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The Effect of SCAMPER Program on Creative Thinking among Gifted and Talented Students

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Abstract

The aim of this study was to test the effect of SCAMPER Program on creative thinking of gifted students at the King Abdullah Schools for Excellence (KASE) in Jordan. A quasi-experimental design quantitative research method was used. A sample of experimental group consists of 21 students and 21 for control group. The Torrance Test of Creative Thinking (TTCT) was used to measure the students' creative thinking. The findings showed significant effect of SCAMPER program on creative thinking as measured by TTCT. Moreover, a significant effect was found on the pre and post-test. Additionally, there is a significant relationship between the pre and post scores of TTCT test attributed to the impact of the SCAMPER program. The mean of the post TTCT test is higher than that of pre TTCT test 4.079 v. 5.134 and is significant. T-test for paired samples was used and revealed significant differences between the pre and post-test of the TTCT. This study provides practical information about the effectiveness of using creativity programs on gifted and talented students. The study can also recommend educators to promote creative thinking through the use of programs such as SCAMPER.

Keywords: SCAMPER; Thinking Programs; Creativity; Gifted and Talented Students.

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1. Introduction

Throughout the world, education process faces many challenges, which might be social, personal, economic, and technological. Hence, there is a need for high degree of adaptability and flexibility of the education systems to face these challenges [1]. Many researchers emphasize the need for a highest degree of encouragement of creativity in learning within the education system [1]. Gifted students specifically, are in dire need of opportunities to develop their thinking, skills and knowledge acquisition through thinking programs that can suit their abilities, their possession of a wealth of linguistic and a wide range of information and ideas, their love for deep investigation and exploration of new things, as well as activities which are at par with their mental abilities. According to [2], there were newly formulated ideation approaches, techniques and programs coming forth with cognitive affirming studies, which required directed and intuitive approaches. These programs and techniques aim to enhance creative thinking and SCAMPER is one of them. SCAMPER technique it basically aims to create numerous ideas from divergent thinking process [3].

The principal philosophy of SCAMPER program proposes that every idea is born out of another existing idea [4]. According to [4], the program permits distinction in student's ways of thinking which on the long run also improve their problem solving and creativity skills. SCAMPER model gives room to extend thinking; measure of integrated creativity; and changing from wrong and right; submission to flow and allow flexibility [5]. In the same vein, [6] affirmed that this program determined student's life and assured changes within them by encouraging their intellectual skills. Therefore, it can be seen that SCAMPER is regarded to be a well-known creativity tool that leads to creating of a new product from the existing product. The SCAMPER program, according to [7] is a good program for improving creativity in students.

Jordan's social and educational systems face a variety of barriers, just like other developing countries, that challenge equality in the access to education for all its students [8]. The Ministry of Education, through the directorate of special education, has established KASE which are to cater for the needs of gifted and talented students, but unfortunately these schools are only focus on the ordinary academic needs, also the Ministry of Education in Jordan has very limited screening instruments to identify gifted and talented students and also there is lack of thinking programs to respond to Jordan's gifted students' unique needs within Jordan's education system [8]. Therefore, the aimed of this study was to test the effect of SCAMPER Program on creative thinking of gifted students at the King Abdullah Schools for Excellence KASE in Jordan.

2. Review of Literature

SCAMPER is an acronym representing techniques for revising or generating ideas whereby idea checklists are designed specifically for creative problem solving and imaginative thought [9]. The 'S' in SCAMPER stands for substitute, where a person or thing serves or acts in the place of another [6]. Substituting might spark ideas or bring a new perspective into awareness. The 'C' in SCAMPER means to combine, and combining enhance economy of time and effort [6]. It may also lead to something different or better. The 'A' in SCAMPER mean adopt [6]. To adopt is to make something one's own, like a song, a child or a pet. To adapt is to adjust for the purpose of suiting a condition or purpose such as the temperature in a room, a car, or clothing. Adaptation is an

important part of healing and helping and can assist clients in becoming more productive. The 'M' in SCAMPER stands for modifies [6]. To modify is to change or to alter the form or quality of something. This can be done in one of two ways. The first is to magnify or to enlarge and make greater in quality or form. The second is to minify, that is, to make smaller, lighter, slower, or less frequent. Creative individuals often minify a response through reframing such as saying one is annoyed instead of being angry. They can also enlarge a feeling such as going from being tepid to being furious. 'P' in SCAMPER is to put something to other uses than the purpose for that it was originally intended [10]. For example, the energy in worrying can also be put into planning. Writing can be put to use, demonstrated, to help clients become more mentally and physically healthy; individuals across the lifespan may find it beneficial to write 20 minutes a day, 4 days a week about anything they find stressful. The 'E' in SCAMPER is for eliminating, mean is to omit, remove, or of a quality [6]. The question in eliminating is, "What are you doing that you could give up and not miss?" In life, eliminating can revolve around privileges, media such as radio, or unhealthy foods or habits such as candy or shouting. In counseling, eliminating closed questions, interrupting rumination through thought stopping, or removing labels on clients is often a helpful thing to do. The last letter 'R' is for reverse or rearranges [6]. To reverse is to turn around. To rearrange is to change order of a plan, a scheme or a layout. There is more than one way to arrange or rearrange them to make a bouquet. Letters are also rearranged to make words. Rearranging what is highlighted in a client's life may mean accentuating some negative situations that ultimately had positive results or taught the client something about life. Reversing can take numerous forms too, such as who talks first.

The effectiveness of SCAMPER in enhancing creativity has been shown in various studies. For example, substantial studies in product-related fields that establish the use of SCAMPER has yielded a certain numbers of novelty outputs but with more gamey utility when compare to those gathered using direct approaches [11]. Furthermore, in a quasi-experimental study carried out by [12], he examined the effect of group cooperation on the level of improvement of creative thinking capacity of individual. The study reveals that there are six major differences between the experimental and control groups. These differences were prototype design, idea and information exchange, idea improvement, critique, level of engagement, and challenging solution. Based on these differences, a theory that explains how group collaboration can be a platform for the improvement of individual level of creativity was presented.

In [13] study which conducted in Northern Kentucky University, by examining exemplary practices being used among primary schools teachers used to enhance creativity in their students. The result of the study indicates that when students are allowed to collaborate, imagine, have choices, make inquiry and learn in a risk-free environment, their creativity can be enhanced. In another study, [5] critically examined counseling students learning experience and their application of SCAMPER for the purpose of enhancing creative thinking. The study reveals that SCAMPER model has the power to help the participants to stretch their thinking and it helps in structuring of creativity as well as in shifting from "right or wrong" application to flexibility and "flow." [5] Also reported the implications of SCAMPER for the training of counseling students in creative methods.

The study of [14] was conducted with the purpose of investigating the efficiency of SCAMPER Strategy on the teaching of sciences in order to develop creative thinking skills of gifted students in AL-Madinah AL-Munowarah Primary School. The findings of the study reveals a significant difference (α=0.05) between the

average scores of control group and experimental group with respect to creative skills acquisition especially in favor of the experimental group. The result further reveals that SCAMPER has important effect on flexibility, fluency and originality. [11] Conducted their study in order to examine the impact of several design methods on the level of creativity of the design outcome. The final outcomes of the study reveal that brainstorming has more power to enhance creativity than SCAMPER and functional Analysis. [15] Also conducted their study with the purpose of exposing the effectiveness of the application of the instructional design prepared through the SCAMPER and Six Thinking Hats Techniques. The study revealed that many of the students are pessimistic about the world and its future environment before the application of SCAMPER and Six Thinking Hats techniques, but optimistic after application of the SCAMPER and the Six Thinking Hats techniques. It can therefore be suggested that when the SCAMPER program is effectively applied, it can bring about students cognitive development in their related subjects by providing the motivation and opportunity to engage in creative thinking. SCAMPER method relies on many ideation metrics, especially for solving transactional design problem. Also SCAMPER can be used with different categories of students. In [16] study aimed to measuring of SCAMPER program on developing creative thinking skills and achievement motivation and cognitive achievement among students with learning disabilities. The study sample consists of 31 girl students with learning difficulties as they are suffering of Arabic language disabilities. The study has concluded that, there is a significant impact of SCAMPER program on the idea-generating strategy and measuring its effect on developing creative thinking skills and developing achievement motivation among students with learning disabilities. As well as in [17] study conducted an experiment on a total of 65 science students to measure the effectiveness of SCAMPER technique in increasing the realization on the collection and utilization of solid waste. The sampled students indicated that they relied on school teaching and visual media as their essential source for inquiries and knowledge. However, the experiment provided positive results as students became more aware of the importance of recycling, indicating that all solid waste will be recycled, except for organic waste. In addition, they suggested for the placing of different containers for the different types of wastes. The study conducted by [3] proposed to examine the influence of SCAMPER on creating innovative thinking skills, the study further affirmed that training on SCAMPER importantly buffer the Test for Creative Thinking - Drawing Production (TCT-DP) marks. The study also indicates SCAMPER to be the most convenient approach in developing creative thinking skills.

2.1. King Abdullah II Schools for Excellence (KASE)

The Hashemite Kingdom of Jordan is one of the leading countries to support the initiating, establishment/ adoption of specific programs for its academically gifted and talented students and always pays attention and focuses on encouraging them. These schools specially-designed education programs aiming at providing a practical education and developing a better school environment for gifted students that assists its students to better refine their skills and push their creativity further through an environment of educational democracy and equal opportunities [18]. Through its advanced programs, King Abdullah II Schools for Excellence (KASE) focus on offering its students with a strong theatrical background in sciences, from the basics to the very advanced levels, developing the upper skills of thinking and scientific research, enhancing these students' practical scientific and technological skills [18]. The students are selected based on four fundamental criteria, namely; the student's general average must be 95% or above, passing a test for the academic readiness,

achieving an IQ test result of 135 or above, in addition to a personal interview. In parallel, the JMOE selects the top teachers who have advanced teaching skills and have the required competencies to be qualified to work in these schools [19]. The targeted segment of the students includes those who have completed the sixth grade and were nominated to join the schools according to servile bases and criteria issued under specific instructions. The criteria according to the Ministry of Education stated that 5 % of the top achieving students in the sixth grade of each ministry school may be accepted in these schools providing that the student is nominated by the competent teachers and families besides having the required behavioural characteristics [19]. The accredited curriculums are examined by a highly-specialized committees and qualified expertise to ensure they meet the students' needs and the overall vision, in addition to the already existing official curriculums. The materials and curricula are prepared according the credit hours system for both curriculums. The schools' curricula include the official curriculum accredited by the Ministry of Education, in addition to the other curriculum which is specially designed upon the needs and attitudes of students [18].

3. Methodology

This study used the quantitative approach, through quasi-experimental design, that is involving the use experimental and control groups. The study included two groups: experimental group and one control group which are studied in the traditional way and the appropriate sampling technique for the current research would be taking into consideration.

3.1. Population and Sampling

The population of this study comprised of the gifted students at KASE in Jordan. According to the 2015-2016 academic school year estimate, the population consists of a total number of 2612 students, of which 1282 are male and 1330 are female. The sample has been selected by using purposive sampling technique, whereby the tenth grade male and female students in KASE, from (Salt School) were chosen. These students have been selected because this sampling method provides the appropriate setting for the purposes of this study. The selected sample was 42 of which were 20 male and 22 were female students from tenth grade in KASE Salt School. Thereafter, based on the results of the pre-test TTCT, through stratified random manner, the students (research participants) have been divided into one experimental group and one control group, with 21 participants in each respective group.

3.2. Research Program and Instruments

This study is based on the implementation of the SCAMPER program, and examines the effect on the level of creativity TTCT among the students at KASE. Torrance Tests of Creative Thinking TTCT was used in the study as a well-known and globally used test for creativity evaluation. This test was developed by Torrance [20]. The Torrance Test (Verbal A) implemented on sample of study. It has used measure the changes in the experimental groups that followed SCAMPER program and in the Control Groups, in order to compare students' output. The Torrance test for creative thinking verbal test (A) was a modified version used for Jordanian context, which was tested for validity and reliability by Abu Jado (2003), [21].

3.3. Data Collection Procedures

After the sample was selected, the pre-test TTCT then was administered to these selected participants. Thereafter, experimental group taught according to the method that has been chosen; thus for the first group have been applied to them the SCAMPER program; the program contains 20 sessions at a rate of 3-7 activities per session for one session (45 minutes) [22]. The implementation of the training programs took seven weeks. The second group which is the control group were studied through traditional approach. After the completion of the implementation of the training programs, the researcher applied the Torrance test TTCT again, that constituted the post-test. The results from the pre-test and the post-test have been used to compare the students' performance on the test before and after the implementation of the training programs and also to detected the extent of the impact on the level of creativity among the study sample.

4. Findings

4.1. Testing the Equality of the variance between the groups

To ensure sample groups were equal in creativity and suitable to conduct the study, means and standard deviation were measured for both experimental and the control groups, also correlation was tested to make sure of the equality of the groups (Control, SCAMPER). The results showed in Table 1.

Table 1: Means and Std. Deviation in the Differences between Gifted Students in pre-test

St. Deviation	Means	Groups
.63350	4.1032	Control
.41035	4.0794	SCAMPER

Leven's test of Homogeneity of variance between groups in pre and post-tests

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
pre	Equal variances assumed	1.328	.256	1.136	40	.263	.12698	.11182
	Equal variances not assumed			1.136	37.041	.263	.12698	.11182
pre	Equal variances assumed	.009	.924	-.064	40	.949	-.00794	.12308
	Equal variances not assumed			-.064	39.978	.949	-.00794	.12308

As can be seen from table 1, all variance as measured by the SD are closed in value 0.4-0.6, indicating that the two groups are equal. The (mean) of the experimental group (SCAMPER) was 4.0794 and the standard deviation was 0.41035 on the pre-test, and the mean of gifted students in groups in the pre-test were close and

therefore, the groups were equal in creativity according to test. Variance between groups is not significant; Leven's test as showed from table 1 demonstrated no significant differences between the two groups in the pre-test and post-test.

4.2. Differences in the pre-test

ANOVA was used to find out if there is a statistical significant difference in the level of creativity of the gifted and talented students at KASE in Jordan at significant level ($\alpha \leq 0.05$) in the pre-test scores as shown in Tables 2.

Table 2: ANOVA Statistics for all groups in pre-test

	N	**Mean**	**Std. Deviation**	**Std. Error**	**Minimum**	**Maximum**
Control	21	4.1032	.63350	.13824	2.83	5.00
Scamper	21	4.0794	.41035	.08955	3.50	4.83
Total	42	4.1296	.46609	.05872	2.83	5.00

ANOVA (pre)

Pre

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.191	2	.096	.432	.651
Within Groups	13.278	60	.221		
Total	13.469	62			

Tables 2 indicate that there is a no statistical significant difference in the level of creativity of the gifted and talented students at KASE in Jordan in the pre-test. ($F = .432$; $\alpha=0.05$).

4.3. Differences in pre and post-test

Table 3 shows that there is a significant relationship between pre and post scores of TTCT test attributed to the impact of the SCAMPER program. The mean of the post TTCT test is higher than that of pre TTCT test 4.079 v. 5.134 and significant. T-test for paired samples was used and the result revealed significant differences between the pre and post-test of the TTCT as shows in table 4.

Table 3: Means and Std. Deviation in the Differences between Gifted Students of control and SCAMPER in post

	group	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Post	Control	21	4.0317	.45832	.10001
	Scamper	21	5.1349	.40352	.08806

Table 4: Paired t-test for SCAMPER program

Paired Samples Correlations						
		N		Correlation	Sig.	
Pair 1	SCAMPERpre &SCAMPERpost	21		.872	.000	
Paired Samples Statistics						
		Mean	N	Std. Deviation	Std. Error Mean	
Pair 1	SCAMPERpre	4.0794	21	.41035	.08955	
	SCAMPERpost	5.1349	21	.40352	.08806	
Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
SCAMPERpre - SCAMPERpost	-1.05556	.20638	.04504	-23.438	20	.000

Table 3 indicates that mean of control group in the post-test was 4.0317 standard deviation was 0.45832 while SCAMPER experimental group of Gifted Students in the post-test was 5.1349 and standard deviation was 0.40352. The table shows that the mean score of TTCT test of creativity of SCAMPER experimental group has higher creativity score than the control group. Results of descriptive analysis pointed to the existence of differences in the mean score of TTCT test of creativity, Table 3 shows that experimental groups are more creative than control group.

5. Discussion and Recommendations

SCAMPER has positive significant effect on the level of creativity on TTCT. The study shows a statistical significant difference in the mean score of TTCT test of creativity of the gifted and talented students at KASE in Jordan. As reported between the two groups, the experimental and the control group which can be attributed to the SCAMPER program in favor of the experimental group. This result is aligned with the results of the previous studies regarding the effect of thinking programs on the improvement of creative skill. The result of this study contributed to the growing body of knowledge which confirmed the influence of raising creativity with the use of creativity training as a rom to buffer creative skill. Creativity training was also affirmed by the previous literature as a successful practice to impact on students with different abilities [23-29].

The study shows that experimental group exposed to the SCAMPER program had higher level of creativity than control group. This result is also consistent with the findings of [15]. On the other hand, in the study of [30]

which was conducted on the sample of 60 pupils of primary school age, they found that, those pupils who made use of SCAMPER did not show any significant improvement in creative writing. Thus, when the SCAMPER program was applied it does not necessarily result in positive students' cognitive development in their related subjects by providing the motivation and opportunity to engage in creative thinking.

6. Conclusion

As teachers and curriculum developers nowadays find it difficult to motivate students and encourage them. the thinking programs come to provide alternative teaching methods that meet the students' needs. SCAMPER one of the thinking programs which were designed based on students' interests to help them utilize their maximum potentials. The current study shows a statistical significant difference in the mean score of TTCT test of creativity of the gifted and talented students at KASE in Jordan, between the two groups, the experimental and the control group which can be attributed to the SCAMPER program. Nevertheless, it is recommended that SCAMPER program is also applied to other schools to detect gifted and talented students and highlight their talents and develop it. Future researchers are recommended to focus on longitudinal studies on SCAMPER in order to achieve a better realization of its impact on the gifted students' creative thinking abilities and skills, as well as their social and personal characteristics specially self-regulated ones. The findings within this study would certainly shed some light for the educational policy makers and the curriculum developers to identify suitable educational programs or redesign the curriculum to support the development of creative thinking among the gifted and talented students in Jordan.

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