

The Effectiveness of Mind Mapping Strategy on Enhancing EFL Pupils' Vocabulary Acquisition

Case of Fourth-year Pupils at Laggoune Lakhdar Primary School

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Abstract

This quasi-experimental study was carried out to examine the impact of mind mapping (MM) strategy on English vocabulary acquisition of fourth-year primary school pupils in Aïn Azel, Sétif, Algeria. The research was designed as a single-group pre-post-test study and conducted over eight weeks (Stream 2). The convenience sampling consisted of 33 EFL pupils. Data collection included pre-/ post-tests assessing vocabulary acquisition and employing matching and sentence completion activities. Results advocated that vocabulary acquisition was significantly increased (post-test mean value, 5.60; $P < .05$) compared to baseline data values (pre-test mean = 5.18) with a size effect of 0.182. These findings affirm the possible effectiveness of mind mapping as an instructional method to improve vocabulary in the EFL context for the primary school level.

Keywords: Mind Mapping Strategy, Vocabulary Acquisition, EFL context

Introduction

Vocabulary acquisition is a cornerstone of language learning, serving as an essential foundation for building comprehensive language skills. EFL learners must acquire a robust vocabulary to enhance their listening, writing, reading, and especially speaking competencies (Nation, 2022). Effective vocabulary acquisition strategies are, therefore, of critical significance. In Algeria, vocabulary acquisition is strongly emphasized within the primary educational sector, as foundational language skills acquired at this stage are crucial for students' future academic success and overall communicative competence (Algerian Ministry of Education, 2020).

Among the different teaching strategies, mind mapping generated from cognitive theories has gained interest among educators as a potentially efficient tool for enhancing EFL learners' vocabulary acquisition. Mind mapping is an educational strategy that entails creating schematics for visual presentation to illustrate the connections between ideas and concepts (Buzan, 2000 in Rafii, 2017). This strategy could to a greater extent enhance learners' understanding and memory retention, making it an attractive approach for EFL education. As Fiktorius (2013) stated, mind mapping helps learners repeat and retain new words in the target language, consequently, this may create a more engaging and instructional environment that increases students' motivation and memory retention by using visual and pictorial design.

Mind maps are graphical presentations that use visual clues such as colors, images, and diagrams to facilitate the retrieval of information and acquisition of knowledge. Consequently, mind maps could help learners retain and memorize concepts and words. Miao

(2007) asserted that foreign language teaching and learning processes might be very enjoyable and effective when using the mind mapping strategy because learners acquire new vocabulary, words, concepts, and themes on a regular and easy basis. Moreover, Al-Jarf (2011) stated that the concept of mind mapping is

“a graphic organizer in which the major categories radiate from a central idea and sub-categories are represented as branches of larger branches. It is a visual tool that can be used to generate ideas, take notes, organize thinking, and develop concepts. Teachers can use it to enhance learning. It is helpful for visual learners as an illustrative tool that assists with managing thought, directing learning, and making connections. It is a skill that cuts across ability levels and encompasses all subject matters. It enables students to better organize, prioritize, and integrate material presented in a course” (p.4).

Recent empirical research in education has demonstrated the use of mind mapping to be an effective pedagogic strategy. Consistent findings state that mind mapping significantly outperforms conventional teaching methods in terms of vocabulary retention and acquisition. For instance, Lun et al., (2022) showed a positive effect of mind maps on vocabulary retention and contextual accuracy. Furthermore, applying mind mapping can enhance an interactive role for EFL learners and trigger motivation to learn more efficiently. Mind maps with young learners assigned to learn vocabulary not only provide a way for them to remember the words but also promote higher-order thinking. The process of creating a mind map prompts students to structure their ideas and understand relationships between concepts as well as combine information contextually (Novak & Cañas, 2008). Hence, this is articulated with modern constructivist learning theories that suggest human beings are active in developing their knowledge directly from the content (Piaget 1970; Vygotsky, 1978). By encouraging this level of cognitive participation, mind mapping assists students in understanding vocabulary and retaining it over time.

Although the empirical evidence encourages the use of mind mapping in many educational contexts, there is a clear vacuum on its application to Algeria especially regarding EFL classes for young learners at primary school. The majority of existing studies focus on secondary or tertiary education and do not consider in-depth research into dimensions relevant to younger learners. This gap is important as early language learning experiences are significant in shaping the way students develop their long-term language proficiency. Therefore, the absence of scant research in this domain misses the broad and relevant window opportunities to comprehend more on what mind mapping can be a tool used by primary school EFL learners for vocabulary acquisition may also impede how much it is practiced within the Algerian context.

Hence, this study aims to examine how effective the use of mind mapping as a teaching strategy in developing fourth-year pupils at Laggoune Lakhdar Primary School vocabulary acquisition. Through a quasi-experimental pretest post-test single group design, this study assesses quantitatively the impact of mind mapping on vocabulary retention and acquisition compared to traditional learning and teaching methods. Accordingly, the following research questions were raised:

RQ: Does the mind mapping strategy enhance Algerian EFL learners' vocabulary acquisition?

Based on the research question raised, the null hypothesis was offered:

Ho: The mind mapping strategy does not enhance Algerian EFL learners' vocabulary acquisition.

By addressing this question, this study seeks to contribute to the broader discourse on innovative vocabulary teaching strategies and support the enhancement of EFL education in Algeria. The findings are expected to offer valuable insights for educators, policymakers, and curriculum developers aiming to improve English language instruction in multilingual contexts.

In a nutshell, while mind mapping has shown promise as a vocabulary acquisition strategy in various educational contexts, its effectiveness among primary school EFL learners in Algeria remains underexplored. This study aims to bridge this gap by investigating the impact of mind mapping on vocabulary learning, among young Algerian EFL students. By providing empirical evidence and practical insights, this research hopes to enhance the teaching and learning of English vocabulary in Algerian primary schools, ultimately supporting the broader goal of improving English language education in the country in general and in the primary sector in particular.

1. Literature Review

Vocabulary acquisition is crucial for EFL learners to comprehend and produce language effectively. Vocabulary knowledge is essential for reading comprehension, listening comprehension, speaking fluently, and writing effectively. Without an adequate vocabulary, learners are unable to communicate their ideas, understand others, or achieve academic success in a second or a foreign language.

In traditional language teaching, vocabulary has been taught through rote memorization and repetition (Schmitt, 2008). Although these strategies could be effective to some extent, they often do not succeed in engaging learners deeply or promoting long-term retention. Consequently, great measures in the field of research and education have been taken to implement alternative - usually more enjoyable- ways of improving vocabulary acquisition, including implementing images, contextual learning, and technology-assisted instruction.

Mind mapping is a visual representation technique introduced by Tony Buzan in the 1970s. It involves creating a diagram that connects related ideas around a central concept, using branches and sub-branches. This technique aligns with the brain's natural way of processing information, which is associative and non-linear (Buzan, 2005). Mind maps can include words, images, symbols, and colors to enhance memory and understanding.

The educational benefits of mind mapping are well-documented. Buzan (2005) notes that mind mapping can improve memory retention by helping learners visualize relationships between concepts. Al-Jarf (2009) found that mind-mapping software significantly enhanced students' writing skills by helping them organize their thoughts and ideas more coherently. Therefore, mind mapping encourages active learning and critical thinking, making it a valuable tool in various educational contexts.

It requires making a tree of all related ideas loaded around the concept with the central idea. This method follows the natural associative and non-linear workings of our brains

(Buzan, 2006). They Can Include Words, Images, Symbols, and Colors to Stimulate the Mind. It has been well-documented that mind maps can be highly beneficial to learning. Mind maps improve memory retention by providing learners with a basis on which to begin visualizing the relationships between concepts (Buzan, 2006). In this study conducted by Al-Jarf (2009), he discovered that the use of mind mapping strategy had resulted in a significant improvement concerning students' writing skills, apparently due to its support in better organizing their thoughts and ideas. Mind mapping promotes active learning and critical thinking (Kinchin et al. 2010) rendering it to be beneficial in diverse educational situations.

As such, there are numerous studies available in terms of the use of mind mapping for language learning- primarily vocabulary acquisition. Feng et al., (2023) investigated the impact of mind-mapping techniques on EFL learners' vocabulary recall and retention, learning motivation, and willingness to communicate (WTC). Using the Oxford Quick Placement test to homogenize a sample of 98 EFL learners separated into a control group and an experimental group. The first group received no treatment whereas the second group received mind-mapping instruction. After 23 sessions of treatment, a vocabulary posttest and two questionnaires on learning motivation and willingness to communicate were administered to measure the effectiveness of the treatments. Results of the statistical tests indicate that EG significantly outperformed the CG regarding vocabulary recall and retention.

In the same line, Hazaymeh and Alomery (2021) examined how the use of visual mind mapping as a reading strategy can improve the critical thinking skills of English language learners. Subjects in the experimental group and control groups were randomly selected from two general English courses. For measuring the subjects' critical thinking, the California Critical Thinking Test was employed. The findings revealed a statistical significant difference ($p < .005$) in the mean scores of both groups in the post-test attributed to the visual mind mapping strategy. This approach had a positive and significant effect on participants' critical thinking skills and reading comprehension ability.

Soliman's (2021) study examined the use of the mind-mapping strategy in developing 6th graders' writing skills of Al Forqan Primary School for males in Qatar. A quasi-experimental design was conducted where a purposive sampling (51) was selected with a total number of 103 students: 27 control and 24 experimental groups. Data analysis was attributed to the t-test formula. The results demonstrated statistical significant differences between the mean scores in the pre-test and the post-test in favor of the experimental group.

These multiple recent studies have demonstrated the positive impact of mind-mapping strategies on primary EFL learners' vocabulary acquisition, writing skills, critical thinking, reading ability, and overall language learning motivation and outcomes. Mind mapping appears to be a highly effective pedagogical approach for teaching vocabulary and other language skills to young EFL students. While these studies provide valuable insights, they still do not directly address the specific topic of mind mapping's impact on primary EFL learners' vocabulary acquisition in Algeria. The available research seems to be limited in that regard. More targeted studies within the Algerian educational context would be needed to fully understand this issue.

3. Method

3.1 Research Design

The current study followed a quasi-experimental research using a single-group pre-post-test design. The independent variable is the teaching method. It has one level: mind mapping strategy. The dependent variable is the pupils' English vocabulary acquisition. A quasi-experimental design is used in this study to compare the effectiveness of mind mapping strategy in enhancing EFL pupils' vocabulary acquisition by conducting pre and post-tests and it allows for a more practical approach, as it mirrors real-world conditions in educational settings.

3.2 Data Collection Procedures

The study's targeted vocabulary was carefully chosen from thematic units that are essential to fourth-year primary school PPs' curriculum. Using the school book 'My Book of English 4Ps' "belonging to the fourth-year primary school pupils. The units used for the study were the first three units which are "Family and Friends", "Occupations and Jobs", and the third one which is "School". Additionally, the chosen vocabulary from these units offers natural opportunities for learning across different subjects. Lastly, by putting the vocabulary in relevant and understandable contexts, the study aims to make it easier for fourth-grade pupils to stay engaged, remember, and use the new language skills they have learned.

3.3. Participants

This study was conducted in Laggoune Lakhdar Primary School Aïn Azel, Sétif, Algeria. It was performed in the first semester of the academic year 2023/2024 and lasted eight weeks. Most of the pupils have been studying in this school for more than four years from the first grade to the fourth grade, as they live in the same town, Aïn Azel. Their ages ranged from nine to ten years. Most of them came from middle-class economic families. They lived near the school and some of them go by foot to school. Half of their parents were government employees, and the others' parents were farmers. The target population consisted totally of fourth-year pupils (N =102) PPs. Participants were just one group pre-post-test (n=33) consisting of 16 females and 17 males, all are native speakers of Arabic and received formal English language instruction for the second year.

The study used convenience sampling to select participants from a group of 102 EFL pupils. This method was chosen because of restrictions that made it hard to use other sampling methods. While convenience sampling may not give a perfectly representative sample, it was a practical choice given the study's limitations. It helped investigate how well the mind-mapping strategy worked for improving EFL pupils' vocabulary. The treatment lasted for eight weeks, each class period of thirty minutes.

Likewise, in the pre-experimental phase (week two) the single pre-post-test group was tested by the vocabulary acquisition pre-test. A pre-test was given to the pupils based on previously taught lessons to evaluate their vocabulary acquisition after the diagnostic test. The 30-minute pre-test includes activities like matching, finishing sentences, and choosing the right response. It's a basic test to see what pupils know about words before start helping them. In the experimental phase (weeks three to six), the experimental group received mind-mapping vocabulary sessions.

Moreover, in the post-experimental phase (week seven), the single group pre-post-test completed the vocabulary acquisition post-test. Post-test tasks include filling in tables, marking wrong answers, and matching terms. The reason behind conducting a post-test was to assess and compare the progress and achievements of pupils to evaluate the impact of the mind-mapping sessions.

3. 4. Stages of the Lessons

Lesson plans are designed for a thirty-minute lesson and have the same structure. The following structure presents the first lesson plan as an example:

3.4.1. Introductory Part

In the introductory part of the first lesson which is ‘the school facilities’, the learners were introduced the topic and the teacher wrote it on the board. Then the he briefly explained the research about the mind-mapping strategy and mentioned that this strategy will be implemented in the learners’ lessons to figure out if the mind-mapping strategy represents a possible strategy for vocabulary acquisition at a primary school level. Particularly, these procedures were followed:

- Introducing vocabulary knowledge.
- Introducing MM strategy.
- The term « mind mapping » was written on the whiteboard, and then questions about the PPs’ preconceptions of the term were asked. As a result, ideas were expressed and discussed. Next, three mind mapping-related questions were presented, with thorough explanations for each. The questions were: What is MM's strategy? How do we use MM strategy? what are the benefits of an MM strategy?
- Defining the major and subtopics as well as the ideas and concepts that go with them.
- Create a shape in the center of the board.
- Using a variety of colors, draw lines from this shape that are wide at the beginning and curl towards the end to represent the number of subtopics. Each subtopic’s sub-ideas were at the top.

The lesson started with an explanation and a warm-up in the form of brainstorming about the topic of the lesson to motivate the learners and encourage them to engage. Writing the main idea on the board which is ‘school facilities’ and structure it into a MM model, and start completing the MM shape on the board with the related items to the main idea (Headmaster’s office, schoolyard, library, computer’s room, classroom, canteen, lavatory, lodge). The learners were encouraged to create associations within the words, using several colors, and lines and putting suitable pictures for the chosen items). This simplified example of an MM strategy briefly explain the basic principles of MM and vocabulary mapping. After the distribution of the MM school facilities handouts, the learners were asked to think about the meaning in pairs and clarified the words if necessary. Then, the researchers choose randomly some PPs, each pupil should read his handout.

3.4.2 Main Part

The main part of the lesson consists of the introduction of the vocabulary of MM itself. The learners are given the MM and allowed to consider the meaning of the words. Announce the learners of reading the school facilities MM to find out which words they already know and which words they need to clarify. If the learners face some of the MM words and they do not understand, they are encouraged to circle them.

After reading the school facilities using MM, words that cause difficulties and words that may cause pronunciation problems were highlighted. Since the learners have visual support in the form of pictures accompanied by a written form of the words in the MM, a further explanation of meaning is provided by miming, giving a simple definition in English, and giving synonyms or antonyms. To practice the pronunciation of all words, single repetitions were opted for. Continuing in this process till repeat all vocabulary.

3.4.3. Concluding Part

At the end of the lessons, the researchers introduced the follow-up activity, which included matching instruction, four pictures were presented according to the lesson on school facilities and four suggestions to match each picture with a suitable word. The learners participate alone to answer the activity. At the end of the lesson, the researchers summed up the lesson, asked the learners if they had any questions to discuss and clarify.

3.5 The Internal Validity of The Pre-Post Test

Utilizing students' grades in the test to compute the internal consistency of the study tool via the Pearson Correlation Coefficient is illustrated in the following table.

Table 1: Internal Validity of the Pre-Post Test

Measure	Correlation Coefficient (r)	Significance
Internal validity of the Tool	0.917	$p \leq 0.05$

It is evident from the table above that the correlation coefficient for the study tool is statistically significant at the 0.05 significance level. The validity coefficient for the tool reached 0.91, indicating high validity, thus affirming the tool's credibility.

3.6. Reliability of the Pre-Post Test

The study computed the reliability coefficient using Cronbach's Alpha, yielding the following result:

Table 2: Reliability Statistics of the Pre-Post Test

Reliability Statistics	
Cronbach's alpha	N of items
0.957	2

It is evident from the table above, concerning Reliability, that the reliability coefficient was high, with a value of (0.95), indicating extremely high reliability suitable for the study's purposes.

4. Results and Discussion**4.1 Results of the Normality Test**

Table 3: Normality Test of Pupils' Pre-test

Statistics	value
KS	0.101
p-value	0.200

The normality test aims to determine whether the population is normally distributed or not. In this study, the normality of the pretest and post-test was conducted by using the Kolmogorov-Smirnov (K-S) test in SPSS. Table 3 above displays the pre-test scores. The K-S test statistic was 0.184 with a significance level (p-value) of 0.200. Since the p-value was greater than the standard 0.05 significance threshold, it can be concluded that the pre-test scores were normally distributed.

Table 4: Normality Test of Pupils' Post-test

statistic	value
KS	0.084
p-value	0.200

Similarly, for the post-test scores, the K-S test statistic was 0.084 with a p-value of 0.200. Again, this indicates that the post-test score distribution did not deviate significantly from normality. These results support the visual inspection of the normal distribution curves, which also suggested that both the pre-test and post-test score distributions reasonably approximated a normal distribution. The normality of the score distributions is an important assumption underlying the statistical analyses conducted in this study.

4.2 Descriptive Statistics

In this study, the data obtained from the participants were normally distributed. A paired samples t-test was conducted, and the results are shown in the tables below. Table 5 below shows that the mean post-test score (5.60) is higher than the mean pre-test score (5.18). This suggests an improvement in vocabulary acquisition after the intervention using the mind mapping strategy. The standard deviations (2.38 for the pre-test and 2.33 for the post-test) are relatively close, indicating a similar spread of scores around the mean for both tests.

Table 5: Descriptive statistical results from the pretest and post-test

Group	N	Mean	Std. Deviation
Pre-test	33	5.18	2.38
Post-test	33	5.60	2.33

4.3 Paired Samples T-Test

Table 6: Paired Samples T-Test

Groups		Mean	Std. Difference	T	df	Sig.
Pre-test	3	0.42	0.96	2.53	32	0.016
Post-test						

It is evident from the table above, which compares the treatment group's pre-test and post-test scores, that the calculated t-value (2.53) and degrees of freedom (32) indicate that the p-value = 0.01) is less than ($p = 0.05$). Hence, there are statistically significant differences within the group between the scores of the pre-test and post-test measurements. The mean score for the post-test (5.60) is significantly higher than that of the pre-test (0.42). From the output table, the significance value of the test (Sig. 2-tailed) was 0.016 which is less than 0.05 ($0.016 < 0.05$). From these results, It is evident that H_1 is accepted and H_0 is declined, so it means that the mind-mapping strategy can affect pupils' vocabulary acquisition.

4.5 Size Effect Test

The effect size was calculated using the following formula: Effect Size ES = "Mean [1] – Mean [2] / Standard Deviation weighted" (Creswell, 2012, p. 195). Accordingly, the ES obtained was 0.182 indicating a small effect. This suggests that while the mind mapping strategy had a positive impact on vocabulary acquisition among fourth-year primary school pupils, the magnitude of this impact is relatively modest.

5. Discussion of the Findings

The study sought to investigate the effect of mind mapping strategy in enhancing English vocabulary acquisition among fourth-year pupils at Laggoune Lakhdar Primary School. Both the pre-and post-test results indicated that mindmapping had made a significant difference in vocabulary development. This is demonstrated by the results of a single group pre-post-test. The pre-test mean of the single group participants was 5.18; however, after the treatment period, the post-test means remarkably rose to 5.60 with a significant difference value of 0.42

This significant improvement in scores is indicative of how the use of mind maps can help to enhance vocabulary comprehension and memorization capabilities. The visual sort of vocabulary would have required learners to put together words and concepts in some way, which can lead to deeper processing along with encoding. Colors, forms, and relationships must have surely made the learning process more engaging and memorable for them.

The method requires that students are engaged in the process of thinking about how words and concepts relate to each other. Most probably the very active participation of workers helped them learn and retain current knowledge. Moreover, Mind mapping arranges vocabulary in a structured way, where students can identify relationships between different words and topics. This approach could have helped learners remember and deploy vocabulary in multiple contexts.

The findings of this study support the findings of Bornay (2011) who investigated the usefulness of using grouping and mind-mapping strategies as vocabulary learning tools for Spanish first-year university students. The results of the participants' reflection on using the mind mapping strategy showed that MM is very useful when learning new words. Moreover, a study conducted by Aziz and Yamat (2016) with the title 'The use of mind mapping Technique in increasing students' vocabulary list' demonstrated that the MM strategy helped to improve pupils 'vocabulary acquisition. Therefore, the study implies that the intervention program using the mapping to improve pupils' ability to increase pupils' vocabulary list as compared to the chalk-and-talk method. Based on the findings, it can be concluded that the

MM strategy, is beneficial for teaching and learning English, particularly for vocabulary acquisition.

6. Conclusion

The findings of this study demonstrated the value of the mind-mapping approach in raising vocabulary acquisition among primary EFL learners. The results imply that mind mapping might be an appropriate and efficient method for teaching second languages (L2) as it encourages EFL learners to consider the subjects before introducing the goal content. This is likely because the mind-mapping strategy reflects the cognitive processes that people go through when developing comprehension and allows learners to recognize connections between ideas.

Despite its limitations, the study offers significant contributions to the field of language education and provides a foundation for future research. Integrating the mind-mapping strategy in vocabulary teaching, might enhance learning and provide a nice language practice setting for EFL learners. Several implications surround the findings of this study. First, mind mapping might help support EFL learners learning so it would be wise for teachers to look at using it in their classes often when handling vocabulary sessions. Second, to enhance overall language competence and vocabulary learning, instructors need to map more deeply over multiple thematic units. Finally, instructors should encourage their learners to create their mind maps so that they become autonomous learners who may develop their understanding.

Although the study provides valuable insights, several limitations should be considered in future research. First of all, only 33 participants from a single school were included in the sample. Hence the results may not be generalizable to the whole population. Besides, the intervention was only for 8 weeks. A longer period could provide more useful data for the long-term effects of mind mapping on vocabulary learning. Additionally, without a control group, we could not attribute improvements to the mind-mapping strategy alone. To further strengthen causal claims, future studies should include a control group. Furthermore, extending the research to examine the impact of mind mapping on other language skills, such as reading comprehension, writing, and speaking, can provide a more comprehensive understanding of its benefits. Lastly, since this study was quantitative, it is highly advisable to conduct a qualitative design in future studies such as interviews and class observations to obtain a deeper understanding of the effectiveness of the mind-mapping strategy on primary EFL learners' vocabulary acquisition.

7. References

- Algerian Ministry of Education. (2020). National curriculum guidelines for secondary education.
- Al-Jarf, R. (2011). Teaching spelling skills with a mind-mapping software. *Asian EFL Journal*, 53(1), 4-16.
- Aziz, A. B. A., & Yamat, H. B. (2016). The use of mind mapping technique in increasing students' vocabulary list. *Journal of Education and Social Sciences*, 4, 105–113.
- Bornay, N. (2011). Explicit strategy training in vocabulary learning for beginning Spanish students. *FULGOR: Flinders University Languages Group Online Review*, 4(3).
- Budd, John W., (2004) Mind Maps as Classroom Exercises, *The Journal of Economic Education*, Vol. 35, No. 1 (Winter, 2004), pp. 35-46. [Available on line but missing

accompanying

graphics www.legacy-irc.csom.umn.edu/faculty/jbudd/mindmaps/mindmaps.pdf, retrieved 2012-12-10]

Buzan, T. (2005). *Mind map handbook*. Great Britain: Thorsons.

Creswell, J. W. (2012). *Educational Research, Planning, Conducting and Evaluating Quantative and Qualitative Research* (4th ed.). MA Pearson.

Feng, R., Alsager, H., Azizi, Z., & Sarabani, L. (2023). Impact of mind mapping technique on EFL learners' vocabulary recall and retention, learning motivation, and willingness. *Heliyon*, 9, 1-13. <http://creativecommons.org/licenses/by-nc-nd/4.0/>

Fiktorius, T. (2013). *The use of mind-mapping technique in the EFL classroom*. Pontianak: University of Tanjung Pura Publication.

Hazaymeh, W. A., & Alomery, M. K. (2022). The effectiveness of visual mind mapping strategy for improving English language learners' critical thinking skills and reading ability. *European Journal of Educational Research*, 11(1), 141-150. <https://doi.org/10.12973/eu-jer.11.1.141>

Kinchin, I., Lygo-Baker, S., & Hay, D. (2008). Universities as centers of nonlearning.

Liu, Y., Zhao, G., Ma, G., & Bo, Y. (2014). The effect of mind mapping on teaching and learning: A meta-analysis. *Standard Journal of Education and Essay*, 2(1), 17–31.

Lun, W. W., Muhammad, M. M., Singh, C. K. S., Ping, C. K., Saimi, N., & May, Y. S. (2022). The Usage Frequency and User-Friendliness of Online Platforms among Pre-University Students during Covid-19 Pandemic. *International Journal of Academic Research in Progressive Education and Development*, <https://ijarped.com/index.php/journal/article/view/1883>

Miao, X. (2007). *Combined research on the teaching of vocabulary in middle school metacognitive strategies and mind map*. Unpublished Doctoral Dissertation, University of Alabama.

Nation, P. (2022). *Learning vocabulary in another language* (2nd ed.). Cambridge: Cambridge University Press.

Novak, J. D., & Cañas, A. J. (2008). *The Theory Underlying Concept Maps and How to Construct and Use Them*. Technical Report IHMC CmapTools 2006-01 Rev 2008-01, Florida Institute for Human and Machine Cognition.

Piaget, J. (1970) Piaget's lbeory. In P.H. Mussen (Ed.) *Carmichael's Manual of Child Psychology* (3rd Edition, vol. 1) New York: Wiley.

Primary School Students in Qatar.” *International Journal of Humanities and Educational Research* 3, no. 4: 206–220. <https://doi.org/10.47832/2757-5403.4-3.18>.

Rafii A. Improving students' motivation in writing descriptive texts by using mind mapping. *ELT Echo: J. Engl. Lang. Teach. Foreign Lang. Context*. 2017;2 (2):147–157.

Schmitt (2008) - *Teaching Vocabulary*. Longman Teacher Guidelines Series.

Sellam, A., & Ghanouar, (2021). EFL teachers' perspectives on the efficacy of mind-mapping techniques in reading comprehension: A case study at Badji Mokhtar University Annaba. *Journal of Language and linguistics Studies*, 17(3), 1234-1248

Soliman, M. M. 2021. “The Effectiveness of Using Mind Mapping Strategy in Developing Writing Skills for Sixth-Year Studies in Higher Education, 33 (1), 89–103.

Vygotsky, L. (1978). Interaction between learning and development. In Gauvain& Cole (Eds.), *Readings on the Development of Children* (pp. 34–40). Scientific American Books.

Yahrif, M. (2021). The Effectiveness of Using Mind Mapping Technique in Teaching Descriptive Textfor Improving Writing Ability. JURNAL PENDIDIKAN, SOSIAL DAN HUMANIORA, 1(1),27–35.

Zhao, Y., Chen, L., & Wang, X. (2018). *The role of mind mapping in enhancing learning outcomes: A meta-analysis*. [Journal Name or Publisher].