

The Use of Mindomo Software to Improve the Logical Development of EFL Learners' Writing

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Educators have always been interested in the establishment of environments which motivate and stimulate students to engage in their learning process in an active and dynamic manner. Digital mind mapping, which is a computerised version of mind mapping, is one of the popular teaching as well as learning strategies emerging in the growing world of technology. The present study aimed to determine the effect of using Mindomo software as a computerised version of mind mapping techniques for the logical development of Iranian EFL learners' writing. Accordingly, thirty female intermediate English language learners were selected from the Shokuh Institute in Tabas, Southern Khorasan as the participants of the study. They were randomly allocated to a control group and an experimental group consisting of 15 subjects. The control group was provided with the usual training, while the experimental group was presented with the intervention twice a week during summer of 2018. Pre-tests and post-tests were applied for both groups in this experimental study and the results were then compared. The research findings indicated that application of Mindomo in teaching writing could promote the learners' abilities to develop their writings logically. The results of the statistical analysis confirm that applying Mindomo software in writing classes helps the learners with the logical development of their writings more effectively, although the changes reported in the present study were not statistically significant.

Key words: *Digital mind mapping, logical development of writing, Mind mapping, Mindomo.*

Introduction

Mind mapping is a visual information management tool that helps us structure, organise, memorise, arrange, brainstorm, and learn information in a completely specialised way (Abdulbaset, 2016; Al-Jarf, 2009). A wider definition of mind mapping considers it as a method for storing, organising, prioritising, learning, reviewing, and memorising information (Alomari, 2019). It presents an overview and summary of a body of language that fuses words and pictures together. In other words, mind mapping mixes logic and creative thinking to help us think more proficiently and effectively about the subject that we are learning (Aydoğdu and Güyer, 2019).

All mind maps have several shared characteristics. All of them possess a natural organisational structure radiating from the centre and using lines, symbols, words, colour, along with images based on simple, brain-friendly concepts. Mind mapping alters a long list of boring data into colourful, memorable, and thoroughly organised diagrams that work in line with the brain's natural procedure of doing different affairs (Aydoğdu and Güyer, 2019; Awashrea, 2015).

Mind maps can be applied in a variety of areas of academic learning by students. Mind mapping often appears in educational literature as employed in the learning of science concepts or with students who are learning English as their second (ESL) or foreign (EFL) language; however, it seems to have advantages as an active and collaborative learning tool in a wide variety of educational environments (Chang et al., 2018; Chaichompoo, 2017; Creswell, 1995).

Although mind maps are usually drawn on paper, there is an increasing interest in using the computerised versions of this method, among other digital educational technologies (Davies, 2010; Elzaaby, 2013). Thus, it is possible to say that two types of Mind Maps exist, including: a. Traditional Mind Maps provided by hand and using paper and pen or on the board and b. Electronic Mind Maps which follow similar steps through application of computer software by which flow branches of ideas originating from the central one can be automatically produced. In Electronic mind mapping, computers that were developed to calculate information initially are used for many different purposes as entertainment, communication, reading, and learning (Hourani, 2011).

In addition to the functions of traditional mind maps, this system also enables students to complete and record relevant information that they had found onto the mind map and further improve the integrity of their own knowledge (Jiang, 2007). Furthermore, the addition or movement of ideas is possible, while the addition or removal of images and symbols can also be performed. E-Mind Maps are applied to represent correlations between ideas and

information and need simultaneous thinking on creation of items (Masoud and Latif Ibrahim, 2017). Digital mind maps are more effective and attractive than traditional ones, since they depend on using professionally fast and specialised computer software which includes photos, colours, and drawings that attract the reader. Hence, some authors suggested using e-Mind Maps in an early education stage as they help students organise ideas and information (Molnár and Horváth, 2010). Accordingly, this strategy can be used in teaching English, as an important subject, regarding the difficulties many EFL learners face in different stages of the teaching – learning process.

An example of a digital mind mapping tool is Mindomo, which is a collaborative mind mapping, concept mapping, and outlining software assisting users in organising information in a visual manner. This way, critical thinking is facilitated through the establishment of connections between data, resulting in the expression of the ideas with freedom, and representing the interrelationships between concepts and content in a visual non-linear configuration (Nong et al., 2009). As a result, this technique can be applied in teaching English as a critical subject, with the hope of providing the EFL learners with more interesting learning contexts and subsequently, promote their learning (Ruffini, 2008).

Statement of the problem

The researcher noticed during her field works that many students consider writing in English as a challenging job. Even when they accomplish this task, they appear worried, uncertain, and unstructured. Sometimes they seem to have good ideas, but they cannot deliver them through appropriate language, dictation, or cohesion. As the researcher believes, this may be because of the teaching methods applied, the kinds of feedback that the students obtain, the kinds of writing activities the textbooks provide, or few opportunities to perform the task practically. Moreover, many teachers believe that teaching writing skills is challenging since these skills cannot be measured easily, and as a result, they do not emphasise them in class due to lack of time.

With all these problems in mind, and considering the advantages mind mapping may have in both teaching and learning, the researcher aims to highlight the employment of mind mapping programs in teaching writing, and then, identify and show its positive effects on the students' ability and stimulation to write in a creative and correct way. This research applies mind mapping software called Mindomo as one of the pre-writing techniques to help language learners in an important aspect of writing skills which is the logical development of writing.

Purpose of the Study and Research Questions

The present study aimed at investigating the application of Mindomo Software to enhance the logical development of EFL students' writing. Thus, the following research question will be considered in this study:

- Are there any statistically significant differences in the logical development of Iranian EFL students' writing mean scores that may be associated with the teaching method (Mindomo software vs. conventional method)?

Research Hypothesis

The following hypothesis was raised in the present study considering the research objective and question:

- Mind mapping software does not have a significant impact on the logical development of Iranian EFL learners' writing.

Literature Review

In recent years, scholars have started focusing on mind mapping techniques in order to investigate their effects and applications in teaching different areas of knowledge including languages. However, with the progress of technology that has made different computer software accessible for all people, particularly students in different fields, employment of software has also been emphasised, and has attracted the attention of scholars. In the area of language teaching, researchers have tried to investigate the influence of various mind mapping software on learning a variety of language aspects. Some of these studies are mentioned in the next paragraphs.

(Elawfy, 2011) examined the effectiveness of applying e-Mind Maps in the achievement of English grammar for the second-grade secondary school. It utilised the quasi-experimental method for two groups, including an experimental group which received the e-Mind Maps strategy and a control one which received traditional teaching. Furthermore, pre and post-tests were implemented for the groups. It was found that there were statistically significant differences between the means of the control and experimental groups' scores in the post-achievement test in favour of the experimental group. It was suggested to disseminate the culture of e-Mind Maps among teachers and students in the various phases as well as interest in modern learning methods supported with technology.

Liu et al. (Liu, 2011) examined the influence of various computerised concept mapping procedures (no-mapping, individual-mapping, and cooperative-mapping) on the performance

of pre-writing stage students with a variety of writing capabilities. He also examined whether the quality of the concept maps created cooperatively were superior to the quality of those generated individually. Ninety-four freshmen registered in an English course were divided into high-level, middle-level, and low-level learners based on their baseline writing scores. Post-test results confirmed that both computerised mapping interventions had equal positive impacts on low level and middle-level learners in comparison with the no-mapping intervention. Nevertheless, high-level learners showed a significantly better performance with the individual-mapping intervention compared to the other two groups.

(Kim and Kim, 2012) conducted a study titled “Kolb's Learning Styles and Educational Outcome: Using Digital Mind Map as a Study Tool in Elementary English Class” in which they concluded that the Digital Mind Map class was effective based on the paired t-test taken before and after the classes for all four groups. Also, students represented significant improvement in the group with mind mapping according to One-way ANOVA test and scheffe’s post hoc tests. Most of them believed that the Digital Mind Map helped them to easily find out and learn vocabularies, which was otherwise difficult to associate with previously known knowledge and having access to a tablet PC indulged out of the class. Digital Mind Map indicates various impacts on a variety of learning styles, so that it is necessary to establish different teaching styles with regard to learners’ styles.

Hariri et al. (Hariri, 2013) sought to investigate the attitudes of English as foreign language teachers towards using e-Mind Maps to improve reading comprehension by applying a questionnaire. The sample of the study comprised 30 students in business administration who joined an English course for 2 hours weekly over 16 weeks. Results revealed that the participants’ attitudes were positive towards e-Mind Maps to consolidate their reading comprehension. It was an interesting tool, although some of them expressed the difficulty of e-mind mapping compared to the manual one. It was also characterised by participation with others on the Internet to design e-Mind Maps.

(Gomez Betancur and King, 2014) designed lessons in English as a second language classroom where they used mind mapping software to teach words in reading texts whose topics were geography and language art. They used NovaMind Software and Mind mapper software. They trained their students in creating mind maps by hand; and then they used the software to recreate them electronically. In exams, students were able to remember the words as pictures, videos and sounds hyperlinked to the map. The researchers found out that using mind maps in teaching vocabulary items was effective and enjoyable to students.

(Elabady and Jradat, 2015) aimed to investigate the impact of using e-Mind Maps on developing reading comprehension among the basic ninth grade students in English. The study was applied to two classes of the ninth grade students of Irbid’s schools, Northern Jordan. The experimental group comprised 30 students who studied using e-Mind Maps and

the control one who studied in the traditional way. Data were collected relying on the reading comprehension test. After conducting statistical analyses, results indicated that the means of students' scores (α) were statistically significant at the level of 0.05 in the post-comprehension test in favour of the experimental group. In addition, the effect size resulting from using e-Mind Maps in the reading comprehension of the experimental group was medium. Accordingly, the study recommended holding training workshops for English language teachers, in particular, and teachers, in general, to train them on preparing e-Mind Maps and utilising them in teaching.

(Sabbah, 2015) has studied the effect of college students' self-generated computerised mind mapping on their reading achievements along with the subjects' attitudes toward generating computerised mind maps for reading comprehension. The experimental group was taught reading texts via students' self-generated computerised mind maps, and the control group was taught by teacher-generated whiteboard maps. Analysis of the students' scores on the post-test was carried out using ANCOVA. Subsequently, significant differences were found in favour of the experimental group. To identify the experimental group attitudes toward the intervention, a 40-item four-domain questionnaire was designed and administered. The results of means, modes, and standard deviations analyses indicated the statistical ranking of the domains from the most to the least positive opinions as comes in the following: educational benefits, mental benefits, usability, and enjoyment.

(Bahadori and Gorjian, 2016) have investigated the role of mind mapping software in developing EFL learner's vocabulary at the pre-intermediate level. This study was conducted on 60 EFL learners in a pre-university centre in Masjedsoleyman. The population of the study was divided into two groups each of which included 30 participants. The experimental group was provided with vocabularies of the texts that were taught using the Mind Mapping software 6 (v3.5.3.0) from Xmind.net website as intervention to participants of the experimental group. Eight texts of the reading lessons were considered for ten sessions. On the other hand, the control group received conventional instruction on learning vocabularies including definitions, explanation and translation. The results of the data analysis indicated that the learners who used the mind mapping software outperformed the control group, although both groups showed progress in learning vocabulary, comparison of the groups' pre and post-test showed that the experimental group performed stronger than the control group ($p < 0.05$).

(Aljaser, 2017) in a study on the effectiveness of electronic Mind Maps in developing academic achievement and the attitude towards learning English among primary school students aimed to identify the effect of using electronic Mind Maps on the academic achievement of the fifth-grade primary female students in the English language curriculum, compared to the traditional teaching method adopted in the teacher's guide. Moreover, the

attitudes of the fifth-grade female students towards the use of electronic Mind Maps were relevant to understanding the study unit adopted in this study. The study utilised the quasi-experimental method applied to two groups: experimental and control. The study revealed that there were statistically significant differences between the mean scores of the experimental group and the control one in the post achievement test scale in favour of the experimental group. The effect size of using Mind Maps was high. There were statistically significant differences between the mean scores of the experimental and control group scores in the post achievement test of the attitude towards learning English in favour of the experimental group.

(Chaichompoo, 2017) studied the use of mind mapping to enhance reading comprehension and summary skills of EFL students. The analysis results revealed that, for comprehension skills, the mean of the pre-test was 5.86 with a standard deviation of 1.51, whereas the post-test exhibited a mean of 7.32 with a standard deviation of 1.04. For summary skills, the mean of the pre-test was 4.70 with a standard deviation of 1.42, while the post-test results showed a mean of 6.38 with a standard deviation of 1.07. The data from the questionnaire and interview indicated that this approach enabled the students to analyse and summarise the contents of the reading passages better, faster and more accurately. The majority of the students perceived the technique to be beneficial for analysing the gist of a reading passage.

(Masoud_and Ibrahim, 2017) have investigated the effectiveness of using an e-mind mapping software based program in developing faculty of education 2nd year English majors' vocabulary acquisition and use. The findings of this study were obtained from the vocabulary tests, and then the data were analysed in order to find out whether teaching vocabulary through mind mapping to the treatment group was effective. It was concluded that the treatment group significantly surpassed the non-treatment one in the post-performance of the tests. The study also reveals that the e-mind mapping program aiming to improve students' ability to increase their vocabulary acquisition and use had a tremendously positive impact on the participants.

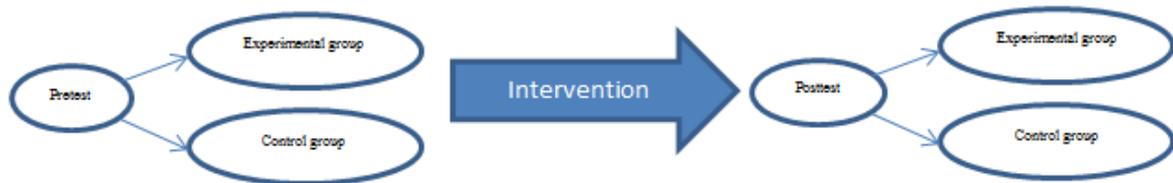
Finally, (Talal Mohaidat, 2018) studied the effects of electronic mind maps on EFL students' reading comprehension. Their findings showed that the effect of applying the electronic mind maps in teaching reading texts was medium. Based on the findings of the study, a number of recommendations were made for both teachers and the Ministry of Education. The most notable recommendation was to train teachers in general and English teachers in particular on how to design electronic mind maps and apply them in their teaching practices.

Research Method

Research Design

The author utilised the experimental method, as shown in the following design:

Fig1. The research design



In this study, a pre-test and post-test design with a control group was used. In the first week, each student was randomly assigned to the experimental group or the control group. Additionally, the experimental students' group was given training on how to create a mind map with the Mindomo application and then sample applications were performed.

Population

The population of the study consisted of 30 language learners from the Shokuh Institute, who were at the intermediate level of English proficiency and whose level had been determined through placement tests of the institute. They were all female and in the age range of 15 to 20 years old. Before the study was performed, the researcher had a meeting with the language learners in the institute, in which she explained the objectives and the procedures of the study. After providing sufficient information, they were asked to participate voluntarily in the research project and they were also reassured about the confidentiality of the results. The subjects were divided into two groups including 15 participants in each group. One of the classes was assigned to the control group in which no intervention was provided. The second group served as the experimental group, which received the intervention in order to be compared with the control group. The classes started in summer because the students of schools and universities were free and could participate in leisure time classes more conveniently. The classes were held two days a week on Saturdays and Wednesdays from 9:30 to 11:00 for the control group and the same time on Sundays and Thursdays for the experimental group.

Data Collection Tools

Data collection was performed in three phases including pre-test, during the course, and post-test. Before the intervention, the pre-test was applied for both experimental and control

groups. They received the same writing pre-test which asked the students to write a paragraph. The essay length and essay components related to the tasks and skills were specified in the test instructions. Two raters graded these writing tasks in order to achieve higher reliability. If the average was the same, teaching could be started. Quizzes were frequently given to the learners during the experiment, and post-test, learners were again asked to write on a specific topic, and all the writings were reviewed and graded by two raters, after which the two groups were compared.

The measurement of students' scores was performed through the scoring rubric which was taken from (Brown, 2004) and whose two aspects which were the focus of the present article are represented here:

Table 1: The Scoring Rubric for logical development

Aspect	20-18 (Excellent to Good)	17-15 (Good to Adequate)	14-12 (Adequate to Fair)	11-6 Unacceptable – Not college-level work	5-1
II. Logical development of ideas: content	Essay deals with the specified topic; the ideas are concrete and completely expanded; no extraneous material; essay represents the thought.	Essay deals with the issues but cannot address some points; ideas could be more thoroughly expanded; some extraneous material is observed.	Ideas are not developed completely or essay seems somewhat off the topic; division of paragraphs is not completely correct.	Ideas are not complete; essay does not represent careful thinking or has been written in a hurry; insufficient endeavour regarding the content.	Essay is thoroughly incomplete and does not represent college-level task; no obvious endeavour to regard the topic exactly.

Since this was experimental research which used an interval scale, the data were analysed by using an independent T- Test in order to calculate the pre and post test results.

Results

Research Implementation

The research was conducted using 30 intermediate learners of English in two phases including a pre-test and post-test. The initial data required for the study were collected from the pre-test, which was applied before the start of the study, and the means of the scores in each component were calculated and presented in a table. Then both groups had 20 sessions

of writing classes with the difference that the control group received conventional teaching, while the experimental group received the mind mapping technique as the intervention. After the determined period of the study, the post-test was applied for both groups and the mean scores were again recorded in tables. It should be emphasised that the writings were corrected by two correctors including the researcher and the observer.

Scoring and Addressing Reliability Concern

As mentioned before, to ascertain the reliability of the scoring procedure, a research assistant was asked to evaluate the given scores to the students. The researcher's scores were compared against the assistant's scores. Thus, inter-rater reliability was calculated and exceeded 89%. According to Creswell (1995): this is considered to be within the highest range of inter-rater reliability. Thus, for the subsequent analyses reported below, the researchers' scores were used as the basis of the analysis.

Results of the pre-test

Table 2 shows the descriptive statistics for the pre-test for both experimental and control groups. As shown in the Table the scores were similar in both groups.

Table 2: Descriptive statistics of pre-test on students' performance on logical development of writing

	Groups of students	No.	Mean scores	SD
Logical development	Control	15	13.93	1.11
	Experimental	15	13.80	1.08

In order to see if the scores of the students in experimental and control groups were statistically similar, the scores were compared pair-wise, through conducting a series of independent T-tests. The relative statistics are shown in Table 3.

Table 3: Independent samples T-tests on students' performance on pre-tests

Aspect of writing	DF	T-value	Sig
Logical development	28	0.21	0.19

In order to see the treatment effects on students' scores in the post-test, their scores were calculated. As Table 4 shows, the experimental group achieved higher scores.

Table 4: Descriptive statistics of post-test on students' performance on logical development of writing

Aspect of writing	Groups of students	No.	Mean scores	SD
Logical development	Control	15	14.13	1.32
	Experimental	15	14.53	0.99

Table 5: Independent sample T-tests on students' scores in post-tests

Aspect of writing	DF	T-value	Sig
Logical development	28	.947	0.35

Accordingly, there was a difference in the students' scores in experimental and control conditions for the logical development of the writing; however, this difference was not statistically significant.

Discussion

The data indicates that the application of Mindomo has improved the learners' scores in the logical development of writings. This was proven, as the mean of the post-tests was higher than the mean of the pre-tests in the experimental group. This finding is also supported by the results of the data analysis from the questionnaire that showed most students responded positively to this technique. The results of this study are consistent with the results of several other studies which have been performed in similar fields. For example, (Trevino, 2005) discussed the use of mental maps as an educational technique in many school subjects and found that the use of these maps created positive attitudes towards learning these subjects; especially positive is that the use of electronic mental maps is simple. They also added that working on these maps in the computer lab created a competitive atmosphere among students, who showed their skills in making these mind maps.

The positive attitudes of the participants towards English can be attributed to the reliance of e-Mind Maps on inserting images and shapes as well as using colours easily and flexibly in a creative computerised environment. The computer attracted the students, since it is supported with various elements of excitement that motivate them to learn English while having positive attitudes. Additionally, (Aljaser, 2017) reported that e-Mind Maps increase learning motivation. (Davies, 2010) also reported that Mind Maps represent a good way of understanding complicated issues because the organised images and graphs are more comprehensible than words. Generally, results are consistent with (Elzaaby, 2013) indicating that students have positive attitudes towards English. They also matched (Hariri, 2013) who reported that participants have positive attitudes towards e-Mind Maps as an interesting tool to consolidate their reading comprehension in English. On the other hand, these results are

inconsistent with (Awashrea, 2015) who reported that participants have negative attitudes towards the use of this technique in learning English.

Conclusion

The study concluded that there were differences between the mean scores of the experimental group and the control one in the post achievement test scale in favour of the experimental group; nevertheless, these differences were not statistically significant. According to the research findings and discussion, it can be concluded that Mindomo has helped the students to develop their texts logically to some extent. Mind mapping software could help them to improve their writing skills in terms of the logical development of ideas, but not significantly. Although there was no statistically significant difference between the two groups, the improvement observed in the experimental group suggests that the use of Mindomo can be promising in the field of EFL teaching, including writing skills. The researcher's observations and experiences confirm this fact, but more research is required to ensure the effects of digital mind mapping in general, and Mindomo in particular, to determine the nature of its association with the improvement of EFL students' language skills.

Recommendations

Since digital mind mapping seems to affect the EFL students' abilities and motivation in writing texts, and particularly enhances their capabilities regarding the logical development of their writing, it is recommended to disseminate the culture of using these kinds of software among students as well as teachers, especially in EFL settings. Students should be guided to apply different versions of mind mapping software while studying their lessons to find out the best one which suits them. Moreover, teachers need to be trained and have access to training courses as well as workshops, to become familiar with and be able to discuss the utilisation of these novel techniques in teaching English. However, it should be noted that the study couldn't prove a significant effect and the results just indicated a difference, which may be due to several reasons including the small sample size. Accordingly, future research is required to confirm the effectiveness of using digital mind mapping techniques in the academic context and on larger samples as well as on different skills which are supposed to be developed in students.

Acknowledgements

The author would like to show her appreciation to all participants of the study that patiently attended the classes and cooperated sincerely during the study period and provided her with the possibility of completing the research.



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