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Effectiveness of Using Poly Category Mind Map for Vocabulary Development

Thashwinny a/p Prabha
Sk Kem Iskandar, Mersing,
Johor, Malaysia.

Azlina Abdul Aziz
Faculty of Education, Universiti Kebangsaan Malaysia,
Selangor, Malaysia.

Abstract
Despite learning English formally in primary classrooms, most of the Malaysian primary learners are incapable of conveying their ideas accurately in the target language since they have limited vocabulary. Action research based on the Kemmis and McTaggart Action Research Model was carried out to alleviate the vocabulary learning challenges. Thus, the study aims are to investigate the effects of the Poly Category Mind Map for vocabulary development of third-year students. Thirty students from the third-year suburban school in Mersing, Johor participated in the study. Vocabulary pre-test and post-tests used as the instruments of collecting the data. The results of the post-test at the end of the second cycle showed a significant difference between the mean scores before and after using Poly Category Mind Map to develop vocabulary ($p>0.05$). The use of Poly Category Mind Mapping helped students in understanding and remembering the words, their meaning, and spelling precisely. The findings concluded that using the features of Poly Category Mind Map, which are the pictures, keywords, and grouping of words aided the students in learning vocabulary. This study hopes to encourage students, teachers, and curriculum designers to integrate Poly Category Mind Mapping strategy in English classrooms. Researchers can also utilise the Poly Category Mind Mapping in learning skills of the English Language such as reading and writing for further studies.

Keywords: Mind Map, Poly Category Mind Map, primary school students, vocabulary, vocabulary development
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Introduction

Vocabulary is one of the main elements in language teaching because students can be successful in learning the language by having adequate knowledge of vocabulary. The Cambridge University Press (2008) defined vocabulary as all "the words are known and used by a particular person or all the words that exist in a particular language or subject" (p. 2). Learners need to master several different components of language, such as grammar and syntax before they can learn a language. However, vocabulary knowledge is the primary and vital component in acquiring a second language. This statement is also supported by Wilkins (1972), who argues that "there is not much value in being able to produce grammatical sentences if one has not got the vocabulary that is needed to convey what one wishes to say" (In Al Qahtani, 2015, p. 22). Thus, vocabulary knowledge is significant as it is the main component of a language.

According to Asgari and Bin Mustapha (2010), vocabulary acquisition is one of the most challenging components of language learning. Therefore, students are weak in their language proficiency is because they have limited numbers of words stored in their mind to convey their ideas. This claim is also supported by Misbah, Mohamad and Yunus (2017) as they found from their study in seven Sekolah Kebangsaan (National) schools in Malaysia that "the most important factor contributing to the students' problems in learning English is the restricted vocabulary" (p.2000). They stated that students with restricted vocabulary have difficulty reading, writing, listening, and speaking English. In conclusion, students' small number of vocabulary knowledge is the most significant barrier learners' face in studying the English language.

Purpose and question of the study

The lack of adequate vocabulary has made Malaysian primary students have difficult times having excellent English language qualifications. This problem is also extended to the researcher's school, as Malaysian Classroom-Based Assessment or also known as Pentaksiran Bilik Darjah (PBS) of third-year students, showed that most of the students scored in low bands in their assessment. Most students are average achievers who scored band 2, which indicates that students are of limited language proficiency. Based on the analysis of the classroom assessments, the researcher found that the students do not fully understand the words, their meaning, and they can't remember the words or the words' spelling that they have learned. All the problems mentioned above address one crucial question, which is how the students can learn words effectively.

The researcher believes that learners need to gain more productive knowledge of vocabulary and build their vocabulary learning strategies. Since the CEFR syllabus is more about the communicative learning approach, teachers often ignore the method to teach individual words. Although these words can incidentally be learned, vocabulary becomes more meaningful to learners when provided with a language-rich setting. In other words, students will benefit from systematic and direct word instruction. This statement is also in line with Thombury (2002), in which he proposed that word teaching is as important as language learning. In short, descriptive vocabulary learning is crucial to enhance the students' language skills.

Another vital issue is the way students in the class represent their knowledge. Based on their English notebooks, the researcher noticed that research participants usually represent their knowledge in linguistic forms. For instance, they will simply write the definition of a new word

without the addition of language recall techniques. This strategy is similar to some of the schools in Malaysia, according to Muhamad and Kiely (2018). They argued that the data gained from their research indicated that teaching vocabulary in the classroom is limited only to discuss the definition of incomprehensible words. Therefore, it is clear that there was a need to develop the representations of word knowledge that makes words acquisition easier and words could be kept longer in the memory. Teachers should assist students with their difficulties in understanding and recalling the words learned in previous lessons. The value of acquiring vocabulary for second-language learning is vital. Since the time at schools is minimal, the students need to know vocabulary items as efficiently and practically as possible.

Thus, action research should be conducted to explore a better language learning strategy. To overcome the problems that are brought upon the students due to ineffective methods of learning vocabulary, memory strategies that are regarded as powerful mental tools should be applied. One of the effective memory strategies to learn vocabulary is using Poly Category Mind Mapping, which is also a type of mind map. Mind map features consist most of the elements in the memory strategies, which is integrating new words into the acquired knowledge via imagery, grouping, use of keywords, and associating. (Schmitt, 1997). Besides, Buzan and Buzan (1993) also advocated the usage of a mind map as a learning tool as they stated that "the brain finds it easier to accept and remember visually stimulating, multi-coloured, multi-dimensional mind map, rather than monotonous, boring liner notes." (p.89) The Poly Category Mind Map is a type of mind map which has only three to seven branches. According to Buzan (1993) also, this type of mind map allows in splitting details of information up into manageable pieces. Thus, this study aims to:

1. Investigate the effects of the usage of the Poly Category Mind Map on third-year students' vocabulary development.

Literature Review

Vocabulary Development Process

Vocabulary is usually regarded to be the most prominent instrument for learners to be successful in second language learning, and ESL students see it as the most challenging section. It is a truism, therefore, that the absence of adequate vocabulary knowledge restricts the understanding of language by learners and hinders their capacity to develop their vocabulary knowledge. It is due to the reason that vocabulary "plays a vital role in all language skills, namely listening, speaking, reading and writing." (Robert Ayin & M. Shah, 2020, p.2) Without a doubt, vocabulary development is a complicated process involving distinct stages, and inadequacy can be an obstacle to vocabulary learning in each step. Nation (2006) also suggested five phases of learning vocabulary to develop students' vocabulary knowledge, including finding new words, knowing the word definition, consolidating the memory of the word form and meaning, and lastly using the word. In reality, the procedures listed show that more explicit teaching strategies are required for vocabulary teaching. O'Malley and Chamot (1990) believed that making vocabulary learning comprehensible and meaningful can be facilitated by using suitable cognitive learning strategies.

Vocabulary Learning Strategy

As stated earlier, vocabulary acquisition is a tricky subject among distinct fields of second-language learning. Many academics think that excellent use of teaching strategies is needed for building a comprehensive vocabulary list and using them correctly (Alharthi, 2014; Khoshsima & Rezaeian, 2014). Folse (2004) stated that L2 learners have to memorise the form, get the definition, and use the term. On the other hand, to obtain, remember, and use new words, it needs the learner to be disciplined. Dóczi (2011) thinks that acquiring vocabulary is an ongoing method, so vocabulary learning strategies have an essential role to play in resolving insurmountable language learning problems. Maximising the opportunity to succeed in teaching, remembering and using words are the primary objectives of vocabulary teaching strategies that can be achieved through cognitive strategies. In reality, the cognitive strategy highlights the growth of thinking abilities. Scheid (1993) also supported this statement by stating that the goal of cognitive strategies is to allow all learners in their learning efforts to become more strategic, self-reliant, flexible, and productive.

Poly Category Mind Mapping Strategy

The Poly Category Mind Mapping Strategy is one of the cognitive learning techniques, as it helps learners to become more pragmatic, self-reliant, agile, and efficient in their vocabulary learning. The Poly Category Mind Map is a form of a mind map. “Mind mapping involves writing down a central idea and coming out with new and related ideas from the centre.” (Yunus and Chien, 2016, p.621) According to Buzan (2016) cited in Hawrani (2011), not only do Mind Maps display facts, but they also demonstrate a subject's general structure and the comparative significance of individual components of it. It enables learners to combine thoughts, believe creatively, and establish links that might not otherwise be possible. These advantages are similar to the Poly Category Mind Map because the Poly category is also a form of a Mind map. However, according to Buzan (2016) cited in Hawrani (2011) Poly Category Mind Maps “can contain from three to seven branches” (p.17). This mind map allows the creation of mental classification capabilities because Buzan (2016) cited in Hawrani (2011) believed that in short-term memory, the average mental capacity of beings is unable to recall more than seven parts of information.

Tony Buzan created Mind Map in the early 1970s as an instrument to help individuals more efficiently take notes and make it easy for us to remember a lot of data. Mind mapping is generally like art because it uses many colourful photos and symbols. Buzan (2016) cited in Hawrani (2011) said mind mapping is a robust graphic method that offers a universal key for unlocking the brain's potential. The recording of data through symbols, images, emotional significance, and colours is precisely the same as the processing of our brains. The Poly Category Mind Map is also in line with the Dual Coding theory, which states that data presented with both verbal depictions and mental images can improve memory and understanding recognition (Li, Yang & Chen, 2010). The Poly Category Mind Maps which consist of both verbal depictions and mental images using pictures, colours, keywords to present thoughts and the picture or topic in the central portion can assist learners' process input more effectively. All the characteristics of the mind map allow the brain to remember better and recollect the words as according to Dual Coding Theory. Although the verbal and nonverbal system are both naturally and structurally discrete, they aid each other during encoding, storing and retrieving, which are the three significant phases of brain memory function.

Past Studies of Using Mind Map to Improve Vocabulary

Studies on the use of Mind Map to develop students' vocabulary are discussed here to see the benefits it has given to other researchers in their studies which could be related to the current study. As indicated by a research, Mind Map seems, by all accounts, to be a compelling approach to educate and find out about new information and overarch ideas. The following studies below show how effectively the Mind Map has been used all around the world, and they are also applicable for students in Malaysia. However, the researcher was unable to find any existing past research on vocabulary learning related to specifically to Poly Category Mind Map.

The first research was carried out in Malaysia by Abdul Aziz and Yamat (2016) to investigate if the implementation of mind mapping method on Year 6 students can expand the vocabulary limit of sample students as well as to obtain a quantitative measure of the difference in vocabulary improvement among the students. The findings showed that there was significant evidence that mind maps had increased the students' scores in the post-test as compared to the pre-test. The second research was carried out by Heidari and Karimi (2015), which aims to explore the impact of mind mapping on vocabulary learning and its retention on 40 Iranian male high school students. The experimental group that was drilled using a mind map had higher scores than the control group. The third research was carried out by Sahrawi (2013), which focuses on investigating the efficacy of mind mapping to instruct English vocabulary on grade 8 students. The research result showed the post-test mean score proved that mind map was effective in increasing students' vocabulary mastery. The fourth research was carried out by Kusuma (2015), which aims to examine the efficacy of mind mapping method on the vocabulary mastery of elementary school second-grade learners. The research found that there were no major differences between experimental group students who used mind mapping and those who used word lists.

These researches explored the efficacy of mind mapping method in teaching vocabulary. For instance, the study carried out by Abdul Aziz, and Yamat (2016), Heidari and Karimi (2015), Kusuma (2015), and Sahrawi (2013) researched on mind mapping technique to learn vocabulary. In the current study, the researcher studies the usage of mind map for vocabulary development. However, only the technique of mind map that is used by Heidari and Karimi (2015), Abdul Aziz and Yamat (2016) and Sahrawi (2013) showed a positive result after the implementation. In the aspect of methodology, Kusuma (2015) and Heidari and Karimi (2015) used the experimental approach. On the other hand, Sahrawi (2013) used the pre-experimental research. However, since the researcher conducted the research in school, action research method is more suitable because the researcher will be able to improve on her teaching method. Concerning the sample of study, it has differed from the previous studies, and all the previous studies are carried out among different learners. Heidari and Karimi (2015) studies on high school students. On the other hand, Kusuma (2015) researched on the second graders but Sahrawi (2013) studies on eight graders. Abdul Aziz and Yamat (2016) conducted on upper primary students. Thus, these studies indicated that mind map is useful tool for learning for all levels of students. Therefore, the current research was conducted among the lower primary elementary learners, which is the third students in Malaysia.

Concerning the location of conducting the study, Kusuma (2015) and Sahrawi's (2013) study were all conducted in Indonesia. Heidari and Karimi's (2015) research was conducted in Iran and

Abdul Aziz and Yamat's (2016) research was conducted in Malaysia. Thus, it can be concluded that the mind map technique can be used for students all around the world, including Malaysia because it showed positive result in students' achievement after using the technique of mind map. However, the findings of all research except for Kusuma's (2015) was different. Kusuma (2015) discovered that there were no significant variations between the learners who were instructed by mind mapping and those who were taught by word list. Therefore, the current study is vital to be conducted among the lower primary students in Malaysia to find out if the Poly Category Mind Map technique works when used it to develop vocabulary.

Significance of the study

Although the mind map is agreed by scholars to be a powerful way to improve memory, there is still a lack of study mind maps in Malaysia for vocabulary learning, particularly in primary schools. Abdul Aziz and Yamat (2016), in their research supported the previously mentioned statement. They found "most of the studies and aspects have been done were just for the secondary and university level" (p. 106). Abdul Aziz and Yamat (2016) carried out their research using the mind map on the upper primary students. To bridge this gap, the researcher has agreed to apply the Poly Category Mind map among lower primary school suburban students in Malaysia. Thus, the Poly Category Mind Mapping strategy in developing students' vocabulary will hopefully act as a guideline for lower primary educators in Malaysia. Teachers, who are still practising the usage of word list memorising method could try out this technique as an alternative technique to help students enhance their vocabulary. The findings of this research are also hoped to benefit many stakeholders. ESL textbook authors and curriculum designers may have practical solutions for vocabulary teaching.

Methodology

According to Creswell and Plano Clark (2007), if you have particular instructional problems to address, action research is used. Therefore, as proposed by Creswell and Plano Clark (2007), the researcher decided to embrace the technique of action research to reflect on the specific problem faced by the learners in the school, to collect and analyse information and to execute modifications based on our results. The researcher also had chosen the mixed method design in action research that combines both qualitative research by doing classroom observation and quantitative research by doing vocabulary tests. The significant advantage is that the interpretation of both kinds of information can provide a better knowledge of the research problem than either type of information alone (Creswell & Plano Clark, 2007). This study used Kemmis and McTaggart Action Research Model-based action research design. The model is a spiral model containing: (a) planning, (b) acting and observing, (c) reflecting and (d) re-planning (Kemmis & McTaggart, 2005)

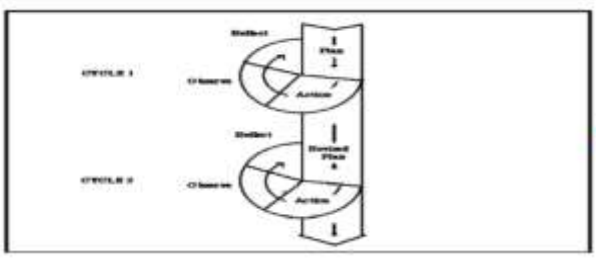

Figure 1 Kemmis & McTaggart, 2005, p.278)

Planning

In the planning stage, the researcher used Poly Category Mind Map to fix the educational issue identified during the preliminary research, which is the lack of vocabulary knowledge. The next step was to analyse items to be constructed in the test given before and after the intervention. The target vocabulary is based on Get Smart Plus 3's Teacher's Book, one of the books given to the teacher under Malaysian CEFR textbook. Topics 'Occupation', 'My House' and ' Seasons of a Year' that were used in intervention were taken from the book. The participants were given a pre-test in the form of the worksheet before they started their lesson for topic "Occupations" in the first week.

After the pre-test was carried out, the teacher gave the students input by teaching the topics based on the textbook. Then the teacher gave the students a mind map each and a whole class discussion was made to construct a mind map. This mind map was used to discuss the types of occupation based on the teacher's input. The mind map illustrations measure about 250 mm x 353 mm, which is the size of B4 paper. Throughout this process, all mind map characteristics such as colours, images, keywords and central image were used to encourage the memorisation process. Both the verbal and non-verbal components of the mind map were combined to ensure a better memory of the students as suggested by the theory of dual coding.

Students were taught how to connect the picture with words. The associated process was linked to the theory of dual coding. For example, a person's picture of 'fireman' was associated with the word 'puts off fire'. Then, students were provided unfinished mind map and learners filled in the missing alphabets based on the specified image. This assignment was aimed at requiring learners to recall the word spelling. The final phase was to strengthen the understanding learned in which the researcher conducted operations such as matching the image and phrases and writing simple sentences based on the vocabulary learnt. All these language skills practices were to reinforce the vocabulary learned.

Implementing and Observing the Intervention Process

During the implementation of the actions, the researcher carried out the intervention process that had been designed. These activities were introduced in one research cycle. The researcher taught new topics during the first, fourth, sixth session. The researcher taught the topic of 'Occupation' at the second meeting,'My House' at the fourth meeting. The topic of 'Seasons in a Year' was taught at the sixth meeting. When the new topics were taught, the students were asked to remember the vocabulary items in the mind map.

Reflection

The evaluation of the action was carried out by examining and analysing the intervention process carried out in the classroom, the outcome of a post-test and classroom observation. Then the second cycle started as the revised strategy (planning) was then implemented again. The first cycle took about two weeks to be completed. The outcome was then reflected in the second study cycle to achieve the research's aimed criteria for success. The criteria of success aimed by the researcher are at least 70% of the participants must have a minimum score of 26 out of 40 questions. The minimum score of 26 is chosen because in Malaysian Primary School English Test for standard six which is also known as the Ujian Penilaian Sekolah Rendah, the percentage of

65% carries the grade of 'B' that concludes that students are in the satisfactory level of English vocabulary knowledge.
The formula used to find the criteria of success was as follows:

% X=X1/N×100%

% X : percentage of success
X1 : number of the learners who scored more that 26 out of 40 questions.
N : total of learners

Participants

The selected participants for this study were twenty 9-year-old primary school students from Mersing, Johor, which is in the southern part of Malaysia. All of them were learning English as their second language since they are the native speakers of Bahasa Melayu or native speakers of Sabah and Sarawak. The twenty students are from 3 Satria. They converse in class using the mother tongue, which Bahasa Melayu or the native language of Sabahan and Sarawakians. The performance of these students was based on the previous Pentaksiran Bilik Darjah with a band score ranging between 2 to 3. According to the Standards-Based Curriculum for Primary Schools or also known as Dokumen Standard Kurikulam dan Pentaksiran (2018), band 2 and 3 in terms of vocabulary knowledge informs that the students can spell some familiar words and use partially correct grammar. (Kementerian Pendidikan Malaysia, 2018). Thus, it can be concluded that the participants of the research students know the familiar words in English but do not have a wide knowledge of vocabulary to communicate effectively.

Instruments

The data collection method used in this study was conducted through the test and non-test instruments. Pre-and post-tests were one of the tools used in this research. The basic principle behind the design of pre-and post-tests requires a pre-test measurement of the outcome of interest before the treatment is carried out and followed by a post-test on the same measure after treatment (Salkind, 2010). Before being introduced to the Poly Category Mind Map, 30 students in Year 3 were provided with a pilot test of 40 items to determine the reliability of the test questions. The researcher made use of the computer program's assistance in finding the accuracy of the 40 test items using the Cronbach's Alpha statistics. It was known that the reliability of the 40 sample items was .915 based on the outcomes of reliability analyses. It implies that questions were highly reliable, and the intervention was carried out. After two weeks of studying vocabulary using Poly Category Mind Map, the respondents were provided with the post-test. The products used in pre- and post-tests were the same except for manipulating the arrangement of the items. The next tool used is in this research is semi-structured classroom observation. This is because the researcher made a semi-structured observation that allows the teacher-researcher the flexibility to attend other concurrent occurrences in the classroom (Hubbard & Power, 2003).

Data Analysis

The data collected were analysed using descriptive and inferential statistics. The descriptive statistical method used to analyse information from pre- and post-tests were frequency and mean. In contrast, the inferential statistical method used was paired sample t-test as a means of answering

the research question. On the other hand, the data from the semi-structured observation were coded and analysed according to emerging subjects. After the process coding, the data were triangulated with data from the pre and post-tests to ensure credibility.

Findings

The findings of this study would be discussed based on the research question that was to prove the effectiveness of using Poly Category Mind Map in Vocabulary Development in the English language. The first data which was the scores of the participants in both pre and post-tests of the first cycle were recorded and analysed through descriptive analysis in terms of frequency and mean and inferential analysis by using paired sample t-test. The test was done through Statistical Package for the Social Sciences (SPSS) software. Table one showed the comparison between these two tests in terms of frequency, mean, standard deviation and significant value. Before that, the Shapiro-Wilk, the tests of normality of data was carried out to ensure the data is normally distributed.

Sample Characteristics

Table 1. *Tests of Normality*

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
PRE TEST	.100	20	.200*	.982	20	.957
POST TEST	.121	20	.200*	.977	20	.884

Shapiro Wilk's test ($p>0.05$) was carried out for the first cycle. Table one shows that the significance of the pre-test is 0.957 and post-test is 0.884. Since the significance value for the pre-test and post-test are more than 0.05, it means that there is not enough evidence to reject the null hypotheses. Thus, the pre-test and post-test are normally distributed because the significant value is greater than 0.05. The Paired sample t-test is run with the following hypotheses:

a) Null hypotheses: There is no significance difference between pre-test and first cycle post-test.

b) Alternative hypotheses: There is significance difference between pre-test and first cycle post-test

Table 2. *Paired sample statistics of first cycle*

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TEST	18.4000	20	3.15228	.70487
	POST TEST	23.5000	20	2.80038	.62618

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From the results, it proved that participants' vocabulary knowledge significantly increase from the pre- to post test. It specified a significant difference between the mean scores before and after using Poly Category Mind Map to develop vocabulary ($p>0.05$). These mean scores projected a significant increment in participants' score after the usage of Poly Category Mind Map. Thus, the null hypothesis is rejected and the alternative hypothesis is accepted. The score performance level as shown in Figure two below can also prove this analysis:

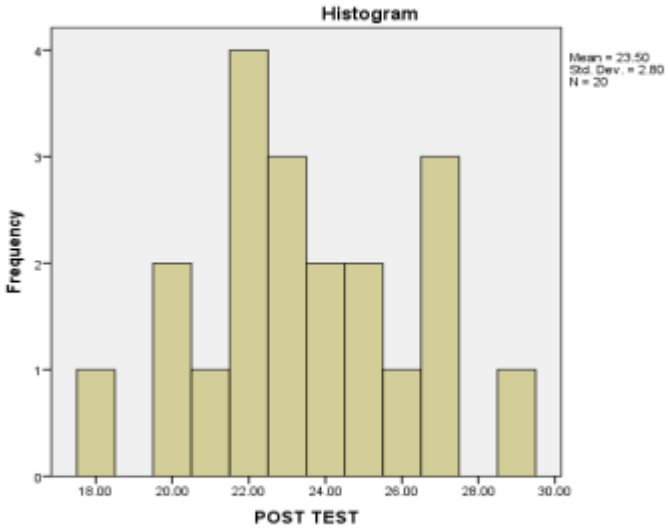

Figure 2. Histogram of Post-test in first cycle

Although there is significant improvement on the scores of the students, the first cycle results of post test revealed that it did not achieve the minimum criteria of success aimed by the researcher which is at least 70% of the participants must have a minimum score of 26 out of 40 questions. Based on the histogram, it was revealed that only 5 out of 20 students achieved the minimum score of 26 and above which revealed that only 25% of students achieved the minimum scored needed to enable satisfactory level of vocabulary knowledge. The researcher did the reflection after the results of observation, and the results of the vocabulary test were collected. From the observation in the first cycle, it was found that many learners still had problems in mastering vocabulary. It could be seen from the learners' answers in the vocabulary test. The next cycle is carried out with the inclusion of students own drawings on the vocabulary learnt in the mind map.

Table 3. *Paired sample statistics of second cycle*

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TEST	18.4000	20	3.15228	.70487
	POST TEST	27.2000	20	3.94168	.88139

From the results of the second cycle, it proved that participants' vocabulary knowledge significantly increase from the pre-test to second cycle post-test. It specified a significant difference between the mean scores before and after using Poly Category Mind Map with the personalised drawing of vocabulary to develop vocabulary ($p>0.05$). These mean scores projected a significant increment in participants' score after the usage of Poly Category Mind Map with the personalised drawing of vocabulary. The score performance level, as shown in Figure three below, can also prove this analysis:

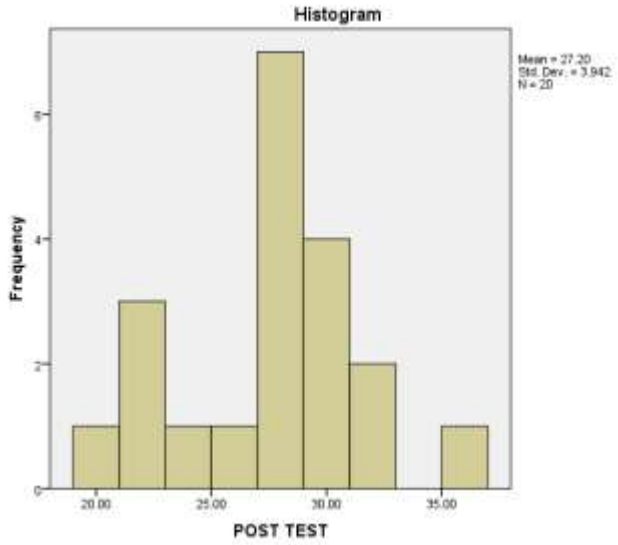

Figure 3. Histogram of Post-test in the second cycle

Based on the histogram of the second cycle, it was revealed that 15 out of 20 students achieved the minimum score of 26 and above. Therefore, in percentage value, 75% of students achieved the minimum scored needed to enable a satisfactory level of vocabulary knowledge. This finding showed that the usage of Poly Category Mind Map with the personalised drawing of vocabulary is more effective and will allow the researcher to achieve the criteria of success aimed by the researcher which is to have at least 70% of the participants with a minimum score of 26 out of 40 questions.

Semi-structured Classroom Observation

The semi-structured observation carried out by the researcher had a few checklists that allowed for triangulation of the data gathered in pre and post-test. During the first cycle, it is observed that the ability of some students in understanding words and their meaning by relating the pictures with good words increased. However, some of the students, especially the ones that scored lower marks in the first cycle post-test had a problem recalling the vocabulary learnt when they were doing their mind map. It is observed that they had to ask their friends when they have to match the words with the correct pictures. Indirectly, it showed that students had trouble relating the images with the vocabulary learnt. However, during the second cycle, when the researcher asked them to draw the pictures, even the low achievers can recall the vocabulary learnt because they remembered their personalised drawing related to the images.

Next, the students also had troubles in identifying the pictures of adjectives with the correct words. The students were always asking for the teacher's help to differentiate the images of 'misty' and 'foggy'. Although some students took the initiative to find the meaning of the words in the Malay language in the dictionary, they were still unclear about the meaning. Most of the students wrongly answered this question in their first cycle post-test. The students were still unclear of the meaning of the words because in the dictionary, both stated 'berkabus' (foggy or misty). However, in English, both fog and mist are caused by water in the air, but fog is thicker than mist. Thus, this hindered the students understanding of the meaning words despite being explained the meaning by the teacher earlier. However, when they drew the pictures of those words by differentiating the colour used to colour the drawing of 'misty' and 'foggy', they understood that 'foggy' is thicker than 'misty'. Some of the students also used darker blue to colour 'foggy' and 'lighter' blue to colour 'misty'. As a result, most of the students understand the concept of 'foggy' and 'misty' and they scored well in these questions during second cycle post-test.

Discussion

This research aimed to investigate the effects of the usage of the Poly Category Mind Map on students' vocabulary development. The data analysis in the form of paired-samples t-test was conducted to compare the results of pre-test and first cycle post-test. There was a significant difference in the scores for pre-test (M=18.400, SD=3.152) and first cycle post-test (M=23.500, SD=2.800) conditions; t (19) =-12.256, p = 0.000. The statistically significant difference between pre-test and post-test scores proved the effectiveness of the Poly Category Mind Map as a tool to improve students' vocabulary learning. However, the result did not attain the criteria of success because only 5 out of 20 students achieved the minimum score of 26 and above. Thus, it revealed that only 25% of students achieved the minimum score needed to enable the satisfactory level of vocabulary knowledge instead of 70% of the students achieving the minimum criteria of success as aimed by the researcher.

Thus a second cycle of the study was carried out with the inclusion of personalised drawings of the words learnt, and the results of pre-test and second cycle post-test were compared. There was a significant difference in the scores for pre-test (M=18.400, SD=3.152) and second cycle post-test (M=27.200, SD=3.941) conditions; t (19) =-10.614, p = 0.000. It was revealed that 15 out of 20 students achieved the minimum score of 26 and above. Therefore, in percentage value, 75% of students achieved the minimum scored needed to enable a satisfactory level of vocabulary knowledge. Thus, the main finding of the current study was the usage of Poly Category Mind Map was able to successfully develop the vocabulary knowledge of the students in terms of understanding and remembering the words and their spelling.

This results can be explained as follows. First, students who used Poly Category Mind Map strategy in learning vocabulary integrated the newly acquired words with the old previously learned ones. The students studied subcategories of words after grasping the main category of words when constructing the mind map. For instance, the words 'hose' is only learnt after learning the words 'fireman'. Integrating and connecting the new words with the previously established vocabulary repertoire facilitated profound semantic processing which in line with Buzan's (2016) cited in Hawrani (2011). He stated that not only do Mind Maps display facts, but they also demonstrate a subject's general structure and the comparative significance of individual

components. These findings is also similar to Sahrawi (2013) findings in which it was found that students were more encouraged to using new words that were reinforced by keywords that they had already known.

Second, Poly Category Mind Map helped the Year 3 students immediately learn and remember English vocabulary due to the 'visual appeal' of the strategy. The nine-year-old students in the current study are proven to be ideal for vocabulary acquisition and retention by pictures and personalised drawings used in this study. This statment is confirmed when the students drew the pictures of words by differentiating the colour used to colour the drawings of 'misty' and 'foggy'. They understood that 'foggy' is thicker than 'misty' because some used darker blue to colour 'foggy' and 'lighter' blue to colour 'misty'. This statement is also supported by Schmidt (2014), as he stated that most experts, in their studies, had advocated the highly influential role of the visual aids in learning vocabulary for children and young learners. The 'visual appeal' effectiveness in learning vocabulary in the current study also correlated with the past study conducted by Heidari & Karimi (2015). They stated that "mind maps helped first-grade high school students acquire and retain English vocabulary directly and very strongly because of their 'visual appeal'" (p.68).

Third, the mixture of pictorial-verbal words in mind maps used in this study involved many parts of the third students' brain and indirectly gave intense cognitive concentration and mental power for acquiring and remembering words. As mentioned earlier, the classroom observation revealed the ability of some students in understanding words and their meaning by relating the pictures with right words had increased. The effectiveness of Poly Category Mind Map has thus been demonstrated to improve memory and understanding recognition similar to the attributes of the Dual Coding theory as mentioned by Li, Yang and Chen (2010). Thus in the current study, the representation of knowledge with a mind map diagram helped increase the cognitive brain load of the students. It mirrors the study by Haji Maibodi and Ashraf (2017) in which they stated the pictorial-verbal combination of words used in their research included many parts of the brain of students and provided more cognitive attention and mental capacity to learn and memorise words.

Next to the outstanding feature of Poly Category Mind Map which helped better vocabulary learning and its retention for students was that Poly Category Mind Maps were easy to review. Regular review reinforced these learners' memory. This view is also supported by Velayutham and Yunus (2019) stating that mind map "is a lot of faster to form, and far easier to recollect and review" (p.32). They specified that the mind map is easy to review because of its non-linear nature and visual quality. Since the research used Poly Category Mind Map, which only consists of only three to seven main branches instead of the various number of branches, it allowed better retention of memory. This verified Buzan (2016) believes in which he specified that in short-term memory, the average mental capacity of beings is unable to recall more than seven parts of information.

The most crucial feature of Poly Category Mind Map, which played a positive role in vocabulary development among students was that they were personalised according to the learning needs or interests of the learners. Although the researcher did not give absolute freedom for the students in the designing of mind map similar to Heidari and Karimi (2015) in their research, it is found that personalised drawings of the students made the students understand and remember the vocabulary learnt better. Both the current research and the research carried out by Heidari and Karimi (2015) found that the freedom of students to construct their mind map by using diagrams,

colours, shapes and lines will eventually help students to acquire the vocabulary better. However, it is essential to note that the current research is carried out among primary school students instead of the high school students in the Heidari and Karimi's (2015) research. Thus, primary students' needs more guidance from the teacher instead of letting all the task to be done by them.

Another point worth considering is that the findings of this study are in contrast with Kusuma's (2015) study. Kusuma (2015) revealed that mind-mapping strategy did not help to acquire low-frequency words and their meanings compared to the students who were taught using word list techniques. The results of the Kusuma's (2015) post-test strongly indicated that "mind mapping is not suitable for Elementary School Students" (p. 86). In contrast, it is evident from the findings of the current study, both in the first and second cycle, the use of Poly category Mind Map helped students to understand and remember the words better. A possible explanation for the ineffectiveness of mind map in improving students' vocabulary knowledge in Kusuma's (2015) research might be due to the way the mind map was utilised among students.

In contrast to current research, which emphasised on personalised mind maps, experimental group participants in Kusuma's (2015) research used mind mapping and the roles in the groups. Thus, using the mind map to learn vocabulary in groups might have demotivated the students because not all students prefer to learn using a mind map in groups. This statement is also supported Goodnough and Woods (2002) as they found in their research that students choose to use Mind Mapping in an individual situation rather than in a group, mainly because it allowed more personal expression of ideas. Hence, as previously mentioned, the personalised mind maps contributed to the current research success because students can efficiently recall the vocabulary learnt due to their personalised learning experience that they have gained during the construction of mind map.

Since Poly Category Mind Map is useful in learning vocabulary, students can construct mind maps regularly after vocabulary lessons. Then, the students will use the mind maps that they have developed to write or tell a story in class. As a result, mind maps can be utilised to develop students' speaking and writing skills. Mind map techniques can only be mastered with regular practices. After the method has been mastered, students can easily apply the skills to memorise vocabulary and organise ideas for their writing and speaking assignments. Indirectly, students would be able to learn other language skills using Mind Map technique. This statement overlaps with another study by Buran and Filyukov (2015) that found that their students developed skills in reading, writing and speaking via the usage of the mind map. Hence, this study using Poly Category Mind Map to develop vocabulary can also be expanded into other language skills in the English Language to optimise the benefits gained.

Conclusion

In general, there is a significant improvement which has been justified from the findings. The differences obtained from the test results show that the use of Poly Category Mind Map was practical and helpful in improving participants' performance in vocabulary learning. The students' second cycle post-test showed that the number of correct answers for each student increased, which showed improvement in terms of understanding of words learnt, remembering the meaning and the spelling of the words. It implied that the use of aspects in mind mapping such as key pictures, keywords, colours, and categorisation made the presentation of vocabulary items easier.

Furthermore, drawing mind-maps skills were also quickly gained by the students because the drawings were personalised and straightforward. In sum, all these outstanding features of Poly Category Mind map aided students to acquire more vocabulary efficiently.

This effectiveness of Poly Category Mind Map also gave insights on the importance of direct vocabulary teaching in the English language. As mentioned earlier, current CEFR syllabus is more about the communicative learning approach. Consequently, explicit teaching of word instruction was considered outdated and often ignored. Poly Category Mind Map, which serves as one of direct vocabulary teaching technique, clearly proved that students still need adequate direct vocabulary instruction. This technique is necessary to help students, especially average learners, to develop their vocabulary knowledge. As mentioned earlier, students in Malaysian classroom, including the ones in the researcher's classroom lack of proper language recall techniques. This condition made the learning of vocabulary a daunting task. Poly Category Mind Map successfully changed the daunting task to a more straightforward method via the usage of memory learning strategies that are embedded in the Poly Category Mind Map. The success of Poly category Mind Map as a better learning strategy compared to word list also correlates with Buzan and Buzan (1993) opinion. They suggested that "the brain finds it easier to accept and remember visually stimulating, multi-coloured, multi-dimensional mind map, rather than monotonous, boring liner notes." (p.89)

The results of the study, however, shed light on the problem concerning the time spent to the mind map activity. Based on the results of this research, it was found out that the use of Poly Category Mind Map consumes more time compared to the traditional word list method. Contrary to this issue, Poly Category Mind Map can be handy as students learn a great deal about new words and the interrelationships in their long-term memory of the meanings associated with the words. It is suggested that a few ready-made templates can be set earlier to conduct better research in future. Thus, the learners can choose a variety of ready templates to work on directly without starting from scratch, and this would take lesser time for them to accomplish their work effectively.

This action work focussed on using Poly Category Mind Map to improve the vocabulary skills of students. This study has proven to give the researcher meaningful data. Yet the study's results should also be complemented by those of additional studies. First, the study could be replicated with different student levels, so the use of the Poly Category Mind Map could be validated further. The study could be conducted with a larger sample population if possible so that the study's generalizability could be increased. The current population, which is one third-year students' class, may not produce enough data to be commonly used.

Suggestions for Further Research

The future study can focus on the topics below:

1) Using Poly Category Mind Map on Malaysian to improve students' acquisition and retention of idioms and collocations

2) The Effect of Poly Category Mind Map on Malaysian male vs. female students' vocabulary development and retention

3) Using Poly Category Mind Map for in developing (listening, speaking, writing and reading) skills of English.

Implications

For three particular groups, the findings of the current study are significant. Firstly, the results of this study may be conducive to Malaysian language learners, offering them some valuable insights into possible alternative forms of learning vocabulary. Secondly, it would be necessary for language teachers to gain a better understanding of the strategies of alternative vocabulary teaching that can promote the long-term retention and development of lexical items in the learners ' minds. Also, the findings of this study may assist materials designers in presenting words through a recommended technique that could promote vocabulary retention among learners.

About the authors

Thashwinny a/p Prabha is pursuing her Master in Education (TESL) at Universiti Kebangsaan Malaysia. She obtained her degree in TESL from the Institut Pendidikan Guru Malaysia Kampus Kota Bharu or IPGM Kampus KB

Azlina Abdul Aziz currently holds the post of Coordinator for Doctor of Education Ed.D in Higher Education Programme at the Faculty of Education, Universiti Kebangsaan Malaysia. A post-graduate of Columbia University, she is skilled at Teaching English as a Second Language (TESL) and the teaching of Literature.
ORCID iD https://orcid.org/0000-0001-7907-3496

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