การพัฒนาบทเรียนคอมพิวเตอร์ช่วยเรียนภาษา ด้วยวิธีการสอนอ่านแบบโครงสร้างระดับยอด เพื่อส่งเสริมความเข้าใจในการอ่านภาษาอังกฤษของนักศึกษา ระดับปริญญาตรี มหาวิทยาลัยราชภัฏนครราชสีมา ระยะที่ 2

A Computer Assisted Language Learning Development via Top Level Structure to Enhance Reading Comprehension for Nakhon Ratchasima Rajabhat University's Undergraduate Students: Phase 2

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บทคัดย่อ

การพัฒนาบทเรียนคอมพิวเตอร์ช่วยเรียนภาษาอังกฤษด้วยวิธีการสอนอ่านแบบโครงสร้างระดับยอด เป็นการพัฒนานวัตกรรมด้านการสอนภาษาอังกฤษเพื่อส่งเสริมความเข้าใจในการอ่านภาษาอังกฤษของนักศึกษาระดับปริญญาตรี ด้วยการวิจัยเชิงพัฒนา โดยดำเนินการศึกษาต่อเนื่องจากผลการศึกษาบริบทจากการวิจัยในระยะที่ 1 สำหรับการศึกษาในระยะที่ 2 นี้ มีวัตถุประสงค์เพื่อ 1) พัฒนาบทเรียนคอมพิวเตอร์ช่วยการเรียนภาษาอังกฤษด้วยวิธีการสอนอ่านภาษาอังกฤษแบบโครงสร้างระดับยอดให้มีประสิทธิภาพตามเกณฑ์ที่กำหนด 2) ศึกษาความก้าวหน้าของผู้เรียนในการทำความเข้าใจในการอ่านภาษาอังกฤษด้วยบทเรียนคอมพิวเตอร์ช่วยการเรียนภาษาด้วยวิธีการสอนอ่านภาษาอังกฤษแบบโครงสร้างระดับยอดที่สร้างขึ้น และ 3) เปรียบเทียบความเข้าใจในการอ่านภาษาอังกฤษของผู้เรียนก่อนและหลังเรียนด้วยบทเรียน คอมพิวเตอร์ช่วยการเรียนภาษาด้วยวิธีการสอนอ่านภาษาอังกฤษแบบโครงสร้างระดับยอด กลุ่มตัวอย่าง คือ นักศึกษาที่กำลังเรียนรายวิชาภาษาอังกฤษพื้นฐาน 2 ในปีการศึกษา 2561 จำนวน 30 คน ซึ่งได้มาจากการสุ่มตามระดับชั้น เครื่องมือที่ใช้ในการศึกษา ได้แก่ แบบประเมินบทเรียนคอมพิวเตอร์ช่วยการเรียนภาษาอังกฤษด้วยวิธีการสอนอ่านภาษาอังกฤษแบบโครงสร้างระดับยอด และแบบทดสอบความเข้าใจในการอ่านภาษาอังกฤษ วิเคราะห์ข้อมูล โดยใช้ค่าร้อยละ ค่าเฉลี่ย และการทดสอบค่าที ผลการวิจัย พบว่า 1) บทเรียนคอมพิวเตอร์ ช่วยการเรียนภาษาเป็นซอฟต์แวร์ที่มีประสิทธิภาพตามเกณฑ์ที่กำหนด 2) ค่าร้อยละความก้าวหน้าของผู้เรียนด้านการทำความเข้าใจในการอ่านภาษาอังกฤษสูงกว่าเกณฑ์ที่กำหนด 3) นักศึกษามีผลการทดสอบด้านความเข้าใจในการอ่านภาษาอังกฤษหลังเรียนสูงกว่าผลการทดสอบก่อนเรียนอย่างมีนัยสำคัญที่ระดับ .05

คำสำคัญ: คอมพิวเตอร์ช่วยเรียนภาษา โครงสร้างระดับยอด ความเข้าใจในการอ่าน

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ABSTRACT

Computer assisted language learning (CALL) development via top level structure (TLS) is a teaching innovation for English. It was developed to enhance reading comprehension of undergraduate students using a research and development methodology. The study was conducted in the academic year 2017-2018, and it was a continuation based on phase 1 research results. The purposes of this phase 2 study, were to 1) develop the efficiency of CALL-TLS to the designated criterion, 2) investigate the students' reading comprehension progress after learning via CALL-TLS, and 3) compare the students' reading comprehension before and after learning via CALL-TLS. The sample group was 30 Nakhon Ratchasima Rajabhat University (NRRU) undergraduates who had registered in an English for Communication II course in academic year 2018; the sample group was randomized using stratified random sampling. Research instruments used in this study were: a reading comprehension test, and a CALL-TLS evaluation form. The data were then analyzed by percentage, mean, and t-test dependent sample. The results of the study were: 1) that CALL-TLS met the designated criterion of efficiency development to enhance the students' reading comprehension, 2) after learning via CALL-TLS, the students made higher reading comprehension progress than the designated criterion, and 3) after learning via CALL-TLS, the students performed with higher reading comprehension than before learning via CALL-TLS at .05 level of significance.

Keywords: Computer assisted language learning, CALL, top level structure, reading comprehension

Introduction

Good reading comprehension greatly assists successful study for university students. Reading influences the students' success in learning as it is used more often than other skills for further levels of study in the university. For instance, students learn and search for what they need for reports, and for electronic communication in their learning context. Therefore, learning facilities in the university are provided to help them learn and use English for their success. However, reading comprehension problems reduce students' success in the university. Several studies conducted by university lecturers shown that the first and second-year students cannot process the material while reading, and have insufficient reading comprehension ability to study in the first year of the university (Mohammed& Rashid, 2017, pp.429-430;

Ntereke& Ramoroka, 2017). In Nakhon Ratchasima Rajabhat university (NRRU), the students have confronted reading difficulty, as their mean scores for a reading comprehension test were at a low level (Termsinsuk, 2017). If left unsolved the problem may affect the students' success, so it is considered essential to develop students' reading comprehension during their early years at the university via an effective English as a foreign language (EFL) approach to instruction.

Analysis of text structure, or how text is organized, offers a promising method for students to comprehend their reading text. Several EFL studies have revealed that background knowledge of a text's structure leads to reading comprehension improvement (Koda, 2017; Akhondi, Malayeri,

& Samad, 2011, pp.368-372). A skillful author becomes a more skillful reader as he or she gains more writing experience, such as recognizing content structure and text structure, to help the comprehension process while reading (Fitzgerald & Shanahan, 2000, pp. 39-50; Heather, 2008, p.111; Llach, 2010, pp.7-8). Based on this point of view, a student becomes a more skillful reader when a lecturer teaches them text structure before they start the reading lesson.

Top Level Structure (TLS) is a specific method for teaching text structure to enhance students' reading comprehension via writing. The method focuses on quick reading based on the writing and reading relationship (Rattanavich, 1988, pp. 89-91; Jinajai & Rattanavich, 2015, pp. 232-233). Use of the method in class helps students learn to quickly recognize and identify writing organizational structures that authors use in their writing. Reading comprehension occurs when students are able to transfer their knowledge of text structure and content structure from writing to reading (Tan-ngamtong,1986, pp.94-108; Fitzgerald & Shanahan, 2000, pp. 39-50). This process helps students discover the main idea and details of the text accurately. Currently, most lecturers use computer technology to help them satisfy a student's need for reading ability improvement via TLS.

One application of computer technology is "computer assisted language learning (CALL)." CALL proves beneficial for second or foreign language learners in many ways. Students who learned via CALL showed reading comprehension improvement and they made higher mean scores for identifying the main idea, and details of the text, and it has been shown statistically that reading comprehension of EFL students was increased via CALL (Sadeghi &

Soltanian, 2010, pp. 48-62; Fardy, Namdar, &Farhadi, 2011, pp. 1-7). Therefore, researching and developing in the NRRU context, the researcher specifically designed CALL for reading comprehension in 2017, to enhance the reading comprehension of NRRU students based on the reading and writing relationship via the top-level structure (TLS) method, named, CALL-TLS.

CALL-TLS software was constructed by the results of phase 1. It consists of: 1) a learning system structure; this is a learning path for a student to go through step by step, consisting of 3 sections: a Pre-CALL-TLS section for pretest and orientation, a CALL-TLS training section for reading comprehension development and feedback, and a post-CALL-TLS for post-test and result feedback, and 2) a learning content structure; the contents are all about the familiar story of King Bhumibol and his Majesty's projects, focusing on the four types of text structure at a paragraph level: description or listing, cause and effect, problem and solution, and comparison and contrast. They are presented through multimedia via frequent activity, practice, and exercises in various reading contexts (Termsinsuk, 2017).

The study reported here investigated whether CALL-TLS enhanced the reading comprehension of NRRU's undergraduate students.

Research objectives

In this study, the research objectives were to: 1) develop the efficiency of CALL-TLS to the designated criterion, 2) investigate the reading comprehension progress of the students after learning via CALL-TLS, and 3) compare reading comprehension of the students before and after learning via CALL-TLS.

A conceptual framework

Learning occurs when a student connects prior knowledge to the existing information in their brain. The information is processed via the relevant actions among three memories in the brain: sensory memory, working memory, and long-term memory (Prasertkul,1986, pp. 94-97; Tan-ngamtong,1986, p.94;Clark, 2002, p.11; Woolfolk, 2007, pp. 250-259 ; Bruning, Schraw & Norby, 2011, pp. 13-64). In teaching, learning via interesting media is important for attention in the sensory memory. Grouping, diagramming, and frequent practice are also vital for the learning process in the working memory and storing in the long-term memory.

Reading comprehension is a process of understanding based on the writing and reading relationship that a reader makes while reading. It consists of the abilities of translating, summarizing, and identifying the main ideas and details of the text. (Rattanavich, 1988; Snow, 2002, p.11; Wiriyajitra & others, 2012; Lenz, 2017, n.d.;Collins English Dictionary, 2017, n.d.). Reading and writing have a strong relationship to each other; they transfer text attributes such as writing organization and writing purposes to each other (Fitzgerald & Shanahan, 2000, pp. 39-50; Heather, 2008, pp.111; Llach, 2010, pp. 7-8). Therefore, each skill always has an interaction with the other while writing or reading is processed by the brain. Based on this point of view, CALL-TLS is a well-designed software using writing knowledge to support reading comprehension with a familiar content that provides a top-level structure (TLS) method to learn with, and a repetition of practice via the learning system of computer assisted language learning (CALL), providing a learning path to follow in order to enhance the students' reading comprehension in English.

Method

The study of phase 2 was conducted in the academic year 2018 following phase 1 of the study which provided the results and CALL-TLS features in 2017. For the phase 2 study, the following were conducted;

1. Scope of the study. The dependent variable was CALL-TLS, and the independent variable was reading comprehension. A sample group containing 30 students was drawn from 115 NRRU undergraduate students who had registered for the English for Communication II course, using stratified random sampling. This was the main sample group for the study.

2. Research procedure. In this study, the research procedure was conducted in 3 steps which were;

2.1 Develop CALL-TLS efficiency to the designated criterion via a developmental test: one to one testing, a group testing, and a field testing (Brahmawong. 2013: pp.11-12). The mixed ability participants were 43 NRRU students who were not in the main sample group.

2.2 investigate the students' reading comprehension progress after learning via CALL-TLS of the main sample group consisted of 30 mixed ability NRRU students.

2.3 In the main sample group, compare the students' reading comprehension before and after learning via CALL-TLS.

3. Research design. One group pre-test post-test design was used for the main sample group; they took a pre-test then the orientation was introduced for 2 hours. After that, they used the effective CALL-TLS to improve their reading comprehension in their own extra time for a month, maximum, and finally took a post-test.

4. Research instruments. The research instruments used in this study were; a reading comprehension pre-test and post-test, and a CALL-TLS evaluation form. The research instruments were examined by a group of experts who were experienced in educational technology, educational technology and innovation, TEFL, and curriculum and instruction. The test reliability (KR-21) was 0.93, the item difficulty index of the test (p) were 0.46-0.77, the item discrimination index (r) of the test were 0.27-0.91, and CALL-TLS quality was appropriate to be used at the highest level, with a mean score of 4.87.

5. Data collection. The data was collected using the formula and statistics as follows;

5.1 Test the efficiency of CALL-TLS via 3 steps of a developmental test, which were; one to one testing, a group testing, and a field testing (Brahmawong. 2013: p.10). The expected results of the designated criterion of $E_1/E_2 = 80 / 80$

$$E_1 = \frac{\frac{\sum X}{N}}{A} \times 100$$

$$E_2 = \frac{\frac{\sum F}{N}}{B} \times 100$$

For the first formula, E1 is the process efficiency which is the percentage of the total mean scores of learning and practices ($\sum X$) consisting of exercises, activities, and quizzes students did while learning via CALL-TLS. N is the number of students, and A is the total of the practice scores.

For the second formula, E_2 is the efficiency of the learning output or reading comprehension, which is the percentage of post-test mean scores that students gained after learning via CALL-TLS. N is the number of students, and B is the total scores of the post-test.

For interpretation of the results, if the designated criterion was achieved, CALL-TLS would be accepted and interpreted as being effective to develop the students' reading comprehension. Additionally, although the results of E_1/E_2 would be accepted at 80/80, the error would also be accepted at 2.50 above or below the designated criterion.

The group of participants used for the 3 steps of developmental test consisted of 43 NRRU students who were not in the main sample group, they included: 3 mixed ability students for step 1, 10 mixed ability students for step 2, and 30 mixed ability students whose scores were in a normal curve distribution who were assigned in a group for step 3.

5.2 Investigate the learning progress of reading comprehension of the main sample group, before and after learning via CALL-TLS, using the following formula (Ritcharoon, 2018).

Reading comprehension $= \frac{\overline{X}_2 - \overline{X}_1}{\text{Total Scores}} \times 100$: designated criterion 25%

In this formula, $\overline{X}_1$ is the total score that pre-test students gained before learning via CALL-TLS. $\overline{X}_2$ is the total score post-test students gained after learning via CALL-TLS.

For interpretation, if the result calculated by the formula is 25% or more, then it will be accepted that the students' reading comprehension had increased after learning via CALL-TLS; in other words, it shows learning progress after learning via CALL-TLS.

5.3   Compare the sample group's reading comprehension before and after learning via CALL-TLS using t-test dependent samples. The alpha set is at 0.05 level of significance.

Findings

To achieve the objectives of the study, the researcher constructed CALL-TLS, and developed its efficiency to the designated criterion, $E_1:E_2 = 80/80$, via the 3 steps of developmental testing. The results of the test are as follows;

1. For the first objective of the study, the efficiency of CALL-TLS via 3 steps of developmental testing is shown in table 1.

In table 1, the test result of CALL-TLS efficiency is shown by the values; E_1/E_2: 78.81/80, 80.20/80, and 80.20/80.22 for step 1, step 2, and step 3, respectively. The three values correspond closely to the designated criterion of CALL-TLS' efficiency at 80:80. Therefore it can be interpreted that CALL-TLS is effective to enhance students' reading comprehension.

2. For the second objective of the study, the progress of students' reading comprehension after learning via CALL-TLS is shown in table 2.

Table 1: The efficiency of CALL-TLS via 3 steps of the developmental testing.

Developmental test	Numbers of students (43)	Mean scores of learning and practice (96)	Mean scores of post-test (15)	Efficiency of CALL-TLS ($E_1/E_2 = 80/80$)
Step 1	3	75.66	12.00	78.81/80
Step 2	10	77.00	12.00	80.20/80
Step 3	30	70.63	12.00	80.20/80.22

Noted: Designated criterion of $E_1/E_2 = 80$

Table 2: The progress of the students' reading comprehension after learning via CALL-TLS

Total score of post-test	($\overline{X}1$)	($\overline{X}2$)	Resding comprehension progress (25%)
30	13.27	22.27	30%

Noted: Designated criterion at 25% increased.

In table 2, The post-test mean score of the students' reading comprehension was higher than the pre-test mean score, and the percentage of the students' reading comprehension had increased by 30% from the pre-test mean scores. The value shown was higher than the designated criterion. The students' reading comprehension had increased after learning via CALL-TLS.

3. For the third objective of the study, the students' reading comprehension before and after learning via CALL-TLS as shown in table 3.

Table 3: Students' reading comprehension before and after learning via CALL-TLS

The paper test (30)	N	X	$\sum D$	$\sum D^2$	df = n^{-1}	t
Pre-test	30	13.27				
Post-test	30	22.27	264	2428	1.699	25.41*

In table 3, the t-test dependent samples show a value of 25.41 which is higher than the values set at 0.05 level of significance (1.699). It was interpreted that after learning via CALL-TLS, the students' reading comprehension was significantly increased.

Conclusion

It was shown that 1) CALL-TLS efficiency met the designated criterion of E1/E2 = 80/80, 2) the post-test score of the students' reading comprehension increased by 30% from the pre-test score and was higher than the designated criterion of 25%, and 3) the students' reading comprehension was significantly increased after learning via CALL-TLS. From the research results of the three objectives of the study, it can be concluded that reading comprehension of NRRU students was enhanced by learning via the effective CALL-TLS constructed by the researcher.

Discussion

The objectives of the study were; 1) to develop CALL-TLS efficiency to the designated criterion of E1/E2 = 80/80, 2) to investigate reading comprehension at the designated criterion 25% increased, and 3) compare reading comprehension before and after learning via CALL-TLS. The results of the study in response to the criteria, and the t-test, revealed its result at 0.05 level of significance. The evidence showed that students' reading comprehension had increased after learning via CALL-TLS. The final result related closely to previous studies of CALL for reading comprehension development in EFL context at university level around the years 2010-2013, and that there was statistical significance which showed that reading comprehension of university students increased by CALL (Sadeghi & Soltanian. 2010 : Online; Fardy, Namdar & Farhadi. 2011: Online; Meihami & Varmaghani. 2013: Online). The enhancement of reading comprehension via CALL-TLS might be for the following reasons;

1. The students made the connection in the relationship between reading and writing while reading. CALL-TLS provided activities focusing on learning about text structure, text development via TLS diagrams, purpose, and signal words that the author often uses; as a result, knowledge about those may transfer to a student while reading. The connection performed reading comprehension that was able to

transfer and helped comprehension while reading (Fitzgerald & Shanahan, 2000, pp. 39-50; Clark, 2002, p. 11; Woolfolk, 2007; Heather, 2008, pp.111; Llach, 2010, pp. 7-8; Akhondi, Malayeri, & Samad, 2011, pp. 368-372; Bruning, Schraw& Norby, 2011, pp.13-64).

2. CALL-TLS provides its learning system sequentially, so that the three memories work together; preparing to learn, learning, and recalling what has been learned. The first part begins with entering the menu and preparing to learn through each orientation step, then moving to the next step. The second part provides learning and processing for comprehension while reading; with multimedia designs and with repetition learning through TLS activities such as diagramming, matching, and answering questions until students perform correctly, resulting in retention. The last part is to recall what has been learned and stored in the student's brain, showing performance changes by taking the post-test. The continuous process works effectively as stated by information theory; that learning occurs when the three memories in the brain work while reading (Clark, 2002, p. 11; Woolfolk, 2007; Bruning, Schraw& Norby, 2011, pp.13-64).

Recommendation

CALL-TLS features may change over time and through the use of improved technologies in class. The changes may achieve more convenient learning options for students to study at any time through internet CALL-TLS or by making a link for CALL-TLS to a Google classroom to serve learning opportunity among students.

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