Reactor as an informal learning tool at home on their own to make full use of the capabilities. It is important to note that when using Language Reactor as a vocabulary learning aid, several teaching steps must be reconsidered, such as working on questions while viewing video material, because it can break students' focus on understanding the content of the material and selecting material that is appropriate to the student's language proficiency. The teacher also suggested paying attention to the subtitles of the video and the playback speed while showing the video because, in the present study, students showed difficulty with the subtitles and the playback speed of the video.

It is hoped that future researchers will be able to utilize the information obtained from this study as a reference for future research on the use of Pop-up dictionaries. Future researchers can also do a study in Language Reactor utilizing Pop-up dictionaries, concentrating on different language skills to determine which pop-up dictionaries can be used efficiently with which language skills. It is also suggested that future studies focus on students who study independently to enhance their vocabulary utilizing Language Reactor.

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