THE EFFECTS OF CONCEPT MAPPING, VENN DIAGRAMS, AND CRITICAL THINKING ON READING COMPREHENSION ACHIEVEMENT OF THE ELEVENTH GRADE STUDENTS OF SMA BINA WARGA 2 PALEMBANG

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Abstract: This study was aimed to investigate the effects of concept mapping, Venn diagrams, and critical thinking on students' reading comprehension achievement. The method used in this study was factorial design. Forty students of eleventh graders of SMA Bina Warga 2 were selected and divided equally into two groups as the sample based on some criteria. They were: (1) regularly taught by the same English teacher, (2) from the same study program (natural science), (3) mostly on the same reading level (level 3), and (4) on the same level of critical thinking (High, Medium, and Low) for each group. The instruments used were critical thinking test, and reading comprehension achievement test. In analyzing the data, four statistical analyses were used: Paired Sample t-test, Independent Sample t-test, Multiple Regression analysis, and two-way ANOVA. The results of the study showed that there was a significant difference in reading comprehension achievement between the students who were taught by using concept mapping and those who were taught by using Venn diagrams (ρ = .014). As a whole, there was no interaction effect of the strategies used and students' critical thinking level on reading comprehension achievement (ρ = 0.427). However, partially, there was interaction effect in details aspect of reading comprehension achievement (ρ = 0.047). The discussion of the results of the study is therefore presented and eventually conclusions are drawn and suggestions are offered.
Keywords: *Concept Mapping, Venn Diagrams, and Critical Thinking*

Abstract: Penelitian ini bertujuan untuk meneliti efek dari pemetaan konsep, diagram Venn, dan berfikir kritis dalam pemahaman bacaan siswa. Metode yang digunakan dalam penelitian ini adalah faktorial design. 40 siswa dari kelas XI SMA Bina Warga 2 dipilih dan dibagi menjadi dua kelopmpk sebagai sampel berdasarkan beberapa criteria, mereka adalah: (1) diajar oleh guru bahasa Inggris yang sama, (2) dari program studi yang sama (IPA), (3) sebagian besar level membaca sama (level 3), dan (4) level berfikir kritis yang sama (tinggi, medium, dan rendah) untuk masing masing kelompok. Instrumen yang digunakan adalah tes berfikir kritis, dan tes pemahaman membaca. Dalam menganalisa data, empat statistik analisis yang digunakan: Paired Sample t-test, Independent Sample t-test, Multiple Regression analysis dan two-way ANOVA. Hasil dari penelitian ini menunjukan bahwa ada perbedaan yang signifikan dalam pemahaman mambaca diantara siswa kelas XI SMA Bina Warga 2 Palembang yang diajarkan dengan menggunakan pemetaan konsep dengan siswa yang diajarkan dengan menggunakan diagram Venn (ρ = .014). Secara keseluruhan, tidak ada efek interaksi diantara stategi yang digunakan dan level berfikir kritis dalam pemahaman membaca (ρ = 0.427). Walaupun, secara parsial, ada efek interaksi dalam pemahaman membaca di detail (ρ = 0.047). Hasil diskusi dalam penelitian ini oleh karena itu diberikan dan kesimpulan kesimpulan digambarkan dan saran saran ditawarkan.
Kata Kunci: *Konsep Pemetaan, Diagram Venn, dan Berfikir Kritis.*

INTRODUCTION

One of the most useful activities for EFL learners is to read and to comprehend texts in the English language. Roe and Ross (1990) explain that through reading, the learners can incriminate various skills, such as finding main ideas, locating details, arranging items in sequence, observing dues to understanding, following directions, recognizing cause and effect, comparing and contrasting relationship, and drawing inferences. In addition, teaching reading is one of the challenging activities for the teachers. Zwiers (2004, p. 14) explains that there are many English learners in the classroom who can fluently read words aloud in English but do not sufficiently understand what they read. Therefore, these students need to be given guidance by their teachers to help them understand the ways how to use the aspects of reading above step by step and in a continuous mode.

In fact, being a good reader is not easy. Hedge (2000, p. 192) states that good readers will be able to identify the words, grammatical structures and other features precisely and fluent readers usually have already had a quite good background knowledge. In addition, he also mentions that there are several ways to help the students as readers in exploring knowledge in a reading class, such as doing a lot of reading that can enlarge their vocabulary and choosing effective strategies to attract their attention.

Unfortunately, the students in Indonesia still have problems in reading. They may understand the meaning of each word from the reading passages but they may lack of the ability to interpret those words in the form of discourse. This is shown in the last survey of Program for International Student Assessment (PISA, 2012, p. 5) which showed the mean reading score of Indonesian students was 396, whereas the mean score of reading in OECD was 496. Furthermore, PIRLS (2011, p. 150) asserts that the reading subscale of fourth graders was only 428, whereas the mean score of PIRLS was 511. In addition, the mean score of locating information sub-scale within the text and identifying main ideas of what they have read were also lower than international average (p. 226).

Nationally, according to Early Grade Reading Assessment (2014, p. 17), "The second-graders' reading achievement in Indonesia fell into the lowest category whereas twenty six point three percent of them was reading with comprehension". Furthermore, there are still three percent of students in Sumatra area who are nonreaders (p. 19). Moreover, Putra (2012, p. 32) discovered that the students' mean score of reading comprehension achievement of narrative text was 14.96 and their mean score of reading comprehension achievement of recount text was 11.59. It proved that Indonesian students' reading achievement is still very much low.

Based on these facts, for the purpose of this study, the writer did a preliminary investigation on students' reading comprehension level at Bina Warga 2 Palembang (the sample of this study). The result showed that 66% of the students were in level 3. To solve this problem, the teachers of English need suitable strategies. The writer thought that the strategies which could improve reading comprehension were *concept mapping* and *Venn diagrams* strategies. According to some experts, these strategies do not only improve reading comprehension, but also improve critical thinking. Stoica, Moraru, and Miron (2011, p. 575) describe that *concept mapping* is a challenge and a chance for the students to develop and think about more linkages. Ahlberg (2013, p. 31) also explains that *concept mapping* can be used to analyze the text. The second strategy, that is *Venn Diagrams* (Tompkins, 2009, p. 129) is very useful for the students because it can make them think, compare and contrast the topics analytically.

In relation to "critical thinking", Facione (2011, p. 14) said that critical or innovative thinking is the way to understand and see new insight. In addition, according to Pierce and Reed (2005, p. 5), "Critical thinking involves asking probing questions, having an open mind, and reaching a logical conclusion based on evidence". Thus, critical thinkers' thoughts are organized in such a way to help them accurately evaluate reading material.

In choosing reading material, the writer chose report text. Based on Read Theory LLC. (2012, p. 1), the teachers are able to teach the students to read and think critically by giving supplementary materials about report text. In this context, all of the materials that make the students think critically describe about the information of animals and the use of things. According to Sudarwati and Grace (2007, p. 32), "The purpose of report text is to describe the way things are such as a man-made thing, animals and plants". Therefore, the writer believes that all of report texts as supplimentary materials are beneficial to improve their critical thinking.

In terms of concept mapping, Davies (2010, p. 5) explains that the aim of concept mapping is not to generate spontaneous associative elements but to outline relationships between ideas. Jankowska (2009, p.16) proved that *concept mapping* is a very useful research tool for revealing snapshots of students' representations of personal development as well as some cultural trends. Then, Beliokas (2007, p. 111) describes that *Venn diagrams* is similar to *concept mapping.* It can be used at three levels, such as: curriculum construction, teaching and evaluation (p. 113). His research showed that Venn diagrams can be needed to improve physics teaching. In this present study, the writer had these two strategies in order to find out the effect of them and improve the students' reading comprehension achievement.

The problems of the study are formulated in the following question: (1) Was there any significant improvement in the students' reading comprehension achievement and its aspects after they were taught by using CM strategy?, (2) Was there any significant improvement in the students' reading comprehension achievement and its aspects after they were taught by using VD strategy?, (3) Was there any significant difference between reading comprehension achievement and its aspects of the students who were taught by using CM strategy and that of those who were taught by using VD strategy?, (4) Was there any significant contribution of reading comprehension aspects to the reading comprehension achievement in total?, (5) Was there any significant interaction effect between teaching strategies used (CM and VD strategies) and critical thinking on students' reading comprehension achievement?, and (6) Was there any significant difference between reading comprehension achievement of the students with High, Medium, and Low level of critical thinking who were taught by using CM strategy and that of those who were taught by using VD strategy?

Method

Research Design

This study used an experimental research. Wallen and Frankael (2009, p. 261) describe "One of the most powerful methodologies that researchers can use, especially to establish cause-effect relationship among variables is doing experimental research". In this study, the writer applied 2x3 (to by three) factorial design because there were two strategies (CM and VD) and three levels of critical thinking (High, Medium, and Low). Creswell (2012, p. 311), added "The purpose of factorial design is to study the independent and simultaneous effects of two or more independent treatment variables on an outcome which is *reading comprehension achievement*".

Population and Sample

McMillan and Schumacher (2010) assert population is a group of elements of cases, whether individuals, objects, or events, that conform to specific criteria and to which we intend to generalize the result of the research. In addition, Wallen and Fraenkel (1991, p. 129) explain "Population is the group of interest to the writer, the group to which the writer would like to generalize the results of the study". In this study, the total number of population was 53 students of the eleventh grade students of SMA Bina Warga 2 Palembang. All of the population gave the CCTT to find their category of rating disposition toward or critical thinking level. In addition, McMillan and Schumacher (2010, p. 129) explain that sample is the group of subjects or participants from whom the data are collected. Wallen and Fraenkel (1991, p. 129) describe "A sample refers to any group on which information is obtained". The sample of this study was 40 students. They were from natural science of the eleventh grade students of senior high school at Bina Warga 2 Palembang in academic year of 2014-2015. (See Table 1)

Table 1

Population and Sample

Population	**Critical Thinking Result**		**Category (rating disposition toward)**	**Sample**	
	Scale	Frequency		Experimental Concept Maps	Experimental Venn Diagrams
53 students	71-100	12	High (Y_1)	4	4
	50-70	21	Medium (Y_2)	9	9
	0-49	20	Low (Y_3)	7	7
Total		**53**		**20**	**20**

Source: SMA Bina Warga 2 Palembang in the academic year 2014-2015

In dividing groups, the sample was also selected based on the following criteria:

1. The students were regularly taught by the same English teacher,
2. The students were the same study program (natural science),
3. The students were mostly on the same reading level (level 3),
4. The students had the same numbers of category of their CCTT (High, Medium and Low).

The students who scored High, Medium and Low in doing the test were divided into two. Therefore, each group of experimental groups (CM and VD) consisted of 4 students who scored High level and 9 students who scored Medium level, and 7 students who scored Low level.

Instrumentations

Critical Thinking Test

For CCTT, the items were in the form of **"Yes, No, Maybe"** questions. The total numbers of try out were 72 questions. The specifications of critical thinking test were as follows:

Table 2. The Specifications of CCTT

No	Content	Indicators	Number of items	Result of Try Out
1	Induction	The students are able to generalize and explain the arguments	7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 48, 50	7, 8, 9, 10, 11, 12, 13, 17,18, 19, 20, 21, 24, 48
2	Deduction	The students are able to make decision and conclusion about the arguments	51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78	51, 55, 57, 59, 61, 62, 63, 66, 67, 68, 69, 72, 76, 77, 78
3	Credibility	The students are able to assess the credibility of sources of information and claims they make	26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, **48**, 49, **50**	27, 28, 29, 31, 33, 35, 37, 38, 39, 40, 42, 44, 45, 47, **48**, 49
4	Assumption Identification	The students are able to identify assumtions, reason eximine the arguments	**66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77**	**66, 68, 69, 72, 76, 77**
TOTAL			**72**	**44**

Reading Comprehension Test

Reading comprehension test were administered to the students as the pretest and posttest. The items were in the form of multiple choice questions. The reading comprehension test consisted of 50 items which covered six aspects (*main idea, detail, inference, cause and effect, vocabulary, and sequence*). The specifications of the reading test were presented in Table 3.

Table 3. The Specifications of Reading Comprehension Test

Indicators	Reading Aspects	Item Number	Total Items	Result of Try Out
To identify the topic of the text	Main Idea (MI)	1, 11, 21, 38, 41	5	1,11, 21,38, 41
To identify certain information	Detail (D)	**2**,**5**,10,**13**,18, **22**, 26, 33, 42, 49.	10	10, 18, 26, 33, 42, 49
To conclude or summarize the text	Inference (Inf)	6, **12**, **17,** 19, 24, 36, **37**, 40, **44**, 48	10	6, 19, 24, 36, 40, 48
To find out reason or influence of the text	Cause and Effect (CE)	8, **15**, 27, 28, 31, 32, 47	7	8, 27, 28, 31, 32, 47
To identify the meaning of the words	Vocabulary (Voc)	3, **4**, 14, 20, **23**, 29, 34, **35**, **39**, 45, 46	11	3,14, 20, 29,34, 45, 46
To identify sequence of the text	Sequence (Seq)	**7,** 9,16, 25, 30, **43**, 50	7	9, 16, 25, 30, 50
Total			50	35

Techniques of Data Analyses

After giving the critical thinking test, the researcher checked and then scored the results manually to know students' critical thinking level scores. The result of critical thinking level was analyzed by using percentage of students' choice as follows:

$$\frac{numbers\ of\ student\ choose\ the\ correct\ answer}{all\ questions} \times 100\%$$

In addition, the researcher used the Statistical Package for Social and Science (SPSS) to analyze the result of the tests. First, to find out the significant difference in reading comprehension achievement between the students' who were taught by using CM strategy and those who were taught by using VD strategy, *independent sample t-test* was used. Second, to analyze significant contribution of reading comprehension aspects to reading comprehension achievement in total in each group, *stepwise regression* analysis was used. Third, to find out the sighnificant interaction effect of strategies used (CM and VD strategies) and critical thinking (High, Medium, and Low) toward the students' reading comprehension, *two-way ANOVA* was used.

Findings

Normality and Homogeneity of the Data

Before doing further analyses the data, the tests of normality and homogeneity of the data were done by using Kolmogorov-Smirnov and Shapiro-Wilk tests. The data distribution was classified into normal if the ρ-value was higher than mean significant influence at 0.05 level. The results of normality and homogeneity tests in this study could be seen in Table 4.

Table 4. Normality and Homogeneity of Pretest, and Posttest Score

Variables	Normality				Homogeneity	
	CM		VD		Levene	Sig.
	Statistical	Sig.	Statistical	Sig.	Statistic	
Pretest	.149	.200	.154	.200	.007	.933
Posttest	.127	.200	.145	.200	1.263	.268

Based on the table above, the result of normality test using Kolmogorov-Smirnov showed the significant value of pretest and posttest data of the two groups were higher than 0.05. It means that the data distributions of pretest and posttest both in CM and VD group were normal.

Futhermore, the homogeneity of the data were determined from the Levene statisic and significant value. If the ρ-value was higher than mean significant influence at 0.05 level, the distribution of the data was considered homogenous.

From the table of homogeneity above, it was found that the results of homogeneity of variace showed the significant value of pretest and posttest data were 0.933 and 0.268 consecutively which means that they were higher than 0.05 level (0.933 >0.05). It means that the data distribution of pretest and posttest both in CM and VD groups were homogenous. The result of homogeneity test also could be seen in Table 4 above.

Descriptive Statistics

in the pretest result of CM group, it was found that there was no student (0%) in Excellent category, there were 2 students (10%) in Good category, 7 students (35%) in Average category, 10 students (50%) in Poor category, and there was 1 student (5%) in Failed category. On contrary in posttest result, , there were 2 students (10%) in Excellent category, 8 students (40%) in Good category, and 8 students (40%) in Average category, 2 students (10%) in Poor category, and there was no student (0%) in Failed category.

Furthermore, the pretest result in VD group, it was found that there was no student (0%) in Excellent category, there were 4 students (20%) in Good category, 7 students (35%) in Average category, 8 students (40%) in Poor category, and there was 1 student (5%) were in Failed category. Meanwhile, there were 9 students (45%) in Excellent category followed by 6 students (30%) in Good category, 4 students (20%) in Average category, 1 student (10%) in Poor category, and no student (0%) in Failed category.

Table 5. Frequency, Mean of Students' Reading Comprehension Achievement in Concept Mapping and Venn Diagrams Group

Score Interval	Category	CM Group				VD Group			
		Pretest		Posttest		Pretest		Posttest	
		Freq	%	Freq	%	Freq	%	Freq	%
86-100	Excellent	0	0	2	10%	0	0	9	45%
71-85	Good	2	10%	8	40%	4	20%	6	30%
56-70	Average	7	35%	8	40%	7	35%	4	20%
41-55	Poor	10	50%	2	10%	8	40%	1	5%
<40	Failed	1	5%	0	0	1	5%	0	0

Paired Sample and Independent Sampe t-Test

To answer research question number one and two, the writer used *Paired sample t-test*. Pallant (2005, p. 177), "*Paired-samples t-test* is used when the writer want to compare the mean score of the pretest and the mean score of the posttest for the same group of people on two different occasions (*concept mapping* and *Venn digarams groups*), or writer have matched pairs (*the results of pretest* and *posttest on reading comprehension achievement*)". The improvement of students' reading comprehension achievement existed after getting treatments if the ρ values (sig 2-tailed) from the two groups which are less than 0.05. As result, the sig. 2-tailed of *paired sample t-test* of CM group was 0.00 and VD group was 0.00. Therefore, it showed that there was a significant improvement in reading comprehension achievement. (see Table 13)

Meanwhile, to answer research question number three, *independent sample t-test* was used, Pallant (2005, p. 177) describes "*An independent sample t-test* is used when the writer want to compare the mean score, on some continuous variable (RCA), for two different groups of subjects (CM and VD)". The significant difference existed if the ρ value (sig 2-tailed) was less than 0.05. As the result, the sig. 2 tailed of *independent sample t-test* was 0.014. It means that there was a significant difference in reading comprehension achievement. (see Table 13)

Table 13. The Mean Difference of Pretest and Posttest on Reading Comprehension Achievement and its Aspects in CM and VD Groups

ASPECT	PRE-TEST		POST-TEST		MEAN DIFFERENCE PRE AND POST POST CM WITHIN	MEAN DIFFERENCE PRE AND POST TEST VD WITHIN	MEAN DIFFERENCE OF POSTTEST BETWEEN VD AND CM	t VALUE AND SIG. BETWEEN PRE POST CM WITHIN	t VALUE AND SIG. BETWEEN PRE POST VD WITHIN	t VALUE AND SIG. POSTTEST BETWEEN CM AND VD
	MEAN CM	MEAN VD	MEAN CM	MEAN VD				t VALUE SIG.	t VALUE SIG.	t VALUE SIG.
Reading Total	19.9	20.55	24.65	28.3	4.75	7.75	3.65	9.463 .000	11.461 .000	-2.573 .014
Main Idea	2.20	1.85	3.70	4.55	1.50	2.70	0.85	5.848 .000	9.275 .000	-3.444 .001
Detail	3.05	2.75	3.70	4.70	0.65	1.95	1.00	2.156 .044	4.951 .000	-2.746 .009
Inference	3.85	3.9	3.95	4.75	0.10	0.85	0.80	2.232 .038	3.489 .002	-2.235 .031
Cause Effect	4.15	4.75	4.70	5.00	0.55	0.25	0.30	2.604 .017	.815 .425	-1.031 .309
Vocabulary	3.90	4.25	4.60	5.45	0.70	1.20	0.85	2.774 .012	3.479 .003	-2.109 .042
Sequence	2.75	3.05	4.00	3.85	1.25	0.80	-0.15	4.194 .000	2.990 .008	.448 .657

Multiple Regression Analysis

To answer research question number four, *multiple regression* analysis with stepwise method was used. This was aimed to find out which aspect of reading comprehension that gave contribution to the reading comprehension achievement (total) in each group (see Table 14 and 15).

Table 14. Contribution of Reading Comprehension Aspects to Reading Comprehension Achievement in CM Group

Aspects of Reading Comprehension	R Square	R Square Change	Sig. F Change
Inference	.674	.674	.000
Inference, Sequence	.858	.184	.000
Inference, Sequence, Detail	.912	.054	.007
Inference, Sequence, Detail, Vocabulary	.965	.054	.000
Inference, Sequence, Detail, Vocabulary, Main Idea	.978	.013	.014
Inference, Sequence, Detail, Vocabulary, Main Idea, Cause Effect	1.000	.022	.

As presented in Table 14, in CM group, the result indicated that the students' reading comprehension achievement was contributed by the aspects of inference (67.4%), sequence (18.4%), detail (5.4%), vocabulary (5.4%), main idea (1.3%), and cause effect (2.2%).

Table 15. Contribution of Reading Comprehension Aspects to Reading Comprehension Achievement in VD Group

Aspects of Reading Comprehension	R Square	R Square Change	Sig. F Change
Detail	.763	.763	.000
Detail, Sequence	.866	.103	.002
Detail, Sequence, Vocabulary	.937	.070	.001
Detail, Sequence, Vocabulary, Inference	.972	.035	.001
Detail, Sequence, Vocabulary, Inference, Cause Effect	.986	.014	.002
Detail, Sequence, Vocabulary, Inference, Cause Effect, Main Idea	1.000	.014	.

As presented in Table 15, in VD group, the result indicated that the students' reading comprehension achievement was contributed by the aspects of detail (76.3%), sequence (10.3%), vocabulary (7.0%), inference (3.5%), cause effect (1.4%), and main idea (1.4%).

Two-way ANOVA Analysis

To answer research question number five, the writer used *two-way ANOVA*. Pallant (2005, p. 201) explains that this analysis is used to test the 'main effect' for each independent variable (CM and VD) and also explore the possibility of an 'interaction effect' (*critical thinking*). The interaction effect exists if the ρ value is less than or equal (<0.05). The description of two way ANOVA analysis can be seen in. Table 16.

Table 16. The Result of two-way ANOVA Analysis

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.
	ReadTotPost	**31.061**	**2**	**15.530**	**.872**	**.427**
	MI	1.043	2	.521	.843	.439
Strategies*	**Detail**	**7.419**	**2**	**3.709**	**3.355**	**.047**
Critical	INF	.781	2	.390	.318	.730
Thinking_	CE	.108	2	.054	.062	.940
Levels	Voc	2.061	2	1.030	.699	.504
	Seq	2.265	2	1.133	1.233	.304

As presented in Table 16 above, in total, the result showed that ρ value of teaching strategies (CM and VD) and critical thinking level was .427 (>0.05). It can be concluded that there was no interaction effect between strategies used and students' critical thinking level towards students' reading comprehension achievement. However, it was found that there was an interaction effect in aspect of details where the ρ value was 0.047. This finding indicated that there was partial interaction effect between strategies used and students' critical thinking level towards students' reading comprehension achievement.

Furthermore, to answer research question number six which was whether or not there was a significant difference in the reading comprehension achievement between the students with High, Medium, and Low critical thinking, the posttest scores in each group based on the level of critical thinking were analyzed by using *independent t-test*. The result showed that there was significant difference in reading comprehension achievement between the students with High and Low level of critical thinking in VD group. (see Table 17)

Table 17. Result of Independent t-Test of Reading Comprehension Achievement between the Students with High, Medium, and Low Critical Thinking in CM and VD Groups

Variable			Mean	Mean Difference	T-value and Sig.	
Reading Comprehension Achievement	CM	H	26.75	2.417	1.175	.265
		M	24.33		1.035	.353
	VD	H	32.25	3.250	1.397	.190
		M	29.00		1.683	.126
	CM	H	26.75	2.893	1.006	.341
		L	23.86		1.046	.330
	VD	**H**	**32.25**	**7.107**	**2.432**	**.038**
		L	**25.14**		**2.928**	**.017**
	CM	M	24.33	.476	.242	.812
		L	23.86		.229	.823
	VD	M	29.00	.3857	1.604	.131
		L	25.14		1.554	.148

Note: H= High Critical Thinking, M= Medium Critical Thinking, L= Low Critical Thinking.

Discussion

In order to strengthen the value of this study, there are some interpretations presented in this part based on the results of the data analysis. The results of this study showed that both of these strategies (CM and VD) could improve students' reading comprehension achievement. However, there were still a few students with poor comprehension. There are some reasons why the mean score of students of the posttest in CM group was still below the school standard. One of them was their Low level of critical thinking skill. Santiago (2011, p. 125) found that critical thinking skills deal with the processing of information through analysis, explanation and evaluation. Therefore, the writer assumed that to get better score, the students need to have High critical thinking.

In relation to the results of the descriptive statistics, the students' reading comprehension score was in Average category (70.45) in CM group and in Good category (80.90) in VD group. This result showed that the students' reading score in VD group was higher than that in CM group. The writer assumed that the way of thinking in creating CM and VD played an important role. Terman (2013, p. 202) asserted that thinking means the way to distinguish and compare with the ideas as needed. In this study, the students who were taught by using VD strategy applied the simple way of thinking. For example, the students only wrote the headlines and the main point they got from passages to complete the VD. However, in CM group, the students did something more complicated. For example, the students were asked not only to rewrite the information from the passages, but also to arrange information from the most general ones to the most specific ideas to complete CM.

Based on the results of *paired sample t-test*, the students in VD did not make significant improvement in the aspect of *cause and effect (p<.425)*. The writer assumed that it was because the

reading passages used in this study (report text) did not expose the idea concerning *cause and effect*. The report texts focused on the information and the usage of something. In addition, VD which is the same as organizational charts has weaknesses. As illustrated by Nishadha (2014), one of the weaknesses of organizational charts was that not all of the information could be described one by one. Therefore, in this research, the organization charts failed to capture the aspect of *cause and effect.*

Moreover, no significant differences in the aspects of *cause and effect (p<.309) and sequence (p<.657)* between the students who were taught by using CM and VD strategies. It happened because the students were involved in both strategies focusing on how to create CM and VD without thinking about *cause and effect* and the *sequence* of the texts. Nonetheless, the students still need to master six aspects of reading comprehension in order to be successful readers. Boardman (2008, p. 6) explains that there are some ways to be successful readers: interpreting what the author conveys in the text, understanding what the text is about, keeping awareness in their prior knowledge, and using various strategies (CM or VD strategies) in reading.

Based on the results of *stepwise analysis* in CM, the highest contribution of reading comprehension achievement aspects was given by *inference* (67.4%). This was not surprising as Facione (2011, p. 6) states, "Inference means to identify and secure elements needed to draw reasonable conclusions, to form conjectures and hypotheses, to consider relevant information and to reduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation".

Meanwhile, the results of stepwise analysis in VD showed that *detail* gave the highest contribution *(*76.3%). This showed that the students only taught about the literal aspects of reading. It means that they were still struggling readers. Boardman (2008, p. 6) explains that there are some criteria of struggling readers: failing to use the strategies while they are reading, lacking knowledge, lacking understanding of the text, failing to interpret and connecting the ideas from the text to their experiences, and failing to read the purpose of the text. In order to cope with them, the students need to struggle think critically.

Critical thinking level was used as the moderator variable that was assumed to influence the improvement of the students' reading comprehension achievement in both groups. Based on three levels of students' critical thinking, 20% of students was in High level, 45% was in Medium level, and 35% was in Low level. Facione (2011, p. 7) explains that there are two things that strong critical thinkers can do, that is, they can describe what they think and they can infer what they analyze. However, a small number of students categorized in High level critical thinking showed that most of the students in this study did not think in the way strong critical thinkers can do.

In total, the result of *two-way ANOVA* showed that there were no significant effects of critical thinking on reading comprehension achievement of the eleventh grade students. Therefore, it could be concluded that CM and VD strategies strongly affected reading comprehension achievement of the students. However, the students' critical thinking level significantly interacted with strategies used in improving *detail* aspects. It happened because through reading using CM and VD strategies, the students used their critical thinking to find the information which was directly stated in the passage. As Jennings (2012, p. 13) explains, concept mapping was required for the students to organize the information. In addition, Moon, Hoffman, Novak, and Canas (2011, p. 9) describe that there are two important distinctions of concept mapping. *First*, concept mapping is used to explore the knowledge in linkage. *Second,* concept mapping is used to describe the context.

Furthermore, according to Venn (2004, p. 5), a founder of Venn diagrams, "Venn diagrams is used to indicate the successive terms and draw into the circles that all subdivision are already existing". In addition, Purnaning, Ayuningtyas, Kridaningtyas, and Hudha (2000, p. 224) illustrated that in VD, the students explained the details which were about the reality, reasons, and examples to describe the main ideas from the passages. Therefore, the writer assumed that the students who were taught using CM and those who were taught using VD significantly improved in *detail* aspect.

Eventually, the interaction of High and Low critical thinking levels with VD strategy in improving reading comprehension achievement of students was probably caused by the fact that students with High and Low critical thinking levels were interested in and actively involved in this strategy. They always asked the teacher in order to understand how to create the VD. The students

with High level of critical thinking already had prior knowledge and found it challenging to complete the tasks. The ones with Low level of critical thinking felt curious to know how to complete their tasks using VD. However, the students with Medium level of critical thinking were assumed not to think critically in learning.

Conclusions

Concept mapping and Venn diagrams are very effective and bring positive impacts on student' reading comprehension achievement. This can be seen from the students' reading comprehension achievement tests before and after the treatment was given. The results of independent sample t-test showed that there was a significant difference in reading comprehension achievement between the students who were taught by using concept mapping and that of those who were taught by using Venn diagrams. In this research, the writer observed that the students were more interested in the study through concept mapping and Venn diagrams, they will be able to answers some questions from the passage and understand what is the passage about. The students should think critically in creating in concept mapping and Venn diagrams. Event hough, Venn diagrams showed better improvement than concept mapping in this study. The most important thing is that these two strategies could improve students' reading comprehension in stages.

Furthermore, the result of two-way ANOVA showed that there was no significant interaction effect of strategies used (concept mapping and Venn diagrams) and critical thinking on reading comprehension achievement of the eleventh grade students of SMA Bina Warga 2 Palembang. In partial, there was a significant effect in *detail* aspect. Even though the students have been categorized into three critical thinking levels, such as high, medium, and low levels, it does not mean that the students in low level had low score in reading comprehension achievement, the students in medium level had medium score in reading comprehension achievement, and the students in high level had high score in reading comprehension achievement. Because, the writer found that based on the result of this study, there were some students had high critical thinking level but low in reading and there were some students had low critical thinking level but high score in reading comprehension achievement.

Suggestions

There are four suggestions offered to the teachers, the students, and future researchers.

The following suggestions are intended for teachers:

1. The teachers should use various kinds of strategies and provide interesting materials to the students, so they are more interested to learn something. Two of them are concept mapping and Venn diagrams.
2. The teachers should more pay attention to teach the students about each aspects of reading. If the students lack of *cause and effect*, the teachers should more focus to teach the students about it in order the students are able to recognize it easily from the reading passages.
3. The teachers should understand the students in thinking and learning English.
4. The teachers should give the students reading materials related to their levels of reading and consider them to be used flesch-kincaid using readability formula.

The following suggestions are given to the students:

1. The students should be aware about their knowledge, way of their thinking and try to improve it to be better.
2. The students should try to read many books, and try to create using new understanding using concept mapping or Venn diagrams strategies.
3. The students should make an effort to think about everything critically.
4. The students should learn everything related to English skills seriously.

The following suggestions are given to future researchers:

1. The future researchers could use concept mapping and Venn diagrams not only for reading comprehension, but also for other skills like: writing and listening.

2. The future researchers could use concept mapping and Venn diagrams for other subjects or lesson, like math, science, biology, history, and others.
3. The future researchers could use critical thinking as the moderator variable to see interaction effect with another dependent variable.
4. The future researchers should think critically about each aspect that they want to do in their research.

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