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The Effect of Creative Thinking Education in Enhancing Creative Self-Efficacy and Cognitive Motivation

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Abstract

This study aimed to explore the effectiveness of creative thinking education on enhancing creative self-efficacy and cognitive motivation. The sample consisted of 44 female students studying childhood education in the Princess Alia University College divided into two groups (experimental and control). The experimental group was taught a unit in creative thinking whereas the control group was not. Data were collected using two tools; first, a creative self-efficacy scale that included two dimensions (self-efficacy in creative thinking and creative performance) and second, a cognitive motivation scale that included three dimensions (curiosity, discovery, and questioning). Data showed significant differences between experimental and control groups in creative self-efficacy and its dimensions, and also in cognitive motivation and two of its dimensions (curiosity and discovery) in favor of the experimental group. No significant difference was found between the two groups in questioning. We recommend embedding creative thinking education in study courses.

Keywords: creative thinking, self-efficacy, cognitive motivation

1. Introduction

Training students on creative thinking skills has become a priority in the 21st century which is characterized byan explosion of knowledge and technology in all fields. In this environment, one faces challenges that require novel and unique solutions. Educational institutes are therefore required to prepare students to face challenges creatively, which reflects positively on the individual and society. Creative thinking is associated with producing change. Thus, students need to be made aware that continuous change is essential in society and they need to be taught to deal with change by using different thinking patterns. Creative thinking is known to produce ideas, solutions, concepts and theories that are characterized by uniqueness and originality (Reber, 1985; Fatt, 2000).

Creative thinking results from synthesis, re-synthesis, generation and idea formulation. It produces new and surprising ideas that have notoccurred to the individual before (Azayaat, 2001). Bayer (1998) stresses the importance of teaching students how to think correctly and to bring thinking to higher and deeper levels. Without this, students cannot produce novel ideas or deal with them. The relevant literature reveals that creative thinking is something that can be taughtand therefore individuals can learn to spontaneously and consciously practice it (Qatami, 2003).

There are several obstacles that hinder the promotion of creative thinking. Among these are personal obstacles such as poor self-confidence and a feeling of helplessness. There are also circumstantial obstacles that relate to social or cultural aspects such as resisting change. Other obstacles exist in the educational process, e.g., placing emphasis on rote learning to the neglect of practicing creative thinking processes (Jarwan, 2008; Al-Atoom, Al-Jarah, & Beshara, 2011).

Eberle (1996) suggests that a teacher should enhance creativity in students by encouraging them to think creatively whenever possible which in turn, increases student participation and promotes the learning and developing of positive concepts. Among the significant aims of creativity education are enhancing the creative

affect, teaching creative attitudes, promoting creative skills and teaching creative thinking techniques. Also required is placing due emphasis on the strong connections between creative attitudes and awareness, and a creative atmosphere. The creativity environment represents a prerequisite for creative thinking and mental activation (Davis & Rimm, 2001).

According to Colangelo and Davis (2011), the factors that enhance creative thinking in students include creative motivation, awareness, attitudes and practice, teaching effective creative thinking techniques, and involving them in activities that require this type of thinking. Torrance (1987) believes that teaching creative thinking can be implemented by using a brainstorming strategy in creative problem-solving and imagination, as well as creative thinking programs or reading programs that allow for the practicing of creative thinking skills by the student. He also asserts the importance of providing a convenient learning atmosphere and the motivation required for pursuing this type of thinking.

Colangelo and Davis (2011) identified several aims of creativity education and training. One of these is enhancing awareness of creativity and creative situations, which helps students to acquire positive attitudes towards creative ideas. Other aims are students' awareness of their creativity, involvement in creative activities, and awareness of obstacles that hinder their creative thinking and finding ways to overcome them. Creative education should also encourage imagination, questioning, and the spirit of humor and adventure. Students should practice creative skills through brainstorming, open-ended questions that invoke creative thinking. They also need to participate in creative activities like painting and creative writing.

Rinco (2011) discussed procedures that affect the success of creative education which include the teacher being clear in his objectives and clear with his instructions to students. For instance, he can show them that creativity is possible and beneficial as well as teach skills on how to reach creative ideas. To achieve this, the teacher must avoid using tasks with specified or predetermined solutions. In addition, it is necessary to encourage transformative learning by training students on the use of metaphors and similes. Students should be challenged and their interests must be considered in learning tasks.

Empirical evidence indicates that teaching creativity thinking enhances the creative learning and psychological abilities of students and employees. Jeng, Hsu, Xie and Lin (2010) reported that teaching creativity thinking promoted the effectiveness of teaching, academic achievement, teaching methods and the personal experiences of students. Hosseini and Watt (2010) found that training teachers on creative thinking enhanced their students' creative abilities. Karpova, Marcketti and Barker (2011) found that training in critical thinking promoted creative thinking skills of Midwestern State University students. Hsiao, Chang and Huang (2000) enhanced university students' creative abilities by cooperative learning. The use of a brainstorming strategy enhanced creative thinking skills of sixth graders in Bahrain (Taleb, Hamza, & Wefky, 2013). Training in creative free writing of fiction and poetry improved self-efficacy and self-image of high school students in the USA (Chandler, 1999).

Even though creative ability is essential for creative expression, it is not enough to generate creative products because creative expression is affected by an individual's subjective judgments regarding his ability to generate new ideas and useful creative products. These subjective judgments that refer to creative self-efficacy predict the future occupational performanceof individuals and their creative behavior (Tierney & Farmer, 2002; Liu & Wu, 2011).

Bandura (1997) defines creative self-efficacy as a person's beliefs about their capabilities to perform the creative behavior successfully in a given environment. To Phelan (2001), it refers toa person's beliefs about their creative personal capabilities and potentials that allow for the achievement of desired improvements and changes. Tierney and Farmer (2002) define self-efficacy as a person's belief and faith in their capabilities to generate creative products. According to Beghetto, Kaufman and Baxter (2011), it means one's belief about their ability to think, act and produce creatively. Finally, Yu (2013) sees self-efficacy as one's ability to convert existing or new ideas to actions.

Self-efficacy reflects a person's confidence in their ability to perform tasks creatively and optimistically. Both self-efficacy and optimism reflect positively on a person's behavior and performance, which helps them to overcome doubt and fear while practicing creativity (Hsu, Sheng, & Hsueh, 2011). Abbott (2010) developed a scale to assess creative self-efficacy. It has two main dimensions: 1) self-efficacy in creative thinking, and 2) creative performance. Self-efficacy in creative thinking refers to the internal mental condition represented by the skills of fluency, flexibility, elaboration and originality. These skills enable the individual to produce new and suitable ideas. Self-efficacy in creative performance refers to the external social condition that is represented by

such factors as motivation, personality and social context. This view of creative self-efficacy was adopted in the present study.

Strong beliefs of self-efficacy may urge one to continue exerting effort to come up with mature creative products, especially in difficult or challenging situations. Such beliefs enhance an individual's confidence in their creative abilities (Tierney & Farmer, 2002). The shaping of the creative self depends on the level of self-efficacy and one's confidence in his abilities and expectations of the outcomes of creative actions that fall within his future aspirations. Individuals with high levels of creative self-efficacy are able to connect motives with sources of knowledge and work paths required to meet the requirements of the circumstances and needs that challenge one's endeavors to achieve his aims (Hsu et al., 2011).

Individuals with high levels of creative self-efficacy prefer to exploit their creative abilities in any form of creative work. They have higher confidence in these abilities, see difficulties as challenges and exert more effort to overcome these by themselves. Furthermore, they spend more time in creative realization identifying the problem and finding solutions (Hsu et al., 2011; Yu, 2013). An individual with a high level of creative self-efficacy also displays a high level of creative behavior toward assigned tasks, as creative self-efficacy enhances one's creativity and enables him to perform more creative work (Chuang, Shiu, & Cheng, 2010).

Creative self-efficacy can be developed by training and effective management of an individual's performance. It can also be developed by mastering the experiences of cognitive and motor interaction with the environment through suitable activities (Hsu et al., 2011). Creative self-efficacy plays a vital role in enhancing creativity. It can also be enhanced by promoting an atmosphere in the classroom and continuous support from the teacher. The extent to which creativity is reinforced depends on the teacher's awareness of the creative process and its theoretical and applied frameworks (Ford, 1996; Beghetto, 2006).

Motivation refers to one's inclination to achieve a certain aim. This aim can relate to satisfying internal needs or desires (Qatami & Ads, 2002).

Cognitive motivation, refers to the continuous desire for understanding and knowledge. It springs from internal motives that are displayed in exploratory activities and a search for further knowledge. Cognitive motivation is known to play a vital role in a student's academic behavior, organization of information and search for connections among pieces of information (Nashawati, 1996).

Proponents of the humanistic trend hold that every individual can be creative, as he is motivated by the aim to achieve himself. An individual can achieve creativity by displaying creative abilities in the situations he interacts with. Thus, education is required to help students access and utilize their potential and release their creative abilities (Good & Brophy, 1987).

The individual is motivated to perform and reach cognitive equilibrium that occurs when one assimilates new information into existing schemata, reaches self-organization of experiences and aptitudes, eliminates cognitiveimbalance and distortion, and comes to cognitive closure (Matar, 2010).

There are two types of motivation that drive and maintain behavior; extrinsic and intrinsic motivation. The former refers to external environmental stimuli such as reward and punishment, whereas the latter refers to internal stimuli. Examples of intrinsic motivation are cognitive motivation, desire and readiness to do tasks. An intrinsically motivated student attempts to answer a daunting question, solve a stubborn problem or discover something new (Ryan & Deci, 2000; Lahey, 2007).

Cognitive motivation, which is an example of intrinsic motivation, refers to the inclination to obtain information about a given topic, idea or event through exploratory behavior. The individual needs to feel efficient and capable of self-control through exploratory behavior. Curiosity also plays an essential role in learning, creativity and mental health. It enables learners to respond to new, strange and ambiguous elements positively. It also drives learners to self-discovery and to learn about their environment and to be persistent in exploration (Nashawati, 1996).

Cognitive motivation in learning is composed of several elements such as curiosity, preference of challenge, exploration, questioning and mastery. All these elements are essential incentives for learning and they therefore shape the theoretical base of successful educational programs (Dev, 1997; Lepper, 2005).

Cognitive motivation is a predictor of an individual's creativity, as challenge and enjoyment spring from work itself. Challenge and enjoyment enhance the continuity of the task, exploration and experimentation, whichin most cases lead to creative products (Hennessey & Amabile, 1998).

There are strong connections between cognitive motivation and creativity. Deci and Ryan (1985) found that individuals with intrinsic motives like cognitive motivation are inclined to search for cases that interest them and require the use of their creative abilities. Al-Areimi (1999) found a positive correlation between cognitive motivation and creative thinking. Similarly, Radwan (2004) reported that students having higher cognitive motivation outperformed counterparts with lower cognitive motivation in creative thinking abilities, fluency and originality. This highlights the significance of investigating both cognitive motivation and creative self-efficacy when delivering training on creative thinking.

To improve students' cognitive motivation, the teacher should provide a safe anxiety-free learning atmosphere, and avoid creating heated competition among students or placing all emphasis on success resulting from rote learning (Nashawati, 1996).

Hong, Eunsook and Hartzell (2011) emphasized holding more training workshops that target student-teachers. Such workshops provide student-teachers with better opportunities to learn and reflect on their characteristics and cognitive motivation. The traditional emphasis on a teacher's knowledge and skills should be replaced with an emphasis on their characteristics and beliefs about student learning. This promotes their future ability to consider individual differences among students and to provide better opportunities of motivation.

Csikszentmihalyi (1996) suggested that enhancing cognitive motivation is the first step in creative production. This motivation invokes curiosity and urges one to question the information given to him. It encourages exploration and a search for different points of view, especially creative ones. It also stirs the mind to reformulate the problem under consideration. Many educationists assert the importance of enriching curricula with elements that invoke student curiosity, as this eliminates the monotony of traditional educational contexts. In this respect, some studies revealed that assisting students in achieving their full mental potential cannot be realized unless students are urged to search and explore (Gagne, 1995).

The teacher can use enjoyable activities to enhance students' cognitive motivation such as computer and imaginative games or puzzles. In addition, a teacher should recognize the difference between sensory and cognitive curiosity. Sensory curiosity is enhanced through sensory aids like sound, music and animation. Cognitive curiosity, on the other hand, is enhanced by helping students understand what they do not know and avoiding inconsistency in their knowledge (Matheson & Spranger, 2001). Students should be challenged through moderately difficult tasks requiring effort and selecting work strategies, potentials or abilities whereby the student feels pride, competence and satisfaction (Winner, 1996).

Creative self-efficacy has been the subject of much research. For instance, Gong, Huang and Farh (2009) found a positive correlation between creativity and the performance of employees. They also found that creative individuals, possessing positive learning attitudes, can possess high creative self-efficacy and vice versa. In a study by Tierney and Farmer (2011), supervisors observed an increase in the creative identity and creative expectations of employees. Results also showed an increase in creative self-efficacy and creative performance of employees. Mathisen and Bronnick (2009) reported that an experimental group outperformed a control group in creative self-efficacy. Liu, Wu, Chen, Tsai and Lin (2014) found that story grammars limited the freedom of creative thinking, which, in turn, lowered self-efficacy among young students. Al-Zoubei (2014) studied creative self-efficacy in gifted students and their teachers and the results revealed statistically significant differences between gifted students and their teachers in creative self-efficacy in favor of students. It is clear from the previous survey of relevant literature that training and creative thinking education enhance creative self-efficacy in different populations (university students, school students and employees). It appears from other studies such as Al-Zoubei (2014) which was used the scale (Abbott, 2010) to measure of creative self-efficacy, the current study has benefited from that measure. This study differed from those studies in the nature of user training.

Research also points to the significance of cognitive motivation and general motivation. Stefanou and Salisbury-Glennon (2002) performed a study aimed to verify the effectiveness of an educational program includes several topics such as cooperative learning, active learning, they found statistically significant differences between an experimental and a control group in motivation and the use of learning strategies in favor of the experimental group. Younos (2007) found statistically significant differences between an experimental and a control group in the total scores of cognitive motivation and its three dimensions. Malik (2011) found a statistically significant effect of the active lecture on motivation, achievement and communication skills.

In a study by Al-Masoudi (2012) students in the experimental group outperformed students in the control group on the posttest of cognitive curiosity. Akyürek and Afacan (2013) found statistically significant differences in motivation between experimental and control group students in favor of the experimental group. The differences

were attributed to brain-based learning. Similarly, Ahmad, Seman, Awangand Sulaiman (2014) reported statistically significant differences between experimental and control group students on the motivation posttest in favor of the experimental group. The previous brief survey indicates that some of the studies that tackled cognitive motivation and curiosity used the quasi-experimental method, e.g., the studies conducted by Younos (2007) and Al-Masoudi (2012). But these two studies did not use creative thinking education. The present study is therefore different in that it used creative thinking education to enhance cognitive motivation.

1.1 Statement of the Problem

Creative thinkingis a priority in the modern age. Academic institutions are thus required to train their students in creative thinking. Unfortunately, higher education institutes still use teaching methods that focus on rote learning to the neglect of creative information processing (Al-Zoubei, 2014). Through theirteaching of courses concerned with teaching thinking processes to Princess Alia University College and other universities, the authors of the present study observed that many students lack confidence in their creative abilities because of a belief that creativity is restricted to geniuses and great inventors. They thus do not attempt to employ their cognitive motivation, curiosity and exploration in handling new topics. They depend on what they receive from teachers in traditional lectures. Accordingly, the present study aimed to explore the effectiveness of creative thinking education on enhancing creative self-efficacy and cognitive motivation of female students at Princess Alia University College.

1.2 Study Hypotheses

The following hypotheses were tested at the .05 level:

- There would be no statistically significant effect of creative thinking education on creative self-efficacy of female students at Princess Alia University College.

- There would be no statistically significant effect of creative thinking education on cognitive motivation of female students at Princess Alia University College.

1.3 Significance of the Study

The present study derives its theoretical significance from its novelty in the Arabic environment. It tackles creative self-efficacy which is a novel topic in psychological and educational literature. The study is expected to provide empirical evidence of the effectiveness of creative thinking education on enhancing creative self-efficacy and cognitive motivation, two elements that are as essential as creative abilities for the development of the creative thinking of students. From a practical perspective, our study is expected to provide university teachers with strategies that will enhance the creative thinking of their students. It will also provide teachers with a referential framework for embedding creative thinking strategies in university education.

1.4 Definition of Terms

Creative Self-efficacy refers to a person's beliefs about their creative capabilities. It includes beliefs about their creative thinking and creative performance (Abbott, 2010). Operationally, it refers to the score a student receives on the Creative Self-efficacy Scale used in the study.

Cognitive Motivation refers to satisfaction and comfort that a student feels when learning something new, discovering something that was previously unknown to him or understanding something that was previously difficult to understand. It is manifested in desiring challenge, curiosity, exploration, and questioning (Vallerand et al., 1993). Operationally, it refers to the score a student receives on the Cognitive Motivation Scale with its three dimensions of curiosity, exploration and questioning.

Creative Thinking Education refers to the direct teaching of the two units of creative thinking and their applications (Al-Atoom et al., 2011) to female students at Princess Alia University College as part of the course entitled "Thinking Education". The two units will be taught using effective creative thinking strategies: brainstorming, imagination, synectics and role-play. Students will also be exposed to models of creative thinking skills (fluency, flexibility, originality, elaboration and sensitivity of problems).

1.5 Delimitations of the Study

The study was limited to female students at Princess Alia University College who studied childhood education during the second semester of the academic year 2013-14.

2. Method

The study used the quasi-experimental method, as a purposive sample of female students at Princess Alia University College was selected and divided into two groups: experimental and control. The two scales of creative self-efficacy and cognitive motivation were administered to the two groups as pretests. The experimental group was taught the creative thinking unit, whereas the control group received no instruction. The creative self-efficacy and cognitive motivation scales were then administered to the two groups as posttests.

2.1 Subjects

The sample consisted of 44 female students studying childhood education in the Princess Alia University College aged between (20-21) years represented the population of the study. Two groups of this population were selected purposively to be the sample of the study. One group (N = 20) from the path of thinking skills represented the experimental group. Another group (N = 24) that did not study the path of thinking skills represented the control group. To verify the homogeneity of the two groups before the experiment, the t-test for independent samples was computed for the creative self-efficacy and cognitive motivation pretests. The pretest creative self-efficacy Mm, SD, and t-value for control and experimental groups were ($M_{control}$=3.39, $SD_{control}$ =0.26, $M_{expermental}$=3.36 , $SD_{expermental}$=0.30, t-value=0.341), while the cognitive motivation pretest M and SD for control and experimental groups were ($M_{control}$=3.62, $SD_{control}$ =0.0.32, $M_{expermental}$=3.61 , $SD_{expermental}$=0.32, t-value=0.139). The t-values were not significant at the level of significance $\alpha = .05$, which were indicating that the two groups were homogeneous in creative self-efficacy and cognitive motivation prior to the experiment.

2.2 Tools

2.2.1 The Creative Self-Efficacy Scale

The creative self-efficacy scale developed by Abbott (2010) and adapted for the Jordanian environment by Al-Zoebi (2014) was used in the study. It consists of 21 items in two main dimensions: 1) self-efficacy in creative thinking, and 2) creative performance. The first dimension, self-efficacy in creative thinking, includes four parts: 1) self-efficacy in fluency, 2) flexibility, 3) elaboration, and 4) originality. Each part is represented by three items. The second dimension of the scale, self-efficacy in creative performance, has three parts: 1) self-efficacy in learning for creativity, 2) communicationand promotion of creativity, and 3) conserving the creative personality. Again, each part is represented by three items.

(1) The Validity of the Creative Self-Efficacy Scale

Al-Zoebi (2014) established the validity of the creative self-efficacy scale by two methods: 1) face validity was established by presenting the scale to a jury of referees and modifying it based on their views, and 2) internal consistency was established by administering the scale to a pilot sample of seventh and tenth graders and their teachers. Correlation coefficients ranged from .24 to .65, all significant at the .05 level.

In the present study, the validity of the scale was established by face validity. It was presented to 8 referees (teaching staff members at Princess Alia College and King Saud University) specializing in educational psychology and measurement and evaluation. They were invited to judge the convenience of the items to the sample and the wording of the items. All items were agreed upon by the majority of the jury.

(2) The Reliability of the Creative Self-Efficacy Scale

Al-Zoebi (2014) established the reliability of the creative self-efficacy scale by the test-retest method and the internal consistency method. The scale was administered to a pilot sample of gifted students and their teachers. The reliability coefficient resulting from the test-retest method was .87 and .88 for students and teachers respectively. Cronbach-alpha coefficient for internal consistency was .91 and .94 for students and teachers respectively.

In the present study, the reliability of the scale was established by computing its internal consistency. The scale was administered to a pilot sample (N = 28) of female students at Princess Alia College. It yielded a Cronbach-alpha of .85 for the whole scale and .83 and .81 for creative thinking and creative performance respectively. The scale was therefore quite reliable to be used in the study.

(3) Scoring System

The scale has 21 items of the 5-point rating scale type, ranging from “Always” (5 marks) to “Never” (1 mark). All items are positively worded. Thus, scores on the scale range from 21 to 105.

2.2.2 The Cognitive Motivation Scale

The cognitive motivation scale developed by Mahmoud (2004) and modified by Younos (2007) was used in the study. It has 39 items measuring three dimensions of cognitive motivation: cognitive curiosity (14 items), exploration (11 items) and questioning (14 items).

(1) The Validity of the Cognitive Motivation Scale

Younos (2007) established the face validity of the cognitive motivation scale by submitting it to a jury of referees. In the present study, its face validity was established by submitting it to 8 teaching staff members of educational psychology and measurement and evaluation at Princess Alia University College and King Saud University. They were requested to judge its wording, convenience to the sample and the representation of items to cognitive motivation and its dimensions. Slight modifications were made based on the jury's recommendations.

The internal consistency of the scale was also established by administering it to a pilot sample of 28 female students at Princess Alia University College (the same sample for establishing the reliability of the creative self-efficacy). Correlation coefficients between items and dimensions ranged from .32 to .78. Correlations between items and the total score of the scale ranged from .29 to .73. All these values are significant at the .05 level. Thus the scale's validity was acceptable.

(2) The Reliability of the Cognitive Motivation Scale

Younos (2007) established the reliability of the cognitive motivation scale by the test-retest method that yielded a reliability coefficient of .81. In the present study, the scale's reliability was verified by the test-retest method and internal consistency. The scale was administered to a pilot sample (the same sample use for computing the internal consistency of the creative self-efficacy) twice with an interval of two weeks. Pearson Moment Correlation Coefficientsfor the whole scale, curiosity, exploration and questioning were .88 and .79, .87 and .81 respectively. With regards to internal consistency the scale yielded Cronbach-alpha coefficients of .92, .83, .86 and .88 for the whole scale being curiosity, exploration and questioning respectively. This reveals that the scale was quite reliable for use in the present study.

(3) The Scoring System

The scale used 5-point rating scale that ranged from "Always or almost always true of me" (5 marks) to "Never or almost never true of me" (1 mark). All the items were positively worded.

2.2.3 Reative Thinking Education

Creative thinking education aimed to familiarize students with creativity and ways to promote it. The proposed teaching took place in the second semester of the academic year 2013-14 within the Thinking Skills Path. Instruction was delivered by one of the researchers. The proposed teaching was based on the creative thinking unit in the book by Al-Atoom et al. (2011). The unit includes several topics relevant to creative thinking, e.g., the concept of creative thinking, theories explaining creative thinking, creativity and intelligence, creative thinking skills, teaching methods and strategies of creative thinking, stages of creative thinking, characteristics of the creative individual, international programs for creative thinking education, and training activities for enhancing creative thinking. These topics were processed on slides to be shown by the Data Show projector. The following strategies of creative thinking education were employed: brainstorming, role-play, discussion and dialogue, imagination, synectics and drawing. The instructor used different teaching methods: cooperative learning, individualized learning and the interactive lecture. Students participated in several activities, e.g., individual imagination and group brainstorming. Special emphasis was placed on internal characteristics of creative production such as self-confidence, motivation and positive beliefs about capabilities.

(1) Study Procedures

The following procedures were followed in conducting the study:

- Dividing subjects into an experimental group and a control group.
- Establishing the validity and reliability of the tools.
- Administering the tools to the students in the two groups as pretests.
- Delivering the proposed creative thinking education to the experimental group.
- Administering the tools to the students in the two groups as posttests.

- Scoring the scales and interpreting results in the light of relevant literature.
- Offering recommendations for teaching and further research.

(2) Variables of the Study

The independent variable: creative thinking education.

The dependent variable: creative self-efficacy and cognitive motivation.

3. Results

3.1 First: Results Concerning the First Null Hypothesis

"There would be no statistically significant effect of creative thinking education on creative self-efficacy of female students at Princess Alia University College".

To test this hypothesis, means and standard deviations of students' scores on the creative self-efficacy posttest and its two dimensions were computed. This statistic is presented in Table 1 below.

Table 1. Means and standard deviations of students' scores on the creative self-efficacy posttest

Dimension	Group	N	M	SD
Thinking	Control	24	3.41	0.29
	Experimental	20	3.76	0.42
	Total	44	3.57	0.39
Performance	Control	24	3.43	0.58
	Experimental	20	3.86	0.34
	Total	44	3.62	0.53
The whole Scale	Control	24	3.40	.360
	Experimental	20	3.60	.230
	Total	44	3.49	.320

It is clear from Table 1 that there were noticeable differences in means of the experimental and control groups concerning the whole creative self-efficacy scale and its two dimensions: self-efficacy in creative thinking and self-efficacy in creative performance. To explore the significance of these differences, one-way analysis of variance (ANOVA) was conducted using Wilks Lambda test. The value of Wilks Lambda was .736 (α=.002). This indicates that there were statistically significant differences (at the .01 level) for the effect of creative thinking education on creative self-efficacy. Accordingly, ANOVA for the two dimensions of creative self-efficacy was conducted, as shown in Table 2.

Table 2. ANOVA for the effect of creative thinking education on the two dimensions (thinking and performance) of creative self-efficacy

Source of Variance	Dimension	Sum of Squares	df	Mean Squares	f-value	Sig.
Group	Thinking	1.296	1	1.296	10.420	**.002
	Performance	2.061	1	2.061	8.657	**.005
Error	Thinking	5.224	42	.124		
	Performance	10.000	42	.238		
Total	Thinking	6.520	43			
	Performance	12.061	43			

** Significant at the .01 level

It is obvious from Table 2 that there were statistically significant differences at the (α = .01) level between the two groups on the two dimensions of creative self-efficacy posttest (creative thinking and creative performance). The computed f-values for self-efficacy in creative thinking and for self-efficacy in creative performance were 10.420 (P = .002) and 8.657 (P = .005) respectively. As listed in Table 1, the means of the experimental group on the two dimensions were higher, indicating that the differences were in favor of the experimental group.

ANOVA was also conducted for the effect of creative thinking education on the total score of creative self-efficacy in the two groups. This statistic is shown in Table 3.

Table 3. ANOVA for the effect of creative thinking education on the total creative self-efficacy of the subjects

Source of Variance	Sum of Squares	df	Mean Squares	f-value	Sig.
Group	0.437	1	0.437	4.699	*0.036
Error	3.910	42	0.093		
Total	4.347	43			

* Significant at the .05 level

As shown in Table 3, there were statistically significant differences between the two groups in creative self-efficacy, as the computed P-value was .036 (α = .05). Referring to the means in Table 2, it is clear that the means of the experimental group were higher than those of the control group. That is, the differences in creative self-efficacy were in favor of the experimental group. The first null hypothesis was therefore rejected and the alternative hypothesis that there is a statistically significant (α = .05) effect for creative thinking education on creative self-efficacy of female students at Princess Alia University College was supported.

3.2 Second: Results Concerning the Second Null Hypothesis

"There would be no statistically significant effect (α = .05) of creative thinking education on cognitive motivation of female students at Princess Alia University College".

To test this hypothesis, means and standard deviations of students' scores on the cognitive motivation posttest and its three dimensions were computed. These statistics are presented in Table 4 below.

Table 4. Means and standard deviations of students' scores on the cognitive motivation posttest

Dimension	Group	N	M	SD
Curiosity	Control	24	3.64	0.38
	Experimental	20	4.04	0.45
	Total	44	3.82	0.46
Exploration	Control	24	3.58	0.59
	Experimental	20	3.97	0.48
	Total	44	3.76	0.57
Questioning	Control	24	3.64	0.50
	Experimental	20	3.82	0.47
	Total	44	3.72	0.49
Total	Control	24	3.62	0.37
	Experimental	20	3.95	0.35
	Total	44	3.77	0.40

It is clear from Table 4 that there were noticeable differences in means of the experimental and control groups concerning the whole cognitive motivation scale and its three dimensions: curiosity, exploration and questioning.

To explore the significance of these differences, one-way analysis of variance was conducted using Wilks Lambda test. The value of Wilks Lambda was .773 (α = .015). This indicates that there were statistically significant differences (at the .05 level) for the effect of creative thinking education on cognitive motivation. Accordingly, one-way analysis of variance for the three dimensions of cognitive motivation was conducted, as shown in Table 5.

Table 5. ANOVA for the effect of creative thinking education on the three dimensions of cognitive motivation

Source of Variance	Dimension	Sum of Squares	df	Mean Squares	f-value	Sig.
Group	Curiosity	1.805	1	1.805	10.563	**0.002
	Exploration	1.624	1	1.624	5.494	*0.024
	Questioning	.364	1	.364	1.549	0.220
Error	Curiosity	7.177	42	.171		
	Exploration	12.414	42	.296		
	Questioning	9.879	42	.235		
Total	Curiosity	8.981	43			
	Exploration	14.038	43			
	Questioning	10.243	43			

* Significant at the .05 level ** Significant at the .01 level

It is obvious from Table 5 that there were statistically significant differences between the two groups on the two dimensions of curiosity and exploration. The computed f-values for curiosity and exploration were 10.563 (P = .002) and 5.494 (P = .024) respectively. As listed in Table 5, the means of the experimental group on the two dimensions were higher, indicating that the differences were in favor of the experimental group. No statistically significant difference was found between the experimental and control groups (α = .05) on questioning. The compute f-value was 1.549 (P = .220).

One-way analysis of variance was also conducted for the effect of creative thinking education on the total score of cognitive motivation in the two groups. This statistic is shown in Table 6.

Table 6. ANOVA for the effect of creative thinking education on the total cognitive motivation of the subjects

Source of Variance	Sum of Squares	df	Mean Squares	f-value	Sig.
Group	1.159	1	1.159	8.712	**.005
Error	5.589	42	.133		
Total	6.749	43			

** Significant at the .01 level

It is obvious from table 6 that there were statistically significant differences between the two groups in cognitive motivation, as the computed f-value was .8.712 (P = .005). Referring to the means in Table 5, it is clear that the means of the experimental group were higher than those of the control group. That is, the differences in cognitive motivation were in favor of the experimental group. The second null hypothesis was therefore rejected and the alternative hypothesis that there is a statistically significant (α = .01) effect for creative thinking education on cognitive motivation of female students at Princess Alia University College was supported.

4. Discussion

4.1 First: The Effect of Creative Thinking Education on Creative Self-Efficacy

The experimental group, exposed to creative thinking education, outperformed the control group that received no instruction in overall creative self-efficacy and its two dimensions: creative thinking and creative performance.

These results appear logical, as creative thinking education enhances a student's confidence in their creative abilities and allows them to test these abilities in a tension-free atmosphere. It familiarizes students with the process of creativity and creative products. In this respect, Karpova et al. (2011) found that creative thinking training enhances creative abilities and skills in university students. It was observed at the beginning of our experiment that the students' general perception regarding creativity was that this was a talent restricted to great inventors and literary writers. With progression in the experiment and after being exposed to analysis of the process of creativity, their perceptions began to change. When given issues in brainstorming sessions, students could generate such creative ideas as "Man's moving from place to place through optical fibers". Creative thinking education also helps students acquire effective strategies and perform activities that lead to the production of novel and original ideas, e.g., brainstorming, synectics, and cooperative creative thinking activities. In this respect, Taleb et al. (2013) reported that brainstorming enhances creative thinking skills. Students' thinking during activities was not restricted by rules. Restrictions were found to affect creative self-efficacy negatively, as it limits freedom in creative thinking (Liu et al., 2014). Cooperative learning, as reported in a study by Hsiao et al. (2000), promotes creative abilities. Students' exposure to creative thinking education and their application of activities targeting creative abilities might have helped them to develop positive beliefs about their creative thinking skills.

The findings of our present study regarding the effect of creative thinking education on creative self-efficacy is in line with the studies of Mathisen and Bronnick (2009) and Tierney and Farmer (2011) wherein both studies report creative thinking education promotes creative self-efficacy.

4.2 Second: The Effect of Creative Thinking Education on Cognitive Motivation

The experimental group, exposed to creative thinking education, outperformed the control group that received no instruction in overall cognitive motivation and two of its dimensions: curiosity and exploration. The two groups did not differ in questioning.

The researchers attribute this finding to the creative thinking education that provided students with theoretical and practical knowledge on creativity. It familiarized students with creative thinking skills and stages, the characteristics of creative individuals, types of creativity, etc. This education also allowed students to use strategies that invoked their curiosity and exploration of ambiguous aspects of various situations in a safe and supportive atmosphere away from criticism and ridicule. During the experiment, students used the imagination strategy and dealt with the ambiguity of situations, which freed them from traditional thinking. Students were also given various roles where they built on simple ideas, added lines to incomplete figures and gave plentiful and varied ideas about given situations. It was observed that students interacted enthusiastically and enjoyed the various situations and activities included in the training. This new pattern of learning takes into consideration the learning and thinking needs of the student. The positive results that students achieved in the present study may have been attributed to this new pattern of teaching and learning replacing the traditional pattern of instruction in which a student's mind is viewed as a vessel to be filled with knowledge, without any participation on their part in discovering this knowledge. Torrance (1987) found that individuals who did things that interested them were more creative than individuals who were committed to work imposed on them. This indicates that creative thinking education aligns with cognitive motivation. This was empirically supported in a study by Jeng et al. (2010) who reported that creative thinking education had a positive effect on the learning motivation of students.

This finding can also be attributed to the positive relationship between creative thinking and cognitive motivation (Al-Areimi, 1999; Radwan, 2004). It is also consistent with some quasi-experimental studies that proved that cognitive motivation can be promoted such as the study by Younos (2007) where the experimental group, exposed to the Hilda Taba model, outperformed the control group on the total score of cognitive motivation and its three dimensions (curiosity, exploration and questioning). The finding is also in accord with the study of Stefanou and Salisbury-Glennon (2002) that reported statistically significant differences between the experimental and control groups in motivation and the use of learning strategies in favor of the experimental group that was exposed to the learning communities program. Finally, it is in line with the study of Al-Masoudi (2012) where the experimental group, taught the SCAMPER program, outperformed the control group in cognitive curiosity.

5. Recommendations

In the light of the results of the present study, the following recommendations are offered:

- Embedding creative thinking education in university curricula/courses.

- Considering university students' creative self-efficacy through creative activities and enhancing students' self-confidence in their creative abilities.

- Invoking students' cognitive motivation by abandoning traditional teaching methods and using varied methods that increase and allow for students' creative thinking and participation in learning.

- Conducting further research on the effect of creative thinking education on creative self-efficacy in other populations and settings.

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