THE EFFECTIVENESS OF USING MIRO DIGITAL MIND MAPPING FOR STUDENTS' VOCABULARY MASTERY AT HIDAYATULLAH ISLAMIC HIGH SCHOOL SEMARANG

A FINAL PROJECT

Presented as Partial Fulfilment of the Requirements

to Obtain the Sarjana Pendidikan Degree

in English Education

by:

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ENGLISH EDUCATION STUDY PROGRAM

FACULTY OF LANGUAGES AND COMMUNICATION SCIENCE

SULTAN AGUNG ISLAMIC UNIVERSITY

SEMARANG

2023

PAGE OF APPROVAL

A Final Project entitled

THE EFFECTIVENESS OF USING MIRO DIGITAL MIND MAPPING

FOR STUDENTS' VOCABULARY MASTERY AT HIDAYATULLAH
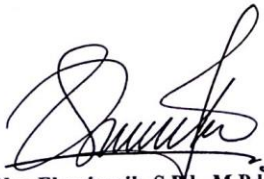
ISLAMIC HIGH SCHOOL SEMARANG

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has been approved by the advisor and to be examined by the Board of Examiners.

Semarang, 30 January 2023

Nur Ekaningsih, S.Pd., M.Pd

Advisor

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PAGE OF VALIDATION

A *Sarjana Pendidikan* Final Project on

THE EFFECTIVENESS OF USING MIRO DIGITAL MIND MAPPING FOR STUDENTS' VOCABULARY MASTERY AT HIDAYATULLAH ISLAMIC HIGH SCHOOL SEMARANG

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Defended before the Board of Examiners
On 3rd February 2023
and Declared Acceptable

Board of Examiners

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Semarang,   March 2023
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PAGE OF STATEMENT

STATEMENT OF WORK'S ORIGINALITY

Hereby, I honestly declare that the undergraduate thesis I wrote does not contain the works or part of the works of other people, except those which were cited in the quotations and the references, as a scientific paper should. If my statement is not valid in the future, I absolutely agree to accept an academic sanction in the form of revocation of my paper and my degree obtained from that paper.

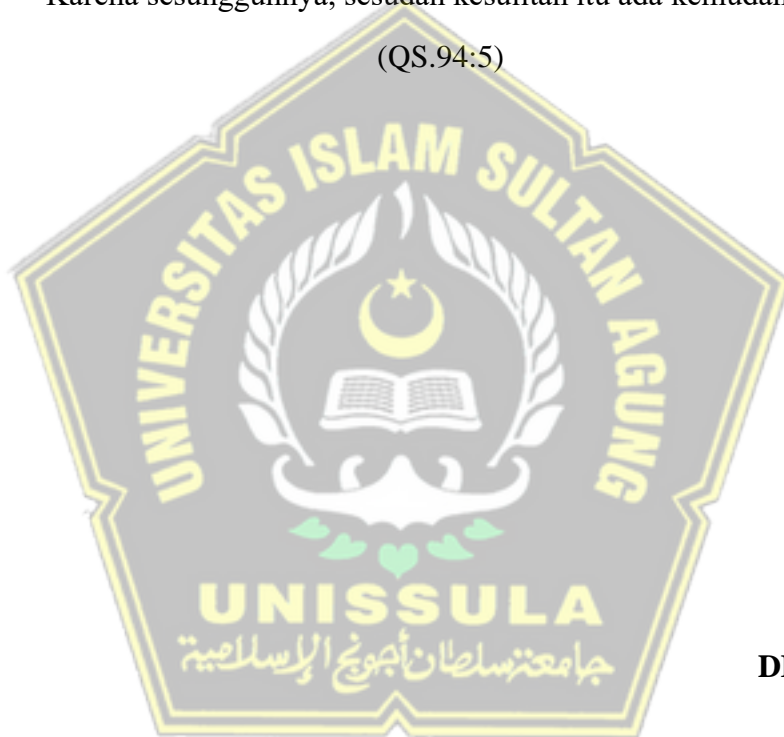Semarang, 1 March 2023

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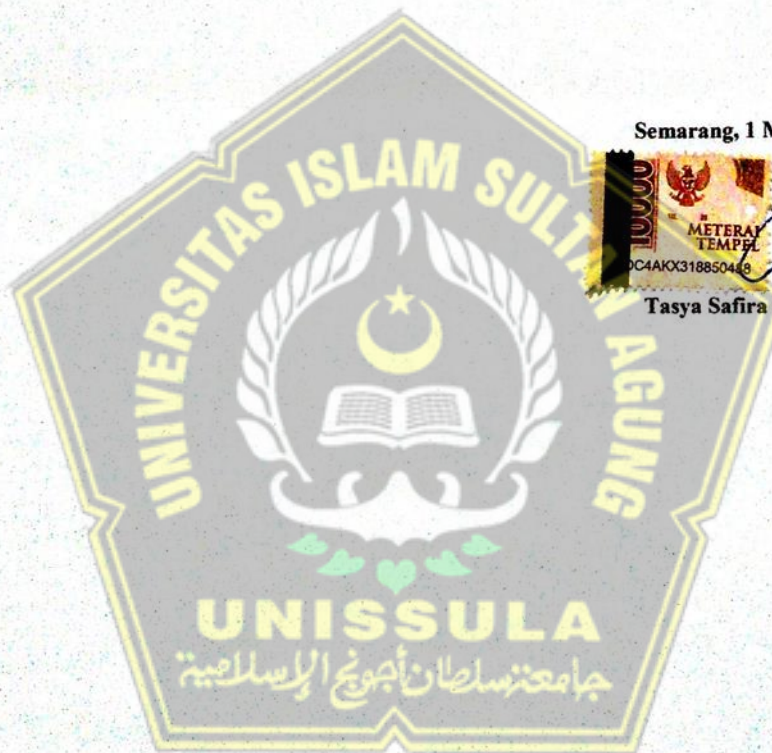
MOTTO AND DEDICATION

MOTTO:

فَإِنَّ مَعَ الْعُسْرِ يُسْرًا

"Karena sesungguhnya, sesudah kesulitan itu ada kemudahan,"

(QS.94:5)

DEDICATION

I dedicate this thesis to:

My beloved father and mother,

My beloved sister and brother

ABSTRAK

EFEKTIVITAS PENGGUNAAN MIRO DIGITAL MIND MAPPING TERHADAP PENGUASAAN KOSAKATA SISWA DI SMA ISLAM HIDAYATULLAH SEMARANG

Tasya Safira Muslikhah

Universitas Islam Sultan Agung

2023

Penguasaan kosakata adalah salah satu keterampilan terpenting yang dibutuhkan untuk belajar dan memahami bahasa asing. Namun, banyak pembelajar bahasa masih menganggap penguasaan kosa kata sulit dan mereka berjuang untuk menemukan cara menguasai kosa kata dengan cara yang efektif. Dalam penelitian ini, peneliti ingin mengeksplorasi cara untuk meningkatkan penguasaan kosa kata siswa menggunakan teknologi digital Miro agar pembelajaran menjadi lebih efektif dan menyenangkan. Penelitian ini menggunakan desain eksperimen dengan Non-Equivalent Groups Design, yang meliputi pre-test dan post-test, serta pemilihan dua ruang kelas yang sebanding. Sampel penelitian ini terdiri dari 48 siswi. Hasil analisis statistik uji-t menunjukkan bahwa ada perbedaan yang signifikan dalam penguasaan kosa kata siswi setelah kelompok eksperimen menerima perlakuan menggunakan pemetaan pikiran digital Miro. Penguasaan kosa kata siswa di kelas eksperimen lebih baik daripada kelas kontrol. Temuan penelitian menunjukkan bahwa penggunaan Miro Digital Mind Mapping efektif dalam meningkatkan penguasaan kosa kata siswa kelas XI SMA Islam Hidayatullah Semarang.

Kata Kunci: Digital Mind mapping, Miro, Penguasaan kosa kata

ABSTRACT

THE EFFECTIVENESS OF USING MIRO DIGITAL MIND MAPPING FOR STUDENTS' VOCABULARY MASTERY AT HIDAYATULLAH ISLAMIC HIGH SCHOOL SEMARANG

Tasya Safira Muslikhah

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2023

Vocabulary mastery is one of the most important skills required to learn and understand foreign languages. Many language learners, however, still consider vocabulary mastery difficult and they are struggling to find ways to master vocabulary in an effective way. In this study, the researcher wants to explore ways to improve student's vocabulary mastery using Miro digital technology to make learning more effective and fun. This study employs an experimental design with a Non-Equivalent Groups Design, which includes a pre-test and a post-test, as well as the selection of two comparable classrooms. The sample of this study consists of 48 females' students. The result of t-test statistical analysis shows that there is a significant difference in the students' vocabulary mastery after the experimental group receive treatment using Miro digital mind mapping. Students' vocabulary mastery at the experimental class is better than ones of the control class. The findings of the study show that using Miro Digital Mind Mapping is effective in improving students' vocabulary mastery for the eleventh-grade students of Hidayatullah Islamic High School Semarang.

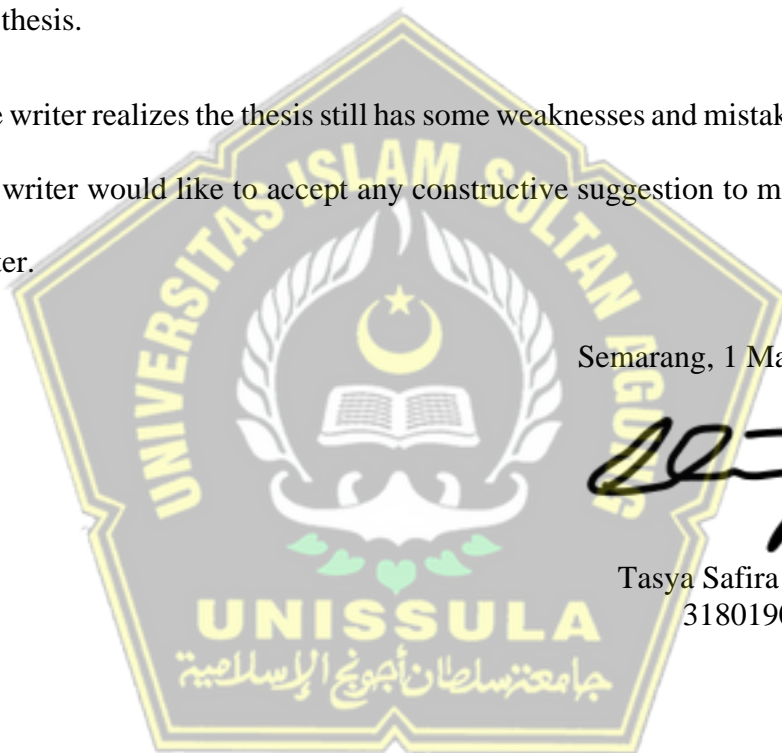**Keyword:** Digital Mind mapping, Miro, Vocabulary mastery

ACKNOWLEDGEMENT

First and first, the writer would like to express her sincere gratitude to Almighty God, Allah SWT, for his wondrous and magnificent grace, for the countless blessings, and for his love, which allowed the writer to finally finish this thesis. This thesis aims to satisfy one of the requirements for the degree of Sarjana Pendidikan of the English Education Department, Faculty of Languages and Communication Science, Sultan Agung Islamic University (UNISSULA). The author also wants to convey her sincere gratitude to the following people:

1. Prof. Dr. H. Gunarto, SH., M.Hum as Rector of Sultan Agung Islamic University Semarang.

2. Trimanah, S.Sos., M.Si the Dean of Faculty of Languages and Communication Science UNISSULA.

3. Nur Ekaningsih, S.Pd., M.Pd, the Head of English Education Study Program.

4. Nur Ekaningsih, S.Pd., M.Pd, as the writer's thesis advisor and academic advisor, for her help, instruction, guidance, time, and support in correcting and helping her finished her thesis.

5. Mrs. Mega Mulianing Maharani, S.Pd., M.Pd and Mrs. Elok Widiyati, S.Pd., M.Pd the writer's Examiners who had given valuable advices, revision and suggestions for her Thesis.

6. My dearest best friends in English Education Department, especially Kuniarsih, Maida Nabilla, Naila Ifada, and Puput Azmiyati. I'm so sorry I

can't mention your name one by one. Thanks for the support and sharing the happiness and sorrow during finishing this thesis, I Love you All.

7. My lovely best friend, Naufal Humam Ramadhani who give me support to do this thesis, big thanks.

8. Teachers and students at Hidayatullah Islamic High School Semarang for their warm welcome, allowing the writer to observe, and for their best cooperation during the research process that led to the completion of her thesis.

The writer realizes the thesis still has some weaknesses and mistakes. Therefore, the writer would like to accept any constructive suggestion to make this thesis better.

Semarang, 1 March 2023

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CHAPTER I

INTRODUCTION

This section presented the study's background, the reasons for selecting the topic, the problem statement, the objectives of the study, the study's hypotheses, the scope of the study, the significance of the study, definitions of key terms, and the study's organization.

1.1. Background of the Study

Languages help people express their feelings and share information through communication. In the 21st Century, multi-language skills have become extremely beneficial with globalization enables people around the world to easily connect each other. Learning foreign languages can develop positive attitudes towards other cultures and languages. For students in non-English-speaking countries, such as Indonesia, mastering English language can help them obtain better academic achievement in their current education as well as in their future studies and careers. For most schools in Indonesia, English is the first foreign language which is learned by their students. This international language has important roles in many aspects of life especially in education. Many students, however, still perceive learning English as difficult and therefore they tend to receive lower grades in English compare with other Subjects.

In language learning, students should master vocabulary. According to Hiebert et al., (2019), students often struggle to communicate in English due to a lack of vocabulary. This may be as a result of ineffective teaching techniques and unsupportive learning environment. Students with limited vocabulary mastery need longer time to understand new vocabulary items, and struggle to comprehend text and communicate with their peers verbally. As a result, they are more likely to achieve low scores in language learning assessments due to learning difficulties. Teachers need to develop lesson syllabus that facilitate students to develop their vocabulary. In addition, they also have to help students to find effective learning strategies in order to develop their vocabulary skills and knowledge (Ghalebi et al., 2021). To improve students' vocabulary mastery, teachers or instructors need to teach vocabulary in more creative and innovative ways. One of the ways is by using technology as a tool in teaching and learning vocabulary.

Nowadays, technology advancements have changed many aspects of human life including communication, transportation, information and education. In the field of education, technology brings new elements to facilitate teachers in creating innovative teaching techniques and strategies to help students improve their English competences, including in mastering vocabularies. Educational technology allows students to learn independently, facilitate self-understanding, maintain interaction with teachers, and improve motivation among students to learn language effectively. Using applications in vocabulary learning can motivate and encourage students to learn English and memorize new words more easily (Nuralisah & Kareviati, 2020).

In this era, various educational applications are available to facilitate teaching and learning processes. These applications give teachers many opportunities to create interactive virtual classrooms and encourage students' motivation to learn. One of the educational technologies which can be used for that purpose is Miro. Miro is an online collaborative whiteboard platform that allows students to work on teams and learn collaboratively. Miro can facilitate teaching and learning in face-to-face, online, as well blended (combination of face-to-face and online components) environments. Its tools and templates allow teachers to design class activities for students to work collaboratively both synchronously and asynchronously. The use of Miro is also relevant to improve 21st century learning skills which helps students to succeed in this era of information. These skills consist of critical thinking and problem-solving, collaboration, communication creativity, (Vu, 2020).

Today, increasing number of educational institutions in Indonesia have shifted to blended learning. It is a method of learning that uses a mixture of face-to-face and virtual learning activities (Ashraf et al., 2021). In this case, Miro is superior to facilitate teachers and students' learning processes both in online or offline environment including in teaching and learning English vocabularies.

The researcher is interested in further examining the effectiveness of using the digital mind mapping application Miro to increase students' vocabulary mastery based on the background information discussed above. The eleventh-grade students at Hidayatullah Islamic High School Semarang are the study's target population. The reason of choosing this school as the students are familiar with the use of digital

technology with the school facilitate each student and teacher with Ipad in daily teaching and learning. The researcher, therefore, proposed to conduct research with the title " The Effectiveness of Using Miro Digital Mind Mapping for Students' Vocabulary Mastery at Hidayatullah Islamic High School Semarang ".

1.2. Reasons for Choosing the Topic

The topic of this study is chosen by the researcher for following reasons:

1. Vocabulary mastery is one of the most important skills to learn and understand foreign languages. It serves as the foundation for the development of other skills such as reading comprehension, pronunciation, writing, spelling, listening comprehension and speaking. Many language learners, however, still consider vocabulary mastery as difficult and they are struggling to find ways to master vocabularies in an effective way. At the same time, currently, there are many digital technologies available that can help language learners to improve their skills. In this study, the researcher wants to explore ways to improve student's vocabulary mastery using Miro digital technology to make learning more effective and fun.

2. Miro smart board technology was used in this research as the researcher believes that it can enhance learning. Miro has a variety of visual elements that can facilitate vocabulary learning. The ability to collaborate with other learners is another advantage of Miro smart board technology over traditional board. Students can write or draw on the same canvas at the same time, stimulating creativity and fun learning.

3. This research involved students of Hidayatullah Senior High School Semarang as they are familiar with the use of technology. Each student and teacher at the school has an access to iPad for daily teaching and learning activities. Therefore, the experiment of using Miro digital mind mapping could be more easily implemented.

1.3. Statement of the Problems

Based on the background of the problem, the problem of this study could be formulated as follow: "Is the use of Miro Digital Mind Mapping effective to improve Students' Vocabulary Mastery at Hidayatullah Islamic high school Semarang?"

1.4. Objectives of the Study

This study's objective is to examine whether the use of Miro Digital Mind Mapping effective to improve students' vocabulary mastery at Hidayatullah Islamic High School Semarang.

1.5. Hypotheses of the Study

The hypothesis of this research is:

1. Null Hypothesis (Ho)

"Miro Digital Mind Mapping is not effective in improving students' vocabulary mastery at Hidayatullah Islamic High School in Semarang"

2. Alternative Hypothesis (Ha)

"Miro Digital Mind Mapping is effective in improving students' vocabulary mastery at Hidayatullah Islamic High School in Semarang."

1.6. Limitation of the Study

The scope of this study are as follows:

1. This study involves eleventh-grade female students of Hidayatullah Islamic High School Semarang.

2. Miro is used as a tool to facilitate students' vocabulary mastery for the experimental class.

1.7. Significance of the Study

This research provides significant contributions both pedagogically and practically.

1. Pedagogical significances

    a.   Students

Students can improve their vocabulary mastery using Miro digital mind mapping. This technology enables students to learn vocabulary in more creative ways both independently and collaboratively with their classmates.

b.   Teachers

Teachers can use Miro digital mind mapping as an alternative to traditional strategy in vocabulary teaching. Miro facilitates teachers in preparing teaching materials, facilitating teaching process, and conducting students' evaluation.

2.   Practical Significance

a.   Students

Students can improve vocabulary mastery as well as other skills such as digital and collaborative skills as well as creativity because by using Miro digital mind mapping as it provides rich-formats (texts, videos, pictures, diagram). Therefore, in addition to obtain better grade in vocabulary mastery, students can also improve the 21st skills.

b.   Teachers

In addition to asking students to memorize vocabularies from reading texts, teachers can use Miro to teach vocabulary in more engaging ways as this tool supports rich format (texts, pictures, videos, diagrams, emoticons, et cetera) and facilitate collaborative learning.

c.   Other Researchers

Other researchers can conduct further research in using Miro digital mind mapping to facilitate English teaching and learning as there is still limited number of researches in this topic, especially in Indonesia.

1.8. Definition of Key Terms

The researcher defines a few key terms used in this study in the following manner to prevent misunderstandings:

1. Vocabulary: The word "vocabulary" can be used to describe words that someone knows, can produce and use, is learning, or that they have trouble understanding. (Songyu, 2021). It can refer to a broad set of words or a more specific set of words.

2. Miro: An online collaborative whiteboard platform that gives teams working remotely a place to easily co-create and collaborate while capturing ideas (Bodnenko, 2020).

3. Digital mind mapping: Digital mind mapping is a powerful imaginative practice for generating ideas and connections on a blank computer page. It has features that are unique for drawing, diagramming, and charting ideas or information. It can also assist in the process of brainstorming and idea generation (Anas et al., 2021).

4. Foreign language: The language that is studied alongside one's mother tongue in a situation in which the targeted language is neither the main language nor used for communication (Kramer Moeller et al., 2015).

1.9. Organization of the Study

Five chapters made up this undergraduate thesis. The introduction chapters includes the study's background, the reasoning for selecting the subject, a statement of the issues, definitions of key terms, the study's goals, the study's hypothesis, the study's findings, their significance, and how the writing is organized.

Chapter two is reviews of related literature. This chapter discusses literature on vocabulary, including the definitions of vocabulary and the kinds of vocabulary. It also presents the literature on Educational Technology and previous research in this topic as well as a brief explanation about Miro and its usages in educational environments.

Chapter three is method of study. This chapter explains design of the study, subject of the study, the type of data. Quasi-experimental is used in this research involving students of Hidayatulllah Islamic high school Semarang as participants. This study used two groups; the experimental and control group. Pre-test and post-test are used as instruments to assess the ability of students in mastering vocabulary. To analyse the data, this study used statistical analysis, that is Difference in Means.

Chapter four are findings and discussion. It discussed the results of the descriptive analysis for both the experimental and the control classes, the results

of normality test of pre-test and post-test data, and the results of independent sample T-test also the discussion of the findings.

The last chapter are conclusion and suggestions. It presented the conclusion and suggestions for students, teachers, and other researchers.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter reviews the theoretical research on vocabulary mastery and the use of educational technology as well as earlier studies.

2.1 Review of the Theoretical Study

In this part, the researcher discusses the concepts and theories relevant to the study. First, the definitions and the types of vocabulary are explained. It is followed by definition of vocabulary mastery. Next, literatures on Educational Technology are discussed as well as an explanation about Miro

2.1.1 The Definitions of Vocabulary

The fundamentals of English teaching and learning are concerned with the student's ability to use four language skills: listening, speaking, reading, and writing. All those skills require learners to master vocabularies in order to improve their language skills. Effective communication is impossible without good vocabulary mastery. Ghalebi et al., (2021) state that vocabulary is considered to be essential for second/foreign language learning success. It is a list of words arranged alphabetically with their definitions (Alizadeh, 2016). According to Vu (2021), vocabulary refers to high-frequency words that merit the most learning success.

Vocabulary knowledge serves as a solid foundation for both later stages of language learning and real-world communication, allowing learners to succeed in all related skills such as listening, speaking, reading, and writing. Moreover, Raskova Octaberlina et al., (2020) mention that vocabulary is a term that has a specific meaning related to the text that can be used to better understand and translate the text.

To summarize, the definition of vocabulary is the understanding of words and their meanings that helps learners communicate effectively, comprehend, and translate text more quickly.

2.1.2. The Types of Vocabulary

According to Harmer (2003), vocabulary is divided into two:

1. Active vocabulary

Students employ active vocabulary in both oral and written communication. The words that students comprehend well enough to use effectively in both speaking and writing.

2. Passive vocabulary

Passive vocabulary is concerned with words that students will recognize and understand in context, allowing them to recall the word's meaning. Passive vocabulary is commonly used by students in listening and reading materials. From the explanation above, there are two types of vocabulary: active and passive vocabulary. Active vocabulary is used in both speaking and writing. Passive

vocabulary is used in listening and reading skills. The researcher used active vocabulary in the study.

In addition, there are three types of reading vocabulary found in the textbooks, according to Munir (2016) :

1. General vocabulary, it is made up of everyday words with broadly accepted meanings in everyday speech.

2. Special vocabulary, it's mainly composed of everyday words that have specialized meanings in a certain content area.

3. Technical vocabulary, it is made up of words that are only used in a specific field.

Therefore, general vocabulary was used in this research. Such as verb used in daily activities can assist learners in understanding the words from their context, naturally expanding students' vocabulary and improving students' language skills.

2.1.3. Vocabulary mastery

The number of vocabularies a person knows determines how well he or she can master a language. In teaching English language, the biggest issue is students' low motivation to learn English due to their lack of vocabulary (Sukrina, 2010). According to Gushendra (2017), vocabulary skill included meaning, spelling, grammar and pronunciation.

Vocabulary mastery is the complete understanding of a language's stock of words and their meanings (Setiawan & Wiedarti, 2020). Acquiring vocabulary is primarily about memorizing. Students need to see, pronounce, and write new words

several times before they are considered to have learnt the new words. Gupta & Macwhinney (1997) explains how words are remembered using three memory systems: short-term storage (STS), long-term memory, and working memory. STS provides a convenient explanation for the rapid loss of information during a few seconds of distraction (Crowder, 1993). Bailey et al., (1996) also explain that long-term memory can occasionally last a lifetime, it typically lasts days, weeks, or even longer than short-term memory. According to Demir (2021), Working memory is the short-term storing of information when performing other cognitive tasks such as learning, problem-solving, or reading.

2.1.4. Educational Technology

The term "educational technology" refers to a project that encompasses the entire educational process, including not just the educator but also the learners and how they use techniques to enhance their learning (Pachler et al., 2010). According to Ausín et al., (2016), multimedia technology has four benefits: 1) It enhances the reception of knowledge as well as the teacher performance; 2) It improves students' memory and accumulation of knowledge by using powerful picture, videos, and refined language; 3) Affective and recognition processes can be connected through the use of multimedia technology and 4) It has the potential to stimulate and motivate student groups to study, as well as improve the efficiency and quality of teaching.

Rezaei et al. (2014) mention that Methods of teaching English have been considerably changed by the use of technology. It offers a wide range of possibilities

for making instruction more engaging and effective in terms of progress. Technology use both inside and outside of the classroom has developed into a crucial component of the educational process. Technology enables teachers to alter lesson plans, which improves the process of learning a language. Technology is playing a bigger role as a tool to help teachers support their students' language development.

Using modern technology in an organized and systematic way to help teaching and learning is known as educational technology. Modern educational teaching techniques can be implemented with the use of educational technology, which is a systematic approach to conceptualizing, carrying out, and assessing the educational process, which includes learning and teaching. With the use of educational technology, students can learn at their own pace, repeat lessons that aren't very clear, and receive their test results right away. They can also keep track of their progress. Modern education uses interactive, multimedia content, which has a number of benefits over traditional education.

According to Pachler et al., (2010) educational technologists investigate how a classroom might change or adapt if a computer is added to the curriculum. Because of this integration, the curriculum and environment may need to change to accommodate the technological opportunities. Educational technology encompassed a wide range of computer-based technologies, telecommunications, interactive videodisc, local area networks, hypermedia, and including interactive audio.

2.1.5. Miro

Miro is a tool or application named after the Spanish artist Joan Miro. Miro was founded in 2011 as Realtime Board by Andrey Khusid and Oleg Shardin, and relaunched as Miro in 2019. Miro is a collaborative virtual whiteboard platform that allows users to work on a project interactively. This online whiteboard application allows for a more effective and efficient work process in this way. This cloud-based application is appropriate for both small and large companies. Miro can be used for a variety of tasks, including research, idea generation, mind mapping and even wireframe creation. Furthermore, Miro board allows students to collaborate with one another in active learning activities such as mind mapping, brainstorming, synthesizing material, and course content analysis. The Miro board promotes learner focus on digital classes as students interact with another (Skubik-Peplaski et al., 2021).

Figure 1 Miro's home page (https://miro.com/index/)

In addition, Bhattacharya & Mohalik (2020) stated that Miro is a digital mind mapping application that allows teams to centralize cross-functional coordination. Miro is a quick and simple way for students to collect, track, and organize user stories, as well as schedule scripts and reflect. It allows for real-time creative drawing. The platform includes an infinitely expandable interactive whiteboard for all visual activities such as adaptable planning, project management, and architecture. More than 20 applications, including In Vision, Confluence, Slack, Google Drive, Jira, and others, are embedded.

Oktaputriviant & Rizqiana, n.d. (2022) mention several advantages of using Miro, including (1) real-time collaboration, which allows team members to view, comment on, and amend results in real time. (2) Take notes on each stage of the process, similar to the ones seen in *Adobe Photoshop.* (3) includes the ability to add links, images, and emoji, as well as emoji display similar to those found in *Whatsapp*; (4) created projects can be saved in.pdf,.jpg,.rtf, and other formats; (5) created projects can be saved in.pdf,.jpg,.rtf, and other formats; (6) created projects can be saved in.pdf,.jpg,.rtf, and other formats; (5) Project outcomes can be disseminated via e-mail or via links.

3.2.5.1 The Procedures of Using Miro Application

First, to begin using Miro, students need to create an account by signing up. Before creating an account, students must first download the app from the Google Play store or open Miro from the website (https://miro.com/index/). When the application is launched, students can create an account, select a username, or sign in with their Facebook or Google accounts. It is best if students create a profile because their progress will be saved if they switch devices.
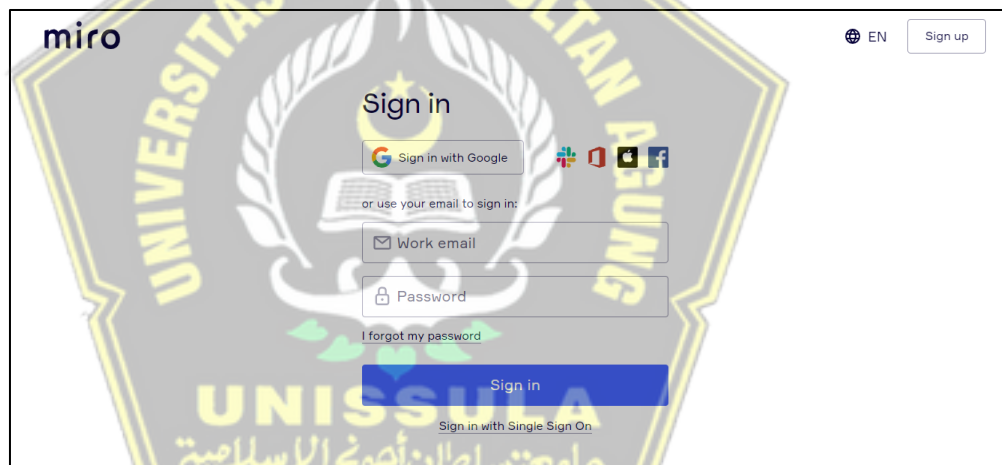
Figure 2 Creating an Account

Next, after the students have logged in to Miro, select the new board option, followed by the create a shared board option. In Miro, the most commonly used feature by beginners is a board. It's a blank wall to which students can add various features.

Lastly, to create projects, students can select the template type or size from the available options on the empty board. template help students define areas on the board, structure, and manage content. Students can also export a frame easily. After choosing a custom easily, students can decorate it with sticky notes, mind maps, text, or videos. When students have multiple frames on a board, students can zoom out to see them all at once.
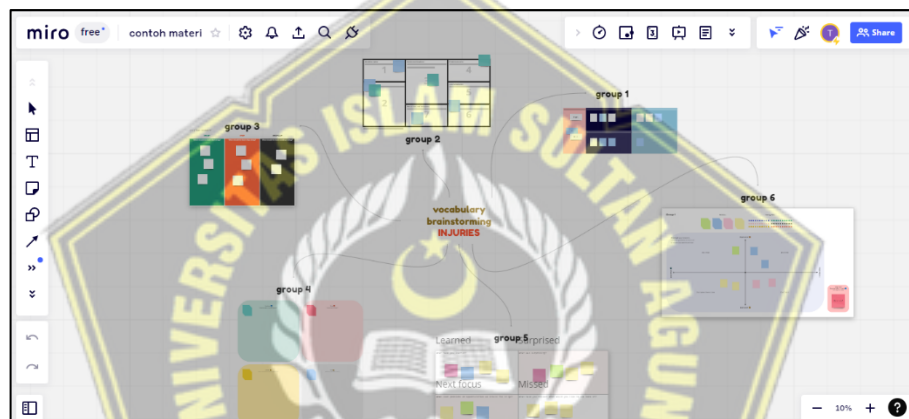
Figure 3 choosing a board

From the information above Miro was used in this study because it facilitates real-time collaboration for students to have a group project. This online whiteboard application allows students to learn for more effective and efficient vocabulary learning process.

2.1.6. Digital Mind Mapping

Digital mind mapping is a special technique that boosts productivity by assisting in the development and analysis of ideas as well as the organization and retrieval of information (Bhattacharya & Mohalik, 2020) . Different kinds of software

are available for educators and students to use to create digital mind maps for teaching and learning. Digital mind maps use a combination of text and graphics to show the relationships between concepts, words, and data. It can be used at all educational levels and has proven to be an effective learning resource.

According to (Jbeili, 2013) Digital mind maps enable students to easily move ideas and objects around by simply dragging and dropping them, in contrast to paper mind maps that necessitate students to repeatedly erase and rewrite. Digital mind maps also allow for the copying of specific sections for use in different maps and the saving of files that can be distributed among students. Students can add hyperlinks and email links to their mind maps using additional digital tools. Students can also upload and watch videos, animated graphics, and images.

2.2. Review of Previous Studies

Prior study on the topic of educational technology and learning English Vocabulary is discussed in this review of previous studies. Using technology as a medium for teaching foreign languages can be an alternative approach to keep students engaged in the class. Previous researchers have proposed Miro application to support student's vocabulary mastery in their study.

Adani (2022) used the Miro mind mapping application and to identify which aspect of reading had increased the most. This study was quantitative and employed an experimental pre- and post-testing design. The study included 17 female students and

12 male students from SMA Negeri 2 Bandar Lampung. A pre-test and post-test were given to gather data. A t-value of 0.05 or less was used to determine significance in the Paired Sample T-Test, which was used to analyse the data in SPSS version 22.0. The fact that the t-value in this study was less than 0.05 proved its significance (0.0000.05). It was discovered that reading narrative text significantly improved the students' reading abilities.

Another researcher, Osipovskaya (2022), conducted study to investigate how traditional approaches to collaborative learning have changed as a result of the new digital environment and how to introduce online group activities, specifically icebreakers. The authors choose the visual collaboration tools Miro and Mural, which let users personalize their workspaces and collaborate with one another. Pricing, interface, templates, integrations, customization, and collaboration were six different aspects of both platforms that were compared and tested. The authors come to the conclusion that the number of templates, integrations, and apps available in Miro is significantly greater. An excellent user experience is produced as a result of the user interface's consistent design, which links UI elements with recognizable and predictable behaviours. More facilitation features are offered by Mural, making it an undeniably potent tool. However, if price is an important consideration, Mural may be the best option. Furthermore, in Miro and Mural, approaches for organizing icebreaker games during a virtual meeting or workshop were considered. The authors recommend several exercises, including creating your own character, answering questions from a

bucket, puzzle, world map, five common things, two lies - one truth, and photographing your desk. Online whiteboards such as More engagement than in face-to-face conversation is possible because to the efficient support of warm-ups and collaborative visualization provided by Miro and Mural in the online environment.

Furthermore, a study by Skubik-Peplaski et al. (2021) focuses on the application of Miro board technology, which enables students to work in cooperative teams to produce a visual representation of a theory in the field of occupational therapy. The use of Miro boards by students was credited with reducing feelings of loneliness, fostering a sense of community and creativity, and encouraging a collaborative, fulfilling educational process. Effective teaching gave students several opportunities to monitor their learning progress and receive insightful and timely feedback during the COVID epidemic.

The similarities between previous and present studies are that both studies use Miro Application. Then the differences between the present and previous studies are the sample and the population of the study. Previous study included 17 female students and 12 male students from SMA Negeri 2 Bandar Lampung. This study included 48 female students of Hidayatullah Islamic High School Semarang. The method in previous and present study employed an experimental pre- and post-testing design has been chosen in the research.

CHAPTER III

RESEARCH METHOD

This chapter discussed about the design, Subject, Data, and Instrument of the Study, technique and procedure for data collection, Data Analysis, and Time schedule.

3.1 Design of the Study

In addition to choosing two comparable classrooms, this study used an experimental design with non-equivalent groups that included a pre- and post-test (Fraenkel et al., 2011). Only the experimental group received a treatment in this study. Pre- and post-tests were given to the experimental group as well as the control group. In this case, the experimental group was given instruction using digital mind mapping with Miro, whereas the control group was not. The table below depicts the pre-test and post-test pattern:

Table 3.1 test pattern

Type	Pre-test	Treatment	Post test
N_1	Y^1	X	Y^2
N_2	Y^3		Y^4

Note:

N_1 = Experimental group

N_2 = Control group

X = treatment by using Miro digital mind mapping

Y^1 = Pre-test experimental group

Y^2 = Post-test experimental group

Y^3 = Pre-test control group

Y^4 = Post-test control group

3.2 Subject of the Study

A participant in research is referred to as a research subject. Information (or "data") about or from the subject of the study is gathered in order to aid in answering the research question. The sample and population of the research are presented as follow:

3.2.1. Population

According to Rusmanayanti (2020), Population refers to any designated group of individuals or non-human entities, such as things, establishments of higher learning, or periods of time. 128 students from Hidayatullah Islamic High School Semarang constitute the population of this study. The following table shows the details of this research's population.

Table 3.2 Population of the research

Name of the classes	Sex	Number of students
XI MIPA 1	Male	32
XI IPS 1	Male	32
XI MIPA 2	Female	32
XI IPS 2	Female	32
Total number of students		128

3.2.2. Sample and Sampling

Getachew (2021) mention that sample is a selected group of some items from the whole population. Bhardwaj (2019) mentions that Sampling is the process of choosing a sample from a single person or a sizable group of people for a certain research objective. This study used purposive sampling which means that members of a sample are chosen based on the purpose of the study. It is also known as deliberate or judgmental sampling (Bhardwaj, 2019).

Using purposive sampling the researcher selected 2 classes they were: XI MIPA 2 and XI IPS 2. Both classes shared similar characteristics as they were composed of female's students. Therefore, the sample of this study consisted of 48 female students. One class was chosen as the experimental group by the researcher,

and the other was chosen as the control group. The following table shows the sample in this research.

Table 3.3 Sample of the research

Classes	Number of samples	Types of group
XI MIPA 2	24	Experimental
XI IPS 2	24	Control

3.3   Data of the Study

All information that has been obtained, seen, produced, or manufactured in order to confirm original research findings is referred to as research data. This part explains about the type of data and variables of the research.

3.3.1 Types of data

According to Hox (2005), data are classified into two types, they are primary and secondary data. Primary data is knowledge that has been discovered for the first time from personal experiences or other tangible proof, usually for academic purposes. Additionally known as raw data or first-hand knowledge. Data is gathered primarily through observations, questionnaires, surveys, interviews, and focus groups, among other methods. The primary data in this research consisted of scores of vocabulary test and student's participation in learning process. The data were collected using pre-test, post-test and observation sheet.

Information that has already been collected and recorded by someone other than the researcher for a purpose unrelated to the current research question is referred to as secondary data. The data are gathered from a variety of sources such as reports, books, etc. The secondary data for this research included the number of classes and students and English vocabulary lesson plans.

3.3.2 Variables

In this study, there are two variables: an independent variable and a dependent variable. Dependent variables are those that are not affected by other variables, whereas independent variables are those that have an impact on other variables. (Andrade, 2021). The independent variable in this study is the use of Miro Digital Mind Mapping. Meanwhile, the dependent variable is students' vocabulary mastery.

3.4 Instruments of the Study

Using an instrument to collect data is one of the research's most crucial components. According to Wilkinson and Birmingham (2003), A research instrument is a device used to gather, quantify, and analyse information relevant to one's studies. The primary tools used in this study were the vocabulary tests. The tests were divided into two parts: a pre-test and a post-test. In both tests, students were given a list of questions regarding vocabulary in the form of multiple choice. The instruments of the study were tested for their validity and reliability before using them to collect data.

3.4.1. Validity

Validity is the appropriateness, significance, accuracy, and usefulness of a researcher's inferences. (Fraenkel et al., 2011). As a result, asking students to answer vocabulary questions is a valid way to assess their vocabulary mastery. The instruments of this study were discussed with an English lecturer and an English teacher as the expert's judgement to determine whether or not the instruments are valid.

3.4.2. Reliability

If the same outcomes can be repeated repeatedly, the research methodology is said to be reliable. (Fraenkel et al., 2011). Consistent results indicate a method's reliability and independence from outside influences. To assess the test's reliability, the researcher used try-out to determine whether or not the results were reliable. To make sure the instrument was clear and the test wasn't too easy or hard, a test was done.

3.5 Technique for Collecting Data

The researcher employed vocabulary tests to collect data. A test is a method of assessing a person's ability or knowledge in a particular domain (Adom et al., 2020). In other words, a test is used to assess a subject's achievement or ability in a specific area of study. The achievement test is used in this study to assess students' achievement in vocabulary mastery. For the Experimental class, the students were given the pre-test first, followed by the treatment, and then the post-test. Meanwhile,

for the control tests, the students were given pre-test and post-test without the treatment. Both pre-test and post-test were designed electronically using google form.

3.6 Data Collecting Procedure

Creswell (2014) stated that defining the parameters of the study, collecting data through unstructured or semi-structured observations and visual materials, as well as establishing the method for capturing information and interviews, documents, are all steps in the data collection process. To collect data in this study, the researcher conducts pre-testing and post-testing. For the Experimental class. The pre-test is given to determine students' ability prior to use Miro application for vocabulary learning. Meanwhile, the post-test demonstrates the students' vocabulary mastery after learning the material using Miro application.

3.6.1. Try out

In this study, the researcher conducted a try-out on another subject of sample. The purpose of the instrument try-out was to ensure the instrument's validity and reliability. Try-outs were held involving eleventh grade students at Hidayatullah Islamic High School Semarang. The researcher chose this subject based on characteristics of students' ability that were similar to the sample used in this study.

3.6.2 Pre-Test

Prior to the researcher treating the experimental class, a pre-test was administered to measure students' vocabulary proficiency. Students were given a

link to a google form that was distributed via WhatsApp group for both the experimental class and the control class. After that, the pre-test results were entered into excel sheets.

3.6.3 Treatment

The researcher administered the treatment to the experimental class after conducting the pre-test. The treatment used Miro application to facilitate vocabulary learning. The researcher using Miro to teach vocabulary focusing on passive voice, to help students improve their vocabulary mastery.

3.6.4 Post-Test

To determine whether the experimental class's treatment was effective, the researcher administered a post-test after the treatment. Similar to the pre-test, the post-test had the same structure. During this time, the post-test was also administered to the control class students so they could be compared.

3.7 Data Analysis

This research used quantitative approaches in analysing the data. According to Apuke (2017), one of the purposes of quantitative research is to test hypotheses. This method involves quantifying and analysing the variables. The effectiveness of using Miro digital mind mapping for students' vocabulary mastery was investigated in this study using a quantitative approach by comparing the data from the experimental and control classes. To test the hypothesis, data from the experiment and control classes were analysed using the t-test with the following assumptions:

$t_o > t_t$: The null hypothesis (Ho) is rejected, while the alternative hypothesis (Ha) is accepted. It means that using Miro makes a significant difference in students' vocabulary mastery, demonstrating that Miro is effective in improving students' vocabulary mastery.

$t_o < t_t$: The null hypothesis (Ho) is accepted while the alternative hypothesis (Ha) is rejected. It means that using Miro has no significant effect on students' vocabulary mastery, demonstrating that Miro is ineffective at improving students' vocabulary mastery.

3.8 Time Schedule

Table 3.4 Time schedule

NO	ACTIVITY	October				November				December			
		1	2	3	4	1	2	3	4	1	2	3	4
1.	Research preparation												
2.	Activity 1												
3.	Activity 2												
4.	Activity3												
5.	Data processing												
6.	Report Writing												

Table 3.4 explains a step-by-step action plan of this study. The following are the steps taken during the research preparation, activity 1, 2, and 3:

During the preparation stage, the researcher visited the school to ask a permission from the headmaster to conduct research and obtain necessary information relevant to the study. The headmaster welcome and gave the permission to the researcher to do the research at the school. From the meeting, the researcher obtained information that

students and teachers at Hidayatullah High School had been using iPad for teaching and learning process. This condition enabled the study to be conducted at the school as Miro application required students to have an access to laptop or iPad. The researcher was also introduced to the English teacher and other staff who would support the study. During the preparation stage, the researcher designed the learning method and evaluation tool to track students' learning outcomes related to vocabulary mastery. The researcher also prepared the observation sheets and field notes to record student activities throughout the learning process.

The activity stages consist of 3 activities. In activity 1, the researcher worked with the English teacher to develop learning scenarios and then used Miro digital mind mapping to create learning scenarios. It was followed by activity 2. Pre-tests were administered in this step to both the experimental and control group of pupils. The researcher then administered treatment to the experimental class by teaching the students how to use the digital mind-mapping tool Miro and by using it to speed up vocabulary learning. At the end of the meeting, the students were given a project assignment to be presented in groups at the second meeting which was conducted virtually. Lastly, in activity 3, the students presented their group work virtually. The researcher prepared and administered post-tests to students in the experiment and control classes after the course of treatment was complete.

Report writing and data processing were the final two phases. The SPSS program was used to statistically analysed the study's data. Following that, during the writing of the report, the results were interpreted, discussed, and reported.

CHAPTER IV

FINDINGS AND DISCUSSION

The research's findings and analysis are presented in this chapter. To test the proposed hypothesis of this study, the data analysis results were presented. Data from 48 eleventh graders at Hidayatullah Islamic High School in Semarang was gathered using pre- and post-test surveys. The discussion of the research results describing whether or not using Miro Digital Mind Mapping was successful in enhancing students' vocabulary knowledge was then presented.

Research participants in this study were grouped into experimental and control classes. Students of XI MIPA 1 Class were involved in the experimental class while students of XI IPS 1 Class were involved in the control class. Each group consisted of 24 students. All students from both groups were given two vocabulary tests: a pre-test and a post-test, consisting of 25 multiple-choice questions.

4.1 Findings

This section covers the findings of the descriptive analyses of the experimental class and the control class, as well as the validity and reliability of the instrument.

4.1.1 Instrument validity and reliability

The author tested 24 students from XI MIPA 2. The purpose of the test is to determine the instrument's validity and reliability. The tryout consists of 25 multiple-choice questions distributed to students via Google form.

1. **Validity**

The test was administered based on the material that students had learned and was also connected to the curriculum, so the researcher used content validity. Google Form was used by the researcher to administer a multiple-choice test. The instruments of this study were discussed with an English lecturer and an English teacher as the expert's judgement to determine whether or not the instruments are valid. The validation sheet in on appendix 5 of this research.

2. **Reliability**

A good instrument must be valid and reliable. Following the analysis of the instrument's validity items, the instrument's reliability is tested. The test is reliable if the result is greater than r-table.

Table 4.1 reliability of the tryout

Reliability Statistics	
Cronbach's Alpha	N of Items
.705	26

The result for computing reliability of the try out instrument was 0.705 for a=5% with N=26 r-table= 0.388. From this calculation showed that the instrument was definitely reliable.

4.1.2. The results of experimental class

The results of the pre- and post-tests for each student in the experimental class are shown in Table 4.1. The minimum, maximum, and mean scores of the data are then described using a descriptive analysis of the scores.

Table 4 1 The Result of Pre-test and Post-test at Experimental Class

No	Name of Students	Pre-test Score	Post-test Score	Gained
1.	STD1	76	90	14
2.	STD2	92	96	2
3.	STD3	72	82	10
4.	STD4	84	90	6
5.	STD5	80	92	12
6.	STD6	82	96	14
7.	STD7	80	94	14
8.	STD8	84	96	12
9.	STD9	72	88	16
10.	STD10	82	96	14
11.	STD11	80	88	8
12.	STD12	76	100	24
13.	STD13	84	96	12
14.	STD14	74	84	10
15.	STD15	78	92	14
16.	STD16	76	82	6
17.	STD17	86	92	6
18.	STD18	82	96	14
19.	STD19	88	92	4
20.	STD20	82	88	6
21.	STD21	80	88	8
22.	STD22	92	100	8
23.	STD23	80	92	12
24.	STD24	82	92	10
N= 24	**TOTAL SCORE**	1944	2200	256
	AVERAGE	**81.00**	**91.67**	**10.67**

The scores of pre-tests and post-test of the experimental class were analyzed using descriptive analyses. The output of the SPSS is presented at Table 4.2:

Table 4 2 Descriptive statistics of the experiment class

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	24	72	92	81.00	5.308
Posttest	24	82	100	91.67	4.887
Valid N (listwise)	24				

According to Table 4.2 descriptive analysis of the data for the experimental class, it is discovered that: First, two students received the pre-lowest test's score of 72. (Students 7 and 9). Additionally, Student 2 and Student 22 both received 92 on the pre-test, which is the highest score for this class. Meanwhile, the mean score of the pre-test of the experimental class is 81.00. According to the post-test results for the experimental class, two students (Students 3 and 16) received the lowest score, 82, while two other students received the highest score, 100. (Student 12 and 22). The experimental class's post-test average score is 91.67. According to the descriptive analysis, the mean score for students in the experimental class has increased by as much as 10,67, on average.

Figure 5 shows a graphic describing more details of the changes in pre-test and post-test scores for the experimental class, as follow:

The difference score of Experiment class
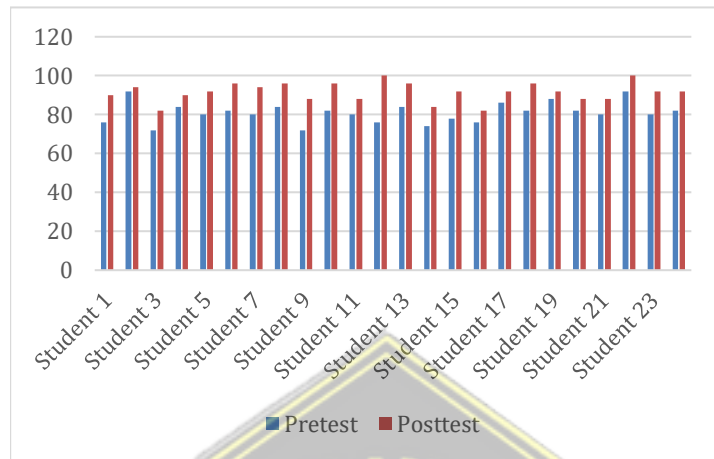
Figure 4 The difference score of Experiment class

The above Graphic shows the comparison between scores of pre-test and post-test for 24 students of the experimental class. It describes that the scores of post-tests are higher than the scores of pre-tests for all students in the experimental class.

4.1.3 The results of control class

Table 4.3 presents both the scores of pre-test and post-test for each student at the control class. Descriptive analyzed is then performed to describe the minimum, the maximum and the mean scores of the data.

The Result of Pre-test and Post-test at Control Class

Table 4 3 The Result of Pre-test and Post-test at Control Class

No	Name of Students	Pre-test Score	Post-test Score	Gained
1.	STD1	74	84	10
2.	STD2	72	88	16
3.	STD3	84	92	6
4.	STD4	76	82	4
5.	STD5	74	86	18
6.	STD6	82	94	12
7.	STD7	86	92	6
8.	STD8	88	90	2
9.	STD9	78	84	6
10.	STD10	80	84	4
11.	STD11	82	96	14
12.	STD12	84	92	8
13.	STD13	88	90	6
14.	STD14	74	86	12
15.	STD15	84	90	6
16.	STD16	80	88	8
17.	STD17	76	84	10
18.	STD18	88	92	4
19.	STD19	72	84	12
20.	STD20	82	88	12
21.	STD21	76	86	12
22.	STD22	80	92	12
23.	STD23	72	82	10
24.	STD24	84	90	12
N=24	TOTAL SCORE	1926	2148	222
	AVERAGE	79,83	88,83	8,34

The results of descriptive analysis for the pre-test and post-test of the control class is presented at Table 4.4:

Table 4 4 Descriptive statistics of the control class

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre test	24	72	88	79.83	5.338
Post test	24	82	96	88.17	3.953
Valid N (listwise)	24				

Table 4.4 above shows the results of both the pre-test and post-test of the control class. The first is the results of the pre-test. The control class's lowest pre-test score is 72, while the highest test score is 88. Meanwhile, the control class's mean pre-test score is 79,25. The results of the post-test come next. The lowest score of the post-test in control class is 82 which is obtained by one student, and the highest score of post-tests in this class is 96 which is obtained by two students. The mean score of post-tests in this control class is 88,17. The descriptive analysis for the control class shows that there is an increase of mean score as many as 8,34 for students at the control class.

Figure 6 shows a graphic describing more details of the changes in pre-test and post-test scores for the control class. The Graphic shows the comparison between scores of pre-test and post-test for 24 students of the control class. It describes that the scores of post-tests are higher than the scores of pre-tests for all students in the control class.

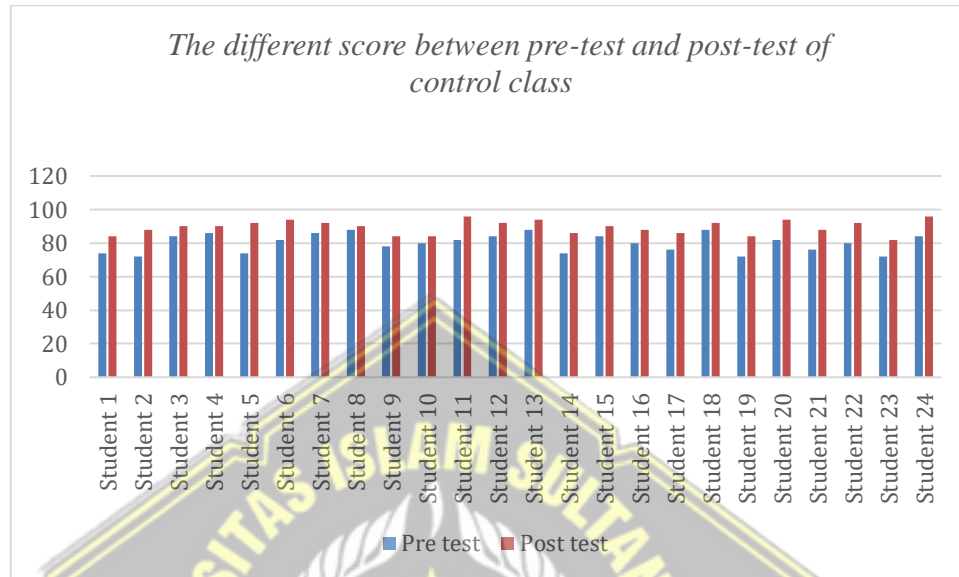**The results of pre-test and post-test of the control class**

The different score between pre-test and post-test of control class

Figure 5 The results of pre-test and post-test of the control class

4.1.4. The Normality and Homogeneity Test

The researcher used the statistical program SPSS v.23 to perform a normality test before using the data to test the proposed hypothesis. The normality test is used to determine whether the distribution of data from both groups is normal. When the significant value is greater than 0.05, the data are considered normal. Table 4.4 displays the outcome. Because there were less than fifty participants in the study, the Shapiro-Wilk technique was used.

1. **The result of Normality test**

Normality test of Pre-test data

Table 4 5 Normality test of Pre-test data

Tests of Normality

	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	1	.134	24	.200[*]	.955	24	.339
	2	.139	24	.200[*]	.929	24	.091

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

a. Lilliefors Significance Correction

Table 4.5 above shows the result of normality test for pre-test data. The significance value using Shapiro-Wilk method for the experiment Class (class 1) is 0.339. Meanwhile, the significance value for pre-test score in the control Class (class 2) is 0.091. The significance values of both experiment and control classes are higher than 0,05, meaning that the pre-test data obtained for both classes were considered normal and can be used for further analysis.

2. **Homogeneity test**

Levene's Test was used to determine the homogeneity of the variances. SPSS 23 was used for the analysis. The decision in this test was made by considering the score of probability. The variances of the dependent variables were homogeneous if the probability score (Sig.) was higher than 0.05. If the probability score (Sig.) is lower than 0.05, the variances of the dependent variables were not homogeneous.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
score	Based on Mean	3.364	1	94	.070
	Based on Median	3.323	1	94	.071
	Based on Median and with adjusted df	3.323	1	93.991	.071
	Based on trimmed mean	3.325	1	94	.071

The outcome of Levene's Test revealed that the probability of significance (Sig.) was 0.070. It was above 0.05 (0.070). The variances of the variables were found to be homogeneous.

4.1.5. Hypothesis Testing

The hypothesis of this research are:

1. Null Hypothesis (Ho)

    "Miro Digital Mind Mapping is not effective in improving Students' Vocabulary Mastery at Hidayatullah Islamic High School in Semarang"

2. Alternative Hypothesis (Ha)

    "Miro Digital Mind Mapping is effective in improving Students' Vocabulary Mastery at Hidayatullah Islamic High School in Semarang."

The hypothesis is tested using test of mean differences and more specifically using independent sample t-test. The criteria to determine whether the hypothesis are accepted or rejected are as follow:

1. The null hypothesis (H0) is accepted and the alternative hypothesis (Ha) is rejected if Sig. (2-tailed) > 0.05 at the significance level of 5%. It indicates that there are no statistically significant differences between the experimental and control classes' pre- and post-test data. Additionally, it implies that Miro Digital Mind Mapping at Semarang's Hidayatullah Islamic High School is ineffective at raising students' vocabulary mastery.

2. The Null Hypothesis (H0) is rejected and the Alternative Hypothesis (Ha) is accepted if Sig. (2-tailed) 0.05 at the significance level of 5%. It indicates that there are significant differences between the experimental and control classes' pre- and post-test data. It also implies that Miro Digital Mind Mapping is effective at improving students' vocabulary mastery at Hidayatullah Islamic High School in Semarang.

4.1.6. The results of Independent Sample T-tests

In order to compare the means of two distinct populations, the independent sample T-test is performed (experimental and control class). With the use of this test, you can determine whether or not the variances between the two groups are equal. The hypothesis to be tested using t-test are as follows:

a. Ho: The variances of data for the experimental and control groups are the same or equal.

b. Ha: the variances of data for the experimental and control groups are different or not equal.

This research uses the standard of significance (α) = 0.05 to test the hypothesis. The interpretations of the results of hypothesis testing are stated below:

a. If sig.(2-tailed) > 0,05 = there is no significant differences

b. If sig.(2-tailed) < 0,05 = there is significant differences

To analyze the data, the researcher uses SPSS version 23. The result can be seen below:

1. **Independent T-Test for Post-test data**

Group statistic of post-test data

Table 4 7 Group statistic of post-test data

	Group Statistics				
	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Posttest	1	24	91.75	4.945	1.009
	2	24	88.17	3.953	.807

Table 4.7 presents the descriptive information of post-test data for both the experimental and control classes. The number of samples in both groups are 24 students so the total samples are 48 students. The table also shows the value of standard deviation and standard error mean. For the experimental class the values are 4.945 and 1.009. respectively, while the values for the control class are 3,953 and 0,807, respectively. Furthermore, the table also present mean values, they are 91.75 for the

experimental class and 88.17 for the control class. It means that the values of mean score of the experimental class is higher than ones of the control class (88.17).

To further test whether the mean differences of post-test data are statistically significant, independent sample t-test for post-test data is performed. The result of this test can help answer the question whether or not the treatment can improve the scores obtained by the students of the experimental class. Table 4.10 provides information about the results of t-test for post-test data.
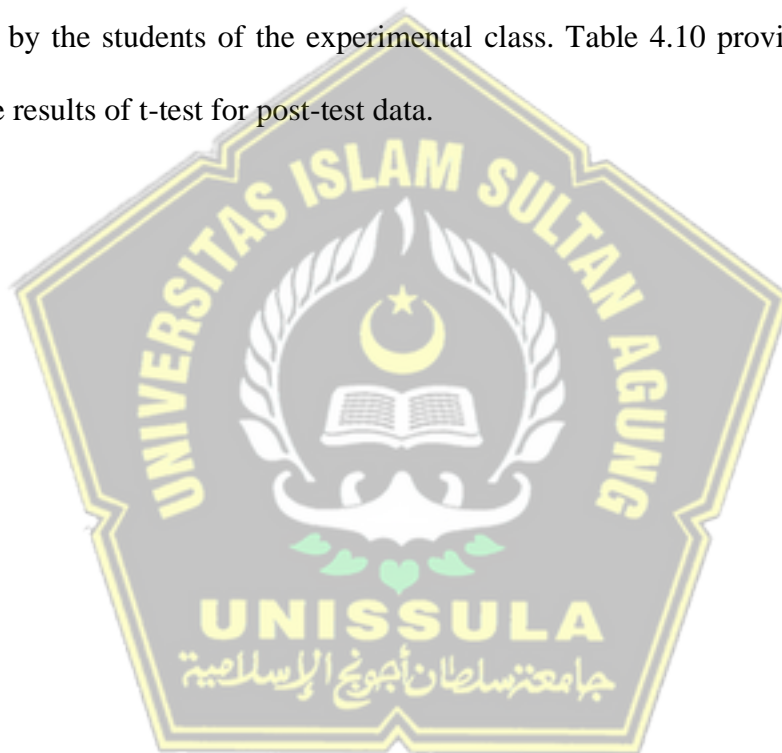
Independent Samples T-test of post-test data

Table 4 8 Independent Samples T-test of post-test data

Table 4 8 Independent Samples T-test of post-test data

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
Posttest	Equal variances assumed	.393	.534
	Equal variances not assumed		

Independent Samples T-Test

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
Posttest	Equal variances assumed	2.773	46	.008	3.583
	Equal variances not assumed	2.773	43.869	.008	3.583

Independent Samples T-Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
Posttest	Equal variances assumed	1.292	.982	6.185
	Equal variances not assumed	1.292	.979	6.188

The results of the t-test analysis are shown in Table 4.8, and they indicate that the p-value is 0.008, which is less than 0.05 (p>0.05). As a result, the alternative hypothesis (Ha) is accepted and the null hypothesis (H0) is rejected. It indicates that

there are sizable mean differences between the experimental class's post-test results and those of the control group. In other words, it can be inferred that students who were taught using Miro Digital Mind Mapping and those who were not show a significant difference in their post-test results.

4.2. Discussion of Research Findings

The purpose of this section is to explain the research findings and discuss them in light of the pertinent theory. Students in the experimental class and those in the control class did not achieve significantly different mean pre-test scores. The higher-than-0.05 p-value of 0.452 demonstrated it.

The results indicated that the pretest scores for students in the experimental and control groups were roughly equal. Additionally, it meant that both classes' student vocabulary mastery prior to the intervention was the same. The lowest pre-test score for the experimental class was 72, and the highest pre-test score for this class was 92. Meanwhile, the experimental class's pre-test mean score was 81,00. The lowest pre-test score for the control class was 72, and the highest score of the test was 88, while the mean pre-test score for the control class was 80,25.

There were significant mean differences of post-test scores obtained by students at the experimental class and those in the control class. It was shown by the p-value of 0.008, lower than 0.05. The results indicated that students in the experiment and control

groups received different post-test scores. Additionally, it meant that both classes' vocabulary mastery was different after the treatment.

The results of post-test of the experimental class, showed that the lowest score of was 82 while the highest score was 100. The mean score of post-tests in the experimental class was 91,67. For the control class, the lower score was 82 and the highest score was 96. Meanwhile the mean score of post-tests in this control class was 89,50. A t-test statistical analysis revealed a significant difference in the students' vocabulary mastery following treatment with digital mind mapping using Miro for the experimental group. Students in the experimental class had better vocabulary mastery than those in the control class. It was evident from the post-test scores of 91,67 and 89,50, respectively.

Based on the explanation above, it could be concluded that using Miro Digital Mind Mapping is effective to improve students' vocabulary mastery at Hidayatullah Islamic High School Semarang. The finding of this study supported prior research that using educational technology could improve students' vocabulary mastery.

A study by Adani (2022), for an example, determine which aspect of reading had improved the most and to see if there was a noticeable difference in the students' reading comprehension after they had been taught using the Miro mind mapping application. It was discovered that reading narrative text significantly improved the students' reading performance. Another study also showed that Online whiteboards such as Miro and Mural effectively supported warm-ups and collaborative visualization

in the online environment, allowing for greater participation than in face-to-face communication (Osipovskaya, 2022).

This study revealed that there were several factors contributing to the improvement of student's vocabulary mastery in the experimental class, such as: (1) students were more motivated because the use of Miro stimulated enjoyable learning environment, (2) students were able to learn vocabulary by constructing information and knowledge by themselves. Therefore, the researcher concluded that Miro Digital Mind Mapping was effective in improving students' vocabulary mastery at the eleventh-grade students of Hidayatullah Islamic High School Semarang.
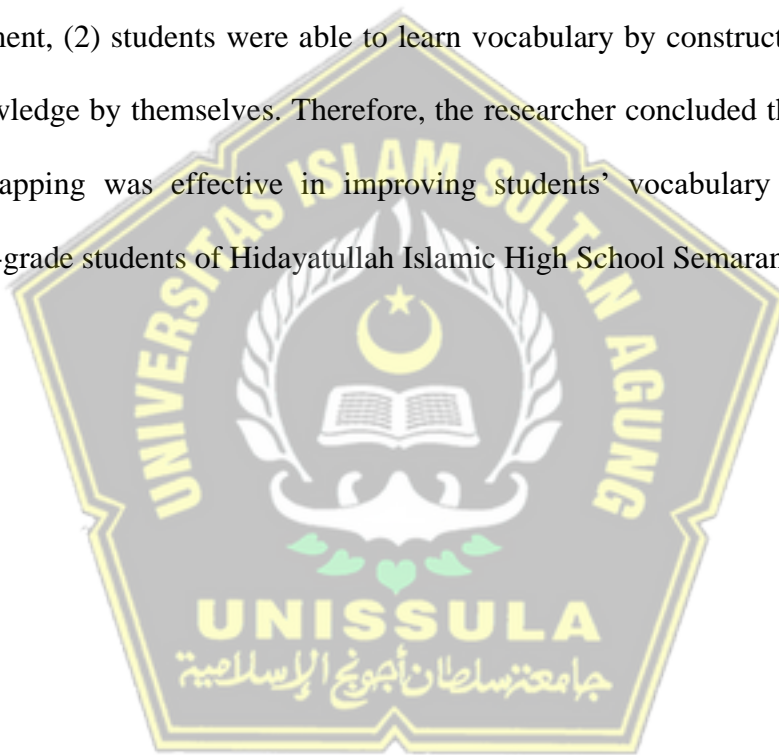
CHAPTER V

CONCLUSION AND SUGGESTIONS

5.1 Conclusions

The results of the study demonstrate that employing Miro Digital Mind Mapping was successful in enhancing students' vocabulary acquisition at Hidayatullah Islamic High School Semarang eleventh-grade students. This was based on the t-test data analysis, which showed that the significant (2-tailed) coefficient value was less than 0.05 and was 0.008 following the treatment.

5.2 Suggestions

Based on the research findings, the following recommendations are suggested.

1. **For Teachers**

   English teachers particularly in High School who have access to digital devices such as laptops or iPad are recommended to use Miro Digital Mind Mapping to facilitate them teaching vocabulary in more engaging and effective ways.

2. **For Students**

   It is recommended for students to improve their vocabulary mastery by using Miro Digital Mind Mapping. By using Miro students can uses visual, text, videos to learn vocabulary. Miro Digital Mind Mapping can also help students become self-directed learners as well collaborative learners. It can help students improve their critical thinking, creativity, collaboration, and communication skills.

3. **For another Researcher**

Other researchers can further study the effects of using Miro Digital Mind Mapping to improve vocabulary mastery for a longer experimental period to determine whether the improvements are consistent. They can also conduct research involving different samples such as university students.

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