

Mind Mapping as a Technique to Reinforce Reading Comprehension: A Study Based on General Certificate of Education Advanced Level English as a Second Language Learners

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ABSTRACT

Reading comprehension is a complex learning and teaching process, and a technique can be adapted to minimize complexity and reinforce reading comprehension. Thus, this study aimed to evaluate whether mind mapping reinforces reading comprehension and investigate the learners' perceptions towards mind mapping after the implementation for G.C.E. A/L ESL learners. The researcher focused on two research questions: finding the impact of using mind mapping to reinforce reading comprehension for G. C. E. A/L ESL learners and learners' perceptions after implementing the technique. This study utilized a mixed-method experimental research design done at Sri Saranankara Sangaraja Maha Vidyalaya, Kurunegala with the sample of 40 students of B1-level. The researcher incorporated two main instruments: tests, including pre-test and post-test, to address the first research question quantitatively and a feedback form to address the second qualitatively. Further, SPSS was used to analyze the quantitative data, while thematic analysis analyzed the qualitative data. Findings revealed a statistically significant difference between scores of the experimental and control groups recorded as $p\text{-value } 0.000 < 0.05$, which was favored by the experimental group exposed to the mind mapping technique. Moreover, the findings indicated that learners perceived positive perceptions towards the mind-mapping technique to reinforce reading comprehension.

Keywords: Mind mapping technique, reinforcement, reading comprehension, English as a Second Language, G.C.E. Advanced Level learners

INTRODUCTION

Background of the study

In second language learning, reading is one of the skills teachers expect learners to acquire, and argues that it is an essential skill for success in all education contexts (Brown, 2004). According to Snow (2003), reading comprehension is the precise understanding of the writer's message through simultaneously extracting and constructing meaning by collaborating reader's background knowledge, interaction, and involvement. The study by Siriphanich and Laohawiriyanon (2010) found that problems related to reading comprehension occur not only in the first language (L1) but also found these problems in English, which is a foreign or second language as well.

In Sri Lanka, reading comprehension is vital for students to improve in secondary school, tertiary education, and the workplace. The researcher intended the learner group as G.C.E. A/L learners because teachers are likely to assume that reading is their most potent skill in assessing students' performance in examinations

(Abeywickrama & Samarakoon, 2021). According to Abeywickrama and Samarakoon (2021), the difficulties caused by monotonous techniques in reading comprehension make the process more complicated. However, Jayasundara (2014) stated that at present, most L2 learners do not tend to read more in their target language even though reading is significant as a receptive skill which leads to acquiring the other two productive skills; writing and speaking.

Consequently, a technique can be adapted to minimize complexity and reinforce reading comprehension. “Reading is a complex process, complex to learn and complex to teach” (Carnine, Silbert, & Kameenui, 1990, p. 3), so a technique must help them read effectively and interestingly. Mcnamara (2006) stated that using reading strategies or techniques is essential; high-ability students who use reading strategies are getting successful not only in comprehending reading but also in overcoming reading problems and becoming better readers and comprehending. In summary, the students should have better strategies or techniques for their excellent comprehension. In this case, the researcher utilized the mind mapping technique to reinforce reading comprehension: “it allows the students to imagine and explore associations between the concepts in a passage and develop a holistic understanding of the content” (Davies, 2011, p.33).

Problem Statement

According to Abeywickrama and Samarakoon (2021), the difficulties caused by monotonous techniques used in the learning process may be unable to comprehend a passage well, especially ESL learners, so they cannot grab information about the content comprehensively. Therefore, the students pay less attention to the subject of English during the A/L examination period and pay more attention to their main subjects. Therefore, when considering the related literature, there is an inadequacy in studies related to the research field conducted in the Sri Lankan context. In the Sri Lankan context, the only research done incorporating the mind map technique and reading skill, “*Effectiveness of mind maps as a learning tool for medical students,*” distinguishes a research gap. “Further studies should be undertaken to evaluate its effectiveness in retaining information in the long-term” (Wickramasinghe et al., 2011, p.32). This study intends to fill the gap by conducting further research on G.C.E. A/L ESL learners. As Jayasundara (2014) stated, even though all four skills are emphasized as necessary in learning any language, reading receives the slightest attention in the L2 teaching and learning at both the secondary and tertiary levels.

Objectives of the Study

The research paper presents an analysis on the use of mind mapping technique in language learning applications for the purpose of learning English as a second language. This study focuses on the use of mind mapping technique to reinforce reading comprehension. The main objective of this study is to evaluate whether mind mapping as a technique reinforces reading comprehension. It further attempts to present an investigation of the learners’ perceptions of mind mapping as a technique after the implementation for G.C.E. A/L ESL learners.

Research Questions/Hypotheses

1. What is the impact of using mind mapping as a technique to reinforce reading comprehension for G. C. E. A/L ESL learners?

H0: Using mind mapping as a technique does not reinforce reading comprehension for G. C. E. A/L ESL learners.

H1: Using mind mapping as a technique to reinforce reading comprehension for G. C. E. A/L ESL learners.

2. What are G. C. E. A/L ESL learners’ perceptions after implementing mind mapping as a technique to

reinforce reading comprehension?

H0: G. C. E. A/L ESL learners perceive negative perceptions after implementing mind mapping as a technique to reinforce reading comprehension.

H1: Advance Level English as Second Language learners perceive positive perceptions after implementing mind mapping as a technique to reinforce reading comprehension

Significance of the Study

The study conducted benefits curriculum planners and developers in the education sector to take necessary steps to design and implement curricula that reinforce reading comprehension for second language learners through the mind mapping technique. The present study is expected to offer substantial proof of the direct impact of mind mapping on students’ reading comprehension. In addition, the study’s results will be significant for teaching reading comprehension in ESL contexts.

LITERATURE REVIEW

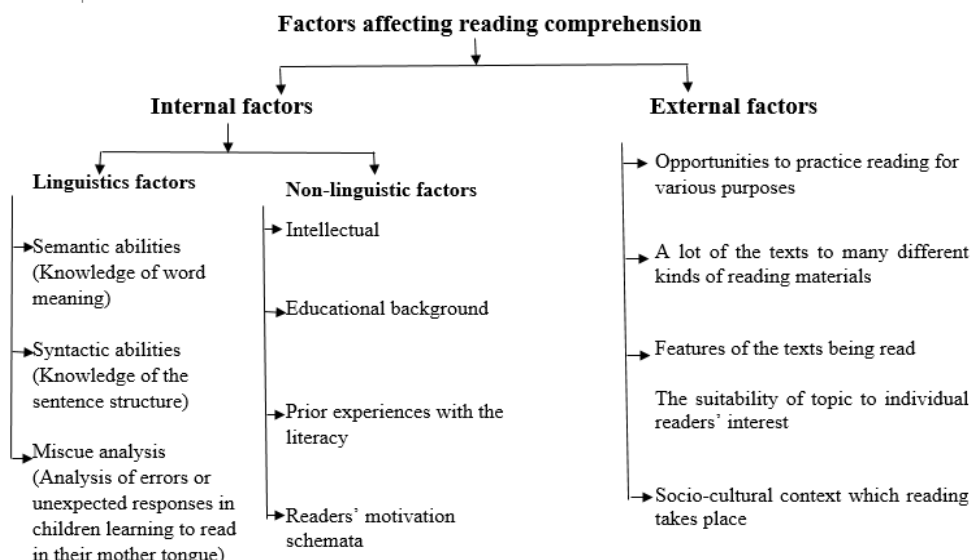
Reading Comprehension

Reading comprehension is defined as the active process of “simultaneously extracting and constructing meaning through interaction and involvement with written language” (Snow, 2002, p. 11). The purpose of reading comprehension is “the ultimate end-goal of reading that if the readers do not read to understand, the readers will read for nothing; comprehension requires the reader to be an active constructor of meaning” (Kurniawan et al., 2013, p. 4). Overall, the purpose of reading comprehension can be concluded as to gain the ability to understand the meaning or idea in the written text completely and chronically.

Reading comprehension occurs with a purpose, as mentioned above. Simultaneously, several factors affect reading comprehension. According to Aprilia (2019), the factors affecting reading comprehension are internal and external. Moreover, internal factors consist of linguistic and non-linguistic factors. External factors also influence reading comprehension, as presented in the figure below.

Figure 2.1

Factors affecting reading comprehension



Note. Adapted from Aprilia (2015, pp. 14-15).

Reading Comprehension among G. C. E. A/L ESL Learners in Sri Lanka

In G.C.E. A/L in Sri Lanka, General English is taught as an additional subject (Hewage et al., 2011). As studying English is not considered a prior subject for students, it affects students not to be motivated to learn English as a subject on the national curriculum or teachers not to be motivated to teach English as a Second language (Canagaraja, 1993; Hettiarachchi, 2010). Reading comprehension is indeed an area that needs specific attention since it is essential for “evaluating students’ performance in exams,” especially for A/L students in Sri Lanka (Abeywickrama & Samarakoon, 2021, p.45). The difficulties caused by monotonous techniques used in the learning process may be unable to comprehend a passage well, especially ESL learners, so they cannot grab information about the content comprehensively (Suryani, 2015). Therefore, monotonous technique use and lack of motivation for reading comprehension may cause difficulties for the intended learner group in Sri Lanka.

Mind Mapping Technique

“Mind maps are an excellent way to help learners organize knowledge, to empower themselves to comprehend key concepts better, and principles in lectures, reading, or other instructional materials” (McGriff, 2007, p.09). “Mind maps” were developed by the British psychologist Tony Buzan in the late ’60s and defined as “a mind map is an associative network of images and words that harnesses the full range of cortical skills: word, image, number, logic, rhythm, color, and spatial awareness in a single, uniquely powerful technique” (Buzan, 1996, p.81). Therefore, mind mapping is effective in helping communicate information because it can clarify complex concepts into simple, meaningful displays so that learners can develop a holistic understanding of the content to be learned.

Previous Studies

Many researchers have proved that mind mapping to improve students’ reading comprehension is increased effective in getting students’ attention to learn (Aprilia, 2019). The study “*Using Mind Mapping Technique to Improve Reading Comprehension Ability of Thai EFL University Students*” (Siriphanich, 2010) found that mind mapping improved reading comprehension as the post-test mean score of students was higher than the pre-test mean score at the 0.05 level of significance. Moreover, the study entitled, “*The Use of Mind Map Technique in Improving Student’s Reading Comprehension at the one of Junior High School in Bandung*” (Dwisetyati, 2013) concludes that the effectiveness of using mind map technique in improving the student reading comprehension is contributed by mind map aspects.

“*Teaching Reading Comprehension Through Mind Mapping: A Case of The Eleventh Grade Students of SMA N 2 Demak in the academic year 2008/2009*” (Amalia, 2008) focuses “the objective of this study is to find out the effectiveness of using mind mapping in improving students reading comprehension achievement”. The result indicates that using mind mapping in teaching reading comprehension effectively improves students’ reading comprehension achievement. The study conducted by Patria (2016), “*Increasing Students’ Reading Comprehension through Mind Mapping Technique from Narrative Text at the First Grade Students of SMA N 2 Kota Metro*”, used quantitative study since it focused on the product (the result of the test) not the process of teaching-learning. It can be seen that the students’ mean post-test scores increased by about 12.4 points after being thought through the mind mapping technique. Therefore, the studies incorporating the mind mapping technique and reading comprehension have effective results when considering the improvement of the test scores and students’ positive perceptions towards the technique.

Theoretical Framework

Huezo-Ponce et al. (2021) suggested that learning theories are proven concepts that assist in incorporating psychology and the learning process. The study focuses on schema theory and constructivism in implementing mind mapping for reading comprehension in line with the interactive process. According to Johnson (2000), mind mapping builds on schema, and mind mapping techniques are also supported by the theory of human constructivism (Novak, 1993).

One of the theories of cognitive psychology that influence current thinking about reading comprehension is the Schema theory (Anderson & Person, 1984; Rumelhart, 1980, as cited in Ambruster, 2002), which explains how individuals acquire, store, and use knowledge in reading a text. According to Nunan (1999), schema theory is based on the notion that past experiences create mental frameworks that help us make sense of new experiences. Simultaneously, mind mapping emphasizes actively utilizing existing knowledge to construct new knowledge in conceptual change.

In reading comprehension, constructivism portrays the reader as actively building a mental representation by combining new information from the text with previously acquired knowledge (Spivey, 1987). Also, mind mapping is considered a technique that could be used in constructivist language lessons because; it develops creativity and promotes individual learning (Erdogan, 2008). As the proponents argue, visual tools are deeply rooted in constructivist theory (Ford et al., 1991). Mind mapping is one visual tool and is also building on the theory. Thus, the interrelation between the mind-mapping technique and reading comprehension corresponds with the theoretical perspectives.

METHODOLOGY

Research Design

This study incorporated an experimental research design. According to Ross and Morrison (2003), experimental design makes a comparison between a control and an experimental group on the dependent or outcome variable in a controlled environment. Similarly, this study utilized two learner groups: the experimental group intervention of the independent variable as mind mapping and the control group.

Research setting and Duration

This research was conducted at Sri Saranankara Sangaraja Maha Vidyalaya, Pothuhera, in the Kurunegala district. The ultimate reason for conducting the research at this school was because it was a readily available and convenient resource. The study was conducted for six weeks, including the first and last weeks, with pre-test and post-test and four 40 minutes lessons for both groups for four weeks apart from the teaching hours.

Research population and Research Sample

The study's target population was G.C.E A/L ESL learners in Sri Lanka. The justification for the population selection is to process the investigation with highly needy reading comprehension due to the A/L examination, and "more than 80% of teachers of view that reading in English is essential for their students" (De Silva & Devendra, 2014, p. 46). The sample of the study were 40 male (17 participants) and female (23 participants) G.C.E. A/L ESL learners. The rationale for the selection of the sample size of the study corresponds to the idea that "there should be at least 15 participants in the control and experimental groups for comparison" (Gall et al., 1996, p. 16). The study utilized non-probability purposive sampling. The 40 participants of the study were selected out of 70 G.C.E. A/L ESL learners within the selected setting with the proficiency reading placement test measured with the CEFR criteria. Further, random sampling was

utilized due to “the greatest freedom from bias” (Taherdoost, 2017, p.20) and divided the sample of 40 students into two groups, including 20, each control and experimental group.

Research Instruments

In this research, the researcher utilized two main instruments to produce data appropriate to address the research questions and test the research hypotheses (Wilkinson & Birmingham, 2003b). Fancher (2013) states that “pre-test and post-test designs are prevalent in scientific studies.” In this study, the researcher utilized a pre-test and a post-test for both groups: the control and the experimental. The pre-test was given to identify the participants’ reading comprehension level before the intervention, and the post-test was re-administered to test expected progress after the intervention. The researcher utilized the past paper question extracted from the G.C.E. A/L examination, 2021 General English 2, Part A, Question 05 for both pre and post-test for both groups: control and experimental.” Various mediums are used to collect feedback and opinions from the desired sample of individuals in a research” (Bhat, 2018). The researcher utilized an open-ended feedback form to gain learners’ perceptions as qualitative data because it can be helpful in various environments and may be necessary for a comprehensive and detailed evaluation (Aldridge and Bianchet, 2022). The feedback form was designed, including ten open-ended questions. The researcher distributed the feedback form only within the experimental group to gain the perceptions of the invented technique.

Data Collection Method

“The mixed method studies procure more breadth, depth, and richness in contrast to either quantitative or qualitative approach alone” (Schulze, 2003, p. 12). This study utilized a mixed-method approach as it can provide rich insight into the research questions. In order to address the first research question, data were collected quantitatively using tests: (pre-test and post-test) in this study. Since the first research question admits to finding the impact of using the mind mapping technique to reinforce reading comprehension among the intended learners, the student’s reading comprehension performance was quantitatively measured by using the test scores from the pre and post-tests. “Qualitative data is non-statistical and not necessarily measured using hard numbers used to develop graphs and charts” (Pickell, 2021) and involves the collection and analysis of narratives and/or open-ended views on focus groups or ethnographies (Coghlan & Brydon, 2014). Qualitative data was collected using an open-ended feedback form given to experimental group students to gain their perceptions after the treatment to address the second research question and test the second hypothesis.

Data Analysis Method

In this study, SPSS was used to analyze the quantitative data, while thematic analysis was utilized to analyze the qualitative data. Comparing various groups is the most common statistical procedure in applied linguistic research (Lazaraton, 2005). According to Van Esch (2013), the quantitative data analysis of pre-tests and post-tests is done utilizing Paired sample t-tests in SPSS to report “correlations, comparisons of means and statistically significant findings” (p.216). Consequently, quantitative data collected via tests was analyzed through IBM SPSS statistics in this study. According to Braun and Clarke (2006), “thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within data” (p.79). In this study, the open-ended feedback form was analyzed thematically to account for an in-depth description and identification of general themes and supporting respondent perceptions towards the mind mapping technique to address the second research question.

Ethical Considerations

For the present study, the researcher employed three letters of consent (from the school’s principal, parents of the participants, and the participants while adhering to the ethical guidelines of conducting studies on

participants below 18. Also, the current research’s informed consent and feedback forms were structured using L1 (Sinhala) and L2 (English).

FINDINGS AND DISCUSSION

Research Question 01

What is the impact of using mind mapping as a technique to reinforce reading comprehension for G. C. E. A/L ESL learners?

The quantitative data for the first research question is analyzed through the pre-test and post-test results of the control and experimental groups. The quantitative data analysis is presented in the following aspects to illustrate each analysis.

1. Analysis of the pre-test results of the control and experimental groups.
2. Analysis of the pre-test and post-test results of the control group.
3. Analysis of the pre-test and post-test results of the experimental group.
4. Analysis of the post-test results of the control and experimental groups.

Analysis of the pre-test results of the control and experimental groups.

Table 4.1

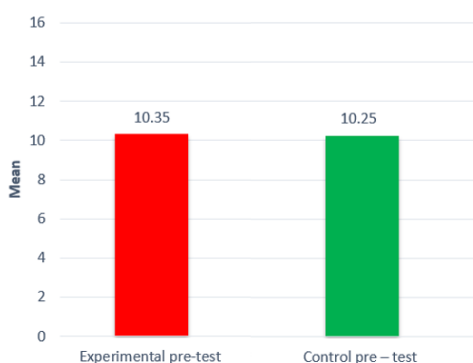
Descriptive statistics of the control and experimental groups concerning pre-test marks

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Con_ pre-test	10.25	20	1.209	.270
	Exp_ pre-test	10.35	20	1.461	.327

Source – Primary data

Figure 4.1

Bar chart of mean score of the pre-test results of the control and experimental groups



Source – Primary data

Table 4.1 depicts descriptive statistics on the pre-test results of two groups; control and experimental. The control group has a mean value of 10.25 for the pre-test results, and the experimental group has a mean value of 10.35 for the pre-test results. When observing the numerical values, there is a mean difference of 0.10 between these two groups. Consequently, there is no considerable difference between the mean values of the two groups, and figure 4.1 further illustrates graphically to make it easier to apprehend. Therefore, table 4.1 and figure 4.1 depicts no considerable difference between the pre-test results of the control and experimental groups.

Significance value of the control and experimental groups concerning pre-test marks

Table 4.2

The significance value of the control and experimental groups concerning pre-test marks

Paired Samples Test									
		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Con_ pre-test – Exp_ pre-test	-.100	1.373	.307	-.742	.542	-.326	19	.748

Source – Primary data

According to table 4.2, the significant value of the pre-test results of the control and experimental groups is 0.748. If the p-value < 0.005, there is a difference between the pre-test results of the two groups. Depending on the results of table 4.2 indicates that the significant value is higher than p- the value. Therefore, it implies no significant difference between the marks of both groups. Consequently, the difference between pre-test results is not statically significant, and it may be postulated that the proficiency levels of both groups are similar before the intervention.

Analysis of the pre-test and post-test results of the control group.

Table 4.3

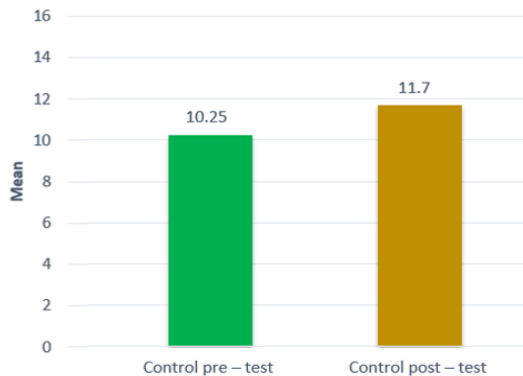
Descriptive statistics of the control group concerning pre-test and post-test results

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Con_ pre-test	10.25	20	1.209	.270
	Con_ post-test	11.70	20	1.218	.272

Source – Primary data

Figure 4.2

Bar chart of mean score of the pre-test and post-test results of the control group



Source – Primary data

According to table 4.3, the mean value of the control group concerning the pre-test is 10.25, while the post-test is 11.7. It is visible that there is a slight increase in the mean value from the pre-test to the post-test (1.45) in the control group. Further, figure 4.2 illustrates graphically the increased mean values to make it easier to apprehend. Therefore, it can be said there is an improvement in students’ marks in the control group from the pre-test to the post-test.

Significance value of the control group concerning pre-test and post-test results

Table 4.4

The significance value of the control group concerning pre-test and post-test results

Paired Samples Test									
		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Con_ pre-test – Con_ post-test	-1.450	.686	.153	-1.771	-1.129	-9.448	19	.000

Source – Primary data

According to table 4.4, the significant value from the T-test is marked to be 0.000 and is thus less than 0.05 (i.e.p-value = 0.000<0.05). It is proved from the significant value that there is a difference between the pre-test and post-test marks of the control group. Therefore, statistically, it demonstrates a difference between the pre-test and post-test marks of the control group without the intervention of the mind map technique.

Analysis of the pre-test and post-test results of the experimental group.

Descriptive statistics of the control group concerning pre-test and post-test results

Table 4.5

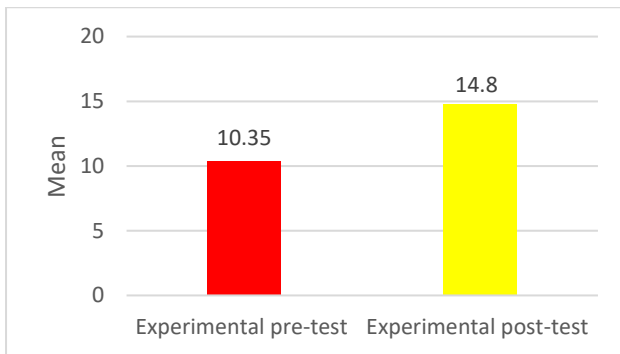
Descriptive statistics of the experimental group concerning pre-test and post-test results

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Exp_pre_test	10.35	20	1.461	.327
	Exp_post_test	14.80	20	1.322	.296

Source – Primary data

Figure 4.3

Bar chart of mean score of the pre-test and post-test results of the experimental group



Source – Primary data

According to table 4.5, the mean value of the experimental group concerning the pre-test is 10.35, while the post-test is 14.8. It is evident from table 4.5 that there is a significant increase in the mean value from the pre-test to the post-test (4.45) in the experimental group. Further, figure 4.3 illustrates graphically the increased mean values to make it easier to apprehend. Therefore, it can be said that the student’s marks in the experimental group from the pre-test to the post-test have increased.

Significance value of the experimental group concerning pre-test and post-test results

Table 4.6

The significance value of the experimental group concerning pre-test and post-test results

Paired Samples Test									
		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Exp_pre-test – Exp_post-test	-4.450	1.099	.246	-4.964	-3.936	-18.108	19	.000

Source – Primary data

According to table 4.6, the significant value from the T-test is marked to be 0.000 and is thus less than 0.05 (i.e. $p\text{-value} = 0.000 < 0.05$). It is proved from the significant value that there is a difference between the pre-test and post-test marks of the experimental group. Therefore, statistically, it demonstrates a difference between the pre-test and post-test marks of the experimental group with the intervention of the mind map technique.

Analysis of the post-test results of the control and experimental groups.

Descriptive statistics of the control and experimental groups concerning post-test marks

Table 4.7

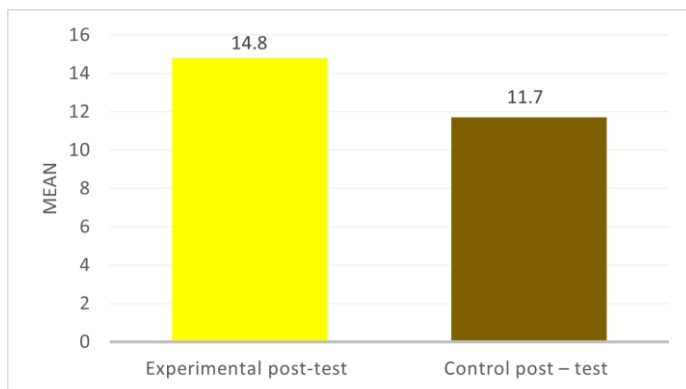
Descriptive statistics of the control and experimental groups concerning post-test marks

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Con_post-test	11.70	20	1.218	.272
	Exp_post-test	14.80	20	1.322	.296

Source – Primary data

Figure 4.4

Bar chart of mean score of the post-test results of the control and experimental groups



Source – Primary data

According to table 4.7, the mean value of the control group concerning the post-test is 11.7, while the mean value of the experimental group concerning the post-test is 14.8. Hence, it is visible that there is an increase in the mean value from 3.1 in the experimental group when compared with the control group. Figure 4.4 further illustrates the graphical representation of the post-test mean values of both groups. Consequently, there is a significant difference between the post-test marks of the control and experimental groups.

Further, when analyzing, the post-test marks of the control group increased by a 1.45 mean difference compared with the pre-test mean value of 10.25 and the post-test mean value of 11.7. Consequently, the post-test marks of the experimental group also increased by a 4.45 mean difference compared with the pre-test mean value of 10.35 and the post-test mean value of 14.8. However, the control group shows a lesser difference in mean value (1.45) than the experimental group’s mean value difference (4.45). Therefore, it can be highlighted that there is a significant improvement in the experimental group marks after implementing the mind-mapping technique for reading comprehension.

Significance value of the control and experimental groups concerning post-test marks

Table 4.8

The significance value of the control and experimental groups concerning post-test marks

Paired Samples Test										
		Paired Differences					T	Df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
Pair 1	Con_post-test – Exp_post-test	-3.100	1.744	.390	-3.916	-2.284	-7.949	19	.000	

Source – Primary data

According to table 4.8, the significant value of the pre-test results of the control and experimental groups is 0.000. If the $p\text{-value} < 0.005$, there is a difference between the post-test results of the two groups. Depending on the results of table 4.2 indicates that the significant value is lower than $p\text{-value}$. Therefore, it implies a significant difference between the marks of both groups. Consequently, the difference between post-test results is statistically significant, and it may be postulated that the use of the mind-mapping technique has made the difference evident. However, to make the afore-predicted statement more evident, the following hypotheses were tested using the paired sample T-test (table 4.8).

H0: Using mind mapping as a technique does not reinforce reading comprehension for G. C. E. A/L ESL learners.

H1: Using mind mapping as a technique reinforces reading comprehension for G. C. E. A/L ESL learners.

Since the significant post-test results of the control and experimental groups are statistically different due to the implementation of the technique, the null hypothesis is rejected, which asserts that using the mind map technique does not reinforce reading comprehension. The analyzed results in Tables 4.7 and 4.8 indicate a significant difference between the experimental and control groups. The post-test results highlight that the mind map technique caused the difference. Therefore, the researcher can conclude that using the mind-mapping technique has reinforced reading comprehension by accepting the alternative hypothesis.

Research Question 02

What are G. C. E. A/L ESL learners’ perceptions after implementing mind mapping as a technique to reinforce reading comprehension?

Qualitative data analysis is a descriptive process that involves the researcher going “beneath the surface” of the data to understand why and how particular participants experience and perceptions (Braun & Clarke, 2013, p. 174.). In this study, the data from the feedback form given to the experimental group are analyzed qualitatively using thematic analysis. Braun & Clarke (2006) defined the phases of thematic analysis as follows: (1) becoming acquainted with the data; (2) generating initial codes or labels; (3) searching for themes or main ideas; (4) reviewing themes or main ideas; (5) defining and naming themes or main ideas; and (6) producing the report.

Three themes were identified by the researcher and are analyzed following the above steps appropriate and comprehensive in describing the data collected to answer the second research question.

Response analysis of learner perceptions after implementing the mind map technique: theme 01- Developing reading comprehension

Table 4.9

Response analysis of learner perceptions after implementing the mind map technique: theme 01- Developing reading comprehension

Main theme	Sub-theme	Code
01. Developing reading comprehension	01.1 Vocabulary awareness	<p><i>“Creating mind maps within a group work improved my vocabulary skills” (S 5)</i></p> <p><i>“I think the use of mind mapping was good, so it is easy to comprehend the text, and then my vocabulary is increased” (S 13)</i></p> <p><i>“Use of dictionary to find new words help me to fill the mind map as well” (S 19)</i></p>
	01.2 Skimming, scanning, searching for information	<p><i>“Using the mind maps increased my understanding of the reading text while going through it” (S 02)</i></p> <p><i>“The mind maps I created improved my knowledge of the information in the text” (S 06)</i></p> <p><i>“The mind map technique combined with scanning and skimming strategy was able to help to find the topic within a passage. I did not need to read the whole words in the texts in detail” (S 11)</i></p> <p><i>“Mind map helped me to identify more details in the reading than I would have identified without mapping” (S 18)</i></p>
	01.3 Incorporated with all three stages	<p><i>“I used mind mapping to be familiar with the topic and understand it at the beginning of the lesson” (S 12).</i></p> <p><i>“Through mind maps, I understand difficult words while reading the paragraphs” (S 16).</i></p> <p><i>“Creating mind maps made me remember the text until the end” (S 20)</i></p>

Source – Primary data

According to the above thematic analysis in table 4.9, the development of reading comprehension utilizing the mind-map technique can be seen with the support of three sub-themes categorized according to the participant’s responses to the feedback form. Moreover, vocabulary awareness, skimming, scanning, reading for information, and corporation of the mind map technique in different stages are further revealed according to the participants’ perceptions towards the implemented mind map technique.

Response analysis of learner perceptions after implementing the mind map technique: theme 02- Learner-centered technique

Table 4.10

Response analysis of learner perceptions after implementing the mind map technique: theme 02- Learner-centered technique

Main theme	Sub-theme	Code
02. Learner-centered technique	02.1 Collaborative learning	<p><i>“I enjoyed working with mind map with my friends” (S 1).</i></p> <p><i>“If given a choice, I would rather read and use mind map than just read” (S 5)</i></p> <p><i>“I like to create mind maps with friends, and it helps me to understand the passage more” (S 09)</i></p>
	02.2 Structure background knowledge and thoughts	<p><i>“Using mind maps helped me to identify the main ideas and sub-ideas more attractively”(S 02).</i></p> <p><i>“Mind maps helped me understand the relationship between main ideas, details, and examples” (S 10).</i></p> <p><i>“Creating mind maps makes me think of many ideas and then organize my thoughts easily” (S 16).</i></p>

Source – Primary data

According to the above thematic analysis in table 4.10, the learner-centeredness when utilizing the mind-map technique can be seen with the support of two sub-themes categorized according to the participant’s responses to the feedback form. Collaborative learning within pairs and groups using the mind map technique inclines with the learner-centered environment highlighting the mind map technique reinforces reading comprehension more focused for the learners. Structuring background knowledge and thoughts of the learners are given the opportunity when incorporating mind maps for reading comprehension according to the participants’ perceptions towards the feedback form.

Response analysis of learner perceptions after implementing the mind map technique: theme 03- Versatility in the application of mind maps

Table 4.11

Response analysis of learner perceptions after implementing the mind map technique: theme 03 Versatility in the application of mind maps

Main theme	Sub-theme	Code
03. Versatility in the application of mind maps	03.1 Learner interest	<p><i>“Using colors, images, and writing while creating the mind maps makes learning easy and interesting” (S 03).</i></p> <p><i>“I really enjoyed when designing mind maps” (S 07).</i></p>
	03.2 Satisfaction and motivation	<p><i>“Creating mind maps enhances my motivation to learn reading” (S 05).</i></p> <p><i>“Creating a mind map is a good exercise for my brain” (S 09).</i></p> <p><i>“Mind maps ensure a relaxed and stress-free atmosphere while reading” (S 14).</i></p> <p><i>“When creating the mind maps, I was absorbed in what I was doing” (S 20).</i></p>

Source – Primary data

According to the above thematic analysis in table 4.11, the versatility of the mind map technique when utilized with reading comprehension can be seen with the support of two sub-themes categorized according to the participant’s responses to the feedback form. Learner interest, satisfaction, and motivation towards applying the mind map technique to reading comprehension are recognized as the sub-themes when analyzing.

In addition, learners’ perceptions of mind mapping as a technique with reading comprehension were positive. The qualitative analysis of the feedback form revealed that the participants’ considered implementation of the mind map technique for reading comprehension develops their reading ability and builds a more learner-centered environment. Further, the versatility of the mind map technique incorporated into reading comprehension provides evidence from the learners’ perceptions. Overall, the present study’s findings reveal that twenty respondents from the experimental group have positive perceptions towards implementing the mind map technique to reading comprehension. However, the researcher tested the following hypotheses to make the afore-predicted statement more evident.

H0: G. C. E. A/L ESL learners perceive negative perceptions after implementing mind mapping as a technique to reinforce reading comprehension.

H1: Advance Level English as Second Language learners perceive positive perceptions after implementing mind mapping as a technique to reinforce reading comprehension.

Therefore, to conclude, the null hypothesis (H0) is rejected while accepting the alternative hypothesis (H1) as the thematic analysis of the participants’ responses validated that there is a positive perception towards implementing the mind map technique to reinforce reading comprehension.

Discussion of quantitative and qualitative findings

Results of the quantitative analysis in section four revealed that the participants in the experimental group

who implemented the mind map technique made significant progress on their post-test scores compared to the participants in the control group. Due to this reason, the researcher's alternative hypothesis (H1) was accepted with the first research question. Consequently, the positive impact of implementing the mind map technique to reinforce reading comprehension is signified. According to previous literature cited in this study, using the mind map technique to reinforce the mind map technique has been proven to positively impact ESL learners (Indrayani, 2014; Saori, 2020; Siriphanich & Laohawiryanon, 2010).

Indrayani (2014) conducted a similar study to observe the effectiveness of mind mapping in improving students' reading comprehension of the narrative text of ESL learners. According to the study, the mean score of post-test results of the experimental group (27.14) is higher than the control group (17.71), and the T-test results signify a difference between the two groups. The study concluded that teaching reading comprehension of narrative text using the mind-mapping technique is effective. Saori (2020) conducted another study that explored the use of mind mapping to teach reading comprehension and explored the positive impact of implementing the technique. The study's result showed that the experimental group's mean score (71.76) was higher than the control group's (60.24) after treatment was given. Thus, the use of mind mapping has a significant effect on students' reading comprehension. It indicated that the technique is an alternative technique to teaching reading comprehension. Similarly, this study found that implementing the mind map technique to reading comprehension reinforces learners.

In addition, participants' perceptions of using the mind map technique to reinforce reading comprehension were positive in this study. The thematic analysis of the feedback form revealed that learners who implemented the mind map technique (experimental group) developed reading comprehension incorporating a more learner-centered environment according to the findings described in the above chapter. The study conducted by Cahyani (2015), entitled "Improving Students' Reading Comprehension Through Mind Mapping at the seventh year students of SMP N 3 Colomadu," found that after implementing the technique, found that the class was better than before. It concluded mind mapping had improved the students' reading comprehension and the class situation. Moreover, Siriphanich and Laohawiryanan (2010), Kim and Kim (2012), and Hofland (2007) conducted studies on learners that learn English as a second language. They found that using the mind map effectively improved the learners' reading comprehension level. Also, the study conducted by Mohaidatg (2018) stated that mind mapping could change the traditional mode of reading class, specifically the "teacher-centered" teaching mode highlighting a more learner-centered environment. Moreover, versatility in applying the technique was positively remarked according to the learners' perceptions, as described in chapter four of this study.

According to the findings analyzed thematically in chapter four, the researcher identified the students' reading comprehension was developed. The learner's perceptions of vocabulary awareness through the mind map technique, focusing on the sub-skills development of reading with the implementation of the technique and the use of mind map technique in all three lessons emphasize its positive impact. The study by Sabbah (2015) designed lessons in English as a second language classroom. They used mind mapping software to teach words in reading texts whose topics and found that using mind maps in teaching vocabulary items was effective and enjoyable to students. Similarly, the researcher found through the learners' perceptions that vocabulary awareness was developed by implementing the mind map technique. Also, the study by Mohaidatg (2018) stated that with the visual chart assisting reading comprehension, the activities based on mind mapping could be conducted before, during, and after reading class. The previous studies' findings correspond with the researcher's findings highlighting the positive impact of using the mind map technique to reinforce reading comprehension.

The participants' perceptions towards implementing the mind map technique revealed that more learner-centered opportunity is created through collaborative learning and structuring background knowledge and thoughts when dealing with reading comprehension. Sundararajan et al. (2018) found that collaborative mind-mapping practices with preschool children effectively developed critical thinking skills. While

performing mind mapping, children cooperate with their peers by expressing their ideas and improving their social skills by taking on individual and group responsibilities. The results of this study were also consistent with the results of Al-Jarf, (2009) and Zhou (2016), which showed that the use of the mind maps provided a successful way to develop the student's ability to generate and organize the ideas they use in their writings. It also developed their positive attitudes toward the program itself. Therefore, the researchers' findings align with the previous literature and studies conducted by the researchers elaborating on the fact that the mind-mapping technique reinforces reading comprehension when analyzing the participants' perceptions.

The thematic analysis of the learner perceptions in chapter four revealed that the versatility of implementing the mind map technique lies in satisfaction, motivation, and learner interest. Cain (2002) surveyed the results of 14 students' satisfaction after using the mind map learning technique. Results showed that ten agreed that the mind map learning technique was satisfactory and adequate to the sample. Similarly, Holland, Holland, and Davis (2004) found that mind mapping made students enthusiastic because it increased their sense of competence. It also enhanced their intrinsic motivation. Wang (2010) carried out a study with two classes at Liaoning University of Petroleum and Chemical Technology, with a participant of 50 students, using mind mapping in the reading 11 class. The results showed that using a mind map for English reading teaching and learning can stimulate students' interest in reading. Similarly, this research found the participants' perceptions to be positively revealed after implementing the mind map technique.

The learning theories and paradigms reviewed in this study on constructivism, schema theory, and top-down process underpins the study results. Based on the Constructivism theory, to construct mind maps, the students have to work in groups and exchange their knowledge with peers to help construct their knowledge (Kanselaar, 2002). The study by Mohaidatg (2018) stated that this study used schema theory to motivate the students and prepare them to be ready before reading. It was utilized as a mental structure representing one's understanding of the world to organize current knowledge and provide a framework for future understanding to activate the students' vocabularies and background information. It advocated that implementing the mind map technique to reinforce reading comprehension mediates the theoretical framework corresponding to the previous studies. Kaufman (2010) said that Mind Mapping is a helpful technique for reading; learners can easily place new information in the appropriate branch or make connections between ideas. This is in line with the theory of top-down process proposed by Brown (2001). Thus, the previous literature proves that the findings of this research on using mind-mapping techniques indeed reinforce reading comprehension.

CONCLUSION

The results of the findings related to the first research question, what is the impact of using mind mapping technique to reinforce reading comprehension among learners, implied a positive impact in favor of the statistical analysis. In order to address the second research question, what are the perceptions of the learners towards implementing the mind map technique to reinforce reading comprehension are discovered under three main themes identified as developing reading comprehension, learner-centeredness, and versatility in the application. The experimental group students perceived positive perceptions towards the mind mapping technique incorporated with reading comprehension.

LIMITATIONS

Although the researcher reached its purpose, some limitations were identified when conducting the research. The sample size, including only 40 students in this study, limits the generalizability of the result. Secondly, the length of the intervention also limits the study's findings because, according to Liu and Brown (2015), the process of learning English as an L2 is ongoing.

Pedagogical Implications

The study results found that the mind-mapping technique is one of the techniques that can be utilized to reinforce reading comprehension. The positive impact of the technique and positive perceptions of the learners towards the technique further illustrates its applicability to reading comprehension. The findings above imply that the mind mapping technique developed reading skills incorporating vocabulary enhancement and reading sub-skills development. Further, the mind mapping technique can be utilized to structure background knowledge and incorporated within a more learner-centered environment. The mind mapping technique develops learner interest, satisfaction, and motivation to read throughout the learning process. Therefore, teachers can use mind mapping in the reading-teaching and learning process. Also, the students can use mind mapping to reinforce reading comprehension and the learning process so that they understand and comprehend a text efficiently.

RECOMMENDATIONS

When considering the results of this study, it is recommended to carry out future research for more extended treatment periods to determine whether the more prolonged exposure to the mind mapping technique would enhance the reading comprehension of all students of all proficiency levels. As well as it is important to use observation methods to observe how the students engage in reading comprehension with the implementation of the mind mapping technique. Additionally, extensive research and pilot studies can be conducted at the rural/urban, district, or provincial level to evaluate and identify the impact and benefits of using the mind mapping technique for learning and teaching other types of reading sub-skills and reading texts. Further, it is recommended that the mind mapping technique can be incorporated to teach other skills, such as writing, listening, and speaking.

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