Enhancing EFL High School Students' Critical Reading Skills Through Visual Thinking

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Abstracts

This research aimed (1) to investigate the effects of Visual Thinking (VT) on English critical reading skills of students majoring in English. (2) to investigate the effects of VT on English critical reading skills of students majoring in Engineer Artificial Intelligence (EAI). (3) to compare the effects of VT on English critical reading skills of students English to those of students majoring in EAI. The participants were 81 students in grade 10 selected by a purposive sampling method dividing into two groups: 44 students majoring in English and 37 students majoring in EAI. The instruments in this study included lesson plans and an English critical reading test. Mean scores, standard deviations, the *t*-test analysis, and the analysis of covariance were used to analyze the data. The results revealed that post- test mean scores of both groups were significantly higher than the pre-test mean scores of both groups. Moreover, there were no statistically significant differences in the gain of students majoring in English and EAI. This suggested that VT had positive effects on critical reading skills of students from different backgrounds.

Keywords: Critical reading; Critical reading skills; Visual Thinking

Introduction

English plays a significant role in Thailand. To begin with the vital role of English in Thai education, English has long been a compulsory subject in the national curriculum taught in every school since 1921 (Aksornkool, 1980 : online ; Chamcharatsri, 2013 : 21-36). There are various topics of English taught in Thailand such as English grammar, vocabulary, reading, writing, and speaking to prepare Thai students, who are EFL students, to be proficient in English. Another main significant role of English in Thailand is relevant to a career path. According to ASEAN policy, English has been used as a working language for ASEAN countries. As a result, those who have high proficiency in English have more job opportunities than those whose English abilities are low. Therefore, English is very crucial for Thai people as it is required in Thai education, and it can allow them to be successful in their career paths.

English has also been used widely on the Internet to access information. As stated by Rao (2019 : 7-19.), people of every age utilize the Internet to keep up with the latest trends and innovation. Although the Internet benefits users in various ways, it can lead to some undesirable consequences. To illustrate, while some people can access any information on the Internet easily, others can create contents or information easily as well. Without any accuracy, the information spread like a real virus. Vosoughi, Roy, and Aral (2018 : 1146-1151) writes, "Falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all

categories of information" (p.1). Consequently, it is mandatory to have an ability to read critically in the twenty-first century.

Critical reading should be valued as a vital skill for everyone. It is a high- level reading potential consisting of analysis and evaluation skills (Miller, 1977 : online). This ability facilitates readers to administer data and analyze whether the information is reliable, factual, and valuable (Kereluik, Mishra, Fahnoe, & Terry, 2014: 127-140). Abd Kadir, Subki, Jamal, and Ismail (2014 : 1) also agreed that critical reading is a key to survive in the world. This notion was supported by Kenneywho wrote that critical reading is perceived as a crucial first step for learning success for students. Also, Lada commented that students with critical reading abilities carefully read texts, which leads to a deeper grasp of what they have learnt. Another advantage of critical reading is that ones who possess critical reading ability become a critical thinker, and this leads them to succeed in life (Abd Kadir et al., 2014 : 1). A person with critical thinking is likely to have life-long learning and problem-solving skills (Kincheloe & Weil, 2004; Lai, 2009). Therefore, students should be prepared to have critical reading skills.

Regarding Thai Education policy, critical reading is very necessary for students in the twenty-first century. Reading ability and critical skills are needed in this era . In the National Basic Education Core Education Curriculum B.E. 2551, the Ministry of Education frames the first strand for Language for Communication. In this strand, students should be able to understand and capacity to interpret what has been heard or read from various types of media, and ability to express opinions with proper reasoning. Therefore, critical reading is very essential for and has impact on students.

Scholars have conducted studies in order to improve students' critical reading skills. Most of the studies showed the positive results on better development of students' critical reading skills. However, some scholars revealed that EFL students still have problems in critical reading. As noted in Par an ability to determine main ideas, identify purposes, make inferences, recognize tones, and draw conclusion of English reading texts of EFL students was still low. Those mentioned skills are considered as subskills of critical reading. Khodary and AbdAllah (2014 : 1) also shared the same result that the EFL students could not make inferences from the passage they read, draw conclusion, recognize the author's purposes and tone, which are skills of critical reading. This is also supported by the study from Zin, Wong, and Rafik-Galea which showed the low level of critical reading of EFL students. In Thailand, students still have difficulties in critical reading. According to the PISA examination 2018, the results indicated that Thai students had critical reading problems. There were only 0.2% of all Thai students who were capable of the critical reading level. This level was lower than the previous results in 2012 which was 0.9% of all Thai students. As a result, it is necessary to find a better way to help improve Thai students' critical reading skills.

Many methods and teaching techniques were suggested in order to help improve students' critical skills. One of these techniques was Visual Thinking (VT). In the educational aspect, VT is a teaching method in which the teacher employs images or visualization to help students generate ideas and better understand texts (Bolton, 2011 : 76). In addition, VT provides various advantages. Firstly, VT can speed up people's learning as brains can work well when working together with hands, so that it can make students learn faster. Another benefit of VT is that VT can help learners identify core messages of any information because VT can help learners see big pictures first, and then help understand complex texts (Jeong, 2017 : 1)

In addition, many scholars have claimed that VT can promote critical thinking. In this technique, people who apply VT can form a picture mentally during the process of reading. They also have a better understanding, remembering what they have read, and recalling the abstract ideas. In other words, this method can help students understand the complicated texts after they picture what they have read in their minds and gain the sense of meaning of the texts which help them be able to read critically.

In addition, Raiyn said that VT encourages students to think critically, communicate clearly, and associate words and ideas with images in order to better understand the complex information. VT allows students to organize ideas and systemize complicated texts and make it easier to understand .Jeong (2017:1) explains that students who cannot focus on the long texts or texts with a lot of information can understand each piece of information separately and together at the same time if they picture what they have read. VT also helps students improve their creativity and memory. To sum up, VT can foster students' reading abilities and promote critical thinking as it is a visual tool that can help filter and organize the complex information (Jeong, 2017:1;).

VT is a form of non-verbal thought that is most used in musical, mathematical and kinesthetic thinking. As a result, VT has been applied to many branches of education such as History, Science, Geometry, Mathematics, Environmental Eduation, and Engineering. However, the application of VT in language learning is still limited, especially in Thailand. In order to fill in this gap, this study was to study the effects of VT on EFL students' English critical reading.

Research Objectives

The overall aim of this study was to investigate the effects of VT on EFL students' English critical reading skills. The objectives of this study were:

1. To investigate the effects of VT on English critical reading skills of students majoring in English.

2. To investigate the effects of VT on English critical reading skills of students majoring in EAI.

3. To compare the effects of VT on English critical reading skills of students English to those of students majoring in EAI.

Research Methodology

Research design

This study employed a quantitative approach for data collection and data analysis. Quantitative method was used to investigate the effects of the use of VT on the participants' critical reading skills. The tools for collecting quantitative data were pre-and post- critical reading tests and a questionnaire. The research model is shown below.
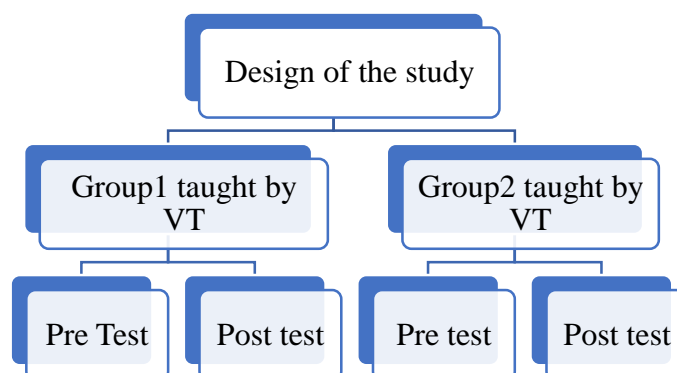
Figures 1 Design of the Study

Population and Participants of the Study

The population was 735 tenth-grade students whose age was 15 to 16 years old in a demonstration school, in Bangkok, Thailand. The reason to choose the demonstration school (Secondary) was because of the school's policy. One of the school's visions aims at preparing their students to become global citizens. Vongsatan, Mangkhang, and Dipyamandala (2020) explained one of the characteristics of global citizens that they should be able to seek knowledge by themselves. Therefore, the abilities to read and think critically are very important.

The participants were 81 students in grade 10 selected by a purposive sampling method. The participants were divided into two groups: 44 students majoring in English and 37 students majoring in EAI. Each group was taught by VT. They enrolled in the Supplementary English II course during the second semester of the 2021 academic year. The reasons to choose these participants were (1) these two-major students are required to enroll the Supplementary English II and the objective of this course is to develop students' critical reading skills, and (2) these two-major students had different backgrounds to ensure accuracy of the results. Students majoring in English are those who were interested in English language and focused on studying about English while students majoring in EAI were those who were interested in a computer science and technology, so they were appropriate to be participants.

Research Instruments

The instruments used in this study were lesson plans based on VT and an English critical reading test. The instruments are described as follows:

1. Lesson plans

Five lesson plans were designed by the researcher, and VT was integrated in each lesson. Each lesson plan lasted 90 minutes. The lesson plans were designed based on the indicators and expected outcomes identified in the school's curriculum and the Basic Education Core Curriculum B.E. 2551 The duration was 6 weeks. Each week lasted 90 minutes. The reading skill contents were author purposes, making inferences, and drawing conclusion.

For all lesson plans, three stages of reading by Mustadi (2019 : 6), are employed as a framework. To illustrate, the process of teaching is divided into three stages: pre-reading, during-reading, and post reading and the three steps of VT- questioning, visualizing, and interpreting- are integrated in to these three reading stages.

In the pre-reading stage, the step of questioning is integrated. The teacher shows the relevant images such as pictures, or videos, or the teacher just introduces the topic by writing a topic on the screen or the board. Then, the teacher continues asking students the three questions. What is going on in this picture? What do you see that makes you say that?, and what further can you find? The teacher lets students share what they know from the picture or the topic they see. The teacher writes student's answers on the screen. This stage can help students be ready to read the given passage and get overall ideas of what they are going to read.

In the during-reading stage, the second and third step of VT which are visualizing, and interpreting will be applied. The teacher asks students to read the reading passage. During this step, the teacher lets students visualize what they read. It can be done in groups or individually depending on the passages. After that, the step of interpreting is applied. The teacher asks students to interpret what they read in preferable frameworks by using VT tools. In is step, the teacher shows some examples of frameworks such as mind maps, timelines, charts, graphic organizers, sketch notes, and diagrams. Then the teacher lets students fill in the information that they perceive from reading. After finishing, the teacher asks students to show or present their work or frameworks to their classmates.

In the post-reading stage, students are required to do many activities which are relevant to the texts they have read such as answering questions, debating, designing posters, or reacting to the given problems.

2. An English critical reading test

An English critical reading skill test included 20 items with multiple choices to investigate critical reading competence covering 3 main skills: identifying author's purposes, making inferences, and drawing conclusion.

Data Collection

This study took seven weeks. In the first week, the participants were asked to complete the critical reading pretest. Then, students were taught English critical reading skills through VT from the second week to the sixth week. After that, the participants were asked to take the posttest.

Data analysis

The data obtained from the English critical reading test were analyzed by means, standard deviation, and the *t*-test analysis to determine whether there were differences in the critical reading skills before and after the experiment. In addition, the analysis of covariance were used to determine whether there were any significant differences in students' critical reading skills between two groups of students.

Research Findings

The results were presented based on the objectives of the study.

1. The effects of VT on English major students' English critical reading skills

Tables 1 The Comparison of the Pre-test Mean Score to Post-test Mean Score of English Major Students

Time	N	Mean	Max	Min	S.D.	t-value	Df	p-value
Post-test	44	17.00	20	12	2.41	26.27	43	0.00**
Pre-test	44	10.59	15	4	2.85			

*$p<0.05$

From the table1, the results reveal that there were statistically significant differences in the pre-test and the post-test mean scores of English Major students (t (43) = 26.27, $p<0.05$). The pre-test man score was 10.59 (SD= 2.85), while the post-test mean score was 17.00 (SD= 2.41). As a result, the post-test mean score was significantly higher than the pre-test mean score. The results indicate the positive effects of VT on English Major students' critical reading skills.

2. The effects of VT on EAI major students' English critical reading skills

Tables 2 The Comparison of the Pre-test Mean Score to Post-test Mean Score of EAI Major Students

Time	N	Mean	Max	Min	S.D.	t-value	Df	p-value
Post-test	37	16.24	20	14	1.80	20.82	36	0.00**
Pre-test	37	10.05	12	2	2.00			

The analysis reveals that there were statistically significant differences in the pre-test and the post-test mean scores of EAI Major students (t (36) = 20.82, $p<0.05$). the pre-test mean score was 10.05 (SD= 2) while the post-test mean score was significantly higher than the pre-test mean score. The results indicate that VT has positive effects of VT on EAI Major students' critical reading skills.

3. The comparison of the effects of VT on English major students' English critical reading skills to those of VT on EAI major students' English critical reading skills

To compare the effects of VT on English major students' English critical reading skills to English major students' English critical reading skills, the analysis of covariance was applied. The results are presented in the Table 3 and Table 4.

Tables 3 Unadjusted and Covariance Adjusted Descriptive Statistic

Group	Before Treatment			After Treatment (Unadjusted)		After Treatment (Adjusted)	
	N	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.E.*
English Major Students	44	10.59	2.85	17.00	2.41	16.84	0.22
EAI Major Students	37	10.05	2.00	16.24	1.80	16.43	0.24

*Covariates appearing in the model are evaluated at the following values: Pre-test = 10.35

Tables 4 The Analysis of Covariance of English Major Students and EAI Major Students

Source of Variance	*SS*	*Df*	*MS*	*F*	*Sig*
Before Treatment	200.84	1	200.84	94.39	0.00**
Between Groups	3.40	1	3.40	1.60	0.21
Error	165.97	78	2.13		

p<0.05

The analysis of covariance shows that there were no statistically significant differences (F (1) = 1.60, p< 0.05) in the mean score of English Major students (*M*= 16.84, *SE*= 0.22) and the mean score of EAI Major students (*M*= 16.43, *SE*= 0.24). Therefore, the results indicate that the effects of VT on English Major students and EAI Major students were similar, which means that VT had similar effects on students with different backgrounds.

In conclusion, the data analysis indicates the positive effects of VT on students' critical reading skills in both groups. In addition, VT had similar effects on students who had different backgrounds.

Discussion

According to the results, VT helped students in both groups develop their critical reading skills. There are many reasons to explain the results.

The first reason was the three steps of VT applied in this study: questioning, visualizing, and interpreting. All these steps benefit students to gain critical reading skills in various ways. For the first step of VT, questioning helped develop students' critical thinking. In this step, pictures relevant to the reading topic were shown to the students, and students were asked four main questions. Students needed to observe all parts of the pictures, colors, and texts in order to answer those questions. Then they needed to think before they answered the questions. There were no right or wrong answers in this step, so students could answer from any angles that they saw. Students also had chances to listen to different ideas from other students. This created critical thinking because they could see various concepts from new angles and broaden the scope of their comprehension like the explanation from Marentette (2018). In the second and third step of VT, visualizing and interpreting allowed students to generate and link ideas which helped students speed up their learning. Since most of the reading passages were long and contained a lot of information, it was very difficult for students to focus on the main points. explained that when there is lot of information, a human's brain cannot function systematically. In this study, the VT activities enabled students to map out, organize all information, and generate ideas, so that students were able to see each piece of information separately and

together at the same time like the idea of .Then students could link each piece of information. In addition, similar to the ideas of Movold (2016 : online), the group work activities such as discussion, drawing from what they have read, and putting the information in frame works provided students opportunities to express their opinions, shared ideas, and learned from each other in class in order to better understand the complex reading passages. For example, in every class, students were asked to draw pictures from the passage they read and to interpret what they read in a preferable framework such as mind maps, graphic organizers, charts, or sketch notes. Besides opportunities for discussion, like the idea of Movold (2016 : online), all activities and visual tools in this study can filter and organize the long and complex passages, so the brains of students started functioning with the layouts and activate students to think visually and trim the information.

Secondly, VT allowed students understand reading passages better. This was similar to the idea of Joeng (2017) who explained that when students are learning through thinking and drawing, they can understand text easier better and faster. In the present study, during the lessons, students were asked to interpret what they read in frameworks such as mind maps. Students could identify core messages of the reading passages because VT helped them see big pictures first, and then understand complex texts visually as the explanation ofJeong (2017:1) that when students think visually, they can organize the information and can know which one is the core and which one is the details, so that they can pick the right information. Therefore, students in this study could learn and read better.

Third, VT enhanced students' creativity. Marentette (2018) explained that when students draw pictures or create image and graphs, this stimulates the visual part of the brain. Therefore, students can produce more creativity, see concepts from new angles, and broaden the scope of their comprehension. This was obviously seen in this study when students were asked to discuss after reading the passages. Students could share their new and interesting information and ideas to their classmates. This helped students in this study better read critically.

In summary, the analysis pointed out that this teaching method VT had positive effects on students, and it helped students develop critical reading skills.

Recommendation

Regarding to this study, VT had positive effects on students' critical reading skills. Therefore, the findings might promote teachers and educators to employ VT to improve the teaching of English language. Due to the benefit of teaching critical reading through VT, this teaching technique can be an alternative for teachers to create more positive classroom environment, promote learning motivation, and improve critical reading performance.

Although the findings of this study confirmed the positive effects of enhancing EFL High school students' critical reading skills through VT, further studies can be conducted to expand knowledge in the field of EFL learning. Firstly, it might be interesting to explore potential of VT in other skills such as writing, listening, or speaking. Furthermore, this study included only high school students, so it might be interesting to investigate the effectiveness of VT to enhance students' critical reading skills at different levels or in different subjects. Lastly, as this study lasted for 7 weeks, other study can be conducted for a longer period of time to assure the results.

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