



**CONCEPT MAPPING AS A SCAFFOLDING TECHNIQUE IN THE
TEACHING OF EFL READING COMPREHENSION AMONG
UNDERGRADUATES IN CHINA**

By

TA NA

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

August 2023

FPP 2023 3

All material contained within the thesis, including without limitation text, logos, icons, photographs, and all other artwork, is copyright material of Universiti Putra Malaysia unless otherwise stated. Use may be made of any material contained within the thesis for non-commercial purposes from the copyright holder. Commercial use of material may only be made with the express, prior, written permission of Universiti Putra Malaysia.

Copyright © Universiti Putra Malaysia



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

**CONCEPT MAPPING AS A SCAFFOLDING TECHNIQUE IN THE
TEACHING OF EFL READING COMPREHENSION AMONG
UNDERGRADUATES IN CHINA**

By

TA NA

August 2023

Chairman : Associate Professor Abu Bakar Razali, PhD
Faculty : Educational Studies

Reading is an essential skill in which it is an interactive process and a fundamental life-long learning tool, which is crucial to students' personal and professional success. Enhancing reading skills has long been a focal point of researcher endeavors. Within this context, concept mapping emerges as a potent technique for improving learners' reading comprehension. Employing a mixed research method, this study combines a quasi-experimental design with qualitative semi-structured interviews. 135 Chinese undergraduates from Chifeng University were recruited and randomly assigned to three groups: the full concept mapping group, the group combining concept mapping and conventional method, and the conventional method group. The full concept mapping group received instruction exclusively centered around the scaffolding technique of concept mapping. In contrast, the group combining concept mapping and conventional method engaged in conventional instruction during the while-reading phase and used concept mapping in the after-reading phase. The conventional method group underwent regular conventional reading instruction throughout the semester. Post-test results unveiled the significant superiority of the combining concept mapping with conventional method group (mean=85.42) over both the full concept mapping group (mean=80.20) and the conventional method group (mean=74.11). Delayed post-test outcomes reinforced the effectiveness of combining concept mapping with conventional method (mean=78.91) compared to full concept mapping (mean=74.51). These findings underscore the advantage of combining concept mapping with conventional method for immediate and enduring enhancements in reading comprehension. Subsequent to the quasi-experiment, semi-structured interviews were conducted with nine participants, revealing that the utilization of concept mapping stimulated the employment of reading strategies and positively influenced attitudes. Thus, this study advocates that the most efficacious approach to incorporating the concept mapping technique into English as a Foreign Language reading comprehension instruction is through its integration with conventional method. Drawing from these findings, this study contributes to theoretical insights by synthesizing various theories

to elucidate the multifaceted process of EFL reading comprehension. Additionally, it provides valuable practical implications for curriculum developers, policymakers, educators and researchers, thereby enhancing the implementation and future exploration of this technique.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PEMETAAN KONSEP SEBAGAI TEKNIK PERANCAH DALAM
PENGAJARAN KEFAHAMAN BACAAN EFL DI KALANGAN PELAJAR
PRASISWAZAH DI CHINA**

Oleh

TA NA

Ogos 2023

Pengerusi : Profesor Madya Abu Bakar Razali, PhD
Fakulti : Pendidikan

Membaca merupakan kemahiran penting yang melibatkan proses interaktif dan merupakan kemahiran pembelajaran sepanjang hayat yang penting dan kritikal untuk kejayaan peribadi dan profesional pelajar. Peningkatan kemahiran membaca telah lama menjadi tumpuan penyelidik. Dalam konteks ini, pemetaan konsep muncul sebagai teknik yang berpotensi untuk meningkatkan pemahaman membaca pelajar. Dengan menggunakan kaedah penyelidikan campuran, kajian ini menggabungkan reka bentuk kuasi-eksperimen dengan temu bual kualitatif separa berstruktur. Seramai 135 pelajar prasiswazah China dari Universiti Chifeng telah dipilih secara rawak dan dibahagi kepada tiga kumpulan: kumpulan pemetaan konsep penuh, kumpulan yang menggabungkan pemetaan konsep dan kaedah konvensional, dan kumpulan kaedah konvensional. Kumpulan pemetaan konsep penuh menerima arahan yang menumpukan sepenuhnya kepada penggunaan teknik pengimbasan pemetaan konsep dalam membaca. Sebaliknya, kumpulan yang menggabungkan pemetaan konsep dan kaedah konvensional menggunakan kaedah konvensional dan pemetaan konsep dalam fasa membaca. Kumpulan kaedah konvensional pula menjalani pengajaran membaca konvensional biasa sepanjang kajian. Keputusan ujian pasca menunjukkan peningkatan yang signifikan kumpulan yang menggabungkan pemetaan konsep dengan kaedah konvensional ($\text{min}=85.42$) berbanding dengan kumpulan yang menggunakan pemetaan konsep secara penuh ($\text{min}=80.20$) dan kumpulan kaedah konvensional ($\text{min}=74.11$). Keputusan ujian lewat menegaskan keberkesanan menggabungkan pemetaan konsep dengan kaedah konvensional ($\text{min}=78.91$) berbanding dengan kumpulan yang menggunakan pemetaan konsep secara penuh ($\text{min}=74.51$). Penemuan ini menekankan kelebihan menggabungkan pemetaan konsep dengan kaedah konvensional untuk peningkatan segera dan berterusan dalam pemahaman membaca. Selepas proses kuasi-eksperimen, temu bual separa berstruktur dijalankan dengan sembilan peserta, dan menunjukkan bahawa penggunaan pemetaan konsep merangsang penggunaan strategi membaca dan memberi kesan positif kepada sikap pelajar. Oleh itu, kajian ini mengesyorkan bahawa pendekatan yang paling berkesan dalam pengajaran

pemahaman membaca Bahasa Inggeris sebagai Bahasa Asing adalah untuk menggabungkan teknik pemetaan konsep dengan kaedah konvensional. Merujuk kepada temuan ini, kajian ini memberi sumbangan kepada pandangan teori dengan mensintesis pelbagai teori untuk menjelaskan proses bersifat pelbagai lapisan pemahaman membaca Bahasa Inggeris sebagai Bahasa Asing. Tambahan pula, ia memberikan implikasi praktikal yang berharga untuk pembangun kurikulum, pembuat dasar pendidikan, pendidik, dan penyelidik, dan juga meningkatkan pelaksanaan dan penyelidikan masa depan terhadap kaedah ini.



ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere appreciation to my main supervisor Dr. Abu Bakar Razali, for his invaluable help and guidance throughout my study. His expertise, valuable suggestions, and constructive feedback have significantly contributed to the improvement of my research. Moreover, his unwavering support and encouragement have instilled in me the confidence and resilience needed to overcome the challenges I encountered.

I would also like to extend my gratitude to my supervisory committee members, Dr. Joanna Joseph Jeyaraj and Dr. Fazilah Razali, for their insightful guidance and valuable comments that have further enriched my study.

Additionally, I am thankful to Dr. Nooreen Noordin for her professional suggestions and comments, which have enhanced the quality of my research.

I am deeply indebted to my dear colleagues: Wang Yanyan, Bao Hongling, and Li Si, who played a vital role in the successful implementation of the teaching methods during the experiment and provided valuable assistance in data collection and analysis.

Last, but certainly not least, I want to express my profound appreciation to my husband, my son, my parents, and my parents-in-law for their unwavering support and understanding throughout my PhD journey.

The PhD journey has been an unforgettable and meaningful experience in my life. It would have been impossible for me to realize this dream without the help and support from each and every one of you. From the depths of my heart, I extend my sincere thanks to everyone who has supported and assisted me on this remarkable journey. Thank you so much!

TABLE OF CONTENTS

	Page
ABSTRACT	i
ABSTRAK	iii
ACKNOWLEDGEMENTS	v
APPROVAL	vi
DECLARATION	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiv
LIST OF APPENDICES	xv
LIST OF ABBREVIATIONS	xvi
CHAPTER	
1 INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem	2
1.3 Research Objectives	4
1.4 Research Questions	4
1.5 Research Hypotheses	5
1.6 Significance of the Study	5
1.7 Scope and Limitation of the Study	6
1.8 Conceptual and Operational Definitions of Terms	7
2 LITERATURE REVIEW	10
2.1 EFL Reading Ability	10
2.2 Scaffolding and Concept Mapping	12
2.2.1 Scaffolding	12
2.2.2 Concept Mapping	13
2.3 Review of Past Studies on Scaffolding and Concept Mapping in EFL Reading Comprehension	19
2.4 Reading Strategies in EFL Reading Comprehension	21
2.5 Reading Attitudes in EFL Reading Comprehension	22
2.6 Challenges with EFL Reading Comprehension	23
2.7 Gaps of the Study	25
2.8 Theoretical Framework	27
2.8.1 Cognitive Constructivism Theory	27
2.8.2 Meaningful Learning Theory	28
2.8.3 Sociocultural Theory	29
2.9 Conceptual Framework	33
3 METHODOLOGY	35
3.1 Research Design	35
3.2 Research Setting, Population, Sample and Sampling Technique	36
3.3 Research Instruments	38

3.3.1	Reading Comprehension Tests (Pre-test, Mid-test, Post-test and Delayed Post-test)	38
3.3.2	Semi-structured Interview Protocol	39
3.4	Treatment Process and Data Collection	40
3.4.1	Phase 1- Quantitative Data Collection	40
3.4.2	Phase 2-Qualitative Data Collection	44
3.4.3	Triangulation of Data	44
3.5	Data Analysis	45
3.6	Validity and Reliability Issues	47
3.6.1	Validity and Reliability of the Quasi-experimental Design	47
3.6.2	Trustworthiness, Credibility, Confirmability, Dependability and Transferability of Qualitative Design	48
4	RESULTS AND DISCUSSION	50
4.1	Demographic Data and Data Screening	50
4.2	Effectiveness of Using Concept Mapping Technique to Improve EFL Learners' Reading Comprehension	52
4.2.1	Results of Students' Reading Comprehension Tests	52
4.2.2	Discussion for Students' Reading Comprehension Tests Results	58
4.3	Students' Use of Reading Strategies in the Three Groups	61
4.3.1	Descriptions of Students' Use of Reading Strategies	61
4.3.2	Discussion on Students' Use of Reading Strategies	67
4.4	Students' Attitudes towards the Use of Concept Mapping Technique	69
4.4.1	Descriptions of Students' Attitudes towards the Use of Concept Mapping Technique in Reading Learning	70
4.4.2	Discussion on Students' Attitudes towards the Use of Concept Mapping Technique in Reading Learning	73
5	SUMMARY, IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH	76
5.1	Summary	76
5.2	Implications	77
5.2.1	Theoretical Implications	77
5.2.2	Practical Implications	77
5.3	Suggestions for Future Research	78
	REFERENCES	80
	APPENDICES	91
	BIODATA OF STUDENT	130
	LIST OF PUBLICATIONS	131

LIST OF TABLES

Table		Page
2.1	Summary of Gaps Addressed by the Current Study	27
3.1	An Overview of the Research Questions, Data Collection Methods, and Data Analysis Methods of the Study	45
4.1	Participants' Demographic Information	50
4.2	Test of Normality on the Reading Pre-test of the Three Groups	51
4.3	Test of Homogeneity of Variances on the Reading Pre-test	51
4.4	Test of Normality on the Reading Mid-test of the Three Groups	51
4.5	Test of Homogeneity of Variances on the Reading Mid-test	51
4.6	Test of Normality on the Reading Post-test of the Three Groups	51
4.7	Test of Homogeneity of Variances on Post-test of the Three Groups	52
4.8	Test of Normality on the Reading Delayed Post-test of the Three Groups	52
4.9	Test of Homogeneity of Variance on Delayed Post-test of the Three Groups	52
4.10	Descriptive Statistics of the Three Groups on the Reading Pre-test	53
4.11	ANOVA Results of the Three Groups on the Reading Pre-test	53
4.12	Descriptive Statistics of the Three Groups on the Reading Mid-test	54
4.13	ANOVA Results of the Three Groups on the Reading Mid-test	54
4.14	Descriptive Statistics of the Three Groups on the Reading Post-test	54
4.15	ANOVA Results of the Three Groups on the Reading Post-test	55
4.16	Post-Hoc Tukey HSD Test Results for the Three Groups on the Reading Post-test	55
4.17	Descriptive Statistics of the Three Groups on the Reading Delayed Post-test	56
4.18	ANOVA Results of the Three Groups on the Reading Delayed Post-test	56
4.19	Post-Hoc Tukey HSD Test Results for the Three Groups on the Reading Delayed Post-test	57

4.20	Types and Numbers of the Specific Cognitive Reading Strategies Reported by Participants in Interviews	62
4.21	Types and Numbers of the Specific Metacognitive Reading Strategies Reported by Participants in Interviews	64
4.22	Types and Numbers of the Specific Socio-affective Reading Strategies Reported by Participants in Interviews	66
4.23	The Number of Coding Sources of the Three Types of Reading Strategies in the Three Groups	67
4.24	Students' Emotional Attitudes towards the Use of Concept Mapping Technique in the Reading Process at the End of the Experiment	70
4.25	Students' Changes of Attitudes towards the Use of Concept Mapping Technique throughout the Experiment	72

LIST OF FIGURES

Figure		Page
2.1	A Concept Map that Describes Concept Maps	14
2.2	The Hierarchical Concept Map	15
2.3	The Flowchart Concept Map	15
2.4	The Spider Concept Map	16
2.5	The Problem-solution Map	16
2.6	The Persuasive-argument Map	17
2.7	The Conceptual Framework of the Study	34
3.1	Explanatory Sequential Design	36
3.2	The Process of Data Collection	40
3.3	The Use of Concept Maps in Different Stages for the Three Groups	42
4.1	Trends in the Mean Scores across the Four Tests among the Three Groups	58
4.2	Participant A's Assignment on Drawing a Concept Map on the Text of Unit 1--- <i>Save Money, Have Fun: The Joys of Doing It Yourself</i>	125
4.3	Participant B's Assignment on Drawing a Concept Map on the Text of Unit 1--- <i>Save Money, Have Fun: The Joys of Doing It Yourself</i>	126
4.4	Participant C's Assignment on Drawing a Concept Map on the Text of Unit 1--- <i>Save Money, Have Fun: The Joys of Doing It Yourself</i>	126
4.5	Participant D's Assignment on Drawing a Concept Map on the Text of Unit 1--- <i>Save Money, Have Fun: The Joys of Doing It Yourself</i>	127
4.6	Participant E's Assignment on the Text of Unit 1--- <i>Save Money, Have Fun: The Joys of Doing It Yourself</i>	127
4.7	Participant F's Assignment on Drawing a Concept Map on the Text of Unit 1--- <i>Save Money, Have Fun: The Joys of Doing It Yourself</i>	128

LIST OF APPENDICES

Appendix		Page
A	Classification of Reading Strategies	91
B	An Excerpt from the Teaching Plan on the Different Ways and Processes of Using Concept Maps in the Two Experimental Groups	92
C	Reading Comprehension Tests	94
D	Semi-structured Interview Protocol	119
E	Consent Form	120
F	Approval Letter from JKEUPM	124
G	Students' Assignments of Concept Mapping	125
H	Excerpts from Teachers' Teaching Journals	129

LIST OF ABBREVIATIONS

EFL	English Foreign Language
ESL	English Second Language
ZPD	Zone of Proximal Development
L1	First Language
L2	Second Language
CET-4	College English Test - Band 4
E1	The full concept mapping group
E2	The combining concept mapping and conventional method group
ANOVA	One-way Analysis of Variance
HSD	Honestly Significant Difference

CHAPTER 1

INTRODUCTION

This chapter begins with the background of the study, discussing the importance of reading comprehension and reading teaching in the field of teaching and learning a foreign language, especially among undergraduates in China. This is followed by the statement of the problem, which explains the need for doing a study on using the visual scaffolding technique of concept mapping in students' learning of reading comprehension. Subsequently, research objectives, research questions, and research hypotheses are presented to further illustrate the aims of the study. Following this, significance and scope and limitations of the study are presented. Finally, the conceptual and operational definitions of terms end the chapter.

1.1 Background of the Study

Reading is an essential skill and a fundamental life-long learning tool for students to achieve personal and professional success. It has been the focus of numerous studies in the field of teaching and learning a foreign language (Macaro, 2003). As Bowey (2005) has mentioned, the ultimate goal of reading is to understand a text. Furthermore, reading instruction aims not only for immediate comprehension but also for the long-term retention and transfer of these vital skills (Cosper & Kephart, 1955).

Reading and reading comprehension has been attached with great importance in China as well. Chinese people read for the purpose of academic advancement as well as career development (Brantmeier & Yu, 2014). For Chinese students, reading is the most important skill for them to master among the four skills of listening, speaking, reading, and writing in EFL learning (Cheng & Good, 2009). Especially for undergraduate students, who are required by *A Guide to College English Teaching (2020)* proposed by China's Higher Education Department of Ministry of Education to achieve a high level of reading ability.

Due to the importance of reading comprehension, it has been the focus of many researchers and educators to find effective teaching methods to improve learners' reading skills. In this regard, concept mapping is one of the more popular and effective techniques in teaching reading for EFL learners that is being practiced across the world. Many studies (e.g. Rassaei, 2019; Liu, et al., 2010; Gurlitt & Renkl, 2008) revealed the positive effects of concept mapping on promoting EFL learners' reading comprehension. By visually organizing and connecting ideas, concept maps are intended to help learners grasp the main idea, identify relationships between concepts, and understand the overall structure and flow of a text (Pinandito, et al., 2021). By actively engaging in the reading process, learners become more active participants, which in turn, promote their retention and application of knowledge acquired through reading (Machado & Carvalho, 2020).

Despite the numerous benefits that concept mapping offers for EFL learners in English reading, however, controversy exists due to conflicting findings from other studies (Andoko, et al., 2020; Furtado, et al., 2018) that suggest concept mapping to be time-consuming and effortful, potentially increasing learners' cognitive load and negatively affecting learning outcomes. Therefore, further research is necessary to determine how to mitigate these negative effects and use concept mapping more effectively in EFL reading classroom.

Moreover, in the context of exploring the effectiveness of concept mapping, it is essential to address the presence of a delayed post-test in this study. The inclusion of a delayed post-test allows for the assessment of the long-term retention and transfer of reading comprehension skills acquired through concept mapping.

1.2 Statement of the Problem

Despite the great importance of reading comprehension, EFL and ESL readers often encounter significant challenges when reading in the English language. According to McNamara (2007), EFL readers typically have little trouble comprehending individual words in isolation. However, when these words are combined into long sentences in a particular context, they are likely to fail to understand the meaning. Similarly, Shehu (2015) noted that a prevalent issue among EFL learners is their excessive concern on the meaning of every single word, which led to their lack of overall understanding of texts. In other words, EFL learners tend to approach articles word by word without connecting the ideas, resulting in a fragmented understanding of the meaning that the text intended to convey (Zarei & Alipour, 2020). That is to say, ESL/EFL learners often struggle to employ effective reading strategies in their reading process, making reading a challenge task (Cynthia & Narayana, 2019; Shehu, 2015).

These difficulties are particularly pronounced in Chinese EFL classrooms, where the focus predominantly centers on the linguistic aspects of reading texts. Teachers frequently instruct students to translate English texts word-for-word into Chinese during the reading process. Unfortunately, this approach fosters rote memorization rather than the effective use of a diverse set of reading strategies and supportive tools, resulting in students' fragmented comprehension of articles (Hu & Baumann, 2014). He's (2006) study underscored the prevalence of instructing students to underline key ideas while reading and translating passages from English to Chinese in Chinese EFL classrooms. Such teaching methods have contributed to students' passive roles in the learning process, a lack of sense of participation, and poor attitudes towards reading (Zhang, 2015; Zheng, 2002). Consequently, despite recognizing the significance of reading in English, EFL/ESL students often perceive it as unenjoyable and invest limited effort in reading (Şentürk, 2015).

In the context of college-level English education, it is imperative to recognize that the demands of reading comprehension extend beyond basic language acquisition (Newton, et al. 2018). College-level English courses often requires students to engage with complex and specialized texts, ranging from academic articles to professional literature. These texts demand not only a mastery of language but also the ability to synthesize

information, critically analyze content, and extract nuanced meaning. The conventional teaching method, as observed in Chinese EFL classrooms, often fall short in equipping college-level students with the advanced skills needed for comprehensive reading.

Therefore, it is essential for both teachers and researchers to explore effective teaching methods and techniques to equip learners with the correct strategies needed to organize scattered knowledge into meaningful understanding (Wang, 2019). Especially in college-level English education, teachers need to adopt more effective teaching methods to meet the needs of EFL/ESL students and enhance their use of effective reading strategies (Ali & Razali, 2019). In China, *A Guide to College English Teaching* (2020), the instructional document outlining the objectives and requirements of College English courses, also encourages teachers to adopt and incorporate innovative teaching methods and techniques to guide students master required skills and cultivate a positive learning attitude. In essence, college English teachers in China should make use of different teaching methods and teaching techniques to get students' high participation and activate their enthusiasm in reading learning.

In this study, concept mapping was employed as a supportive technique in College English courses, aimed at assisting students in mastering learning strategies and fostering more positive learning attitudes, as stipulated by the *Guide to College English Teaching* (2020). To address potential drawbacks associated with sole reliance on concept mapping, the study specifically integrated it with the conventional teaching method commonly used in college-level English instruction. The conventional method here refers to the traditional teaching practices prevalent in college English classrooms, which often involves direct instruction, reading comprehension exercises, and linguistic analysis. By combining concept mapping with the conventional teaching method, the study sought to harness the strengths of both methods. While concept mapping encourages students to visualize their thought processes and construct a holistic understanding of texts, the conventional method provides essential linguistic and analytical skills. This combination was intended to mitigate any potential negative effects attributed to relying solely on concept mapping and enhance the overall effectiveness of reading instruction. The effectiveness of concept mapping as a scaffolding technique in the teaching of EFL reading comprehension was measured using reading comprehension tests. These tests include reading tasks such as cloze exercises, information matching, and multiple-choice questions. These tasks were designed to measure specific aspects of comprehension skills, such as identifying main ideas, inferring meaning from content, making connections between concepts, and synthesizing information from complex texts. The tests involved the use of a variety of English texts, including argumentative and narrative articles in the fields of science, economics, food, and the environment, among others, to represent the types of materials that college-level students typically encounter. To account for the development of reading comprehension, the study incorporated pre-tests, post-tests, and delayed post-tests, assessing students' progress over time. The inclusion of a delayed post-test allowed for the assessment of the long-term retention and transfer of reading comprehension skills acquired through concept mapping.

Furthermore, alongside with the sociocultural perspective, teachers in conventional EFL reading teaching classrooms are used to provide help or support, which is referred

to as scaffolding, to students in the linear form of questioning, cuing, and giving feedback. Such scaffolding, however, is not always effective since teachers can't always get students' responses in time so as to know their actual level of development, and sometimes students are not good at expressing themselves or even not realizing their own problems, which makes it difficult for teachers to adjust the support in time. As a result, the scaffolding that teachers provide in the conventional EFL reading teaching classroom is not always within students' Zone of Proximal Development (Vygotsky, 1978). In this regard, however, concept mapping can work as a specific form of visual scaffolding to be provided in reading teaching, which refers to the construction of a graphical diagram to organize the textual information and represent the meaningful connections among the concepts in the text. In the process of concept map construction, students can visualize their thinking process and present their understanding of reading materials, which makes their thoughts explicit and facilitates teachers to detect their problems and provide tailored support to help them make continuous progress in learning. In current study, researchers also explored the detailed procedures for providing concept mapping as a scaffolding technique in the reading teaching process and aimed to find out how to provide such scaffolding within the ZPD of undergraduate students in China.

1.3 Research Objectives

The current study investigated the effectiveness of concept mapping as a scaffolding technique in the teaching of EFL reading comprehension among undergraduates in China, as well as students' attitudes towards such technique. Specifically speaking, there are three research objectives in the study:

1. To determine the effectiveness of using concept mapping as a scaffolding technique to improve Chinese EFL learners' reading comprehension.
2. To explore how the use of concept mapping as a scaffolding technique influence Chinese EFL learners' use of reading strategies in reading comprehension.
3. To investigate Chinese EFL learners' attitudes towards the use of concept mapping technique in college English reading.

1.4 Research Questions

In line with the research objectives, three research questions were proposed as follows:

1. Is the use of concept mapping as a scaffolding technique effective for improving Chinese EFL learners' reading comprehension?
2. How does the use of concept mapping as a scaffolding technique influence Chinese EFL learners' use of reading strategies in reading comprehension?
3. What are Chinese EFL learners' attitudes towards the use of concept mapping technique in college English reading?

1.5 Research Hypotheses

With respect to the first research question of the study, two null hypotheses were proposed. Null hypotheses were used in the study because there were still controversies on effectiveness of using concept mapping in the teaching of EFL reading in past studies.

- a) H_0-1 : There is no statistically significant difference in the means of reading comprehension scores among the three groups of experimental group 1 (which used full concept mapping), experimental group 2 (which combined concept mapping and conventional method), and control group in the post-test.
- b) H_0-2 : There is no statistically significant difference in the means of reading comprehension scores among the three groups of experimental group 1 (which used full concept mapping), experimental group 2 (which combined concept mapping and conventional method), and control group in the delayed post-test.

1.6 Significance of the Study

The study has the potential to make valuable contributions to the field of teaching reading in EFL contexts. It aims to explore the effectiveness of the concept mapping technique in the practical teaching of EFL reading comprehension. By investigating its impact on students' EFL reading comprehension and attitudes towards English reading, this research seeks to shed light on its possible benefits.

Moreover, this study may offer insights into the role of concept mapping as a teaching technique that can complement other reading methods in EFL classrooms. It is anticipated that concept mapping, when used in conjunction with conventional methods, could provide a scaffolded learning experience for students within their Zone of Proximal Development (ZPD), drawing from Vygotsky's sociocultural theory. This approach is expected to yield favorable results in reading learning, but further investigation is needed to confirm its effectiveness.

In terms of research implications, this study differs from previous research (Andoko, et al., 2020; Rassaei, 2019; Morfidi, et al., 2018) in its experimental design, which combines concept mapping with conventional methods. While this approach holds promise, the study's outcomes will be crucial in determining its efficacy.

Additionally, potential policy and pedagogical implications may emerge from this research. Curriculum developers and syllabus designers could consider the integration of concept mapping techniques into the design of English language learning programs, aligning with suggestions made in prior research (Brulliard & Baron, 2000). This incorporation might occur at various stages of the reading process, before, during, or after reading.

Furthermore, teacher education programs may explore the inclusion of concept mapping as part of their training to equip educators with a broader range of effective teaching methods and techniques for application in Chinese EFL classrooms.

1.7 Scope and Limitation of the Study

In addition to its significance, the study has some limitations as well. Firstly, while the study would ideally have taken place in a traditional classroom, the unexpected COVID-19 pandemic necessitated the use of online teaching as the mode of intervention. Online instruction for concept mapping offers distinct advantages, particularly in terms of enhanced visibility and peer learning. In the online environment, teachers employ screen sharing to elucidate each step of creating a concept map, ensuring all students have equal opportunities to clear instructions and visual information. Moreover, students' online concept map presentations facilitate peer observation, promoting collaborative learning and a richer understanding of the technique. These advantages demonstrate how online teaching can overcome certain limitations inherent in traditional face-to-face instruction, such as limited visibility and opportunities for peer learning, especially when dealing with complex processes like concept mapping. However, it is crucial to acknowledge that differences may exist between online teaching and face-to-face teaching, particularly concerning teacher monitoring and facilitative roles. To address these potential challenges, the current study utilized the online teaching platforms Tencent Meeting and Xuexitong to facilitate teacher monitoring and facilitation. For example, the Tencent Meeting platform offers real-time chat, discussion forums, and collaborative document sharing, enabling teachers to monitor student progress actively and engage with them while providing timely feedback. Xuexitong allows students to express their opinion, ask questions in real-time, and submit their concept maps for evaluation. Nevertheless, the findings of this study should be interpreted in the context of online teaching, and caution should be exercised when extrapolating them to conventional classroom settings.

Secondly, the study is limited to only the participants who are 135 second-year university students in a public university, Chifeng University, in China. Although concept mapping technique has been proven to be an effective teaching approach in higher education overseas (Ritchhart, et al., 2009), studies in China were mostly among the sample of primary school students (Hwang, et al., 2019) and senior high school students (Tseng, 2020), whereas comparatively few studies focused on university students, especially university students in Chifeng, Inner Mongolia --- northern part of China. Therefore, it is necessary to carry out this current study among the subject of undergraduate students in Chifeng University. For the above reason, the findings may not be generalizable to other samples, such as younger learners.

Finally, the study is a quasi-experimental study among the three groups of students chosen from intact groups of classes. These classes were selected based on their similarities in terms of educational background and, most importantly, their level of reading comprehension. The duration of the study was one semester, namely 32 sessions (90 minutes for one session). The decisions to use intact classes without

dividing students into new groups of classes and conduct the experiment for one semester are for the sake of not disrupting the university's regular teaching plan and students' normal studies. Although one semester is enough to carry out the research rigorously, future studies with longer time duration can be conducted because sufficient time duration will give students the opportunity to become more proficient in the technique.

1.8 Conceptual and Operational Definitions of Terms

Reading Comprehension

Comprehension is the ultimate goal of reading, and various experts provide differing definitions of reading comprehension. According to Woolley (2011), "Reading comprehension is the process of making meaning from text" (p. 2). The primary purpose of reading is to achieve a comprehensive understanding of the text's content by extracting the meaning of words and sentences. Zimmerman, et al. (2007) further elaborate that reading comprehension involves a set of systematic and interconnected skills that enable individuals to extract relevant and important information from the text, make connections between this information and their prior knowledge, and accurately understand the meaning of the text.

In the context of this study, reading comprehension is operationally defined as the capacity of students to recognize, understand, and extract meaning from English reading materials commonly encountered in college English courses. The study utilized the textbook *21st Century English for Interactive Purposes IV*, covering the first four units during the study period. To quantitatively assess students' proficiency in reading comprehension, the study employed reading comprehension tests adapted specifically from the reading sections of CET-4 (College English Test-Band 4) examinations. These assessments encompass various reading tasks, including fill-in-the-blank tasks, matching information, and multiple-choice questions. These tasks were thoughtfully selected to evaluate specific aspects of comprehension skills, such as identifying key concepts, inferring meaning from text, establishing connections between ideas, and synthesizing information from complex passages. The assessments incorporate a diverse range of English texts, including argumentative and narrative articles in fields such as science, economics, food, and the environment, among others, to mirror the types of materials typically encountered by college-level students. To account for the development of reading comprehension abilities, the study integrated pre-tests, post-test, and delayed post-test, enabling the assessment of students' progress over time.

Conventional Method of Teaching Reading

The conventional method of teaching reading is characterized with great emphasis on linguistic knowledge of the target language (Sariah, et al., 2018) and it is featured by the prior emphasis on understanding and memorizing vocabulary and grammatical rules of language and making translations (He, 2006). The conventional way of teaching reading usually asks students to answer reading questions while reading and

write summaries or create outlines after reading (Curtis & Kruidenier, 2005). In this process, teachers devote many efforts into explaining, asking questions, and doing translations in class.

In the current study, the conventional teaching method refers to the lecture method that Chinese EFL teachers use in college English classes. The routine process of English language reading teaching follows the procedures where: Firstly, teachers interpret new words and present background information of the text. Subsequently, students are asked to have a skimming and scanning of the text to get the main idea and answer teachers' questions related to the text. This is followed by the most important part, which is the detailed reading of the text with teachers' explanation on linguistic knowledge, such as analyzing sentence structures, during which process students are asked to underline important ideas, explain by paraphrasing, and translate the text from English to Chinese. The final step is to review the text by summarizing important information or retelling.

Scaffolding

Scaffolding, as defined by Wood, Bruner, and Ross (1976), refers to the expert support provided to a novice for completing a task that he/she cannot perform alone. This support can take various forms, including asking probing questions, teacher monitoring, providing prompts, or offering feedback (Wharton-McDonald, et al., 1998), as well as utilizing visual aids such as graphic organizers, semantic webs, and concept maps (Chang, et al., 2002). It's important to note that while scaffolding involves the assistance that teachers provide to students, it should not be conflated with simple help or assistance (Amerian & Mehri, 2014). Scaffolding, within the framework of Sociocultural Theory (Vygotsky, 1978), is best understood as a continuous and dynamic form of support provided within students' ZPD, facilitating their ongoing progression towards higher levels of skill and understanding.

In the context of the current study, scaffolding was implemented through the utilization of concept mapping technique within the reading instruction process. Specifically, during the map construction process, the teacher provides scaffolding to students by breaking lessons into manageable units and demonstrating how new information can be effectively utilized. Subsequently, the teacher guides students as they apply the new information. Finally, students are encouraged to use the new information independently and share their concept maps with classmates. The feedback provided by the teacher and classmates also serves as scaffolding, enabling students to continually advance towards a deeper level of understanding.

Concept Mapping Technique

A concept map is sometimes confused with another familiar graphic tool known as a mind map, characterized by a central word or image connected to secondary concepts radiating as branches. A mind map is considered less formal and structured, often used by students for tasks such as brainstorming or vocabulary learning. In contrast, a concept map is more formal and tightly structured (Davies, 2011), typically employed

to display relationships among concepts.

In the context of this study, concept mapping technique involves students creating concept maps to visually represent the relationships among concepts based on their comprehension of information within College English course reading texts. These concept maps are manually created using paper and pencil, as opposed to computer-generated maps, which would require additional software skills from students and potentially consume more time and effort. Hand-drawn concept maps offer greater flexibility for beginners to make changes and corrections. Students have freedom to select various types of concept maps, including hierarchical trees, flowcharts, spider charts, problem-solution charts, or persuasive-argument charts, depending on their interpretation of the reading content and their preferred method of organizing information. Regardless of the chosen format, all concept maps should include three fundamental elements: concepts, connecting lines, and linking words or phrases. Incorporating concept mapping into reading comprehension instruction can help learners develop a deeper understanding of texts, improve their comprehension skills, and enhance their ability to retain and apply what they've learned in future reading tasks.

REFERENCES

- Aebersold, J. A., & Field, M.L. (1997). *From reader to reading teacher*. CUP.
- Alderson, J. C. (2000). *Assessing reading*. Ernst Klett Sprachen.
- Alesandrini, K., & Larson, L. (2002). Teachers bridge to constructivism. *The Clearing House*, 75(3), 118-121.
- Alexander, J. E., & Filler, R. C. (1976). *Attitudes and reading*. Reading Aids Series.
- Ali, A. M., & Razali, A. B. (2019). A review of studies on cognitive and metacognitive reading strategies in teaching reading comprehension for ESL/EFL learners. *English Language Teaching*, 12(6), 94-111.
- Aljaafreh, A., & Lantolf, J. P. (1994). Negative feedback as regulation and second language learning in the zone of proximal development. *The Modern Language Journal*, 78(4), 465-483.
- Alrabah, S., & Wu, S. H. (2019). A descriptive analysis of the metacognitive reading strategies employed by EFL college students in Kuwait. *International Journal of English Linguistics*, 9(1), 25-35.
- Amerian, M., & Mehri, E. (2014). Scaffolding in sociocultural theory: Definition, steps, features, conditions, tools, and effective considerations. *Scientific Journal of Review*, 3(7), 756-765.
- Andoko, B. S., Hayashi, Y., Hirashima, T., & Asri, A. N. (2020). Improving English reading for EFL readers with reviewing kit-build concept map. *Research and Practice in Technology Enhanced Learning*, 15(1), 1-19.
- Anisah, N., Fitriati, S. W., & Rukmini, D. (2019). Teachers' questioning strategies to scaffold students' learning in reading. *English Education Journal*, 9(1), 128-143.
- Ausubel D. P. (1963). Cognitive structure and the facilitation of meaningful verbal learning. *Journal of Teacher Education*, 14(2), 217-222.
- Ausubel D. P. (1963). *The psychology of meaningful verbal learning*. Grune & Stratton.
- Axinn, W. G., & Pearce, L. D. (2006). *Mixed method data collection strategies*. Cambridge University Press.
- Baig, M., Tariq, S., Rehman, R., Ali, S., & Gazzaz, Z. J. (2016). Concept mapping improves academic performance in problem solving questions in biochemistry subject. *Pakistan Journal of Medical Sciences*, 32(4), 801-805.
- Barker, C., Pistrang, N., & Elliot, R. (2015). *Research methods in clinical psychology: An introduction for students and practitioners*. John Wiley & Sons, LTD.

- Barron, R. F., & Schwartz, R. M. (1984). Graphic postorganizers: A spatial learning strategy. *Spatial learning strategies*, 275-289.
- Bereiter, C., & Bird, M. (1985). Use of thinking aloud in identification and teaching of reading comprehension strategies. *Cognition and Instruction*, 2(2), 131-156.
- Block, E. L. (1992). See how they read: Comprehension monitoring of L1 and L2 readers. *TESOL Quarterly*, 26(2), 319-343.
- Bowey, J. A. (2005). *The science of reading: A handbook*. Blackwell Publishing.
- Brantmeier, C., Strube, M., & Yu, X. (2014). Scoring recalls for L2 readers of English in China: Pausal or idea units. *Reading in a Foreign Language*, 26 (1), 114-130.
- Braun V., & Clarke, V. (2006). Using the thematic analysis in psychology. *Qualitative Research in Psychology*, 3 (2), 77-101.
- Brulliard, E., & Baron, G. L. (2000). Computer-based concept mapping: A review of a cognitive tools for students. *Proceedings of the International Conference on Educational Uses of Communication and Information Technologies* (pp. 331–338).
- Bruner, J. (1983). Play, thought, and language. *Peabody Journal of Education*, 60(3), 60-69.
- Cao, Z. H. (2007). The effect of learning strategies on reading comprehension. *Sino-US English Teaching*, 4 (4), 15-18.
- Carstens, A., Masenge, A., Immelman, S., & Smith, S. (2020). Concept mapping as a strategy to scaffold concept literacy in accounting for extended programmes. *South African Journal of Higher Education*, 34(1), 116-136.
- Chang, K. E., Sung, Y. T., & Chen, S. F. (2001). Learning through computer-based concept mapping with scaffolding aid. *Journal of Computer Assisted Learning*, 17(1), 21-33.
- Chang K. E., Sung Y. T., & Chen I. D. (2002). The effect of concept mapping to enhance text comprehension and summarization. *The Journal of Experimental Education*, 71 (1), 5-23.
- Cheng, Y. H., & Good, R. L. (2009). L1 glosses: Effects on EFL learners' reading comprehension and vocabulary retention. *Reading in a Foreign Language*, 21(2), 119-142.
- China's Higher Education Department of Ministry of Education. (2020). *A guide to College English teaching*, Higher Education Press.
- Chiou, C. C. (2008). The effect of concept mapping on students' learning achievements and interests. *Innovations in Education and Teaching International*, 45(4), 375-387.

- Clark, K. F., & Graves, M. F. (2005). Scaffolding students' comprehension of text. *The Reading Teacher*, 58(6), 570-580.
- Cosper, R. , & Kephart, N. C. (1955). Retention of reading skills. *The Journal of Educational Research*, 49(3), 212-216.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (fourth edition). Pearson Education, Inc..
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.
- Curtis, M. E., & Kruidenier, J. R. (2005). *A summary of scientifically based research principles. Teaching adults to read*. National Institute for Literacy.
- Cutrer, W. B., Castro, D., Roy, K. M. & Turner, T. L. (2011). Use of an expert concept map as an advance organizer to improve understanding of respiratory failure. *Medical Teacher*, 33 (12), 1018-1026.
- Cynthia, V. L., & Narayana, T. (2019). A study of the issues and the factors on reading efficiency in ESL at undergraduate level. *International Journal of English*, 9(2), 39-48.
- Davies, M. (2011). Concept mapping, mind mapping and argument mapping: What are the differences and do they matter?. *Higher Education*, 62(3), 279-301.
- DeCuir-Gunby J. T., Marshall P. L. & McCulloch, A. W. (2011). Developing and using a codebook for the analysis of interview data: An example from a professional development research project. *Field Methods*, 23 (2), 136-155.
- De Simone, C. (2007). Applications of concept mapping. *College Teaching*, 55(1), 33-36.
- Dey, I. (1993). *Qualitative data analysis: A user friendly guide for social scientists*. Routledge.
- Dole, J. A., Duffy, G. G., Roehler, L. R., & Pearson, P. D. (1991). Moving from the old to the new: Research on reading comprehension instruction. *Review of Educational Research*, 61 (2), 239-264.
- Dolehanty, C. (2008). Concept mapping and reading comprehension. Retrieved October, 12, 2010.
- Fageeh, A. I. (2018). Effects of using computerized concept mapping on developing reading comprehension in an advanced college reading course. *Concept Mapping: Renewing Learning and Thinking Proc. of the Eighth Int. Conference on Concept Mapping*.

- Feng, A. (2009). English in China: Convergence and divergence in policy and practice. *AILA Review*, 22 (1), 85-102.
- Fletcher, J., Grimley, M., Greenwood, J., & Parkhill, F. (2012). What are the school-wide strategies that support sustained, regular and effective instructional reading programmes for 10–13-year-old students? A New Zealand experience. *Teachers and Teaching*, 18(4), 399–416.
- Flindt, N. L. (2007). *Exploring the relation between basic reading proficiency and reading comprehension across grades*. University of Oregon.
- Friesen, D., & Haigh, C. A. (2018). How and why strategy instruction can improve second language reading comprehension: A review. *Reading Matrix: An International Online Journal*, 18(1).
- Furtado, P. G. F., Hirashima, T., & Hayashi, Y. (2018). Reducing cognitive load during closed concept map construction and consequences on reading comprehension and retention. *IEEE Transactions on Learning Technologies*, 11(2), 402-412.
- Gallimore, R., & Tharp, R. (1990). Teaching mind in society: Teaching, schooling, and literate discourse. *Vygotsky and Education: Instructional Implications and Applications of Sociohistorical Psychology*, 175-205.
- González García, F. M., & Zuasti Urbano, J. (2008). The running of the bulls. A practical use of concept mapping to capture expert knowledge. *Proceedings of 3rd International Conference on Concept Mapping*.
- Goodman, K. S. (1967). Reading: A psycholinguistic guessing game. *Literacy Research and Instruction*, 6(4), 126-135.
- Grabe, W. (2008). *Reading in a second language: Moving from theory to practice*. Cambridge University Press.
- Gray, J. H., & Densten, I. L. (1998). Integrating quantitative and qualitative analysis using latent and manifest variables. *Quality and Quantity*, 32 (4), 419-431.
- Grbich, C. (2007). *An introduction: Qualitative data analysis*. Sage.
- Guan, T. J. (2017). *Effects of computer-assisted concept mapping strategy on non-English learners' English reading comprehension- a study based on sophomores' ESP reading course*. PhD thesis. Xinan University.
- Gurlitt, J., & Renkl, A. (2008). Are high-coherent concept maps better for prior knowledge activation? Differential effects of concept mapping tasks on high school vs. university students. *Journal of Computer Assisted Learning*, 24(5), 407-419.
- Halim, N., Arif, M. M., & Supramaniam, K. (2020). Enhancing reading comprehension through metacognitive reading strategies and peer tutoring among year 7 students at a home school centre. *Asian Journal of University Education*, 16(1), 22-31.

- Han, L. R. (2020). *A survey of the factors influencing pupils' English reading comprehension --- based on the China's standards of English*. Master thesis. Huaibei Normal University.
- Harrison, S., & Gibbons, C. (2013). Nursing student perceptions of concept maps: From theory to practice. *Nursing Education Perspectives*, 34(6), 395-399.
- Hattan, C., & Alexander, P. (2018). Scaffolding reading comprehension for competent readers. *Literacy Research: Theory, Method, and Practice*, 67(1), 296-309.
- Hay, D. B., Tan, P. L., & Whaites, E. (2010). Non-traditional learners in higher education: comparison of a traditional MCQ examination with concept mapping to assess learning in a dental radiological science course. *Assessment & Evaluation in Higher Education*, 35 (5), 577-595.
- He, Y. (2006). *A study on the application of concept maps to EFL reading teaching in high school*. PhD thesis. Xibei Normal University.
- Hu, R., & Baumann, J. (2014). English reading instruction in China: Chinese teachers' perspectives and comments. *The Reading Matrix*, 14, 26-60.
- Hwang, G. J., Chen, M. R. A., Sung, H. Y., & Lin, M. H. (2019). Effects of integrating a concept mapping-based summarization strategy into flipped learning on students' reading performances and perceptions in Chinese courses. *British Journal of Educational Technology*, 50(5), 2703-2719.
- Hwang, G. J., Kuo, F. R., Chen, N. S., & Ho, H. J. (2014). Effects of an integrated concept mapping and web-based problem-solving approach on students' learning achievements, perceptions and cognitive loads. *Computers & Education*, 71, 77-86.
- Iftanti, E. (2015). What makes EFL students establish good reading habits in English. *International Journal of Education and Research*, 3(5), 365-374.
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112-133.
- Klein, G. A., & Zsombok, C. E. (1991). Models of skilled decision making. *Proceedings of the human factors society annual meeting*, 35 (19), 1363-1366.
- Kinchin, I., Cabot, L. B., & Hay, D. B. (2008). Visualising expertise: Towards an authentic pedagogy for higher education. *Teaching in Higher Education*, 13 (3), 315-326.
- Lantolf, J. P. (Ed.). (2000). *Sociocultural theory and second language learning* (Vol. 78, No. 4). Oxford University Press.
- Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural theory and genesis of second language development*. Oxford University Press.

- Lazarus, B. D., & Callahan, T. (2000). Attitudes toward reading expressed by elementary school students diagnosed with learning disabilities. *Reading Psychology, 21*(4), 271-282.
- Linse, C. T. (2005). *Practical English language teaching: young learners*. McGraw-Hill.
- Liu, J. (2020). *The application of concept-map based activities to English reading teaching in senior high school*. PhD thesis. Sichuan Normal University.
- Liu, P. L., Chen, C. J., & Chang Y. J. (2010). Effects of computer-assisted concept mapping learning strategy on EFL college students' English reading comprehension. *Computer & Education, 54* (2), 436-445.
- Liu, S. H., & Lee, G. G. (2013). Using a concept map knowledge management system to enhance the learning of biology. *Computers & Education, 68*, 105-116.
- Long, D. J., & Carlson, D. (2011). Mind the map: How thinking maps affect student achievement. *Networks: An Online Journal for Teacher Research, 13*(2), 262-262.
- Luo, M., Main, S., Lock, G., Joshi, R. M., & Zhong, C. (2020). Exploring Chinese EFL teachers' knowledge and beliefs relating to the teaching of English reading in public primary schools in China. *Dyslexia, An International Journal of Research and Practice, 26* (3), 266-285.
- Macaro, E. (2003). Second language teachers as second language classroom researchers. *Language Learning Journal, 27* (1), 43-51.
- Machado, C. T., & Carvalho, A. A. (2020). Concept mapping: Benefits and challenges in higher education. *The Journal of Continuing Higher Education, 68*(1), 38-53.
- Maybin, J., Mercer, N., & Stierer, B. (1992). 'Scaffolding': Learning in the classroom. In: Norman, Kate ed. *Thinking voices: The work of the national oracy project*, (pp. 186-195). Hodder & Stoughton.
- McCarthy, C. (1999). Reading theory as a microcosm of the four skills. Applied Linguistics Series.
- McNamara, D. S. (2007). *Reading comprehension strategies: Theories, Interventions, and Technologies*. Lawrence Erlbaum Associates Publishers.
- Mercer, N. (1994). The quality of talk in children's joint activity at the computer. *Journal of Computer Assisted Learning, 10* (1), 24-32.
- Merisuo-Storm, T. (2007). Pupils' attitudes towards foreign-language learning and the development of literacy skills in bilingual education. *Teaching and Teacher Education, 23*(2), 226-235.
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. Jossey-Bass.

- Mokhtari, K., Dimitrov, D. M., & Reichard, C. A. (2018). Revising the metacognitive awareness of reading strategies inventory (MARSII) and testing for factorial invariance. *Studies in Second Language Learning and Teaching*, 8(2), 219-246.
- Morfidi, E., Mikropoulos, A., & Rogdaki, A. (2018). Using concept mapping to improve poor readers' understanding of expository text. *Educ Inf Technol*, 23, 271-286.
- Muhid, A., Amalia, E. R., Hilaliyah, H., Budiana, N., & Wajdi, M. B. N. (2020). The effect of metacognitive strategies implementation on students' reading comprehension achievement. *International Journal of Instruction*, 13(2), 847-862.
- Murtagh, L. (1989). Reading in a second or foreign language: Models, processes, and pedagogy. *Language, Culture and Curriculum*, 2 (2), 91-105.
- Myles, F., & Mitchell, R. (2004). Using information technology to support empirical SLA research. *Journal of Applied Linguistics*, 1(2).
- Nanda, D. W., & Azmy, K. (2020). Poor reading comprehension issue in EFL classroom among Indonesian secondary school students: Scrutinizing the causes, impacts and possible solutions. *Englisia: Journal of Language, Education, and Humanities*, 8(1), 12-24.
- Natsir, Y., & Anisati, A. (2016). The matters in teaching reading comprehension to EFL students. *Studies in English Language and Education*, 3(1), 65-78.
- Newton, J. M., Ferris, D. R., Goh, C. C., Grabe, W., Stoller, F. L., & Vandergrift, L. (2018). *Teaching English to second language learners in academic contexts: Reading, writing, listening, and speaking*. Routledge.
- Novak, J. D. (1978). An alternative to Piagetian psychology for science and mathematics education. *Science Education*, 61 (4), 453-77.
- Novak, J. D. (1981). Applying learning psychology and philosophy of science to biology teaching. *The American Biology Teacher*, 43(1), 12-42.
- Novak, J. D. (1998). *Learning, creating, and using knowledge: concept maps as facilitative tools in schools and corporations*. Lawrence Erlbaum Associates, Inc.
- Novak, J. D. (2002). Meaningful learning: The essential factor for conceptual change in limited or inappropriate propositional hierarchies leading to empowerment of learners. *Science Education*, 86 (4), 548-571.
- Novak, J. D. (2010). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Routledge.
- Novak, J. D., & Canas, A. J. (2006). The origins of the concept mapping tool and the continuing evolution of the tool. *Information Visualization*, 5 (3), 175-184.

- Nunan, D. (2003). *Practical English language teaching*. Mc Graw-Hill Publishers.
- Oliver, K. (2009). An investigation of concept mapping to improve the reading comprehension of science texts. *Journal of Science Education and Technology*, 18(5), 402-414.
- O'Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. Cambridge University Press.
- Pamuji, A. (2015). The correlation among attitude, reading comprehension, and writing achievement of English education study program students of Sriwijaya University. *Jurnal Adminika*, 1(1).
- Patel, M. F., & Jain, P.M. (2008). *English language teaching*. Sunrise Publishers and Distributors.
- Piaget, J. (1936). *Origins of intelligence in the child*. Routledge & Kegan Paul.
- Piaget, J. (1965). *The moral judgment of the child*. The Free press.
- Pinandito, A., Hayashi, Y., & Hirashima, T. (2021). Online collaborative kit-build concept map: Learning effect and conversation analysis in collaborative learning of English as a foreign language reading comprehension. *IEICE TRANSACTIONS on Information and Systems*, 104(7), 981-991.
- Ragab, S. H. H. (2018). Using concept maps strategy in developing the English reading comprehension skills and attitudes of preparatory students. PhD thesis. Ain Shams University.
- Rasinski, T. V., Rupley, W. H., Pagie, D. D., & Nichols, W. D. (2016). Alternative text types to improve reading fluency for competent to struggling readers. *International Journal of Instruction*, 9(1), 163-178.
- Rassaei, E. (2019). Effects of two forms of concept mapping on L2 reading comprehension and strategy awareness. *Applied Linguistics Review*, 10(2), 93-116.
- Ritchhart, R., Turner, T., & Hadar, L. L. (2009). Uncovering students' thinking about thinking using concept maps. *Metacognition and Learning*, 4 (2), 145-159.
- Rumelhart, D. E. (1977). *Toward an interactive model of reading*. In *Attention and Performance VI* (pp. 573-603). Routledge.
- Safdarian, Z., Ghyasi, M., & Farsani, M. A. (2014). How reading strategy use and personality types are related?. *Reading*, 14(1), 121-135.
- Sandelowski, M., & Barroso, J. (2003). Classifying the findings in qualitative studies. *Qualitative Health Research*, 13 (7), 905-923.
- Sari, D. K., Pratiwi, E., & Thereana, A. (2018). Effective reading strategies for reading skills. *Esteem Journal of English Education Study Programme*, 2(2), 112-120.

- Sariah, S., Jamaluddin, J., & Setiadi, D. (2018). The learning tools based on the REMAP TMPS model (reading concept map timed pair share) and the effectiveness of students critical thinking skills. *Jurnal Penelitian Pendidikan IPA(JPPIPA)*, 4(2), 34-37.
- Saye, J. W., & Brush, T. (2002). Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. *Educational Technology Research and Development*, 50 (3), 77-96.
- Schunk, D. H. (2000). Coming to terms with motivation constructs. *Contemporary Educational Psychology*, 25(1), 116-119.
- Şentürk, B. (2015). EFL Turkish university students' attitudes and motivation towards reading in English. *Procedia-Social and Behavioral Sciences*, 199, 704-712.
- Shehu, I. (2015). Reading comprehension problems encountered by foreign language students, case study: Albania, Croatia. *Academic Journal of Interdisciplinary Studies*, 4 (1), 91.
- Sheorey, R., & Mokhtari, K. (2001). Differences in the metacognitive awareness of reading strategies among native and non-native readers. *System*, 29(4), 431-449.
- Smith, M. C. (1990). A longitudinal investigation of reading attitude development from childhood to adulthood. *Journal of Educational Research*, 83(4), 215-219.
- Soleimani, H., & Nabizadeh, F. (2012). The effect of learner constructed, fill in the map concept map technique, and summarizing strategy on Iranian pre-university students' reading comprehension. *English Language Teaching*, 5 (9), 78-87.
- Stanovich, K. E. (1980). Toward an interactive compensatory model of individual differences in the development of reading fluency. *Reading Research Quarterly*, 16 (1), 32-71.
- Syahabuddin, K., Yusny, R., & Zahara, N. (2019). Teacher teaching styles in introducing concept mapping strategy in reading comprehension activity at senior high schools in Meureudu, Aceh. *Englisia: Journal of Language, Education, and Humanities*, 6(2), 130-145.
- Tabrizi, H. M., Behnam, B., & Saeidi, M. (2019). The effect of soft vs. hard scaffolding on reading comprehension skill of EFL learners in different experimental conditions. *Cogent Education*, 6(1).
- Tajeddin, Z., & Tabatabaei, S. (2016). Concept mapping as a reading strategy: Does it scaffold comprehension and recall. *The Reading Matrix: An International Online Journal*, 16(1), 194-208.
- Tseng, S. S. (2020). Using concept mapping activities to enhance students' critical thinking skills at a high school in Taiwan. *The Asia-Pacific Education Researcher*, 29(3), 249-256.

- Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher–student interaction: A decade of research. *Educational Psychology Review*, 22(3), 271-296.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Vygotsky, L. S. (1986). Konkretnaya psikhologiya cheloveka [Concrete human psychology]. The Moscow University Herald. Series 14. *Psychology*, 14(1), 51-64.
- Vygotsky, L. S. (1987). The collected works of LS Vygotsky: Problems of the theory and history of psychology (Vol. 3). Springer Science & Business Media.
- Wang, S. H. (2019). Instruction Design and Strategy of Concept Mapping. *Proceedings of the 5th international conference on economics, management, law and education*.
- Wharton-McDonald, R., Pressley, M., & Hampston, J. M. (1998). Literacy instruction in nine first-grade classrooms: Teacher characteristics and student achievement. *The Elementary School Journal*, 99 (2), 101-128.
- Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *The Journal of Child Psychology and Psychiatry*, 17 (2), 89-100.
- Wood, D., & Middleton, D. (1975). A study of assisted problem-solving. *British Journal of Psychology*, 66(2), 181-191.
- Woolley, G. (2011). *Reading comprehension: Assisting children with learning difficulties*. Springer science and business media.
- Xu, Y., & Brown, G. T. L. (2016). Teacher assessment literacy in practice: A reconceptualization. *Teaching and Teacher Education*, 58 (supplement C), 149-162.
- Yue, M., Zhang, M., Zhang, C., & Jin, C. (2017). The effectiveness of concept mapping on development of critical thinking in nursing education: A systematic review and meta-analysis. *Nurse Education Today*, 52, 87-94.
- Zarei, A. A., & Alipour, H. (2020). Shadowing and scaffolding techniques affecting L2 reading comprehension. *Applied Research on English Language*, 9(1), 53-74.
- Zeki, S. (1993). *A vision of the brain*. Blackwell scientific publications.
- Zhang, L. (2015). Reflections on the EFL reading comprehension teaching for English majors in China. *College English Teaching and Research*, 6, 7-11.
- Zhang, L. J. (2010). A dynamic metacognitive systems account of Chinese university students' knowledge about EFL reading. *Tesol Quarterly*, 44(2), 320-353.
- Zheng, L. (2002). Discovering EFL learners' perception of prior knowledge and its roles in reading comprehension. *Journal of Research in Reading*, 25 (2),

172-190.

Zimmerman, C., Gerson, S., Monroe, A., & Kearney, A. (2007). Physics is harder than psychology (or is it?): Developmental differences in calibration of domain-specific texts. In D. S. McNamara & J. G. Trafton (Eds.), *Proceedings of the Twenty-ninth Annual Cognitive Science Society* (pp. 1683-1688). Cognitive Science Society.

Zwaal, W., & Otting, H. (2012). The impact of concept mapping on the process of problem-based learning. *Interdisciplinary Journal of problem-based learning*, 6(1), 104-128.

