

Investigation of the Effect of Teaching a Thinking and Research Lesson by Cooperative and Traditional Methods on the Creativity of Sixth Grade Students

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Abstract—The present study investigates the effect of teaching a Thinking and Research lesson by cooperative and traditional methods on the creativity of sixth-grade students in Piranshahr province. The statistical society includes all the sixth-grade students of Piranshahr province. The sample of this study was selected by available sampling from among male elementary schools of Piranshahr. They were randomly assigned into two groups of cooperative teaching method and traditional teaching method. The design of the study is quasi-experimental with a control group. In this study, to assess students' creativity, Abedi's creativity questionnaire was used. Based on Cronbach's alpha coefficient, the reliability of the factor flow was 0.74, innovation was 0.61, flexibility was 0.63, and expansion was 0.68. To analyze the data, t-test, univariate and multivariate covariance analysis were used for evaluation of the difference of means and the pretest and posttest scores. The findings of the research showed that cooperative teaching method does not significantly increase creativity ($p > 0.05$). Moreover, cooperative teaching method was found to have significant effect on flow factor ($p < 0.05$), but in innovation and expansion factors no significant effect was observed ($p < 0.05$).

Keywords—Cooperative teaching method, traditional teaching method, creativity, flow, innovation, flexibility, expansion, thinking and research lesson.

I. INTRODUCTION

CONSIDERING the fast changing world of today, children and teenagers need to learn creative thinking and creative acting to be able to face the daily problems of life and get ready to live in the society. If the educational system aims to prepare children and teenagers to live in this environment, it should train them in a way to enable them to play an efficient and appropriate role in society. They should be enabled to act correctly in relation with family, groups, and other social bodies, as well as in decision making. They should be able to solve problems with new ideas.

Developed nations believe that today, instead of selling goods, we should produce science, and instead of consumption, we should think of producing novel ideas. The first prerequisite for the implementation of this policy is to provide the appropriate atmosphere for nurturing the creativity

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of people. To this aim, the educational goals of society carry creative messages. Many thinkers believe that in the fast changing world of 20th century, teaching creation and making students creative are the most important and crucial responsibilities of institutes [1].

Late in the 19th century and in the beginning of the 20th century, creativity went under attention as a new resource. In this period, the thought that ingenuity or an unusual ability in a person comes from an external soul faded away, but the effects of this thought that creativity and ingenuity are synonymous still remained and continued even to the Renaissance era. Therefore, half a century passed until creativity went under careful and scientific study. The leadership of this scientific movement was done by Guilford (1959-1966-1967) [2].

Creativity has four aspects or features as the following:

- 1- Flow or fluency: Ability to create meaningful relationship between thought and idea, which is measured based on the number of thoughts or solutions in a certain time.
- 2- Originality or innovation: Ability to think in an unusual way that reaches unusual, strange and clever answers.
- 3- Flexibility: Ability to think of different ways to solve a new problem [3].
- 4- Expansion: Ability to complete one thought and add related details to it. Despite usual people who are always trying to find easy solutions and examined ways, creative people choose complexity and try to find an easy solution for problems [4].

Overall, the aim of teaching creativity includes the following:

- 1- Recognition of students of creativity talent,
- 2- Recognition of creativity talent in self,
- 3- Believing in the growth of creativity and trying to nurture it, and
- 4- Applying creativity ability to solve problems in life [2].

The classroom, in which most teaching and learning occurs, has a major role in preparing the atmosphere for creativity. The emotional environment, physical condition, learning atmosphere, amount of motivation for learning, and so on are intra classroom factors that affect the development of creativity. Among the mentioned factors, the role of teacher in nurturing creativity is undeniable.

In today's world, having a methodology in science education expansion is critical and inevitable. The extreme rate of development in different fields of science and technology has been due to application of modern and correct

methods. The discussion in teaching methodology also follows this process. One of the most necessary transformations in educational systems is transformation of teachers' viewpoints and teaching methodology because revolutionary theories and approaches in education gain meaning by correct use of teaching-learning strategies. Using active and process oriented methods has gained more attention compared to the past [5].

Active teaching methods are in the form that the human mind is active in them and the teacher provides learning conditions and reinforces mental and thinking skills. Reinforced inter group relationship and cooperation grow with a feeling of self-confidence, spirit of exploration, conceptualization, explanation and analysis of the problem, so the student is directed to tracking the subject and tolerating ambiguity; The spirit of creativity and individual autonomy is strengthened; active teaching methodology works in a way to consider the classroom as continuance of thinking, thinking center, and educational leadership of thinking process [6].

Cooperative learning is an active approach to learning and teaching which engages groups of learners in working together to solve a problem, complete a task, or produce an item. Learning through cooperation is based on this belief that learning is naturally a social action in which the participants talk to each other and learning happens through talking. In this strategy, learners are responsible for others' learning as much as they are responsible for their own learning. Therefore, the success of one learner helps other learners to succeed [7].

The aim of a thinking and research lesson is to develop critical thinking, develop reasoning ability, intellection, transmission of knowledge, and viewpoint and skills that prepare the person for living in society. To reach this aim, people should be educated in a way to be able to apply their knowledge in different situations in life. The prerequisite to this aim is that people get engaged in the education and learning process actively and in action, and participate freely in classroom discussions so that in addition to enforcement of their ability of reasoning and creativity, they learn social skills in action and by experience [8]; however, today in schools, due to various reasons, we see that some teachers ignore the nature of the lesson and the proposed subjects and use traditional teaching methods without any flexibility.

Isfahani, in a study named *the effect of different teaching methods on creativity*, examined the amount of utilization of brainstorming method in development of creativity in students. He found that using this method has a positive effect on students' creativity and the teacher should show students in action that their ideas are respectable [9]. Ghooshly performed a study named *experimental investigation of creativity education method in lecture lesson teaching in second grade of junior high school*. He performed his study among female students in second grade of junior high school in Kermanshah by using educational methods striker, synectics, problem solving and discussion in the form of pretest and posttest of creativity with a control group. He found that using the synectics method in lecture lesson could increase students' creativity [10]. Rasouli et al. in their study named *comparison of the effect of cooperative learning and lecturing on creative*

thinking and educational development of third grade of junior high school female students in profession and technology lesson in Yazd, showed that the cooperative teaching method is more effective in increasing the creative thinking and educational development of female students than teaching by lecturing method, and that this effectiveness is more apparent in weaker students with regard to educational development [9].

Various researches have been done about the effect of the cooperative teaching method on students' educational development; however, this method has not been much under attention and only in few cases this relationship has been investigated. Thus, in this study, the basic problem is that whether the cooperative teaching method, which is nowadays introduced as an example of active teaching methods, increases creativity of students in a thinking and research lesson compared to traditional teaching methods.

II. RESEARCH METHODOLOGY

Given the aim of the study, that is the effect of two methods of teaching namely cooperative and traditional on students' creativity, a quasi-experimental design with pretest, posttest, and control group was used (one experimental and one control group). The statistical society in this study includes all male students in sixth grade in Piranshahr province in the educational year 2014-2015. The reason for selecting this society was to control for variables of age, gender, educational level, and culture. The sample was selected by available sampling. From among male elementary schools of Piranshahr, two schools were selected for the study. These classes were then randomly assigned into groups of cooperative and traditional teaching methods.

III. DATA COLLECTION TOOLS

A. Abedi's Creativity Questionnaire

This questionnaire contains 60 questions that measure four factors of flow, innovation, flexibility and expansion, respectively. Each question has three options of a, b, and c, which have the scores 1, 2, and 3, respectively. Total score of all the factors will make up the final creativity of students [11].

B. Reliability of Abedi's Creativity Questionnaire

Arabzadeh et al. in their study based on Cronbach's alpha coefficient, reported the reliability of factors flow 0.62, innovation 0.51, flexibility 0.54, expansion 0.56 and total creativity 0.69 [12]. In the present study, to evaluate the reliability of the questionnaire, the questions were administered for a group of 30 students of sixth grade who did not participate in the study. Based on Cronbach's alpha coefficient, the reliability of factor flow was gained 0.74, innovation 0.61, flexibility 0.63, and expansion 0.68.

C. Method of Administration of Teaching

The selected lessons of thinking and research book were taught in 10 sessions with cooperative method. Each lesson

was taught in one or two sessions. In the first educational session, the intended lesson in the experimental group was taught by cooperative method and in the control group, the lesson was taught by traditional method. At the end of treatment period, posttest of creativity was administered in the same condition as the pretest and simultaneously in the last week of March.

Before starting the treatment, four briefing and training sessions for each teacher were held with the help of an educational psychologist. After training teachers and holding the pretest, students of the experimental group received cooperative teaching method from the second week of January of the educational year 2014-2015 for a duration of about three months, in 10 sessions, each session lasting for 45 minutes (one session per week is approved by Organization of Planning and Compilation of Textbooks). Teachers taught nine lessons of thinking and research book in this period by

cooperative and traditional methods to student under supervision of the researcher.

IV. DATA ANALYSIS METHOD

To analyze the data, two methods were used. In the descriptive method, frequency and percentage of the scores of participants and mean and standard deviation of research variables in the two groups was used. In the inferential method, univariate covariance analysis (ANCOVA) and multivariate covariance analysis (MANCOVA) were used to evaluate the difference of means and pretest and posttest scores.

A. Descriptive Analysis of Data

After extraction of creativity scores of all students, the mean and standard deviation of scores were calculated and the results were provided in table and graph forms.

TABLE I
MEAN AND STANDARD DEVIATION OF CREATIVITY PRETEST AND POSTTEST SCORES AND ITS ELEMENTS IN COOPERATIVE AND TRADITIONAL GROUPS

Test type		Pre test		post test		The difference between the mean pre-test and the test	N
group	Scale	mean	Standard deviation	mean	Standard deviation		
Collaborative	Creativity	136.40	11.743	139.20	9.271	2/80	30
	flow	49.67	5.033	52.57	3.884	2/90	30
	innovation	23.87	2.837	25.57	2.402	1/70	30
	flexibility	36.37	5.623	36.27	4.025	-1/10	30
	expansion	26.50	3.411	24.80	2.552	-1/70	30
Traditional	Creativity	136.20	13.900	136.63	13.720	/43	30
	flow	50.23	5.211	50.47	5.124	/24	30
	innovation	25.10	5.026	25.40	4.889	/30	30
	flexibility	36.07	4.856	35.70	4.879	-1/34	30
	expansion	24.80	3.478	25.07	3.183	/20	30

As seen in Table I, the mean and standard deviation for cooperative group were (11.743-136.40) and (9.271-139.20) and for the traditional group were (13.900-136.20) and (13.720-136.63). In addition, the difference of the means of pretest and posttest for the cooperative group was 2.80 and for the traditional group was /43.

B. Inferential Analysis of Data

The main hypothesis of the research: cooperative teaching method is effective in increasing creativity of sixth grade male students of elementary school.

In order to test the first research hypothesis, the creative performance of the cooperative and traditional teaching groups was measured in the form of pretest and posttest of creativity by covariance analysis test.

Before covariance analysis, the prerequisites of covariance calculation should be followed. One of the factors that should be assessed before covariance analysis is homogeneity of regression. The results of homogeneity test of regression coefficients of creativity factor for cooperative and traditional groups ($P > 0.05$) and ($F = 0.877$) for group interaction and pretest is not significant in a level less than 5%. Therefore, the data supports homogeneity hypothesis of regression slopes. Thus, this hypothesis is accepted and covariance analysis can be performed. Moreover, another factor that should be

evaluated before covariance analysis is homogeneity of variances. Levin's test examines this hypothesis. Given the meaningfulness level that is more than 0.05, the opposite hypothesis is rejected and the null hypothesis is accepted. Moreover, another prerequisite of performing covariance analysis is normality of groups. To evaluate the normality, Kolmogorov Smirnov test was used. Given the statistics $z(596)$ and comparison with critical values of the table it is not meaningful in 95% (/870). Therefore, the null hypothesis is rejected and Distribution of dependent variable scores (posttest) for the experimental (cooperative) and control (traditional) groups are normal. Since the prerequisites of performing covariance analysis were confirmed, this method was used.

TABLE II
RESULTS OF CREATIVITY COVARIANCE ANALYSIS IN THE EXPERIMENTAL (COOPERATIVE) AND CONTROL (TRADITIONAL) GROUPS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	804/956	1	804/956	15/505	.000	/2140
pre_kol	4992/606	1	4992/606	96/169	.000	/6280
group	88/019	1	88/019	1/695	.198	0/029
Error	2959/160	57	51/915			
Total	1149311/000	60				

To determine the effectiveness of cooperative teaching method in the creativity of students of the experimental and control groups, covariance analysis was performed. Table II shows the effect of the cooperative teaching method on creativity. Considering that ($P > 0.05$), $P = 0.198$, $F(57, 1) = 1.698$, there are no logical reasons to confirm the main hypothesis, and it cannot be said that students who were taught by the cooperative method had more creativity than students who were taught by the traditional method. In other words, the cooperative teaching method could not increase students' creativity. The amount of ETA in the group indicates that 0.029 percent of increase of students' creativity is due to implementation of the cooperative teaching method.

V. SUB-HYPOTHESIS OF RESEARCH

In this step, to assess the sub-hypotheses of research, considering the sub-components that exist, multivariate covariance analysis was used to test the effect of cooperative teaching methods and novelty on factors of creativity (innovation, flow, flexibility, expansion). The results will be

described in detail.

One of the prerequisites of MANCOVA is equality of matrix of covariance. The results of Box test showed that no significant difference exists between covariance matrixes in sub-components of creativity. Another presumption of this test is equality of error variances. This presumption was available regarding the fact that linear transformation of dependent variables existed in each of the four elements.

TABLE III
RESULTS OF MULTIVARIATE COVARIANCE ANALYSIS

Effect	Value	F	Hypothesis df	Error df	Sig.
Pillai's Trace	0.249	4.228 ^b	4.000	51.000	0.005
Wilks' Lambda	0.751	4.228 ^b	4.000	51.000	0.005
Hotelling's Trace	0.332	4.228 ^b	4.000	51.000	0.005
Roy's Largest Root	0.332	4.228 ^b	4.000	51.000	0.005

In order to investigate the effectiveness of cooperative teaching method in sub-components of creativity, multivariate covariance analysis was used.

TABLE IV

RESULTS OF MANCOVA IN EXPERIMENTAL AND CONTROL GROUPS ON SUB-COMPONENTS OF CREATIVITY (INNOVATION, FLOW, FLEXIBILITY, EXPANSION)

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
group	flow	79.942	1	79.942	8.610	0.005	0.138
	innovation	14.523	1	14.523	3.646	0.062	0.063
	flexibility	4.442	1	4.442	0.472	0.495	0.009
	expansion	5.853	1	5.853	1.141	0.290	0.021
Total	flow	160503.000	60				
	innovation	39825.000	60				
	flexibility	78853.000	60				
	expansion	37784.000	60				

Sub-Hypothesis 1: Cooperative teaching method is effective in increasing the amount of flow in sixth grade elementary school male students.

In order to determine the effect of cooperative teaching method on the amount of flow of experimental and control group students, MANCOVA was performed. Table IV shows the results of MANCOVA in the experimental and control groups for the sub elements of creativity (innovation, flow, flexibility, expansion). Given that ($F=8.610$, $df=1$, $P=0.005$, $P < 0.05$), the sub-hypothesis 1 is confirmed. In addition, based on the squared parabola ETA index, the size of the effect of the cooperative teaching method on flow factor has been 13%.

Sub-Hypothesis 2: Cooperative teaching method is effective in increasing the amount of innovation of sixth grade elementary school male students.

To assess the effect of cooperative teaching method on innovation, we refer to table IV. The results indicate that given that ($F=3.646$, $df=1$, $P=0.062$, $P > 0.05$), the sub-hypothesis 2 is not confirmed and we cannot say that the level of innovation in students who were taught by cooperative method was significantly more or less than the students who were taught the same lessons by traditional method.

Sub-Hypothesis 3: Cooperative teaching method is effective in increasing the amount of flexibility of sixth grade of

elementary school male students.

Table IV shows the results of MANCOVA in experimental and control groups on sub-components of creativity. Given that ($F=0.472$, $df=1$, $P=0.495$, $P > 0.05$), there are no reasons to confirm the sub-hypothesis 3. We cannot say that the level of flexibility of students who were taught thinking and research lesson by cooperative method was significantly different from the students who were taught this lesson by traditional method.

Sub-Hypothesis 4: Cooperative teaching method is effective in increasing the amount of expansion in sixth grade of elementary school male students.

Finally, the results of MANCOVA in Table IV show the effect of cooperative teaching method on the amount of expansion. Given that ($F=1.141$, $df=1$, $P=0.290$, $P > 0.05$), there are no reasons to confirm the sub-hypothesis 4.

VI. DISCUSSION AND CONCLUSION

The main hypothesis of the research: cooperative teaching method is effective in increasing the amount of creativity of sixth grade elementary school male students. Table II shows the effect of cooperative teaching method on creativity through covariance analysis. Given that ($F(57, 1) = 1.695$, $P=0.198$, $P > 0.05$), there are no reasons to confirm the main

hypothesis and it cannot be said that the creativity of students who were taught the thinking and research lesson by cooperative method was significantly more or less than students who were taught this lesson by the traditional method.

The result of the main hypothesis of the research is in line with findings of Guneysoy and Tekman [13] and Ghooshly [10] with regard to the effect of cooperative teaching method on increase of creativity. However, it is not in line with the research results of Rasouli et al. and Isfahani with regard to the effect of cooperative teaching method on increase of creativity [13], [14], [9].

In the process of cooperative learning, students find more opportunity to see how their partners think and make up new ideas. Observation of this process can be a good example for them. If the members in cooperative groups have positive correlation, they can create a supportive atmosphere. In such a supportive atmosphere, students will feel more security and freedom to discuss, think, and express new ideas. More and deeper learning that is provided by cooperative environments is the basis of any kind of creativity. Different viewpoints of members in heterogeneous creates create new ideas in students' minds [15]. In explaining the results of this hypothesis, it can be said that in the collaborative method, given that the activities were already planned, and the students did not have the opportunity to change the stages of teaching, as well as the lack of a positive supportive environment and a sense of security among the students of the experimental group, they did not have the opportunity to express new ideas, and this created a difference between the two groups.

Since the present study was done at the sixth grade level and among male students and about a thinking and research lesson, performing another research of this kind at other educational levels and on female students and about other lessons can be effective. Furthermore, performing research in other provinces of the country can be an appropriate basis for comparison of the advantages of this method. In addition, with regard to the book being newly compiled and the importance of research for students in elementary and junior high school, it is suggested that similar studies are done at these levels.

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