Effects of a creativity training program for Breadth and Organization on the creativity thinking skills of students with learning disability

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Abstract

This study aimed at examining the effect of a creativity training program on the creativity thinking skills of students with learning disability of the fifth grade in Al Ain District. The sample of this study consisted of (32) students. They were randomly assigned into two groups, the experimental (16), and the control (16), the experimental group was exposed to the creative training program. Torrance Figural Test was administered to both groups as (pre-posttest). The Statistical Package for Social Science (SPSS; 1998) was used for the initial screening data and the subsequent analysis. Descriptive hierarchical discriminant function analysis was used to address the research question. The results of this study indicated that there were significant effect of a training program on the fluency, flexibility, and elaboration in favor of the experimental group.

Introduction

Nearly everyone agrees that one of the main goals of education is to develop creative thinking of all students. Thinking seems a natural enough process and one is happy with one's competence. There is, however much more individuality in thinking styles and sufficient difference between individuals to suggest that thinking may be a skill about which something can be done. It is with this in mind that de Bono designed the CoRT thinking lessons for schools, the earlier that children can be taught to think the greater advantage they will have to understand and assimilate other subjects. Students with learning

disabilities, as well as most students in general, often do not have well-developed creative abilities. The teaching of creative thinking is, therefore, crucial in preparing students with learning disabilities for future employment opportunities and the ability to keep pace with the challenge of a today's society.

Most teachers will agree that teaching good creative thinking skills to students with learning disabilities can be a difficult task. Students with learning disabilities do not intrinsically think creatively. They frequently assimilate information, ideas, and arguments at the concrete level without engaging in higher order thinking. This tendency toward concrete reasoning can often result in an inability to examine or question the validity of information when deciding what to believe or do. To further exacerbate the problem, younger students with learning disabilities may manifest lower creative skills as a result of their educational experiences in special education classes or resource rooms. As a result skill deficits in the development of creative thinking may be as much a function of their educational experiences, as specific information processing deficits related to having a learning disability. Although, programs aimed at teaching creative thinking have been initiated in regular education classroom, especially in classrooms for gifted and talented students, but less has been paid to special education classrooms (Nickerson, 2005). In fact, until recently, learning activities in the special education classroom have been heavily influenced by the view that students with learning disabilities must be taught the basic before any instructional in formal reasoning can be conducted. They assumed that students with learning disabilities cannot benefit from instruction

in creative thinking until basic skills are mastered. However, recent research findings lend little support to this approach to instruction. Indeed, in the last few years, a new focus of special education research has emerged that seeks to develop and evaluate programs for teaching creative thinking skills to students with learning disabilities (Al Zyoudi, 2008).

Review of the literature

The premise of the legislation over the world (e.g. Individuals with Disabilities Education Act, 1997; Jordanian Welfare for People with Disabilities, 2007, etc) is that a free and appropriate public education will be provided for all children with special needs and emphasize on the participation of students with disabilities in the general education program. Furthermore, teaching students with learning disabilities require opportunities to promote creative thinking to achieve the accelerated academic proficiency expected from normal students. They require gifted instruction and the special instruction, adaptations, and accommodations provided to other students with special needs (Al BAtina, et al., 2007; Davis & Rimm, 2004; Sharon, 2000; Neilson, et al., 1993). The highest incidence of giftedness among exceptional children is most likely to be found among students with the most frequently occurring disabilities, such as learning disabilities (Miller & Teryy-Godt, 1996). In recent years, interest in creativity as an area of educational research began in the second half of the 20th century. Since then, creativity research has had an impact on educational objectives, teaching strategies, and administrative practices (Torrance, 1998). Educators have emphasized the importance of promoting favorable conditions for developing the creative potential of

students, and several studies have suggested ways to cultivate creativity in an educational environment. The notion that creativity is a gift present in some individuals has been effectively called into question by the expansion of several training programs around the world in which the main goal is to enhance creative thinking abilities (Renzulli, 2003; Fleith, 2000; Daniels, 1997; Sternberg & Williams, 1996). Moreover, educators and psychologists have developed different techniques and instructional materials to facilitate the expression of creativity. As Rose and Lin (1994) said: "all the approaches share a common premise that training, practice and encouragement in using creative thinking skills can increase the degree of creativity manifested by individuals" (p.11).

Many studies suggested that training does affect creativity (Al Zyoudi 2007; De Bono, 2004; Dalah, 2002; Staboha, 2001; Barha, 2000). In addition, Torrance (2003) highlighted: "the most successful approaches seem to be those that involve both cognitive and emotional functioning, provide adequate structure and motivation, and give opportunities for involvement, practice, and interaction with teachers and other children" (pp. 132-133).

These findings reinforce the idea that the curriculum developed in schools should include training in a variety of creative thinking tasks, improving students' creative thinking and problem solving abilities (Davis & Rimm, 2004). Brody & Mills (1997) found that students with learning disability must develop creative thinking to overcome their academic achievement difficulties. As recommended in the literature (e.g. Smith, 2007, Al Zyoudi, 2008) early identification and appropriate intervention for students with

learning disability are essential if we want students with learning disabilities to succeed.

Many studies have evaluated the impact of creativity or enrichment programs on normal students. The results have shown an improvement in creative abilities on students with and without disabilities (Al BAdi, 2008; Kattab & Al Hadidi, 2008); Al Zyoudi, 2007; Levine, 2005; Davis & Rimm, 2004; Winebrenner, 2003; Bright, 2002; Monahan, 2000).

A recent study by Kattab & Al Hadidi, (2008) obtained interesting results with respect to the affect of the creativity training program on the creative and self-concept of fourth and fifth and sixth-grade students in Amman. In this study, the experimental group had a significant gain in the creativity and self-concept, in comparison to the control group experienced decline.

It is clear that further research is necessary to investigate the effects of a using a creativity training program on learning disabled students' creative thinking. Despite recognition of the importance for fostering students' creative potential, teachers often give priority to the development of logical thinking the emphasizes knowledge and reproduction (Westby, 1997). In this regard, it is important for teachers to learn how to implement educational strategies that promote the development of learning disabled students' creative thinking abilities.

Although there are an overwhelming number of studies on creativity training programs in several countries around the world, there no research carried out on the creativity training programs among students with learning disabilities in the UAE. Previous literature has already provided creativity training programs for student without disability. Therefore, it is the intention of

this research to use a highly effective a creativity training program based on best practices, which cab incorporated into the emergent the creativity training program in school in the UAE. The purpose of this study was to examine effects of a creativity training program for breadth and organization on the creativity thinking skills of students with learning disability

Research question

In an effort to address of unanswered question about the development of creativity, a study was designed to examine the effects of a creativity training program on the creativity thinking skills of students with learning disability. The following question served as the focal point for this research: "Do students who have participated in a creativity training program attain grater scores on the Torrance Tests of Creative thinking than students who have not participated in the program?"

Methods

Participants

Participants in this investigation included (32) students identified by their school as having learning disability and were attending fifth grade in one school in Al Ain District. Those students have variety of processing difficulties; they were experiencing academic difficulties which caused a significant discrepancy between apparent potential and achievement. They were randomly assigned to an experimental (16) and control group (16)

Study design

For the purpose of this study, a pretest-post test experimental design for an experimental and control groups was employed because its goal to examine the effects of a creativity training program on the creativity thinking skills of students with learning disability.

Instruments

Torrance Tests of Creative Thinking-Figural, form A

The Torrance Tests of Creative Thinking (TTCT) were first published by E. Paul Torrance and his associates in 1966. The tests have been normed four times since in 1974, 1984, 1990, and 1998. There are two forms (A and B) of the TTCT-Verbal and two forms (A and B) of the TTCT-Figural. This study used only the TTCT- Figural (form A). The TTCT- Figural has much to support its use (e.g., Cropley, 2000). It has been translated into over 35 languages (Miller, 2002).

The TTCT-Figural is the most widely used test of creativity (Colangelo & Davis, 1997), and has been used in more research than any other creativity test (Al Sror, 1998). The standard administration and scoring procedures (Davis & Rimm, 2004) as well as the development and evaluation (Colangelo & Davis, 1997) have made the TTCT especially useful for identifying gifted and talented students. The TTCT-Figural has had 25 years of extensive development and evaluation (Miller, 2002). It has large norming samples, valuable longitudinal validations, and high predictive validity for a very wide age range (Cropley, 2000). The TTCT-Figural are unbiased in terms of gender, race, and for persons who have various language, socioeconomic status, and

cultural backgrounds (Torrance, 1974; Cramond, 1993). The scores can also be useful for counseling purposes (e.g., Cropley & Cropley, 2000).

Each form of the test consists of three activities; each designed to tap somewhat different aspects of creative functioning. Following is a brief description of the activities included in the TTCT-Figural, Form A.

Activity 1: Picture construction consists of a single curved shape.

Activity 2: Picture Completion consists of ten incomplete linear figures.

Activity 3: Lines, in Figural Form A, consists of three pages of sets of parallel lines.

These three activities provide scores for five norm-referenced creative thinking abilities and 13 criterion-referenced abilities. Norm Referenced Creative Thinking Abilities are fluency, originality, abstraction of titles, elaboration, and resistance to premature closure. Fluency refers to the number of ideas a person expresses through interpretable responses that use the stimulus in a meaningful manner. Originality refers to the infrequency and unusualness of the response.

In scoring elaboration, credit is given for each pertinent detail (idea, piece of information, etc.) added to the original stimulus figure, its boundaries, and/or its surrounding space. Resistance to premature closure refers to the ability of a creative person to keep open and delay closure long enough to make the mental leap that makes possible original ideas. This is measured by the individual's tendency to close the incomplete figures immediately with straight or curved lines or not (Torrance, 1998). In scoring for the criterion-referenced creative thinking strengths, any genuine appearance of strength is indicated by a plus sign (+). If the strength appears three or more times; this is indicated by

two plus signs (++). These creative strengths include: emotional expressiveness (in drawings, title), storytelling articulateness (context, environment), movement or action (running, dancing, flying, falling, etc.), expressiveness of titles, synthesis of incomplete figures (combination of 2 or more), synthesis of lines (combination of 2 or more), unusual visualization (above, below, at angle, etc.), internal visualization (inside, cross section, etc.), extending or breaking boundaries, humor (in titles, drawings, etc.), richness of imagery (variety, vividness, strength, etc.), colorfulness of imagery (exactingness, earthiness, etc.), and fantasy (figures in myths, fables, fairly tales, science fiction, etc.).

The CoRT Thinking Program

The CoRT Thinking Lessons are now the most widely used materials for the direct teaching of thinking as a basic skill. The lessons have been in use since 1970 and in the intervening years a great deal of experience in the direct teaching of thinking as a skill has been accumulated. These lessons, in six sections are now in heavy use though out the U.S.A, in the UK, Canada, Australia, and Jordan. Many counties have already expressed interest in following this example. The CoRT Thinking Lessons are divided into 6 unites with ten lessons in each unit. The complete set of lessons for teachers and students, these are: Breadth, Organization, Interaction, Creativity, Information, and Action. The CoRT Teaching Lessons are being made available in a number of languages (De Bono, 2004).

In this study two unites were used, these are:

1. Breadth; the specific purpose of this unit is to broaden perception so that in any thinking situation we can see beyond the obvious, immediate

and egocentric. Experience has shown that students who have been thorough the lesson develop a much broader view of situations. The subjects covered are: PMI (Plus, Minus, Interesting)- the treatment of ideas; CAF (consider all factors); Rules; C&S (Consequence and Sequel)-focus on sequences; AGO (Aims, Goals, Objectives)-focus of the purpose; Planning; FIP (First Important Priorities); APC (Alternatives, Possibilities, Choices)-focus on alternatives; Decisions; OPV (Other People's Views)

2. Organization. The thinking tools on this unit are concerned with some basic thinking operations and their organization for use. Practice of the tools is the main purpose of the unit so that the student can use a particular thinking tool fluently and deliberately as required. The subjects covered are: Recognize; Analyze; Compare; Select; Find other ways; Start; Organize; Focus; Consolidate; Conclude.

The training was conducted over a 14-week period. The researcher met with each teacher individually to introduce the rationale, purposes, activities, and procedures for implementing the training program (CoRT). All participating teachers were trained and provided with instruction for each CoRT lesson, as well as activity pages for their students. The program was designed to help teachers develop students' creative thinking skills (fluency, originality, and elaboration). The research observed each classroom and met with teachers every 2 weeks to ensure that the program was being implemented as planned. Posttest measure was administrated to the experimental and control groups immediately after the classroom training was finished.

Data analysis

The Statistical Package for Social Science (SPSS; 1998) was used for the initial screening data and the subsequent analysis. Descriptive hierarchical discriminant function analysis was used to address the research question. The grouping variables were the groups (i.e. experimental and control groups). The predictor variables for the research question was pretest creative thinking abilities scores, which was entered as covariates, and posttest creative thinking skills scores.

Results

Before discussion of the findings related to the research question, the steps taken to validate the instrument used in this study for learning disabled students are outlined.

Reliability

The test and retest scores were compared to examine the stability of the Torrance Tests of Creative Thinking-Figural, Form A, scores over time.

Tables 1 and 2, reports a series of statistics for the children who had retested for both raw and standard composite and total scores. Pearson product moment correlation coefficients (*r*) were calculated to examine the relationship between the test and retest scores and are reported in Tables 1 and 2 along with the levels of significance. Using Cohen's classification of correlation coefficients (Cohen, 1998. p. 123), all raw coefficients were significant and large, ranging

from .76 to .91. All standard score coefficients were significant and large ranging from .64 to .92.

Table 1 Test-Retest Reliability Coefficients of the TTCT-Figural, Form A for Raw Scores

	Raw scores				
TTCT-F	*r*	*p*	*t*	*p*	*d*
Fluency	.77	.023	12.5	.034	.59
Originality	.79	.031	14.4	.048	.63
Elaboration	.87	.039	20.7	.049	.73

Table 2 Test-Retest Reliability Coefficients of the TTCT-Figural, Form for Standard Scores

	Standard Scores				
TTCT-F	r	p	t	p	d
Fluency	.71	.024	1.06	.034	.05
Originality	.64	.021	-.17	.011	-.01
Elaboration	.84	.036	-.06	.001	.00

Differences between the test and retest scores were analyzed by calculating a *t* test of means for paired samples. The paired samples *t* test evaluates whether the mean difference between the test and retest scores is significantly different from zero. These results indicate that the mean retest raw scores were significantly greater than the mean initial test raw scores for all composite and total scores for the TTCT-Figural, Form A. In contrast, there were no significant differences between the standard scores from test to retest.

The mains statistic was computed as the effect size index by dividing the mean of paired differences by the average of the two standard deviations. As *d* diverges from 0, the effect size becomes larger. The effect sizes for differences between raw scores range from .25 to .85. Regardless of sign, mains values of .25 represent a small effect size, but mains values of .73 and .85 represent large effect sizes (Cohen, 1998). In contrast, the effect sizes of the differences in standard scores can even be classified as small (ranging from .00 to .09), indicating that there were not appreciable differences in standard scores from test to retest. These results indicated that the TTCT-Figural, Form A detects growth over short periods, based on changes in raw scores from test to retest. Moreover, these results show that the TTCT-Figural, Form A produced relatively stable rankings of children, even when these children showed significant improvement over a short period of time, based on the strong correlations of the raw and standard scores from test to retest. The test-retest data provided evidence of high stability for the TTCT-Figural, Form A over a two month retest interval.

Validity

One useful way of conducting validity studies is analyzing the latent structure of the instrument which is a type of construct validity study. I analyzed the TTCT in order to understand its latent structure, to confirm its validity. In this regard, I conducted confirmatory factor analysis to test the fit of the proposed two –factor model with the entire sample, using the LISREL 8.53 program (Jöreskog & Sörbom, 2002). I used covariance matrices generated by the PRELIS 2.51 program (Jöreskog & Sörbom, 2002) as input to LISREL to analyze the confirmatory factor analysis model. All of the correlation

coefficients between the variables were significant at the .01 level. These finding provide evidence about construct validity of the instrument on learning disabled population.

Multivariate Analysis of Variance (MANOVA)

Means and standard deviations for the TTCT-F scores for each group (learning disable experimental and learning disable control) are shown in Table 3. I screened the data for outliers using SPSS. I found no significant outliers. Also, I examined the values of skewness and kurtosis in order to see whether each variable was approximately normally distributed. No values of the skewness were greater than 2. However, several kurtosis values were slightly high. There were no missing values so that all of the participants were used in the analysis.

Table 3 Means and Standard Deviations of Raw Scores for LDE and LDC

	Mean		Standard Deviation	
	LDE* (n=16)	LDC** (n=16)	LDE (n=16)	LDC (n=16)
Fluency	12.99	14.25	6.73	6.44
Originality	11.78	13.78	6.81	6.72
Elaboration	11.10	12.68	4.52	4.57

*LDE: learning disabled experimental group**LDC: learning disabled control group

Multivariate analysis of variance (MANOVA) was carried out by using SPSS 11.0. MANOVA is used to simultaneously compare mean differences on the two sets of scores on the outcome variables (Anderson, 2003).

The test statistics employed are Wilks lambda, Pillai's criterion, Hotelling's trace, and Roy's largest root. Table 4 details the multivariate statistics are statistically significant.

Table 4 Multivariate Test Statistics Comparing learning disabled students on Creative Thinking Abilities

Statistics	Value	Approximate F Statistics	Significant of F
Wilks lambda	.17185	2.7635	.030
Pillai's trace	.18835	2.8123	.031
Hotelling's trace	.85049	2.705	.027
Roy's largest root	.13522		

The MANOVA revealed a significant overall effect (Wilks lambda = .17, $p < .05$). Both tau squared (τ^2) and zeta squared (ζ^2) were computed as indices of effect size. Tau squared (τ^2) was equal to .74 and zeta squared (ζ^2) was equal to .76. The discriminant function that results from the descriptive discriminant analysis may be used to calculate a discriminant score for each child. The discriminant scores are then correlated with each variable. These resulting correlations are referred to as structure coefficients. In the current study, these structure coefficients were based upon the total sums of squares and cross-product matrices. Structure coefficients greater than .3 are considered to be meaningful. Table 5 represents the structure coefficients for creative thinking abilities.

Table 5 Structure Coefficients for Creative Thinking Abilities

Variable	Structure Coefficient
Fluency	-.55
Originality	-.07
Elaboration	.21

The results from the MANOVA indicate that LDE are different from LDC in creative thinking abilities. Tuckey HSD tests revealed that the LDE scored significantly ($p < .05$) higher than the LDC in fluency, and originality and elaboration.

Table 6 Means, standard deviations and the level of significance for the Pretest and posttest

		Pretest		Posttest		
		M	*SD*	*M*	*SD*	*Sig*
Fluency	Experimental	27.75	7.03	52.94	15.96	0.0001
	Control	27.00	9.25	28.38	6.65	
Originality	Experimental	19.06	4.09	40.94	13.37	0.0001
	Control	17.63	4.59	21.31	4.85	
Elaboration	Experimental	15.88	6.11	32.44	11.71	0.0001
	Control	15.38	5.30	15.06	5.11	
Total score	Experimental	62.69	15.37	126.31	40.14	0.0001
	Control	60.00	18.29	64.75	15.11	

Table 6, indicated that both experimental and control groups had higher scores posttest when they compared to their scores on the pretest. However, the difference between pretest and posttest thinking abilities mean scores of the

experimental group was greater than the difference between mean scores of the control group. According to the results described, the creativity training program improved the creativity thinking skills of students with learning disability in the experimental group.

Discussion

Despite the fact that creative thinking abilities are well-researched topics with nondisabled persons of different ages, there have been no attempts to study several creative thinking abilities of students with learning disabilities in a cohesive conceptualization. In this context then, the purpose of this study was to the effects of a creativity training program on the creativity thinking skills of students with learning disability. Results from this study will be discussed in reference to the research question stated and the literature reviewed.

The findings of the multivariate analysis of variance revealed that there were differences between the experimental and control samples regarding creative thinking abilities. Therefore, students who participated in the CoRT program performed significantly better than did learning disabled who did not participated in the program. These findings support the idea that a creativity training program enhances students' creative skills, which other researchers have found (Kattab & Al Hadidi, 2008; Al Zyoudi, 2007; Daivs and Rimm, 2004; Renzulli, 2003; Winebrenner, 2003; Monahan, 2000). The findings indicate that the manner in which the creativity training program was implemented seems to have influenced the students thinking. The positive outcomes associated with creativity training program included the opportunity

for students to share ideas, to engage in their favor activities, to express themselves, and to become aware of their potential. A supportive classroom climate seemed to play an important role in the successful in establishing implementation of the creativity training program.

The creativity lessons, combined with a supportive and encouraging classroom climate, seemed to contribute to the success of the program. Sternberg & Williams (1996) believed that a comprehensive view of creativity takes into consideration the interchange between the individual and the environment in the creative process, the psychological meaning of the creation situation for the individual, and the power of the environment in establishing conditions for the development of creativity.

In conclusion, the results of this study suggest that creative training might have an impact on students' creative thinking skills, and a nourishing classroom climate seems to play a role in the process of developing children's creativity. The results suggest that it is important to consider students' cognitive, social, and emotional characteristics, as well as their backgrounds, when implement a creative thinking program.

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