# Effects and evaluation of creativity instructional methods on creativity of students

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**Abstract:** The purpose of this study to investigate and compare the efficacy of brain storming methods, group discussion and guided discovery of creative high school female students of Ahvaz was the third base. The study sample of 80 third grade high school students in Ahwaz city in the 89-90 school year as a cluster random sampling and then selected randomly in three experimental groups (brain storming, group discussion, guided discovery) and a control group ( expository or traditional) were appointed to replace. The dependent variable to measure creativity, creativity test was used in Abedi. The research design and experimental test of the type pre and post test control group had. After random selection of experimental and control groups, first for all three groups, pre-test was performed, and then the pilot interventions in 10 sessions of 45-70minutes to the test groups were presented and after the training program after the test were. Analysis of covariance using a data track (ANOVAs) showed that techniques brain storming, group discussion and guided discovery than an expository of how creative the students had a positive impact. The results also showed that it isn't any of the methods in terms of impact than the other does not**.** .

*Key words*: Creativity, Expository, Brain Storming, Group Discussion, Guided Discovery

## 1. Introduction

We may consider the expansion of effective ways in teaching and learning as one of the psychologists' endless missions for helping the educational systems (Turnbull, Allison & Malcolm, 2010). Nowadays, Creativity and its operation and its effects on learning and teaching methods are psychologists and educational scholars' interest. In past few decades, many studies have been done relating to this subject in order to answer these two main questions: what is creativity? And is it teachable? (Teo2010).

Creative thinking is one of the most complex and outmost display of human thought. (Morris.W, 2006) According to Turnbull etal (2010) creativity is the ability to produce new thoughts and mix existing thoughts in a new form to find new solutions for the problem. While Robert Gangne (1984) considers creativity as special way of solving problem, Wool folk (1993) believes the core of all creative ideas and thinking is novelty concept. Torrance (1988), the scale of creativity inventor, with more than 40 researches regarding this matter believes creativity means to create, make and express exquisite ideas and it can be taught to others.

Psychologist and educational tutors believe there are two models for training creativity. One relates to person and other to the environment. In individual related way, child learns the ways and methods and uses them that lead to growth and prosperity of universal creativity. (Heausler1998). Four major methods used in this research can be the representative of these two above general practices.

In brain storming method, the main purpose is to separate the process of producing answer from the process of their evaluation, because evaluation mostly generates diverse answers and prevents its evaluation separately. In this method teacher gives examples to the students and asks them to express solutions that come to their mind for each issue. Before giving all answer no explanation or suggestion is not given by teacher or other students, this method is like the free association method use by psychologists, with this difference that free association is an individual process but brain storming is performed with other students participants (Mellew1996).

Of course we should mention that brain storming may be the way to evaluate input behaviors because the answer that are given by students at first are more dominated on them than others. Following the brain storming method will make students to think about more unlikely answers, also this method can teach students to remember concepts and basics required to solve an issue (kakia, & Madan dar Arani, 2010).

In traditional educational methods that are usually called expository method. Teacher in teaching materials gives students all concepts and basics for resolving an issue and then shows them the answer. But in Brain storming method, teacher doesn't give students concepts and basics rather the student is free

to find the solution for the problem any way he.she wants. Also in group discussion method that is a very common method in teaching, students unlike the traditional or explanatory methods participate actively in class. (Berg.R.2007) with this method we are able to create a better team work and make them involve in subject and finally help them to learn the material more stable than before(safavi, 2004).

Curran and his colleagues (2008) consider the approaches based on small group discussions effectiveness method in inter professional learning and believe that interaction factors in this method have important effect on interest, creativity, learning and satisfaction of students during learning process.
In Guided discovery method which is a combination of these two methods, student has an independent role in his work but still teacher supervises his activities and anytime he needs, teacher guides him through. For example, in guided discovery method teacher gives the concepts and basics to students and the student himself tries to solve the issue (kakia, & Madan dar Arani. 2010).

Results of Turnbul, Alison and Malcolm (2010) studies regarding education and group discussion designs and teaching methods effects on creation showed that this methods are effective in increasing the person's creativity and gives the ability to produce new ideas and mix existing ideas to new form in order to find a new solutions for problems.

Livingston (2010) in his research about creativity relation with academic education demonstrated that using new methods in academic education makes a creation of creativity in educational environments possible, he concluded that teaching in university creates a natural place for organizing educational structures and learning techniques, so this not only leads to creativity and individual training it also organizes people's relationships with each other, regulates and allocates time for finding the solution of one problem.

Sonz de Acedo Lizarraga, Oliver (2010) studied works of intellectual skills stimulation on intellectual skills, creativity, self organizing and educational success in 46 high school students between 16 to 18 years old. The results showed that stimulating intellectual skills with different methods of learning at first will lead to increasing the intellectual and creativity skills and then leads to higher self organization and educational improvement.

Sharifi and Davary (2010) execute a research with the purpose of studying and comparing the effects of 3 creativity training methods (brain storming, forced relationship and) in increasing the creativity of students in Shahrekord second grade of junior high school students. Their results showed a notable difference between pre-exam scores and post-exam scores in all

groups except control group. (Brain storming group P<0.05, Sinectis P<0.01 and forced relation P<0.05) It also showed that none of the training creativity methods had superiority to others (P<0.001).

Dusold and Sadoski Study (2008) that also included the comparison of final exam result of two groups in form of group discussion following the individual study and lecture, showed no significant difference. In this study, base on researched performed by researchers, students in group discussions mentioned that they didn't need to study very much and most of the time they stick to those material discussed, while students in lecture group spent more time in preparing themselves for earning better scores.

Slavin etal (2008) in their study about the effects of four methods on creativity: a) traditional method b) combinational training methods using big and small groups and working or learning computer c) only teaching computer and d) processing programs that motivated teachers to create new methods in teaching, control groups were chosen accidentally and the result showed that partnership learning and combination methods have more effect on creativity and learning of audiences.

Feingold etal (2008) not only mentioned the difficulties of choosing a teaching method that can increase creativity and understanding level in students, but also offered a study named teaching by using small groups from university students in bachelor degree. Those who used interviews and observation as a collection tools for their data, reported that this method can significantly increase interaction between people, efforts and creativity to answer multidimensional questions.

Following this findings, Bourgeois JA and ET (2008) also by performing a study on PHD courses in California University, reported that courses based on small groups make a great impact on patient interaction, creative work in medical procedures, compliance with ethical issues and counseling approaches.

Also Kakia and Madan dar Arani (2009) in one research studied the female students' creativity according to evaluation and comparing effectiveness of brain storming and expository methods. The result showed teaching creativity by brain storming method in expansion level P<0.001 is approved but in other levels they didn't observe any significant difference between brain storming method and expository method.

Falavin(2006) in studying effectiveness of Brain storming, sinectis and forced relationship in Female and male students found out that the average of female creativity scores in brain storming method was higher than male scores in the same group although in

sinectis and forced relationship groups male had higher creativity levels(Sharifi and Davary,2010).

Asgary (2007) in his study about effectiveness of different teaching methods on creativity level in 574, 4th grade school girls in Hamadan province demonstrated that brain storming methods, research skills, creative study, active teaching (solving problem and group discussion), using self concept incremental approaches and available tools, familiarizing teachers with creativity and its value and importance, and using flexible curriculum in class have positive effect on students.

In another study, Marel (2003) by studying different creativity technique discovered that flexibility of training structure in class is effective in students' creativity. Morgan R.R and Et study(2000) on the role of intelligence and creativity methods in accordance with competitive environment showed that although intelligence has a important role in understanding human behavior but by using creativity, one can understand the ability of man to match himself with competitive environment and use appropriate and new methods.

Proctor (2002) in one experimental research, studied the effect of teachers' workshops on creativity, recognition, academic achievements of second grade gifted and non-gifted students. According to him factors related to school and teachers have the most important effect on student work in developing countries.

In his studies, Sternberg R.J (2001) showed that creativity is the ability to create new ideas in high level and it is teachable to students by using different techniques. This leads to a mixture of creativity power, flexibility, and sensitivity about existing beliefs in them. He believed that teaching creativity techniques to a person gives him the ability to think about other findings with reasonable thinking to have beneficial achievements for him and others.

Gardner and Jouler (2000) in their research regarding effectiveness of traditional and active learning methods declared that those students that use active learning not only have better learning but also enjoy the learning process. Because instead of being only a listener they participate in learning process actively and consider themselves as responsible for their learning (Yazdian poor, Yousefi and Haghani 2010).

However considering the previous researches, present study tries to evaluate the creativity power of third grade school girls in Ahvaz base on four teaching methods brain storming, group discussion, guided discovery and expository.

Therefore following hypothesizes were considered and studied in this research:

A. **First hypothesis**: *Teaching brain storming, group discussion, guided discovery methods is effective in third grade female students.*

B. **Second hypothesis:** *There is a significant difference between brain storming, group discussions, guided discovery methods in third grade female students' creativity levels.*

## 2. Methods

This study has been accomplished base on experimental method by using pre-exam and post-exam from control group. All of the third grade high school female students in Ahvaz during 1389-90 academic years were considered as statistical society of this paper. Statistical sample includes 80 people from this society that were chosen cluster randomly from high schools in Ahvaz's district 1. And base on simple sampling they were divided to 4 groups each twenty students (3 experimental groups and one control group). Some of the features of these sample groups are presented in Table 1.

As it is considered in Table 1, in Expository group 17 years old students had the most frequency with approximately 60% and 16 years old students had the lowest with 40 samples. Also in group discussion group, 17 years old students with the most frequency around 50% and 18 years old students had the lowest with 15 samples.

In guided discovery group, like two groups above, 17 years old students had the most frequency with 55% and 16 years old students had the lowest with 20 samples. In brain storming method, 17 years old students had the most frequency with 60% and 16 years old students had the lowest with 5 samples.

### 2.1. Research Tools
*2.1.1. Creativity questionnaire*

In order to measure the dependent variable – creativity- Jamal Abedi creativity evaluation test was used. This questionnaire includes 60 articles. Each article has 3 options a, b, c. that is scored respectively 1, 2, and 3. This questionnaire has 4 creativity, flowing, flexibility and expansion components that are respectively 16, 22, 11 and 11 questions. The final ratios reported for this questionnaire varies from 0.70 to 0.83.

In current research, final ratios of creativity questionnaire are calculated according to Tansif and Cronbach's alpha that were respectively 0.84 and 0.80. Those were the acceptable final results of this questionnaire.

**Table 1: Distribution of subjects according to age group**

| Age (year) | Group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Expository Method | | Group Discussion Method | | Guided Discovery Method | | Brain Storming Method | | Total | |
| | frequency | Percentage | Frequency | percentage | Frequency | percentage | Frequency | percentage | Frequency | percentage |
| 16 | 8 | 40.0 | 7 | 35.0 | 4 | 20.0 | 1 | 5.0 | 20 | 25.0 |
| 17 | 12 | 60.0 | 10 | 50.0 | 11 | 55.0 | 12 | 60.0 | 45 | 56.3 |
| 18 | 0 | 0 | 3 | 15.0 | 5 | 25.0 | 7 | 35.0 | 15 | 18.7 |
| Total | 20 | 100 | 20 | 100 | 20 | 100 | 20 | 100 | 80 | 100 |

.**2.2. Research Findings**

*2.2.1. Descriptive findings*

This research's descriptive findings include statistical indicators such as mean, standard deviation that are different for all variables. This point is mentioned in Table 2.

As it is mentioned in table 2, in pre-test period the average and deviation of creativity in each group respectively are as follow : control group (expository, "traditional and speech" method) 12.21 and 122.50, group discussion 14.59 and 120.35, guided discovery group 11.86 and 122.65, brain storming group 11.84 and 119.75 and in post exam period the average and deviation of each group are control group (expository, "traditional and speech" method) 14.02, 121.00, group discussion 14.77 and 128.00, guided discovery group 10.35 and 129.20 and brain storming method 11.23 and 125.40.

*A-      Findings      regarding      the      research hypothesizes*

*First hypothesis: Teaching brain storming, group discussion, guided discovery methods is effective in third grade female students.*

**Table 2:** Creativity Variable descriptive features in pre-test and post-test period
**(S d= standard deviation)**

| Group / Variable | Pre test | | Post test | |
|---|---|---|---|---|
| | Average | $S_d$ | Average | $S_d$ |
| Control (Expository) | 122.50 | 12.21 | 121.00 | 14.02 |
| Group Discussion | 120.35 | 14.59 | 128.00 | 14.77 |
| Guided Discovery | 122.65 | 11.86 | 129.20 | 10.35 |
| Brain Storming | 119.75 | 11.84 | 125.40 | 11.23 |

As it is shown in table 3, with controlling the creativity pre test a big difference was demonstrated among female students in control and experimental groups (F=9.39 and P<0.001)

In other word, There was a great creativity difference among students who experienced brain storming , group discussion and guided discovery ( experimental groups) and those who didn't learn these methods and used the traditional way of expository (control group).

As it is shown in table 4, there is no significant difference between triple experimental group (group discussion, guided discovery, brain storming) by Pursuing Bonferoni test analysis. Therefore the second hypothesis is not confirmed. In other word, the effect of teaching in group discussion, guided discovery and brain storming to female students is almost the same.

**Table 3**: One track covariance study results (*ANOVAs*) a      comparison of creativity average after exam   Experimental and control groups before test

| SOV | TS | df | MS | F | P |
|---|---|---|---|---|---|
| Pre-test | 9691.52 | 1 | 9691.52 | 276.74 | 0.0001 |
| group | 987.22 | 3 | 329.07 | 9.39 | 0.0001 |
| E | 2626.47 | 75 | 35.02 | | |

Second hypothesis: There is a significant difference between brain storming, group discussions, guided discovery methods in third grade female students' creativity levels.

Considering the fact that there is no significant difference among groups, using one track covariance analysis therefore, for this paper we used bonferoni analysis that its results are mentioned in Table 4.

**Table 4**: Pursuing bonferoni test Result among post creativity test average (*Av.*) scores. Experimental (*Exp.*) and control groups in monitored pretest

| | Groupos | Av. | Exp. | Gr. dis | Gui. Dis | Br. S |
|---|---|---|---|---|---|---|
| 1 | *Control (Expository method)* | 121.00 | | (0.0001) | (0.001) | (0.003) |
| 2 | *Group discussion method (Gr. dis)* | 128.00 | | | - | - |
| 3 | *Guided Discovery method (Gui. Dis)* | 129.20 | | | | |
| 4 | *Brain Storming Method* | 125.40 | | | | |

## 3. Conclusion

As it was explained, this research was done with the purpose of studying and comparing the effectiveness of brain storming, group discussion and guided discovery teaching methods on third grade students' creativity level. The table 3 result showed that there is a significant difference among students who were taught according to brain storming, group discussion and guided discovery teaching method ( experimental method) and those who didn't follow these methods and were taught in traditional way (control group). (p<0.0001) and this means that brain storming, group discussion and guided discovery teaching method is influential in third grade student creativity.

*These findings are matched with researches done by Turnbul, Alison and Malcom (2010), Liunig Stone (2010) Sanz de asdo lizarga , oliver (2010), Sharifi and Davari (2010), Karan and et (2008) Dusold and Sadoski (2008) Slavin and et ( 2008) Fingled and Et (2008) Borgeuis and et (2008) Kakia and Madan Dar Arani (2009), Flavin (2006), Asgary (2007), Meril (2003), Peractor (2002), Steranberg (2001), Gardner and jouler (2000).*

In order to explain these results, we can mention that new studies show, the concept of creativity can contain a vast range of social effects in person's individual growth especially in childhood. (kratzer, J.2008), these researches also confirm the positive effect of creativity on formation of" social wealth" in children and teenagers and provide an opportunity for most of people to use this wealth or source in their adult age. Therefore understanding the conditions of growth and expansion or teaching creativity can be considered as one of the knowledge areas that are not fully comprehensive for men. And this gives a good opportunity to psychologists and

researchers to investigate and study.(Bandura A., 2001)

Although paying attention to creativity in psychology field was mostly started by Gilford's studies in 1950 AD and then followed by Turens researches in 1970s, but it entered schools as a basic field of study favorites by teachers and psychologists (Craft, A.). However recently many of Psychologists and teachers have tried to consider this issue more practically and expand its training in effective living areas such as educational system, especially in schools ( Persaud, R.) Meanwhile teachers who consider creativity inflorescence and growth in students as the most important goal of education, tried to apply active learning method (like methods used in this research) and help students to use their creativity as far as it's possible. (Hosseini2002)

In this regard, Persaud (2008) believes that producing and creating creativity in schools requires deep attention toward the quality of education. Many scientific researches consider teaching and learning by brain storming method as an active teaching that after dividing evaluation process from answer production process plays an essential role in idea creation of students. (Abedi1993). This method increases the effort of students to give more direction to their answers hence lead to increase of answers produced by students (Persaud2008).

It must be acknowledged that brain storming can be a way to evaluate the input behaviors because the answers which students first give are probably those that they are more dominance.

Continuing the brain storming method can eventually make students to test their weaker answers. Also this method can make students to try to remember the concepts and basics required for solving the issue (Madan Dar Arani & Kakia, 2009).

Group discussion method, one of the methods apply in this research, is also introduced as active learning and increases creativity and innovational skills in students. As a matter of fact, applying this method can help create a better interaction among students and this way increase their involvement with the lesson subject and eventually create a more stable learning. Those teachers who believe in active participations of students in class and give them relative independence so they can feel proud and possession toward the class not only increase the students' inner motivation but also provide a ground for reinforcement and development of creativity(Am ably, 1996).

Group discussion method, regardless of educational aspects and enough opportunity to analyze the details being discussed, has undeniable effects on enhancing social culture and people communications. This method is valuable in

communication improvement, creating self confidence by discussing the topic, improving the ability of transferring and transparency of ideas, listening ability reinforcement, observing other people's reaction about what is being said, disagreeing without showing any resistance and entrenchment, free expression of ideas and asking mutual questions that in some points can be the starter and starting point of one research (Barras R, 2002).

Regarding the manner of guided discovery method effectiveness which is a combination of brain storming and traditional or expository method, we can say that student unlike expository or speech method uses teacher's instructions and supervision while keeping his independence. Although in this method students are completely free to find the solution but teachers also help them anyway they can. However this help is for preparing and assisting them to remember the knowledge or concepts or basics and skills required to solve an issue. This method can play an important role in students' growth and creativity because it teaches students to take responsibility for finding relations and organizing the information and also anytime needed teacher's support and guidance is provided (Seif2000).

Also considering the fact that second hypothesis about the lack of differences in brain storming, group discussion, guided discovery method effectiveness on female students in third grade of Ahvaz high school showed no real meaning. We can consider that according the results in table 3, this research like Sharifi and Davary's researches 2010, Asgary 2007, Neka 1984, Mirzaeian 2004 showed no superiority among creativity methods, although in this regard, in some researches (flavin 2006, Hasani 2000, Bahrami, Rashidi and Arizi 2000) one creativity method was considered better that the others.

Therefore considering the mixed scientific information about the differences of creativity training methods 'effectiveness, it seems that this research's limitations in addition to test inefficiency in considering the environmental, cultural, social and moral variables in students is due to inadequate number of teaching creativity sessions, insufficient volume content, lack of intelligence control (although in this research other variables such as sex, economical –social conditions was controlled) .

However, in order to enhance the quality of the future studies following points are recommended, it is better to increase the test time, the sample size of research and number of training sessions and diversification of creativity training content in addition to use other creativity training methods such

as model making or combinational methods and comparing their results in different creativity levels.

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11/12/2011