Use of Mind-Mapping in Language Learning: A Cognitive Approach

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Abstract—This article aims to describe the use of mind-mapping techniques in language learning as a way to assist students in developing their analytical, organizational, collaborative, and creative skills in addition to their language capabilities. During the 2020 academic year, mind-mapping was utilised as a teaching and learning tool in an English class composed of 93 12th-grade students. The research tools used for the purpose of a quasi-experiment included lesson plans, integrated mind-mapping techniques and unit tests. Through a one-group posttest-only design, cognitive-related data was collected by way of unit tests while a questionnaire was used for gathering opinions related to the use of mind maps in English classes. The results showed that the use of mind maps in English language classrooms provide an opportunity for students to be an active learner by acquiring data, processing information, organizing details and constructing knowledge by themselves. In addition, mind-mapping techniques also improve students' skills such as creative and critical thinking, collaborative and organizational skills, alongside their English-language skills. They also develop positive attitudes towards mind-mapping techniques in which they can apply to other subjects.

Index Terms—mind-mapping, language learning, active learner

I. INTRODUCTION

English classes place a strong emphasis on developing the communication skills of students so that they possess the ability to articulate, communicate and interpret the meanings and values from their experiences. The students are not only required to have knowledge of grammatical rules, but also be able to communicate clearly. With continued strides towards a borderless world, there is a need for students to be fluent in languages other than their mother-tongue in order for students to have greater opportunities in the future. The Ministry of Education (2008) clearly states that the Basic Education Core Curriculum of Thailand B.E.2551 (A.D. 2008) aims to equip learners with a "favourable attitude towards foreign languages, the ability to use foreign languages for communicating in various situations, seeking knowledge, engaging in a livelihood and pursuing further education at higher levels" (p.252). The main content of English classes encompasses language for communication and culture, as well as language and its relationship with the community, the wider world and even other learning areas. Nevertheless, language-learning has been often associated with rote-learning. Students believe that they can better acquire a language through memorization of vocabulary, sentence structures and grammatical rules. Consequently, students are often found to recite content before examinations, yet fail to understand or apply them in real-life situations. In reality, language is a skill-based subject covering four main skills - listening, reading, writing and speaking - all of which can be developed and improved through practice. Once students associate learning a language with the need to recite, they feel overwhelmed with the effort that is required. Therefore, English is perceived as one of the most difficult subjects for Thai learners.

Despite the fact that there have been many policies issued to reform language teaching, Thailand is categorized as having 'very low proficiency' in the EF English Proficiency Index (Education First, 2021). This situation demands finding an effective tool to assist learners in learning languages. A language teaching method is a single set of procedures of which teachers are to follow in the classroom. Methods are usually based on a set of beliefs about the nature of language and learning (Nunan, 2003). Consequently, it is the responsibility of the teacher to select and apply a variety of different methods, as proposed by Kumaravadivelu (1994), in order to 'maximise learning opportunities' (p.33) and 'promote learner autonomy' (p.39-40). Therefore, any teaching and learning activity must empower learners to learn independently. A mind map can help learners become an active, constructive thinker by processing the language words and structures and constructing knowledge of a language by themselves. There is an abundance of studies on the use of mind maps in teaching foreign languages (Casco, 2009; Buran, 2015) so as to enhance different skills including writing (Wangmo, 2018), English grammatical structure (Wibowo, 2020; Normawati, 2020; Wang, 2019), English vocabulary (Jiang, 2020, Shdaifat, 2019; Wang, 2018; Sahrawi, 2013), and speaking skills (Nasution, 2020). This paper aims to study the impact of mind maps on the cognitive domain with respect to language learning.

II. LITERATURE REVIEW AND RESEARCH STUDIES

A. Cognitive Approach in Language Learning

Cognition refers to mental activities occurring in the brain to absorb and retain information through experience, senses and thought. This includes thinking, remembering, learning and using language. A cognitive approach in learning helps to understand the connections between new information and concepts with that of existing knowledge, breaking down information and reconstructing it logically. Consequently, such a process maximizes memory and retention capacity. Cognitive learning relates to all forms of knowing including memory, psycholinguistics, thinking, comprehension, perception and application.

Language is a form of communication based on a system of symbols. Communication can be conducted through spoken, written or signed forms. What makes a language comprehensible is its use of words by a community in conjunction with the application of a set of rules delineating the way the language works. Since English is a foreign language in Thailand, learners lack experience in the linguistic, cultural and historical background of the language. In addition, their exposure to the language is limited to weekly classes at school. Most of the time, there is a missing link between existing knowledge of the language to the new lesson learned. The cognitive process sheds light on how learners construct their knowledge of language. As the term suggests, a cognitive approach focuses on the mental process of learners when learning a language, rather than their behavior or the teachers' role in the learning process. Cognition in language study concerns the acquisition, storage, transformation and use of knowledge. It consists of a wide range of mental processes including perception, memory, imagery, language, problem-solving, reasoning and decision-making (Belkhir, 2020). Therefore, in a language lesson the learners, acting as active constructors of knowledge, perceive the language they have learned through mental processes which help them make sense of, memorize and apply what is being taught.

There are many cognitive strategies that teachers can use to teach language. However, the focus should be on developing learners' mental processes with respect to their thinking and problem-solving ability. For example, learners can repeat new vocabularies, organize linguistic structure, guess meaning from context and associate visualization. These student-led activities allow active learners to acquire and process a language in a way that make sense to the individual student.

B. Mind Mapping

The mind map was a concept originated in 1970 by Tony Buzan. It is a graphic technique encompassing the full range of cortical skills including word, image, number, logic, rhythm, colour and spatial awareness in a single, uniquely powerful manner. For educational purposes, mind maps can be used for revision and exams, overviewing the whole picture of the topic, concentrating, memorizing information, organizing details, presenting, communicating, planning, analyzing thoughts and brainstorming ideas (Buzan, 2017). A mind map contains the main idea or key word in the center, with secondary ideas radiating into the surrounds and additional details presented as branches. It shows relationships between ideas through connecting lines.

C. Use of Mind Maps in Language Teachings

Mind maps have been used in foreign language teachings as a tool to activate students' prior knowledge of a topic and assist them in organizing and recalling vocabulary. The activities can be done individually or as a collective class task. The teacher can ask students to create mind maps instead of writing bullet points or paragraphs of what they know about the topic or vocabulary related to it (Casco, 2009). There have been many studies on the use of mind maps in teaching foreign languages to enhance different skills, such as the writing (Wangmo, 2018) of 4th-grade Bhutanese students. The mind mapping technique was considered an appropriate instrument in providing the students with the basic skills necessary for writing, revealing a positive impact on students' writing competency. Additionally, it also enhanced Bhutanese students' higher order thinking skills.

In addition to this, mind mapping was implemented in the teaching of English grammatical structure to students (Wibowo, 2020). The technique allowed for students to be active in giving feedback and also became a measure in assessing the extent to which students understood the material during teaching and learning activities. There were advantages in integrating mind- mapping in grammar lessons because the technique provided students with an overview of the grammatical concept, in-turn allowing for the grammar point to be more easily understood and memorized. In addition, Normawati (2013) conducted studies on digital mind-mapping to improve learners' grammar competence using different platforms, including Instagram and WhatsApp, in the learning process. The students were allowed to create mind maps using digital tools and share it on social media platforms. The mind-mapping technique helped students categorize information and ideas while recognizing the connection between ideas. It also helped them focus on lectures and discussions about grammatical materials while thinking systematically. Wang (2019) conducted research on the application of the mind map in English grammar teaching to study its effectiveness in improving students' interest and efficiency in grammar learning. The results found that mind-mapping can enhance students' initiative, promote interest in learning, and improve the efficiency of learning and the ability of students to grasp grammar knowledge.

The use of mind maps also yielded positive results in English vocabulary lessons. Jiang (2020) applied mind-mapping techniques for vocabulary learning during online courses in China which transformed plain text into colorful, highly organized and easy-to-memorize diagrams in ways that encouraged students to not only actively participate in activities, but also gain a deeper understanding of the content. Moreover, Shdaifat (2019) revealed a positive impact of

an E-mind mapping strategy on improving early-stage students' English vocabulary in Jordan. In addition to achieving an enhanced vocabulary, E-mind mapping strategy transformed the classroom into a more cheerful and colorful environment, with the added benefit of increasing students' self-confidence. Wang (2018) analyzed the feasibility of using mind maps in teaching and learning English vocabulary. The findings revealed that mind maps should play an important role in teaching practices because it could help create interconnectedness among isolated units or items. It could help learners organize and manage knowledge learned in such a way that learners gain a deeper understanding of the lesson. At the same time, teachers could apply mind-mapping techniques to help create knowledge and facilitate communication and learning. Sahrawi (2013) studied the effectiveness and significance of mind-mapping for teaching English vocabulary with 8th-grade students. The study proved the effectiveness of mind-mapping for language learning, with the findings revealing students had an improved knowledge of vocabulary terms as a result of its use. As such, it was suggested that teachers implement mind-mapping strategies for teaching English in the classroom.

Nasution (2020) also observed the positive results of implementing mind-mapping to improve students' speaking skills. In addition, the research identified six factors influencing students' speaking skills including: interesting teaching media, interesting materials, engaging classroom activities, enjoyable classroom management, as well as an engaging teachers' approach and teaching strategy.

III. METHODOLOGY

With the aim of this study being to describe the use of mind-mapping technique in language learning, mind maps were used in an attempt to answer the fundamental question: what happens to students' understanding of English when mind-mapping techniques are incorporated into lessons?

The mind-mapping technique was used in an English class with of 12th-grade students during semester 2 of the 2020 academic year (October-December). There were 93 student participants. The one-group posttest-only design employed the following research tools: lesson plans, integrated mind-mapping techniques and unit tests. The cognitive-related data was collected through the use of unit tests while a questionnaire was used for gathering opinions related to the use of mind maps in English classes. The data was presented as descriptive statistics.

The lesson focused on English grammar and vocabulary. Each unit included at least 15 new vocabulary terms presented through a reading passage and 2 grammatical topics presented through 2 reading passages or dialogues. The unit requires 6 periods of 40 minutes length each.

The lesson was delivered by allocating individual students self-study time on the unit and tasking them with creating a mind map prior to the class. As an individual task, the mind map aimed to allow students to analyze, organize and process all of the information included in the chapter by themselves. This allows students the opportunity to absorb the information, process all the details and present their understanding in the mind map. Please note that, at this stage, there may be some information missing. The students were able to include symbols or drawings in place of the concept they lack understanding of. At the end of each chapter, the students were assigned to work in pairs to discuss, integrate, revise and refine their mind maps. The pair assignment allowed students to work collaboratively and creatively with their classmates. They were required to criticize, negotiate, make decisions and solve problems that arose during their pair-work activity. Prior to COVID-19, the students were asked to write a mind map on a piece of paper. During the COVID-19 pandemic situation however, the use of online platforms was compulsory. Students were allowed to write a mind map on paper, take a photograph and submit it through the online assignment system. Otherwise, they could use applications to creatively produce their work, including programs such as Procreate, Canva, GoodNotes, Microsoft PowerPoint and Google Docs.

IV. RESULTS AND ANALYSIS

At the end of the unit, the 93 students were required to complete the unit test. The results are as shown in Figure 1.
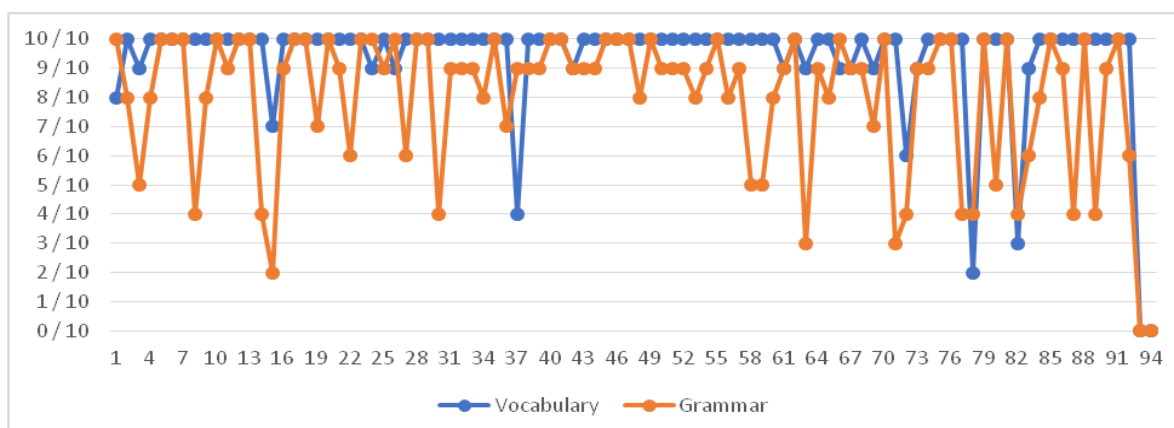

Figure 1 Passing Rates and Mean Scores of the Unit Test Following Intervention Using Mind Mapping Strategies

There were 20 questions: 10 vocabulary-based and 10 grammar-based questions, for a potential total score of 20. The passing criteria were set at 80%. The average score was 9.46 for vocabulary and 8.14 for the grammar component. There were 87 students, equivalent to 93.5%, who achieved the passing criteria for the vocabulary component and 69 students, equivalent to 74%, who achieved the passing criteria for the grammar component

After implementation, the questionnaire was distributed to elicit students' attitude towards the use of mind maps and to answer the question: what happens to students' understanding of English when mind-mapping techniques are incorporated into lessons? 89 questionnaires were returned which was equivalent to 95.70%. There were fifteen, 5-rated scale questions asking students' opinion on the use of mind maps in English classes plus one open-ended question asking for students' additional comments or suggestions. The results are reported in Table 1.

TABLE 1
STUDENTS' OPINIONS TOWARDS APPLICATION OF MIND MAPPING TECHNIQUE IN ENGLISH CLASS

Experience on Mind Mapping Technique	M	SD	Interpretation
Mind map is considered useful for learning English.	4.40	.75	Agree
Mind map is useful for summarizing the lesson learned.	4.58	.65	Strongly Agree
Mind map is useful for organizing the contents of the lesson.	4.49	.71	Agree
Mind map helps students recognize relationship between topics included in the chapter.	4.39	.76	Agree
Mind map helps students understand the contents of the lesson easier.	4.33	.84	Agree
Mind map can be applied in other subjects.	4.43	.74	Agree
Students will apply mind map in studies in the future.	4.30	.82	Agree
Mind map helps students improve English language skills.	4.28	.90	Agree
Students prefer to review studies through mind map to textbook.	4.29	.93	Agree
Students prefer to be assigned mind map as individual task.	3.96	1.29	Agree
Students prefer to be assigned mind map as pair work.	4.34	1.10	Agree
Students prefer to be assigned mind map as group work.	3.56	1.48	Agree
Students enjoy the use of mind map in English class.	4.35	.81	Agree

The study found that 88.7% of students perceived mind map as a useful tool for learning English (M = 4.40, SD = .75). 93.3% of them found that mind maps were useful for summarizing the lesson learned (M = 4.58, SD = .65). 92.2% of them agreed that mind-mapping was useful for organizing the contents of the lesson (M = 4.49, SD = .71). 89.9% of students held the view that mind maps helped them recognize relationships between topics included in the chapter (M = 4.39, SD = .76). 84.3% of students agreed that mind maps helped their understanding of the contents of the lesson (M = 4.33, SD = .84). When asking whether the use of mind maps can be applied in other subjects, 87.7% of students agreed as such (M = 4.43, SD = .74) while 84.2% said they would apply mind-mapping strategies to their studies in the future (M = 4.30, SD = .82). As students were asked to write mind maps in English, 84.3% of students thought that mind maps helped improve their English language skills (M = 4.28, SD = .90). 82% of students were found to prefer reviewing their studies through mind maps compared to textbooks (M = 4.29, SD = .93). Students preferred to be assigned mind maps as an individual task (29.2%, M = 3.96, SD = 1.29), pair work (48.3%, M = 4.34, SD = 1.10) and group work (22.5%, M = 3.56, SD = 1.48) respectively. In overall, 84.3% of students enjoyed the use of mind maps in English class (M = 4.35, SD = .81).

In terms of other skills, 74 students (83.2%) viewed mind maps as helpful in improving their collaborative skills. Moreover, 78 students (87.6%) expressed that mind maps improved their creativity. 74 students (83.1%) perceived mind maps as an effective tool in improving their critical thinking skills, with 73 students (82%) holding the view that mind mapping techniques improved their organizational skill. s

In the open-ended question, students expressed that mind maps were useful for learning as a tool, using only key words for providing an overall idea of the lesson. Some students thought that mind maps were an innovative way for writing short notes summarizing all the details, and that it was useful for reviewing the lesson before examination. Many students enjoyed creating the mind map.

V. DISCUSSIONS

Mind mapping is an effective tool for language learning. Besides cognitive skills, it enhances students' psychomotor and affective domains as well. This study revealed an increase in knowledge and understanding of vocabulary, which is in accordance with the studies of Jiang (2020), Shdaifat (2019), Wang (2018) and Sahrawi (2013), as well as grammatical comprehension of the language as proposed by Wibowo (2020), Normawati (2020) and Wang (2019). In addition, mind mapping techniques also improved students' collaborative, creative, critical thinking and organizational skills, as is suggested within the research findings of Wangmo (2018). Moreover, the use of mind-mapping also resulted in a positive affective domain among students. Many students enjoyed the inclusion of mind-mapping activities in the English class, and the creative process behind it, which is in accordance with the studies of Jiang (2020), Shdaifat (2019) Wang (2018) and Nasution (2020).

In summary, mind maps should be integrated in English language lessons so as to improve students' comprehension of the language concepts being taught in the class, whilst also allowing for students to be active learners, take ownership of their learning and improve other necessary skills.

VI. Conclusion

This study reveals that the use of mind maps in English language classrooms provides an opportunity for students to be an active learner by acquiring data, processing information, organizing details and constructing knowledge independently. According to the results from the unit tests, mind maps are a learning tool that helps students understand vocabulary and grammar effectively (Casco, 2009 & Belkhir, 2020). In addition, mind mapping techniques also improve students' skills such as creative and critical thinking, collaborative and organizational skills as well as their English language ability. Students also hold positive attitudes towards mind-mapping techniques, of which they can apply to other subjects.

Mind maps prove to be an effective tool for cognitive learning in English classes as it helps students concentrate on the key words and concepts of the lesson by requiring them to organize, plan, brainstorm and communicate with their friends (Buzan, 2017). Such a cognitive activity can be implemented individually, in pairs or as a group (Casco, 2009) which can maximize both cognitive and social skills of the learners.

As observed and supported by the feedback from the students, mind maps provide students with an opportunity to express their creativity and work collaboratively with their friends. They tend to have positive attitudes towards English and less associate the subject with the need to recite or memorize. The mind map can be used again when they need to review the lesson for their examinations or other assignments. With this new adopted attitude, they tend to put extra effort in completing this and other assignments.

VII. Recommendations

This study presents the following recommendations for future researchers who are interested in this issue.

Firstly, future studies can explore the impacts of mind-mapping techniques on participants from different populations, so that diverse data can imply how effective the technique is on different ages and educational levels of students.

In addition, researchers can investigate the impacts of mind-mapping techniques on the different aspects of language teaching and learning such as vocabulary, grammar, reading and writing.

This study highlights several recommendations for teachers. The mind-mapping technique can be applied in various settings, both in traditional and online classrooms.

To being with, integrating mind-mapping activities in learning environments cultivates a sense of ownership of knowledge among students. This transforms students into active learners while teachers enact as the facilitator and coordinator in the class (Buran & Filyukov, 2015).

Additionally, mind-mapping techniques provide different opportunities for students to learn a language. It also accounts for the differing learning styles of learners in the class (Buran & Filyukov, 2015). Students can transform textual descriptions into visual depictions, allowing for visual learners to capture and understand the details of the lesson more easily. Logical learners prefer the patterns of information that a mind map allows for. In addition, social learners can benefit from the collaboration required with their classmates in discussions as a part of mind-mapping activities.

In conclusion, mind maps have positive impacts on students' understanding of English. It also improves students' skills that are essential for being an active learner. Such techniques can be easily integrated into English classes, with which both students and teachers alike can greatly benefit from.

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