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Demonstrating the Impact of Brainstorming Technique on EFL Students and its Consequences for Improving the Creativity of Solving-Problems During Times of Covid-19 Pandemic

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A R T I C L E I N F O

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A B S T R A C T

This study aims at studying the impact of utilizing brainstorm technique in improving creative problem-solving abilities among EFL students through the approved E-Learning as a means of distance learning under the current circumstances of Coronavirus pandemic and its effect on the subject. The sample of the study contains (96) students from College of Education for Women, Tikrit University. The sample is divided into two groups. Firstly, the experimental group which consists of (46) students who are taught by means of brainstorming technique in the course of improving thinking abilities during in the academic year 2019/2020. Secondly, the control group consists of (50) students. The research devices used in this study includ a program of brainstorming technique and Torrance creative thinking test. The results reveal statistical significant differences at the level of ($\alpha = 0.05$) between the experimental group and the control group in the total score and the sub scores of the creative thinking for the experimental group. This result indicates the impact of brainstorming technique for improving creative thinking abilities. The researcher recommends applying this technique to universities as well as performing more studies regarding its impact on different samples and under other conditions.

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توضيح أثر تقنية العصف الذهني على طلاب اللغة الإنكليزية كلغ أجنبية وعواقبها في تحسين ابداع حل المشكلات خلال جائحة كورونا

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الخلاصة

الهدف من هذه الدراسة هو التحقق من تأثير استخدام تقنية العصف الذهني في تحسين قدرات حل المشكلات الإبداعية بين الطلاب في جامعة تكريت / كلية التربية للبنات من خلال التعليم الالكتروني

المعتمد كوسيلة للتعلم عن بعد في الظروف الحالية لفيروس كورونا وتأثيره على الموضوع. تتكون العينة لهذه الدراسة من (٩٦) طالب وطالبة. تم تقسيم العينة إلى مجموعتين، الأولى تمثل المجموعة التجريبية بأجمالي (٤٦) طالباً يتم تدريسهم من خلال تقنية العصف الذهني في سياق تحسين قدرات التفكير في العام الدراسي ٢٠١٩-٢٠٢٠، والثاني يمثل المجموعة الضابطة التي يبلغ مجموعها (٥٠) طالباً. كانت وسيلة هذه الدراسة برنامجاً لاستخدام تقنية العصف الذهني (اختبار تورنس) للتفكير الإبداعي. أظهرت نتائج الدراسة وجود فروق ذات دلالة إحصائية بين المجموعة التجريبية والمجموعة الضابطة في الدرجة الكلية والعلامات الفرعية للتفكير الإبداعي لصالح المجموعة التجريبية تشير إلى أثر استخدام تقنية العصف الذهني في تحسين قدرات التفكير الإبداعي. نصح الباحث باستخدام هذه التقنية في الجامعات وكذلك إجراء المزيد من الدراسات حول تأثيرها من خلال استخدام عينات مختلفة في ظروف أخرى.

1. Introduction

The world is changing to be a tiny town, due to the improvements in the systematic, technical, economic and social sectors of life which is almost influenced by globalization. In response to those improvements, it becomes a necessity to prepare a generation capable of overcoming new challenges. This can be done through converting the normal procedures of learning and teaching as well as concentrating on such appropriate methods of teaching and creative thinking.

Al-Daoud, (2004) mentions: "that individuals can not be prepared for present and future through pouring information into them through the traditional teaching methods that depend on the teacher in the first place. However, this must be done through guiding students towards achieving knowledge understanding in relation to everyday problems since we live in the era of openness between communities. This requires us to employ information and utilize it in solving problems. This leads to the development of the ability of thinking as well as developing innovation and creativity.

Jarwan, (2005) points out that brainstorming strategy is one of the most important strategies in provoking creativity and solving problems in the educational, commercial, industrial and political fields. Brainstorming strategy was introduced by Alex Osborn, an American advertisement company manager in 1938 due to his inconvenience of traditional business meetings. Brainstorming means the use of brain for the sake of solving problems in such an active way. The brainstorming session aims at developing creative solutions of difficult problems.

On the other hand, creative thinking is recognized as a complex rational activity pointing to guide a strong wish to look for clarifications or reaching original results that were not recognized previously (Jarwan, 2008).

2. The problem of the study

Since English learners have to deal with the emerging circumstances of Coronavirus Pandemic, creative thinking abilities concerning solving-problems

should be improved because of their importance in helping students to cope with international changes, technology revolution and the communication and interaction in the globalization era. Moreover, these abilities help to improve a balanced individual's personality capable of social interaction using self-learning. Hence, the teacher plays the role of facilitator and trainer, requiring him/her to obtain new teaching methods such as brainstorming technique, which can develop creative thinking abilities among students. Therefore, the current study seeks to answer the following questions:

1. Is there a statistically significant impact at the level of significance ($\alpha = 0.05$) for using brainstorming program in teaching creative thinking abilities improvement course in stimulating creative problem solving abilities among Tikrit University students compared to the control group?.
2. Is there a statistically significant impact at the level of significance ($\alpha = 0.05$) on improving creative thinking sub abilities of the experimental group compared with the control group?

3. The Aim of the Study

The study aims to:

1. Explore whether there are differences in the means of students' scores on problem- solving abilities attributed to the brainstorming program, in addition to determining the extent of acquiring creative problem solving abilities among Tikrit University students after the emergence of Coronavirus pandemic.

4. Procedural Definitions

- **Brainstorming Strategy:** brainstorming is an innovative conference with special nature aims at producing a list of ideas that can be used as clues leading students to solve the problem while giving each student the chance to express their ideas and share those ideas with others and encourage new ideas (Al-Blwi, 2006).
- **Creative Problem Solving Skills:** refer to mental process where the talented student uses his/her experiences and available information to respond to the requirements of unfamiliar situation through executing whatever that may solve ambiguity and closing time gaps. They are measured through calculating students' scores on Torrance test (Al-Lala, 2009).

  Scholars and researchers discussed the issue of creative problem solving of problems in general and on the talented students in particular. The creative problem solving can be defined within its three components. Firstly, the solution refers to finding a way to solve the problem. Secondly, the problem refers to obstacles that present a challenge to the individual to reach the goal. Finally, the challenge needs a solution or making a decision. Thus, creative problem solving is a frame or system including productive thinking tools that can be used to understand problems or generating different ideas that are not traditional then evaluating them to reach new solutions (Mitchell & Kowalik, 1999).

5. Literature Review

The section reviews the concepts of brainstorming and creative problem solving skills as well as related studies in both national and international levels. Hence, brainstorming is defined as a creative structural forum composed of general ideas (Al-maghrawy,2012). According to Zayton (2001), brainstorming is developed to produce ideas without inhibition. Brainstorming technique involves oral and pre-writing exercises for helping the learner and for expressing ideas by the teacher using the discussion method.

Al-Blwi (2006) conducted a study to investigate the effectiveness of brainstorming on developing creative thinking and measuring the thinking among science stream students. The sample consisted of (100) male and female students chosen from Tabouk public schools one for males and females. Two classes were chosen, each class consisted of (25) students. The findings of the study showed that there were significant statistical differences between the two groups attributed to the teaching method of creative thinking. There were no significant statistical differences between the means of performance and the interaction in terms of gender.

Bani Hamad (2006) investigated the effect of brainstorming on eighth grade student's achievement in science according to Bloom taxonomy. To achieve the aim of this study, two classes including (64) students were chosen randomly to present the groups of the study. Each group consisted of (32) students, the first group studied through brainstorming; while the second one studied through the traditional method. The findings of the study showed that there were no significant statistical differences between the means of students' scores in both groups on the pretest attributed to the teaching strategy. Moreover, there were no significant statistical differences between the means of students' scores in both groups on each category of the Taxonomy attributed to the teaching strategy.

Al-Olimat (2008) studied the effect of brainstorming and discovery strategies on developing creative thinking among eighth graders in science in Jordan. The sample was chosen purposefully including (85) students distributed to experimental group and a control group. The findings of the study showed that there was an evident effect for brainstorming and discovery on developing creative thinking. Moreover, there were differences between both strategies in favor of brainstorming.

6. The Principles and Rules of Brainstorming

Several studies revealed that Brainstorming aims at carrying out two main principle:

1. Different judgment.
2. The ability to strive. Therefore, after having many ideas the idea of better quality will be produced. (Richey, 1968:565, Prikes, 1981:70, Fontana, 1981:85, and Finnochiaro, 1988:13).

The first principle is based on the assumption that people produce both a small number of ideas and few ideas of good quality since they are fixated on evaluation. If people would not be involved in evaluating their ideas, more ideas

and better- quality ideas would be produced. During the brainstorming sessions, evaluation is postponed temporarily. After the ideas are generated, another group sessions is held to evaluate them and to select the ones that should be followed up.

As for Osborn (1963:39) and Parries (1976:68), thinking involves both a "Judicial mind" which analyzes, compares and choses (i.e. evaluate) a "creative mind" which visualizes, foresees and generates ideas. It is highly believed, in this study, that judicial mind restricts the creative mind, and this restriction needs to be removed so that ideas can be generated (Haslevad, 1972:11).

To remove such a restriction, the first principle of brainstorming has to be considered. So, the individual verbalizes or writes down his ideas without censorship of their value, feasibility or significance call of which are, however, to be considered later. Looking at the second principle, one can infer that the more ideas produced, the better ones may be generated. This implies that quantity of thoughts breeds their quality. The rationale, here, originates in associationistic psychology, which assumes that our thoughts or associationistic are structured hierarchically.

The most dominant thoughts in this hierarchy are those that are most habitual, common or usual and are, therefore likely to be from other points of view, the "safest" and most acceptable to others. Then it is necessary to tackle these conventional ideas if we are to reach the original ones. After the dominant ideas have been exerted, additional efforts have to be spent in order to generate fresh associations (stein, 1981:29).

Implicitly, there are some common associations in the repertoire of an individual and others, if combined properly, can yield creative results. Briefly speaking, the first type of ideas, which is generated in response to a problem, is likely to be usual and commonplace. Then, the unique and potentially creative one are the more likely to occur later in a chain of ideas and they can only be arrived at by producing a quantity of ideas. However, the two basic principles of brainstorming just described above give rise to four essential rules for the brainstorming session they are as follows:

A. Criticism is Ruled Out

This denotes that criticism and evaluation are postponed until the end of the brainstorming session. This key rule constitutes the means of implementing the principle of deferred judgment. The teacher applying brainstorming should prohibit any student or group of students trying to criticize. Among the reasons why the number of ideas produced with brainstorming is larger than that produced with more evaluative procedures, may be related to this evaluation characteristics that prohibits flow of ideas (Stein,1981:137).

B. Flow of Ideas is Welcomed

This explains that participants offer ideas when they feel free. The goal behind this rule is to help the individual feel more relaxed and less inhibited than he might be in ordinary circumstances by encouraging him using his own imagination. One can suggest that this will relieve him of responsibility for

evaluation. Hence, dozens of suggestions, fact, ideas or creative solutions are generated in a matter of minutes (Dikes, 1985:7).

C. Quantity is Wanted

This rule interprets the second principle of brainstorming, that the more ideas suggested the greater probability that original ones will rise (Dikes,1985:80).

D. Combination and Improvement are Sought

The intent of this is to motivate participants to build on others' ideas by explaining how already offered ideas might be improved or combined in various ways with other ideas. This rule, again, not only encourages the development of additional ideas but also offsets any feeling of embarrassment individuals might experience. It is worth noting that the two above cited principles and four rules of brainstorming represent a fundamental orientation to the generation of ideas irrespective whether this orientation is practiced by an individual or by a group of individuals.

7. Types of Brainstorming:

1. **Making a List**

Write single words, phrases, or sentences that are connected to your topic. Look at the list a student made when brainstorming ideas to write about her topic. "What should I study in college" (Zemach and Rumisek, 2003:6).

Examples: History…..learning about the past

Math (too difficult, not interesting?)

What a job do, want there?

English for work? Travel? Writing? (Ibid).

2. Free writing

When you feel free to write, you write whatever comes into your head about your topic, without stopping. Most free writing exercises are short just five or ten minutes. Free writing helps you practice fluency (writing quickly and easily) when you free write you do not need to worry about accuracy (having correct grammar or spelling). Do not check your dictionary when you free write. Do not stop if you make mistake just keep writing! (Zemach and Rumisek, 2003:7).

3. Mapping

To make a map, use a whole sheet of paper, and write your topic in the middle with a circle around it then put the next idea in circle above or below your topic, and connect the circles with lines that the two ideas are related. (Ibid: 7)

- **Example about Free Writing**

There are many subjects to study at university. It is difficult to choose one for my research. It is always made good grades in math, but I do not like it very much. I do not like physical, physics or any science very much. I have always liked writing would journalism be a good course to take. Newspaper have pictures, too, so may be photography would be good. I am definitely looking forward to meeting new friends at university, and what about reading. Reading

is a part of any course, but literature. Includes a lot of reading and it probably includes a lot of writing too (Zemach and Rumisek, 2003:8).

- **Explaining the above example**

Notice how writer's ideas jump around when she makes a mistake, she just crosses it out and continues writing. One thoughts (writing) leads to another (journalism) and then to another (photography). There are some details that are not exactly about her topic (looking forward to meeting new friends), but that is acceptable in free writing. You want to get as many ideas on paper as you can take out unnecessary words and sentences later (Ibid: 8).

8. Methodology

A. Research Sample

The sample is consisted of (96) EFL students purposefully selected from College of Education for women, Tikrit University. These students were studying English through E-Distance Learning in the second semester of the academic year 2019/2020. They were divided into two groups. The experimental group included (46) students taught by means of using the training program; whereas the control group included (50) students who did not receive any training program.

B. Research Tool

Torrance test is used to measure the level of creative thinking and its sub skills; it is valid for all age categories as it consists of five items as follows:

- Requesting questions: the respondent is required to ask any number of questions about a picture.
- Predicting Reasons: the respondent is required to predict all consequences related to the situation in the picture.
- Enhancing creation: the respondent is required to think of the smartest and novel ways to make a doll more interesting for children.
- Unusual practice: the respondent is required to think of the biggest number of uses for empty cartoon boxes.
- Theoretical situations: the respondent is required to write all his predictions for the consequences of a hypothetical situation through a picture representing this situation.

In this study, Torrance test was designed to measure three skills, those are:

1. Fluency: represented by the possible number of responses for the situation within a time unit.
2. Flexibility: represented by the different categories of responses in a fixed time unit.
3. Originality: represented by the number of fixed and unique responses in a certain time unit.

9. Results

Results of the first question: Is there a statistically significant impact at the level of significance ($\alpha = 0.05$) for using brainstorming program in teaching creative

thinking abilities improvement course on enhancing creative problem solving abilities among students of experimental group compared to the control group?. To answer this question, the means and standard deviations were calculated for the Samples' scores in the pre- and post- tests of Torrance as a whole according to group variable (experimental that was taught using the training program and the control group that did not receive any training. **Table (1)** shows the results

Table (1) Means and standard Deviations for Samples' scores in the pre- and post- tests of Torrance as a whole according to group variable.

	Control Group			**Experimental Group**		
	Number	M	SD	Number	M	SD
Pre-test	50	36.80	3.10	46	37.65	3.15
Post-test	50	40.35	2.89	46	53.24	2.94

Table (1) demonstrates a difference between the two means of students' scores in Pre- and Post-tests of Torrance for both groups.

To determine the value of differences in the means between the two groups, modified means were calculated after eliminating the effect of performance in the pre-test. **Table (2)** shows the results.

Table (2): Modified means of students' scores for both groups in the Torrance post-test after eliminating the impact of Performance in the pre-test

Group	**Modified means**	**Standard Error**
Experimental	53.12	0.37
Control	40.87	0.34

Table (2) shows that the differences were in favor of the experimental group who was taught using the program as the modified means totaled (53.12), which was higher than that of the control group(40.87) who didn't receive any training program. Eta Square was used to find the effect size, it was (81.9%), meaning that the group variable explained (81.9%) of the variance in the means between both groups in the test as a whole.

Results of the **Second question** (Is there a statistically significant impact at the level of significance ($\alpha = 0.05$) on developing creative thinking sub abilities of the experimental group compared to the control group.

To answer this question means and standard deviations were calculated for the samples' scores on each skills of creative test according to group variable

(experimental that was taught using the program and the control group that did not receive any training program). **Table (3)** shows the results.

Table (3): Means and Standard Deviations for the Samples' scores in Torrance tests as a whole according to group variable.

Skill	-	***Control Group***			-	***Experimental Group***	
		No	*M*	*SD*	*No*	*M*	*SD*
Fluency	*Pre-test*	*50*	*23.75*	*2.15*	*46*	*23.83*	*1.75*
	Post test	*50*	*24.85*	*2.85*	*46*	*32.05*	*1.05*
Flexibility	*Pre-test*	*50*	*8.81*	*0.95*	*46*	*9.45*	*0.85*
	Post test	*50*	*10.78*	*1.15*	*46*	*14.17*	*1.60*
Originality	*Pre-test*	*50*	*2.65*	*1.07*	*46*	*2.85*	*0.95*
	Post test	*50*	*3.82*	*1.14*	*46*	*5.80*	*0.98*

Table (3) shows that there is an apparent difference between the two means of students' scores on each skill in the pre- and post- creative test for both groups.

To investigate the significance of this difference according to group variable: (experimental that was taught using the training program and the control group that did not receive any training program), modified means were calculated after eliminating the differences in the post- test. **Table (4)** presents the results.

Table (4): Modified means of students' scores in both groups in the Torrance post-test for each skills after eliminating the impact of performance in the pre-test

Skill	***Group***	***odified mean***	***Standard Error***
Fluency	*Control*	*24.65*	*0.11*
	perimental	*32.05*	*0.12*
Flexibility	*Control*	*10.70*	*0.15*
	perimental	*13.85*	*0.17*
Originality	*Control*	*3.75*	*0.12*
	perimental	*5.45*	*0.13*

Table (4) shows the modified means for the students' scores in both groups on each ability of post creative thinking test (originality, flexibility and fluency) after eliminating the differences in the pre-test. Differences were in the favor of the experimental group taught using the training program as the means were (5.45, 13.85, 32.05) respectively, which were higher than that of the control

group (3.75, 10.70, 24.65). To find the impact of the method Eta square was calculated and found to be (30.0%, 49.0%, and 86.4%). This means that the group variable interpreted (86.4%٣٠,٠%،٤٩,٠%،) respectively on the variance between the means of students' performance in each ability of Torrance creative thinking test.

Such as seen above, there is a statistical significant difference between the means of the performance of the experimental group that received training program and that of the control that did not receive any training program in the total score of the test and its sub abilities. This may be attributed to the nature of brainstorming strategy as a collective discussion strategy that encourages students to generate the highest number of ideas that are varied and creative in a spontaneous and free open climate that is not critical and does not limit the freedom of launching ideas. Moreover, its nature based on phases allows students to move from one-step to another freely after completing the previous stage.

10. Conclusions and Recommendations

Based on the results analysis of the following conclusions and recommendations were reached:

a. Conclusions :

1. The impact of brainstorming technique on improving creative thinking as a whole and in its sub abilities may be attributed to the advantages of this technique that are accepted among students. Some of those advantages are the preparing element and making students ready to participate in the sessions as well as creating a joyful environment that provides students with a free climate that does not contain any critics and involvement.
2. The findings of this study imply that instructions of brainstorming strategy are effective in improving students' writing performance through employing E-learning under the actual circumstances of Coronavirus pandemic. Overall, the experimental group made more gains in terms of the grades awarded. The questionnaires also revealed that the students in the experimental group felt positive about the brainstorming strategy.

Recommendations

1- Organizing Ability: members have to use brainstorming technique as well as E-learning in teaching.

2- Achieving more studies discussing brainstorming technique and its relation to critical thinking and E-learning.

3- Achieving more studies on other samples from different study and age levels and from different environments.

4. For helping university students in an EFL classroom create and organize ideas for a composition, the brainstorming strategy training should be implemented in a writing class. First of all EFL teachers need to change their attitudes towards the teaching of English writing. Instead of focusing on teaching their students how to produce correct writing, EFL teachers should adopt a process-based approach, providing their students with opportunities to

interact with each other. This is important since peer help and cooperation are of paramount importance in the use of brainstorming strategy, strategy training should emphasize cooperation.

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