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Web-Based Instructional Model Development plus Face to Face Learning for Enhancing Critical Reading Skills of Thai Undergraduate Students*

การพัฒนารูปแบบการเรียนการสอนผ่านเว็บร่วมกับการเรียนในห้องเรียนเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณของนักศึกษาไทย ระดับปริญญาตรี

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Abstract

The study objectives were: (1) to analyze the needs of undergraduate students at Rajamangala University of Technology Isan, Khon Kaen Campus (RMUTI) for the critical reading web-based instructional model; (2) to develop an effective web-based instructional model to enhance undergraduate students' critical reading skills according to the 75/75 standard criterion; (3) to investigate the effectiveness and the effect size of the web-based instructional model; and (4) to investigate the students' opinions on the web-based instructional model. The study was conducted with a sample of 30 fourth year students who were enrolled in the Critical Reading course in the academic year 2016 at RMUTI and were purposively selected. The experiment was carried out for 14 weeks, 42 hours in total. Data were collected using the critical reading achievement tests administered before and after the implementation of the critical reading web-based instructional model. The obtained scores from the pre-test and post-test were compared using paired sample t-test. Cohen's *d* effect size was calculated to evaluate the magnitudes of the effects caused by the developed critical reading web-based instructional model. In addition, students' opinions toward the critical reading web-based instructional model were assessed at the end of the course. The data obtained from the

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questionnaire was analyzed to determine the mean score using descriptive statistics for the five-point Likert scale items and content analysis for open ended questions.

The results were as follows:

1. Based on the needs analysis, the majority of participants lacked critical reading skills such as making judgement on the text and analyzing the text. There was a need for a web-based instructional model for enhancing critical reading skills. It was recommended that the model should provide real – life texts, the tools that are user-friendly, and various learning activities.

2. The efficiency score of the developed critical reading web-based instructional model was 81.10/80.00. This demonstrated that the efficiency of the developed critical reading web-based instructional model was higher than the expected criterion 75/75 (E_1/E_2) and the model was proven efficient.

3. There was a statistically significant difference between the mean scores students obtained from the critical reading pretest and posttest scores at the 0.05 level. The Cohen's *d* effect size yielded the value of 3.90, which were considered large.

4. The findings from the questionnaire on investigating the students' opinions toward the critical reading web-based instructional model revealed that the students' opinions toward the instructional model were mainly positive.

Keywords: 1. Critical Reading 2. Web-Based Instructional Model 3. Critical Reading Skills

บทคัดย่อ

งานวิจัยนี้มีจุดประสงค์เพื่อ (1) วิเคราะห์ความต้องการจำเป็นในการมีรูปแบบการเรียนการสอนผ่านเว็บเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณ ของนักศึกษาระดับปริญญาตรี มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน (2) พัฒนารูปแบบการเรียนการสอนผ่านเว็บเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณให้มีประสิทธิภาพตามเกณฑ์75/75 (3) ศึกษาผลประสิทธิภาพและขนาดของผลความแตกต่างที่เกิดขึ้นก่อนและหลังการใช้รูปแบบการเรียนการสอนผ่านเว็บและ (4) ศึกษาความคิดเห็นของนักศึกษาที่มีต่อรูปแบบการเรียนการสอนผ่านเว็บเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณ กลุ่มตัวอย่างในงานวิจัยนี้เป็นนักศึกษาชั้นปีที่ 4 จำนวน 30 คน ที่ลงเรียนวิชาการอ่านอย่างมีวิจารณญาณปีการศึกษา 2559 ที่มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน วิทยาเขตขอนแก่นโดยใช้วิธีการเลือกกลุ่มตัวอย่างแบบเจาะจง การทดลองใช้เวลา 14 สัปดาห์ รวมทั้งสิ้น 42 ชั่วโมง การเก็บข้อมูลได้ดำเนินการโดยใช้ข้อสอบวัดผลสัมฤทธิ์ในการประเมินความสามารถในการอ่านอย่างมีวิจารณญาณก่อนและหลังการทดลองใช้รูปแบบการเรียนการสอน โดยคะแนนที่ได้จากแบบทดสอบก่อนและหลังเรียนนำมาเปรียบเทียบกันโดยใช้ paired sample t-test และ Cohen's *d* effect size เพื่อวัดค่าอิทธิพลความ

แตกต่างของผลคะแนนจากการใช้รูปแบบการเรียนการสอนที่ได้พัฒนาขึ้น และหลังจากนั้นได้มี การใช้แบบสอบถามเพื่อวัดความคิดเห็นของผู้เรียนที่มีต่อรูปแบบการเรียนการสอน ข้อมูลที่ได้จากแบบสอบถามได้นำมาวิเคราะห์ผลหาค่าเฉลี่ยโดยใช้สถิติเชิงพรรณนาสำหรับข้อที่ใช้มาตรวัดแบบลิเคิร์ท 5 ระดับ (five-point Likert scale) และใช้วิธีวิเคราะห์เนื้อหาสำหรับคำถามปลายเปิด

ผลการวิจัยพบว่า

1. ผลจากการศึกษาความต้องการพบว่า กลุ่มตัวอย่างส่วนมาก ขาดทักษะการอ่านอย่างมีวิจารณญาณเช่นการประเมินค่าและวิเคราะห์บทอ่าน ดังนั้นจึงมีความต้องการรูปแบบการเรียนการสอนผ่านเว็บเพื่อเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณ กลุ่มตัวอย่างมีความต้องการรูปแบบการเรียนการสอนที่มีบทอ่านที่พบได้ในชีวิตจริง รูปแบบการเรียนการสอนที่ใช้ง่ายมีกิจกรรมการเรียนรู้ที่หลากหลาย

2. รูปแบบการเรียนการสอนผ่านเว็บเพื่อเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณมีค่าประสิทธิภาพอยู่ที่ 81.10/80.00 ซึ่งเป็นไปตามเกณฑ์มาตรฐาน 75/75 (E_1/E_2) ที่ตั้งไว้ และแสดงให้เห็นว่ารูปแบบการเรียนการสอนนี้มีประสิทธิภาพดี

3. ผลสัมฤทธิ์ทางการอ่านอย่างมีวิจารณญาณของผู้เรียนหลังการใช้รูปแบบการเรียนการสอนของผู้เรียนสูงขึ้นอย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 และมีค่าขนาดของผล (Effect Size) ผลต่างของคะแนน อยู่ที่ 3.90 ซึ่งถือว่าเป็นขนาดของผลที่อยู่ในระดับมาก

4. ผลจากแบบสอบถามความคิดเห็นที่มีต่อรูปแบบการเรียนการสอนผ่านเว็บเพื่อเสริมสร้างทักษะการอ่านอย่างมีวิจารณญาณแสดงให้เห็นว่าผู้เรียนมีความคิดเห็นที่ดีต่อรูปแบบการเรียนการสอนนี้

คำสำคัญ : การอ่านอย่างมีวิจารณญาณ รูปแบบการเรียนการสอนผ่านเว็บ ทักษะการอ่านอย่างมีวิจารณญาณ

Introduction

Currently, critical thinking has been widely used as a parameter to assess graduates' performances in workforce after their graduation. Since the 1990s, developing critical thinking skills in undergraduate students has been set as an elementary goal in higher education in hope that students can function well within society, evaluate the validity of information available, and make better personal, business or leadership decisions (Braun, 2004; Halpern, 1998; Kegan, 1994).

In EFL (English as a Foreign Language) and ESL (English as a Second Language) settings, critical thinking skills are the most widely applied to reading classes which is called "critical reading" (Kue, 2009): Shin & Crookes, 2005), as reading has also been considered one of the most important skills in EFL/ESL contexts (Farhadi & Mirhassani, 2001). Hence, the integration of critical thinking and reading could be most effective to EFL/ ESL learners.

Critical reading is one aspect of critical thinking, which is the ability to evaluate arguments and reach to well-reasoned conclusions (Kennedy, Fisher, & Ennis (1991). Critical reading is normally defined as the ability to obtain a level of interpretation higher than that needed for literal interpretation (Smith, 1982). As indicated by Flynn (1989), critical reading skills entail the abilities of mental processes such as discernment, analysis and evaluation; all of which can be applied to the information in order to achieve a logical final understanding and judgment.

Wallace (2003) asserts that lacking the skill to read critically means that readers will tend to perceive all the information they see as facts, without the urge to question or break down any assumption that the information might be implying. Therefore, it is imperative for teachers to teach critical reading skills to students because these skills could support them to survive when they leave universities, especially when entering the workforce after graduation.

It is found that the 21st century learners' ways of acquiring reading have been changed. According to Shelburne (2009) and Foasberg (2014), the traditional activity of reading has undergone some recent technological changes. While the Internet is a text–saturated world, reading online screens tends to be significantly different from reading printed text (Manley & Holley, 2012). More and more materials are accessible electronically, and for those who want to read something in an electronic format, there are often many alternatives available. One may read from a standard computer screen, a tablet computer, a smartphone, or one may simply print out the relevant materials to read offline. Consequently, to give all students the best chance to succeed in developing their critical reading skills, exploring strategies for teaching critical reading that effectively facilitate student learning should be considered.

Information and Communication Technology (ICT) has been distinctly playing a large role in changing the field of teaching reading. The integration of information and communication technology (ICT) into language classroom environment could aid in developing reading instruction (Warschauer, 2001 & Ridgeway et al., 2002). Hence, the use of computers in the language classroom may be a solution to motivate learners to read more. According to Khan (1997), who has the credit of first coining the phrase "Web-Based Instruction", defines WBI as "a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported" (Khan, 1997). In terms of pedagogical features of the web, WBI facilitates communication, enhances interactions, provides student-centered, self-paced, and

collaborative learning, disseminates shared information, and reaches out to global communities (Downing & Rath, 1997 & Maddux, 1996). Warschauer and Kern (2005) support that incorporating web-based lessons and activities is a new way for teachers to utilize computer technology to enhance learning. Therefore, it seems that the integration of WBI in reading classes is another new way that could encourage students to learn.

Background and Rationale of the study

According to latest results of the worldwide study called Program for International Student Assessment (PISA) provided by The Organization for Economic Co-Operation and Development (OECD) (2018), the most recently published results from the assessment in 2015 revealed that Thai students' scholastic performances were below expectations especially on their ability to access, interpret, evaluate different types of texts which implies that they lack the ability to reading critically.

Another worldwide assessment that plays a central role in language and education policy nowadays called The Common European Framework of Reference for Languages (CEFR) test (Davidson & Fulcher, 2007). The Common European Framework of Reference for Languages: learning, teaching, assessment (CEFR) was created by the Council of Europe to provide a common basis for the elaboration of language syllabuses, curriculum guidelines, examinations, textbooks, etc. (Council of Europe, 2001). The framework is used to benchmark communicative language ability in reading, writing, speaking, and listening. The CEFR is divided into 3 levels; basic users (Level A), independent users (Level B), and proficient users (Level C) (Council of Europe, 2001). For Thailand, in 2014, the Ministry of Education announced policies to reform teaching and learning English using CEFR as the main criterion for managing teaching and learning the English language (Ministry of Education, 2014). The Ministry of Education has set the following English language proficiency targets for students in Thailand as; 1) by the end of Prathom 6 (Grade 6) students should have reached A1 proficiency, 2) by the end of Mathayom 3 (Grade 9) students should have reached A2 proficiency, and 3) by the end of Mathayom 6 (Grade 12) students should have reached B1 proficiency (English Language Development Center, 2005). As for the undergraduate level, one of the qualities that students need to acquire in terms of their language proficiency is the to achieve the level of B2 under CEFR (Byram & Parmenter, 2012; Sirindhorn International Institute of Technology, 2013; Read, 2014). Since this research is mainly aimed at enhancing critical reading skills of undergraduate students, the B2 level of reading proficiency should be defined.

For B2 level of reading proficiency, students can understand articles and reports concerned with contemporary problems in which the writers adopt particular stances or viewpoints. They can understand contemporary literary prose and can adapt style and speed of reading to different texts and purposes, using appropriate reference-sources selectively (Council of Europe, 2011). Consequently, in order to support students in achieving CEFR outcomes, teachers are given a supporting role to help bring the students' language proficiency up. Hence, course books and supplementary materials that are referenced to the CEFR may help teachers achieve their classroom goals.

Due to the importance of critical thinking and reading skills, the evidence revealed from the latest results of PISA 2015, and the importance of CEFR framework in Thailand's education system, there is an urgent need to conduct effective English teaching methods for students (Office of Higher Education Commission, 2013). English teachers are responsible for the quality of teaching and learning in order to keep up with the increasing expectation from stakeholders such as students, parents, educational institutions, employers, and national policies.

Objectives of the Study

1. To investigate the students' needs for designing a critical reading web-based instructional model: reading comprehension ability, critical reading ability, reading topic interest, and basic computer skills.

2. To develop an effective web-based instructional model to enhance undergraduate students' critical reading skills according to the 75/75 standard criterion.

3. To investigate the effectiveness of the critical reading web-based instructional model on the students' critical reading abilities before and after learning through the constructed instructional model.

4. To investigate the students' opinions on the critical reading web-based instructional model.

Participants

The participants of the study consisted of a group of 30 fourth year RMUTI students who were enrolled in the "Critical Reading" course in the second semester of the academic year 2016.

Variables of the Study

1. The independent variable in this study is the developed critical reading web-based instructional model.

2. The dependent variables in this study are students' critical reading skills, and students' opinions on the use of the developed critical reading web-based instructional model.

Research Design

This study was a Research and Development (R&D) conducted with a quasi - experimental design which was a mixed-method including qualitative and quantitative research studies. The type of the study is one - group pretest - posttest design.

Research Instruments

1. The set of needs analysis questionnaire for the development of the critical reading web-based instructional model

2. The critical reading web-based instructional model comprising of 10 lessons

3. The critical reading pretest and posttest

4. The questionnaire on students' opinions toward the critical reading web-based instructional model

This research consisted of three phases; 1) the needs analysis for developing a critical reading web-based instructional model as a supplementary tool to enhance critical reading skills 2) the development of the critical reading web-based instructional model, and 3) the implementation and evaluation of the constructed critical reading web-based instructional model.

Phase 1 The Needs Analysis

The aim of this phase was to obtain the information concerning the students' needs for the web-based instructional model to enhance critical reading skills. After the literature related to critical reading and web-based instruction were acquired, analyzed, and synthesized for designing a set of needs analysis questionnaire. Before distributing the need analysis questionnaire, the content validity was examined by three experts. Two of the experts are English instructors who have been teaching in the university level for more than 20 years. The last expert is an English instructor who has been teaching in the university level for more than 10 years with 10-year experience in e-learning course design and development. The data obtained during this phase was analyzed and employed in developing the instructional model.

Phase 2 The Development of the Critical Reading Web-Based Instructional Model

The data from the needs analysis, the course description and objectives, reading topics for B2 level of reading proficiency proposed by The Common European Framework of Reference for Languages: learning, teaching, assessment (CEFR), and reading textbooks designed for intermediate and upper-intermediate learners were studied and used for constructing the critical reading web-based instructional model and the pre-posttest. Before developing the critical reading web-based instructional model, the unit content specification of the critical reading web-based instructional model was validated by the same three experts as in the previous phase. The Index of Item Objective Congruence (IOC) is used to determine the validity of the unit content specification (Carmines and Zeller, 1979). Finally, 10 units contained in the critical reading web-based instructional model are presented in Table 1 below.

Table 1: Units and Learning Objectives

Unit	Objectives
1. Fact and Opinion	1. To distinguish between facts and opinions. 2. To identify and describe facts and opinions with text-based evidence.
2. Author's Tone and Mood	1. To define tone and mood as it applies to literature 2. To identify examples of tone and mood in a work of literature 3. To analyze tone and mood in literature
3. Figurative Language in Poetry	1. To explain the difference between figurative and literal language in poetry 2. To identify figurative language from poetry 3. To analyze figurative language used in poetry
4. Author's Purpose	1. To describe types of author's purpose in writing 2. To identify author's purpose in writing 3. To analyze author's purpose in writing
5. Point of View	1. To describe types of author's point of view in writing 2. To identify author's point of view in writing 3. To analyze author's point of view in writing
6.Reasoning and Making Judgement	1.To recognize types of claim and evidence used in argumentative texts 2. To identify claims and evidence used in argumentative texts

	evidence from the text 3. To analyze claims and evidence used in argumentative texts by determining whether its specific claims are supported by reasons and evidence from the text
7. Logical Fallacies	1. To describe the concepts of logical fallacies used in argumentative texts 2. To identify logical fallacies based on consistent logic and evidence in argumentative texts 3. To analyze how logical fallacies can make their argument invalid in argumentative texts
8. Bias	1. To understand the concepts of bias used in the news 2. To identify types of bias used in the news 3. To analyze bias used in the news
9. Propaganda	1. To understand the concepts of propaganda techniques used in the texts 2. To identify propaganda techniques used in the texts 3. To analyze propaganda techniques used in the texts
10. Stereotypes	1. To understand the concepts of stereotypes used in the texts 2. To identify types of stereotypes used in the texts 3. To analyze stereotypes used in the texts

The three stages of teaching which involve teaching students to delve into texts are also suggested; pre-reading, while-reading, and post-reading (Wallace, 2003). The pre-reading stage provides a scaffold for new concepts and vocabulary, promotes engagement and provides a means for prediction. During this stage, students' background knowledge which is related to the texts should be motivated. The second stage, while-reading, allows students to integrate their knowledge and information they bring to the text with a new information in the text. The last stage, post-reading, allows students to articulate and process their understanding of what they have read and to think critically about the validity of the text. Additionally, the suggested teaching procedure for enhancing students' critical reading skills is to facilitate comprehension first then utilize critical reading strategies directly as a medium for improving the deep understanding to find the concepts behind the lines. Finally, the three teaching steps for the Critical Reading course were integrated into the web-based instructional model as presented in Figure 1.

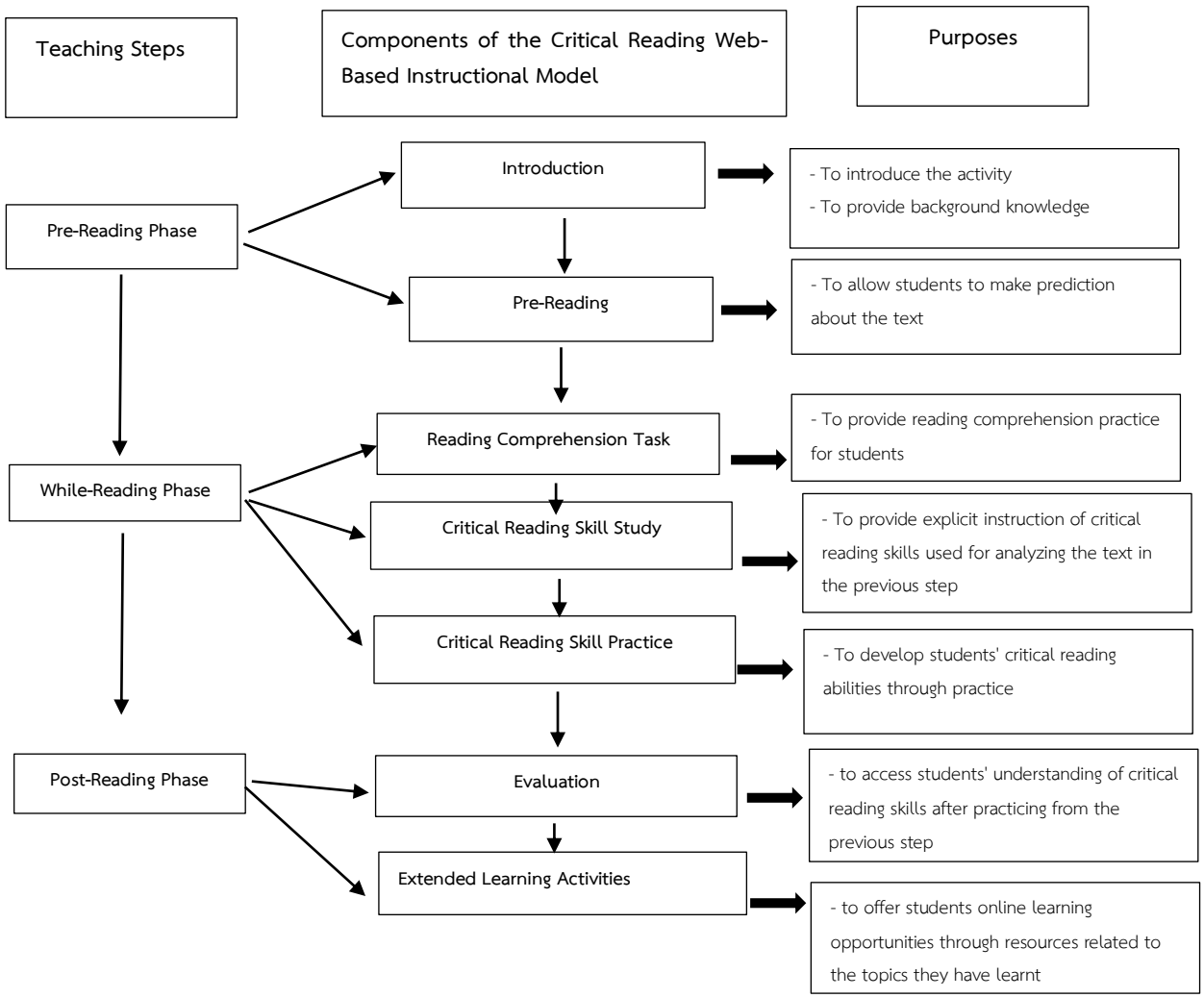

Figure 1: critical reading web-based instructional model

As seen in the model, the process of teaching used within this web-based instructional model is adapted from the traditional pre-while-post teaching method. The three steps consist of pre-reading phase, while-reading phase, and post-reading phase. One thing to be noted here is that throughout the process except for the extended activities, both the face-to-face and web-based instruction method will need to be used in conjunction to one another.

The first phase consists of Introduction and Pre-Reading. The purpose of this first step is to introduce the activity and provide background knowledge. At the same time, the activity will also activate students' prior knowledge to the issue which will allow them to start making the prediction to the text. This step also helps students to be able to predict the vocabularies and the context of the reading. In the Introduction, a short video clip with the

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content that relates to the main text will be shown to students in order to gauge students' prior knowledge on the issue as well as shifting and maintaining the focus of students to the content at hand.

Next, the while-reading phase consists of Reading Comprehension Task, Critical Reading Skill Study, and Critical Reading Skill Practice. In the Reading Comprehension Task, the questions in the exercises is aimed at comprehension skill. After that, critical reading skills is explicitly taught and described in Critical Reading Skill Study then the same text which is used during the Reading Comprehension Task is again utilized together with a set of questions that are designed to encourage students to think more critically.

For the post-reading phase, students are allowed to employ their critical skills which they had developed during the second step. The post-reading phase is further extended to Evaluation and Extended Learning Activities. Evaluation consist of sets of questions about related stories to the text that was used in the beginning of class in order for students to be able to practice the skills that they have just learned with related issues in different texts. The questions employed during this process will be in the questions that requires students to use the critical reading skills in order to find the answers. The Extended Learning Activities provide a space for students to reflect and practice the skills that they had learned in class.

Before implementing the critical reading web-based instructional model, the instructional model was evaluated the efficiency of process (E_1) and product (E_2) by using the efficiency formula 75/75 (Brahmawong, 2013). The two steps of the pilot study had been conducted: individual testing and small group testing. The instruments were firstly piloted with 3 third year students, secondly with 10 third year English major students from the department of English for International Communication (EIC) enrolled in the Critical Reading course during the 2015 academic session.

Phase 3 The Implementation and Evaluation

After the critical reading web-based instructional model was evaluated its efficiency and adjusted, the actual course implementation was carried during the second semester of the academic year 2016 at Rajamangala University of Technology Isan, Khon Kaen Campus. The main study was conducted with 30 fourth year RMUTI, Khon Kaen Campus students who were enrolled in the "Critical Reading" course in the academic year 2016. The semester lasted for 14 weeks, 42 hours in total. The implementation of the model was carried out once a week, from 1 a.m. to 4 p.m. every Wednesday. The first week was devoted for administering pretest to measure students' critical reading ability before implementing the critical reading web-

based instructional model, thus the implementation of the instructional model started in the second week with an orientation session so that the participants got acquainted to the teaching-learning process. The course was always implemented in the computer lab with internet access.

Data Collection

The procedure of data collection is presented below.

1. The pretest was administered in the first week of the first semester of the academic year 2016 while the posttest was administered in the last week of the semester. The time allotment of each test was 110 minutes as shown in the test content specification.

2. The researcher introduced teaching-learning activities at the orientation session.

3. Teaching-learning activities were administered through the critical reading web-based instructional model.

4. At the end of the course, the posttest was administered which was the same test used at the beginning of the course.

5. Lastly, the questionnaire on students' opinions toward the critical reading web-based instructional model was collected.

Data Analysis

Data analysis process is presented as follows.

1. The critical reading web-based instructional model was evaluated the efficiency index for the process in terms of the percentage score from the exercises in the lessons (E1) and the efficiency index for the product in terms of the percentage score from the posttest (E2) by using the efficiency formula 75/75 initiated and developed by Chaiyong Brahmawong. The efficiency criteria of E1/E2 = 75/75 is comparing the percentage of formative assessment scores with summative assessment scores (Brahmawong, 2013).

2. The data obtained from the critical reading pretest and posttest were analyzed using descriptive statistics. The mean scores were compared through Paired sample t-test to measure the critical reading ability before and after using the critical reading web-based instructional model. After that, the scores obtained from the pretest and posttest were compared and calculated using Cohen's *d* effect sizes to measure the effects and the magnitudes of the effects caused by the developed critical reading web-based instructional model.

3. The data obtained from the questionnaire on students' opinions toward the critical reading web-based instructional model was analyzed to determine the mean score using descriptive statistics for the five-point Likert scale items while the last part that allowed the students to give their suggestions on the critical reading web-based instructional model, the data was analyzed by content analysis.

Results

Phase 1: Based on the results of the questionnaire, most students lacked critical reading skills and they were aware of the importance of the critical reading skills. The key findings revealed that the need for the critical reading web-based instructional model existed. The summary of the result of phase 1 is presented in Table 2.

Table 2: The summary of the result of phase 1

Parts of the Questionnaires	Statements/topics with Highest Mean	Statements/topics with Lowest Mean
Reading Comprehension Strategies	Reading the title and sub title before reading the rest of the text. (Mean = 4.27)	Planning what to do before start reading (Mean = 2.81)
Active Reading Strategies	Asking questions about the text and reading confusing passages. (Mean = 3.69)	Evaluating the text by forming opinions about what I have read. (Mean = 2.92)
Critical Reading Skills	Underlining, highlighting main ideas, main points, vocabulary, etc. while reading. (Mean = 4.42)	Identifying similarities and differences in a text. (Mean = 2.27)
Items Read	Websites. (Mean = 4.77)	Printed books and newspapers (Mean = 2.69)
Reading Topic of Interest	Education and Entertainment. (Mean = 4.35)	Religion and Politics (Mean = 3.77)
Basic Computer Skills	Hardware and equipment (Mean = 4.67)	Software and application software knowledge and skills (Mean = 4.19)

Table 2 shows both the statements and topics with the highest and lowest mean. For the Reading Comprehension Strategies part, the statement that received the highest mean is "Reading the title and sub title before reading the rest of the text" with the average mean of 4.27. The statements from this part that received the lowest average mean score is

"Planning what to do before start reading" at 2.81. In the Active Reading strategies part, the statement with the highest average mean was "Asking questions about the text and reading confusing passages" at 3.69. The statement with the lowest average mean for this part is "Evaluating the text by forming opinions about what I have read" at 2.92. As for the Critical Reading Skills part, the statement with the highest average mean is "Underling, highlighting main ideas, main points, vocabulary, and etc., while reading" at 4.42. The statement with the lowest average mean for this part is "Identifying similarities and differences in a text" at 2.27. As for the part of the questionnaire concerning topics, under Items Read, the topic that receive the highest average mean score is websites while the topic with the lowest average mean is "Printed books and newspapers at 2.69. Under the "Reading Topic of Interest", the topics with the highest average mean are "Education and Entertainment" at 4.35 while the topic with the lowest average mean is "Religion and Politics" at 3.77. The last part of the questionnaire on basic Computer Skills, the topic that received the highest average mean was "Hardware and Equipment" at 4.67 while the topics with the lowest average mean was "Software and application software knowledge and skills at 4.19.

Phase 2: The result of phase 2 revealed that the efficiency of the percentage of formative assessment scores of the 10 units (E_1) and summative assessment scores (E_2) was 81.13/80.00, which showed that the efficiency of the process and the product of all the critical reading web-based instructional model lessons met the standard criterion of 75/75 (E_1/E_2). The scores indicated that the developed critical reading web-based instructional model was effective in enhancing the students' critical reading skills.

Phase 3: The data obtained from the critical reading pretest and posttest were analyzed using descriptive statistics. The mean scores were compared through Paired sample t-test to measure the critical reading ability before and after using the critical reading web-based instructional model. The rater gave one mark for each correct multiple-choice item and the scores obtained were calculated with the Microsoft Excel. After that, the scores obtained from the pretest and posttest were compared and calculated using Cohen's *d* effect sizes to measure the effects and the magnitudes of the effects caused by the developed critical reading web-based instructional model. See the following table.

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Table 3: Results of the comparison of the pretest and posttest scores of the main study participants using paired sample t-test and effect size

Critical Reading Test (70 marks)	n	Mean (70)	S.D.	Mean (Paired Differences)	S.D. (Paired Differences)	t	df	p-value	Cohen's *d*
Pretest	30	34.47	3.54	20.73	5.32	21.33	29	.000*	3.90
Posttest	30	55.20	5.40						

*Level of significance .05 P < 0.05

From Table 3, the mean score of the critical reading pretest was 34.47 and that of the posttest was 55.20. The standard deviations of the pre- and posttest were 3.54 and 5.40 respectively. The results indicated that participants in the study had higher scores in their critical reading posttest. The t-test analysis showed that there was a statistically significant difference between the reading pre-test and post-test at the level of .05. It was evident that the students' reading improved significantly with the effect size at 3.90, which is considered a large effect. Thus, the second hypothesis of the study which stated that the web-based instructional model can improve critical reading skills of the students and has the effect size in large magnitude was accepted.

Lastly, the data obtained from the questionnaire on students' opinions toward the critical reading web-based instructional model was analyzed to determine the mean score using descriptive statistics for the five-point Likert scale items while the last part that allowed the students to give their suggestions on the critical reading web-based instructional model, the data was analyzed by content analysis. The results of the data analysis are as the following table.

Table 4: The results of the students' opinions toward the critical reading web-based instructional model.

Statements	Descriptive Statistics	
	Mean	SD
Content	3.40	0.8737
1. The web-based environment offers access to a wide variety of learning resources and materials.	3.90	.712
2. The critical reading web-based instructional model offers rich opportunities for interactions between teacher and classmates.	3.87	.819
3. Web-based materials are relevant to the daily life.	3.40	.770
4. The text length and its difficulty were suitable	2.43	1.194
Design	3.61	0.779
5. The critical reading web-based instructional model was well-designed.	3.97	.718
6. The elements of the critical reading web-based instructional model are aligned appropriately.	3.70	.794
7. I have no readability problem within the pages of the critical reading web-based instructional model.	3.47	.730
8. Sometimes, there were technical computer and internet problems in the classroom.	3.30	.877
Usefulness	3.98	0.881
9. Learning with the critical reading web-based instructional model was useful and interesting.	4.23	.898
10. The critical reading web-based instructional model has motivated me to read further.	4.10	.759
11. Through this critical reading web-based instructional model, my critical reading skill has improved.	4.07	.828
12. Web-based materials are easy to handle.	3.53	1.042

Preference	3.76	0.829
13. I prefer materials provided in the critical reading web-based instructional model because I can use them at a convenient time and place.	3.97	.850
14. In general, I was satisfied with this critical reading web-based instructional model.	3.70	.535
15. I prefer learning through this critical reading web-based instructional model plus face to face learning rather than the traditional paper-based reading course.	3.60	1.102
Total Average	**3.68**	**0.842**

The results disclosed that after having through the critical reading web-based instruction model, students developed positive opinion towards many aspects in the model.

Discussion

The efficiency of the critical reading web-based lessons via the implementation was at the level was 81.13/80.00. This meets the standard level of 75/75 (E1/E2). This was because the components of the critical reading web-based instructional model were integrated with the steps of teaching critical reading appropriately. As seen in the model, the process of teaching used within this web-based instructional model is adapted from the traditional pre-while-post teaching method proposed by C. Wallace (2003). The three steps were broken into 7 steps: 1) Introduction, 2) Pre-Reading, 3) Reading Comprehension Task, 4) Critical Reading Skills Study, 5) Critical Reading Skills Practice, 6) Evaluation, and 7) Extended Learning Activities.

Another reason is possibly because the lessons were completely developed in two trial steps in the developmental testing process: individual testing (3 students) and small group testing (10 students). The data obtained from each stage of the try-out process helped the researcher to find the weak and strong points so that the researcher could develop and revise the lessons for the critical reading web-based instructional model. This point supports the idea of Brahmawong (1989) that the developmental testing processes can enhance the teachers' confidence to create suitable lessons. Moreover, the developmental testing processes can support the teachers to be professional in designing lessons. The reason that the efficiency of the critical reading web-based lessons was at the level 81.13/80.00 (E_1/E_2) is that students became familiar with doing the exercises provided in the model. The students' improvement

in critical reading ability was determined by the results of formative and summative assessment. The formative assessment included 10 multiple choice test items from the section "Evaluation" of each unit. The summative assessment included posttest. The goal of formative assessment is to monitor student learning to provide ongoing feedback that can be used by instructors to improve their teaching and by students to improve their learning. This finding agrees with Black and Wiliam (1998) who pointed out that formative assessment helps teachers and students find out the students' achievements in the performance that summative assessment does not. At the same time, it also finds out students' specific problems existed. This assessment not only allows students to better play their strengths, but also provides specific support for individual student. Clearly, formative assessment can not only praise and encourage students, but also help students who are lack of confidence realize their own progress and help them establish their direction and goals. In the aspect of summative assessment, Bloom (et al.,1971) pointed out that summative assessment is an assessment of the course, the education program's validity and education research in order to classification, identification, evaluation of progress after a teaching program or the end of the term. Therefore, the current research conducted both formative and summative assessment in order to get more comprehensive and reasonable assessment of students' learning through the critical reading web-based instructional model.

Another strong point of the critical reading web-based instructional model is that it could offer learning activities based on learners' needs. Nunan (1988) supported that identifying learners' needs can set the goals of the course and guide the selection of contents and to bridge the gap between the teachers' and learners' expected teaching and learning approach. Therefore, during phase 1 of the study, students' needs and instructional contents were all analyzed carefully to minimize the gap between the teacher's and students' expectation.

Recommendations for Further Research

The following recommendations based on the results of this study are proposed for future research.

First of all, further studies are needed to conduct needs analysis, like this present study, because needs analysis could help researchers know the students' difficulties in learning as well as their preferences and interests, all of which can be used for making decisions about course design (Graves, 2000). This helps researcher to take into account any unknown difficulties that students might be facing with as well as their preferences in learning

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and their topics of interest. This is crucial to the course design since each and every student prefers different kind of learning styles and therefore, the model should be able to address those differences

With regard to the data collection, the following issues into consideration. First, instead of using the same pre and posttest, an equivalent form of the test could be considered in order to avoid the practice effects. And second, a delayed posttest is recommended for investigating the effectiveness of the treatment on students' critical reading abilities and retention overtime.

Another point is that this study used a one-group, pretest posttest design. In order to gain stronger empirical evidence on the effectiveness of the critical reading web-based instructional model, it is recommended that future studies should be conducted with a true experimental research design with a control group and an experimental group.

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