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ON THE EFFECTS OF CREATIVITY-BASED TEACHING METHODS ON COGNITIVE-CREATIVITY, EMOTIONAL CREATIVITY AND ACADEMIC PERFORMANCE AMONG ADOLESCENTS

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ABSTRACT

The present study aimed to investigate the effects of creativity-based teaching methods on cognitive-creativity, emotional creativity and academic performance among adolescents. Population included all male students of Babolsar junior high schools (96-97). Having used a single stage cluster sampling technique, researchers selected the sample. Then 7th graders of different schools taught by the same teachers in writing and thinking-lifestyle courses were chosen and randomly assigned to control (N=30) and experimental (N=30) groups. To collect the required data, Abedi's (1363) creativity scale, Averill's (1999) emotional creativity inventory (ECI), and teacher-made test batteries. The study used a quasi-experimental design with pretest-posttest. The experimental group was exposed to the treatment, e.g. use of creativity-based

teaching methods for a 2-month period. To analyzed the data, Analyze of Covariance (ANCOVA) was used. Results of the study manifested that creativity-based teaching methods affected students' cognitive creativity, emotional creativity, and their performances in writing as well as thinking-lifestyle (F=112.794, F=14.851, F=0.270, respectively), hence, indication the difference between the two groups.

STATEMENT OF THE PROBLEM

To face a great amount of problems in the future, human communities see education as being inevitable to achieving such goals as peace, freedom and social justice. Conditions for change need to be created based on new advances in technology and the resultant ongoing changes. The initial condition for change is cognition and awareness. Then, planning is needed to accomplish goals. The importance and effectiveness of more efficient teaching and learning methods have always been the focus of scholars in the field of educational science. Since the early 20th century, many studies have been conducted by Mumann, et al., Montessori,Dewey, Herbart,Thorndik et al. on the effectiveness of teaching methods in all subjects (Afshar, 1390, p.183). Today, teaching approaches focus on innovation, creativity, and knowledge creation which must be a feature of teaching method so that teaching process is founded on the principle of learners' interaction with the environment and the discovery of facts (Fazlikhani, 1392).

Development of students' logical and creative thinking is viewed as a primary goal of all societies which has been taken into consideration of experts and theorists in the field of education and its evaluation mainly depends on quality and methods of teaching. It is due to this fact that as the education matter arises, teaching and its methods are inevitably manifested.

Studies on teaching methods suggest that many teachers are still spending a considerable amount of the class time on lecturing and asking questions which do not require anything but gathering simple scientific facts and only 1% of the time is allocated to questions which require thoughtful responses (Najafi 1393).

Teaching needs more than just explaining a lesson, and listening does not mean learning. Learning does not aim at recalling and learning passively but at fostering students' creativity and engagement and improving group work (Tick, 2007). In fact, education must be a step-by-step movement (from simple to complex), accordingly, it is, first, required to create a simple and general scheme being the same as that of a portraitist when drawing a face being completed through adding details (Naghibzadeh, 1394).

A successful teacher is not one who teaches most things within the shortest time but one who increases student's eagerness to learn and understand, since education does not aim at collecting information but at enabling thinking and understanding. The best way of understanding is doing, we do understand and

recall more effectively when we have learned it in our own ways (Naghibzadeh, 1394).

When one wishes to do an activity but fails, a problem will arise. In other words, each ambiguous situation creates a problem. Most researchers in the field of problem-solving have come to a consensus on the issue that a problem occurs only when someone faces a problem since there is no quick response. Dewey states that the best method of teaching is scientific-research approach used by students themselves, in other words, the method adopted by a researcher or a scientist to find answers to a problem.

When encountering an ambiguous situation, one poses a precise question, searches and collects data, arrives at answer/s, and finally evaluates and tests responses to make sure that they are reliable. Teachers should avoid expressing thoughts in a definite and dogmatic manner, as far as possible, since students feel that the questions have already been solved. Providing information is beneficial, only, when we are supposed to solve a problem because information is recognizable only as being utilized (Naghibzadeh, 1394).

Contrary to the above-mentioned method, there is a traditional approach to teaching whose key feature is materials a teacher expresses in the class where students pay attention to the lecturer. The lecturer may feel that s/he is the only one who can speak in that class and, even, may make students stop posing their questions. Therefore, according to what mentioned so far, the question arises as to whether creativity-based methods of teaching can affect students' cognitive creativity, emotional creativity and their academic performance.

METHODOLOGY

A quasi-experimental design with a control group pretest-posttest was used through which the effects of independent variable on the experimental group were investigated. These steps are diagramed as follows:

Table 1 Outline of the study

Group	Random sampling	Pretest	Independent variable	Posttest
Experimental	R	T1	X	T2
Control	R	T1		T2

Population

Population included all male students of Babolsar junior high schools (1396-97).

Sample and sampling technique

Having adopted a single-stage cluster sampling technique, the researchers selected two schools from among 10 junior high schools. Writing and thinking-lifestyle courses were taught by the same teachers in the two sample schools. Then, participants of the 7th grades of these schools were randomly assigned to experimental and control groups.

Having administered the pretest (writing and thinking-lifestyle), the researchers decided to assign one of these two classes as the experimental group; the other class was, also, selected as the control group. The treatment was implemented in form of an active teaching based on creativity, brain storming, and synectics teaching for three months. Then, both groups sat for the posttest, and the obtained data were analyzed.

Instrumentations

Abedi's creativity scale

To measure creativity, the above instrument was used. The questionnaire includes sixty 3-choice items. Developed, first, in 1363 based on Torrance definition and theory of creativity by Abedi, the questionnaire was administered to 650 testees including 3rd graders of junior high schools, Tehran.

Abedi and Schumacher (1989) re-built the questionnaire items due to lack of access to the original version. The new version was revised several times. It was, first, used by Abedi,O'Neil, and Spielberger (Daemi, 1376).

Reliabilities of four components were computed through administration of test-retest to students of junior high schools as .85 for fluency, .82 for originality, .84 for flexibility, .80 for elaboration. Internal consistency was estimated through Cronbach's Alpha on 2264 Spanish students (1994). The indexes were .75, .66, .61, and .61, for fluency, flexibility, originality, and elaboration, respectively (Abedi, 1372).

Validity: Studies on validity of the questionnaire have been conducted. Correlation coefficients between the four scores of Torrance creativity test and the four components of Abedi's creativity scale ranges from .15 to .41. The highest correlation coefficient belongs to fluency-verbal scores. The correlation between components of Abedi's scale and Torrance scores has been achieved. These coefficients have been reported as moderate and higher (Abedi, 1372).

Averill's Emotional Creativity Inventory (ECI)

To measure emotional creativity, the Averill's (1999) Emotional Creativity Inventory was used. Composed of four components (novelty, N=14 items;

effectiveness, N=5 items; authenticity, N=4 items; preparedness: N=7 items) the scale contains 30 items.

The items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It is necessary to mention that items 11 and 29 are reverse-scored. Having used Cronbach's Alpha, Averill (1999) reported an adequate reliability for the test as a whole (α=.91).

Having used factor analysis and criterion-related validity, Averill (1999) investigate the scale validity. Results of actor analysis indicated that there were three, but not four, factors (effectiveness and authenticity made up a single factor). The first dimension is novelty (N=14 items), authenticity involves 9 items, and preparedness includes 7 items. Having administered the test to Iranian students, Hashemi (1388) confirmed the three-factor structure of the scale and provided sufficient evidence for its validity and reliability (α=.85, .71, .64, for novelty, authenticity, and preparedness, respectively).

Teacher-made test batteries

It is necessary to mention that the above-mentioned instruments were utilized as pretest and posttest.

Data analysis procedures

Mean (M) and standard deviation (SD) were used to provide descriptives about variables and participants' bio-data. To test research hypotheses ANCOVA, Pearson correlation test and regression were run in SPSS.

RESULTS OF THE STUDY

Findings of the study are divided into three sub-sections including bio-data, condition of variables, and statistical hypothesis testing.

Results of bio-data

Table 1 Results of descriptives

Test		Emotional creativity	Cognitive creativity	Writing	Thinking-lifestyle
Pretest	N	60	60	60	60
	M	90.82	111.58	13.82	15.82
	SD	21.717	16.245	2.288	22.601
	MAX	17	76	10	8
	MIN	124	140	18	187

Posttest	N	57	60	60	60
	M	107.93	120.72	15.63	16.85
	SD	20.863	16.157	2.270	2.596
	MAX	60	79	11	10
	MIN	141	145	19	19

As displayed in Table 1, means of emotional creativity in the pretest and the posttest are 90.82 and 107.93, respectively; those of cognitive creativity are 111.58 and 120.72, respectively. Means of writing pretest and posttest are 13.82 and 15.63, respectively. Pretest-posttest means of thinking-lifestyle lesson are 15.82 and 16.85, respectively.

Results of normalizing test

Table 2 Results of Kolmogorov–Smirnov Test

	Cognitive creativity	Emotional creativity	Writing	Thinking-lifestyle
N	120	120	120	120
M	116.15	99.15	14.73	15.33
SD	16.772	22.887	2.446	16.026
Absolute	.180	.098	.103	.401
Positive	.660	.048	.093	.401
Negative	-.081		-.098	.-338
Kolmogorov-Smirnov Z	.081	.098	.103	.401
Asymp. Sig. (2-tailed)	.051	.86	.36	.51

As **Table 2** shows, p-value for all variables is higher than .05 (sig=.051 for cog. cre.; sig= .56 for em. cre.; sig=.36 for wr.; sig= .51 for th.lif.), therefore, null-hypothesis of theKolmogorov–Smirnov Test indicating normality of data distribution is supported.

Results of ANCOVA

To see if the present data could estimate underlying assumptions of ANCOVA, data were examined for outliers. The other four assumptions of ANCOVA including linearity, multicollinearity, homogeneity of variances, homogeneity of regression slopes were, also, tested. Results are as following.

Results of outliers

To examine univariate outliers, first, the score of each variable (scale or subscale) was calculated according to the test guide, then, SPSS was used to check them in order to find such outliers.

Linearity

The most underlying assumption for ANCOVA is the linearity of the correlation between dependent variables and covariate variable. In other words, this kind of correlation can be determined by using a straight line. Through ANOVA Table for each pair of variables, linearity and non-linearity can be examined (Garson 2012, as cited in Keikhosrovani, 1380). The present study used pretests (cognitive creativity, emotional creativity, academic performance) as covariate variables; also, posttests were considered as dependent variables. Table 3 summarizes the results of linear correlation between pretest-posttest variables.

Table 3 Results of linear correlation between pretest and posttest of all variables

Variables	df		F statistics		p-value		R
	Linearity	Deviation	Linearity	Deviation	Linearity	Deviation	
Cognitive creativity	1	11	.82	.38	.04	.68	.26
Emotional creativity	1	11	6.22	2.95	.033	.15	.42
Academic performance	1	11	.78	1.28	.56	.78	.23

As displayed in Table 3, all variables have a linear correlation with related covariate, thus supporting the assumption indicating that the relationship between the independent and dependent variables needs to be linear.

Multicollinearity

In the present study**,** pretests were viewed as covariates. A small relationship (r=.21) was found between pretests of cognitive creativity, emotional creativity, and academic performance. Based on the observed coefficient, the assumption of multicollinearity deviance between covariates has been met.

Homogeneity of variances

To check homogeneity of variances, Leven's test was used.

Table 4 Results of Leven's test for all variables: cognitive creativity, emotional creativity, academic performance

Effect	Dependent variable	F. Value	p-value
Group	Cognitive creativity	3.585	.07
	Emotional creativity	3.434	.08
	Academic performance	2.564	.06

As it can be observed in Table 4, Leven's test is not statistically significant (p>.05) for all variables, therefore, the variances of the two groups (experimental and control) in variables under discussion (cognitive creativity, emotional creativity, academic performance) are not significantly different. Thus the homogeneity of variances is confirmed.

The Research Hypotheses

H1: The use of creativity-based teaching methods has significant effect on cognitive creativity among adolescents.
To test the hypothesis, Univariate Analysis of Covariance (ANCOVA) in the context of Multivariate Analysis of Covariance (MANCOVA) on dependent variables was used. Results of ANCOVA are shown in Table 5 where posttest means, if pretest is controlled, of the two groups in cognitive creativity are compared.

Table 5 Results of univariate ANCOVA (the effect of group membership on cognitive creativity scores)

Variables	Sum of squares	df	Mean squares	F	p-value
Cognitive creativity	10171.753	1	10171.753	112.794	.000
Error	5230.430	58	90.180		
Total	889753.000	60			

As **Table 5** shows, there is a statistically significant (F=112.794, p=.000) difference between the experimental and control groups in cognitive creativity. Accordingly, it can be concluded that there is a significant difference between the two groups.

H2: The use of creativity-based teaching methods has significant effects on the adolescents' emotional creativity.

To test this hypothesis, univariate ANCOVA in context of MANCOVA on dependent variables was used. Results are shown in Table 6 where posttest means,

if pretest results are controlled, of the two groups in emotional creativity are compared.

Table 6 Results of univariate ANCOVA (the effect of group membership on emotional creativity scores)

Variables	Sum of squares	df	Mean squares	F	p-value
Emotional creativity	5182.053	1	5182.053	14.851	.000
Error	19191.666	55	348.939		
Total	688358.000	57			

As Table 6 displays, there is a statistically significant (F=14.851, p-value=.000) difference between the experimental and control groups in emotional creativity. Accordingly, it can be concluded that there is a significant difference between the two groups in emotional creativity.

H3: The use of creativity-based teaching methods has significant effect on adolescents' writing skill.
To test this hypothesis, univariate ANCOVA in context of MANCOVA on dependent variables was used. Results are shown in Table 7 where posttest means of writing, if pretest results are controlled, are compared between the two groups.

Table 7 Results of univariate ANCOVA (the effect of group membership on writing scores)

Variables	Sum of squares	df	Mean squares	F	p-value
Writing	144.043	1	144.043	52.252	.000
Error	159.890	58	2.757		
Total	14968.000	60			

As shown in **Table 7**, results of univariate ANCOVA indicate a statistically significant (F=52.252, p<.05) difference between the two groups. As a result, it can be argued that the two experimental and control groups have a significantly different performance in writing skill.
H4: The use of creativity-based teaching methods has a significant effect on thinking-lifestyle course.

To test the above hypothesis, univariate ANCOVA in the context of MANCOVA on dependent variables was employed. Results are shown in Table 8 where

posttest means of the two control and experimental groups in thinking-lifestyle lesson are compared, given that the pretest is controlled.

Table 8 Results of univariate ANCOVA (the effect of group membership on thinking-lifestyle scores)

Variables	Sum of squares	df	Mean squares	F	p-value
Thinking-lifestyle	1.840	1	1.840	.270	.606
Error	395.810	58	6.824		
Total	13629.000	60			

As shown in **Table** 8, results of univariate ANCOVA reject any significant (F=.270, p=.606>.05) difference between the two groups in thinking-lifestyle. Thus, it can be concluded that the two experimental and control groups are not significantly different with respect to thinking-lifestyle.

DISCUSSION

Data analysis performed on the students of junior high schools of Babolsar showed that creativity-based methods of teaching have influenced their creativity. Thus, the general hypothesis of the study is supported. The present finding is in agreement with those found by Khazaei (1389), Fazlikhani (1383), Ali Hosseini (1389), Gugen (1983), Maddon and Litton (1968), Milgram (1990), Torrance (1987), Remi and Perre (1974), Sullivan (1974), Chambers (1973), Rumerro (2009), Kleams (2009), Peng (2010), Kanesting (2010), Clowren (2010), Mishla and Fransvar (2010), Mary Clean (2009), Katami and Alcais (1995) and Beach Hoda et al. (1994).

Gugen (1983) in their study administered Torrance tests of creativity to 225 students and found that active methods developed their creativity, particularly females'. Compared to active methods, traditional approaches to teaching led to the lowest level. After a year, it was shown that their creativity was lower than the baseline. Another study by Huddon and Litton (1968) made a comparison between a dynamic and a traditional classroom. They arrived at the finding that students of the dynamic class exhibited a more stable outperformance in divergent thinking over their counterparts taught traditionally.

Milgram (1990) believes that one of the main barriers to creativity in schools is the monotonous education, while each student is a unique individual. Torrance (1987), relying on 308 previously conducted studies, shows that the appropriate methods of teaching put positive effects on creativity growth among children, indicating that 70% of these cases were successful. Study of Remi and Pere (1974) and Sullivan (1974) compared dynamic (open) and traditional classrooms.

It was found that the atmosphere of dynamic classrooms was more appropriate for improvement of research conditions, curiosity, manipulation, self-ownership, and learning.

Chambers (1973) in a study including 671teachers investigated their negative and positive effects on students' creativity. Their responses showed that teachers developing creativity among students have a tendency towards informal methods of class management and leadership. They let their students select their favored subjects. They welcome unusual views of students. They reward any creativity. They interact with the students outside the class. They believe that the encouragement of students' autonomy and positive performance contributes to creativity.

In a study Gonzales et al. (2009), exploratory learning affected speed of receiving information and enhanced the process of receiving. According to Kleams (2009), to create the best educational conditions, it is needed to update and develop teaching methods. Cheng (2010) believes that students' creativity needs to be formed by using modern and improved methods of teaching in the classroom. Thus, the most useful facilities are provided to facilitate education.

According to Clowren (2010), to achieve a better learning and teaching and for different aspects of creativity to take place, teachers need to make use of different and various teaching methods. Mishla and Fransoa (2010) a more developed method of creativity formation and its education affects teachers' knowledge, attitudes and skills. Regarding lecture method and its effect on primary activation of students' minds, Mary Klean (2009) came to the conclusion that the method can affect creativity, if used as a complementary one.

Katami (1995) in their study on the correlation of creativity, academic achievement, and cultural, social, economic variablesfound a significant difference between creative and non-creative people. Beach Huvda et al. (1994) explored the effect of exploratory method of teaching in Biochemistry lesson, and, finally, appropriate effects were shown.

In their study entitled "on the effects of active versus traditional teaching methods on students' creativity in high school" Fazlikhani (1383) concluded that active methods are more effective. Study of Ali Hosseini entitled "On the effects of active vs. passive teaching methods on students' creativity in high school" indicated more effects of active methods. Therefore, the present study concludes that creativity-based methods of teaching affect students' creativity.

CONCLUSION

Overall, the study showed that creativity-based teaching methods affect students' creativity. Teachers as professionals of education system need to examine

teaching methods and attend in-service education designed for familiarity with creativity-based methods. Thus, they should use methods depending on their needs to develop their students' creativity and productivity.

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