

## **Evaluating Effect of Plans and Research Activities of Students' Research Centers on the Process of the Creative Solution of Problems amongst Secondary Students**

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### **ABSTRACT**

Problem-solving is an indispensable part of every research activity and all research houses of students have been established with purpose of teaching skills of creative problem-solving and culture of research to the students. The current research is conducted with the objective of "evaluating the effect of research plans and activities of students' research houses on creative problem-solving amongst the secondary level students". This research is of semi-experimental type and it has a probationary type of method (preliminary test and final test plan with the control group and without using any random selection) and tools for data gathering via questionnaires of problem-solving process. Finally, based on calculations via the trial test of T as the mean of scores for problem-solving amongst the students of both trial group and control group is significantly different which indicates the effect of all research plans and activities of students' research-houses on the creative process of problem-solving amongst secondary level students. While examining the components of creative solution of problem such as simple decision making, initiative and flexibility, the results are the same and only the significant difference existed while comparing the average of the independence scores (self-sufficiency) in two trial and control groups.

**KEYWORDS:** Process of finding a creative solution of problem; simple decision-making; initiative; flexibility; independence

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### **INTRODUCTION**

The students' research-houses have been generated with the aim of teaching skills related to creative problem-solving and spreading culture of research and investigation among the students in order to organize and plan for their own activities based on order, thinking and speculation and learn the way to conduct a scientific research through accomplishing development and innovative plans supervised by guide teachers and making use of all planned activities and plans.

The current research has been implemented with the objective of review of amount of effect of the students' research-houses research plans and activities on the process of problem-solving among the secondary level students. Since the creative thinking is considered as the most complicated aspects of humane thinking and the key to personal and social progress in world of today, the creative thinking is the power of finding multiple solutions for many problems. Thus, it is necessary that the research programs pave all the way for expansion of creative activities for the students.

Problem solving is an inseparable part of the research activities. In the past, they considered the problem solving trend as an inferential and intellectual issue; however, in recent years they have concluded that a completely inferential and intellectual method does not cover all dimensions of problem solving and creativity is highly important for the problem solving to be a success. Therefore, process of creative problem solving has been welcomed for utilizing from all the chances and opportunities.

The study of creative activities has been conducted in arenas of psychology, Gestalt's psychology and psychometrics. Freud recognized the creative activities as a means for expressing aggression and sexual desire in a sociable way and Gestalt's psychological theory like that of Wertheimer (1945) is about solving problems through insight which expresses the creative thinking. According to psychometrical traditional viewpoint, Guilford (1950-1967) conceptualized creativity in format of a series of divergent thinking skills (Carr, 2004).

Most researchers believe that the education's traditional methods not only do not assist in growing the students' creativity, but such methods prohibit them from moving forward (Amobile, 1996, Torrance, 1990, Joyee 1990, Berg 2000). If education departments create a suitable and confident atmosphere and utilize from some active and exploratory educational methods, it has assisted the students in line with benefiting from their own creative

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power. Osborn, 1996 and Torrance 1990 believed that all the individuals can relatively be creative and nourishing the speculative capacities is the foundation of creativity. Debono, 1986 found that people should be taught how to think logically in order to be able to be creative individuals. Sternberg (2001) believes that creativity is a completely multi-faceted trend in which the thinking style, quality, motivation and environmental context have some influences.

Isaksen and Terfingher (2007) in a study concluded that if individuals of team work or the school have a clear insight about the methods of problem solving, they will be able to apply the process of problem solving in a better and more effective way.

Cramonf and Martin (1991) have shown that the process for creative problem solving is an inherent and flexible gift; however, if more options and more ways be given to the individuals and their decision making power enhances, they will obtain more skills in solving problems.

In a research conducted by Reza Sacki (2005) titled "Designing of Research Management Modification Guide in Educational system of Iran" he has put forward the subject of management in this area of activities in order to obtain all the necessary efficiency in this regard.

Nejadhosseini (2009-2010) in a study titled "Evaluation of effect of teaching creative problem solving on level of problem-oriented scientific researches of the students" has assessed the role and effect of teaching creative thinking and creative problem solving on the problem-oriented level of their scientific researches.

Payandeh et al (2010) in a study titled "Creative Learning through teaching various methods of problem-solving in children and adolescents" has dealt with methods and techniques related to nourishment of creativity and creative learning through teaching different methods of problem-solving.

In fact, research-houses are considered as an opportunity for empowering students to creatively solve problems. Consequently, it is necessary that their activities and plans nourish the creative thinking and train them as scholars, creative, innovative, productive and agents of change. Therefore, the effect of the research plans and activities of student research-houses among secondary level students is studied in this research.

## **RESEARCH METHOD**

By considering the subject and objective of the research that considers the creative problem-solving process, the current study is of semi-experimental research type and it has a trial method. Since it was not possible to select and divide the subjects randomly, we used the preliminary and final testing plans with control group and without using the random system of selection.

In execution of the plan, those students who use the research plans of the research-houses were selected as the trial group by gender-based separation and among those secondary students who do not refer to the research-houses; some were selected by gender-based separation as the control group. At the end of month of November when the registration for the research-houses were complete, both the control and trial groups took a pre-test, and finally, at the end of month of April of the next year when the trial groups experienced the research plans of such houses, again a final test was held for both the trial and control groups and the mean of the scores obtained from both preliminary and final tests were compared with each other and they were statistically analyzed.

The current study's statistical society are the secondary level students of Kerman province during the year 2010-2011 who use the research programs of students' research-centers with a number of eight thousand people and they are training in eighteen research-houses and their peers all are studying at the secondary schools of the same cities.

Due to the fact that this research is a semi-experimental one and the volume of the sample is not influenced by the society, therefore, the sampling was accomplished in multi-stage cluster and simple random format.

In order to select the trial groups, first of all, two research-houses were chosen out of eighteen research-houses randomly at the province level, and from every research-house, a number of twenty boys and twenty girls were chosen randomly which formed eighty people and the trial groups. Also, amongst the secondary schools of the cities where the two research-houses were selected, first of all, one males secondary level and one females secondary level were chosen and from every high school 40 people were identified and selected randomly which totally formed eighty people and the control groups.

Therefore, the sample group for the current study consists of 160 people (80 girls and 80 boys) out of which 80 people (40 girls and 40 boys) have experienced all plans and activities of research-houses and have constituted the experimental groups. The remaining 80 people (40 girls and 40 boys) have not applied the research-houses' programs and activities and have formed the control groups and the preliminary and final test has been taken for both the trial and control groups.

The tools for data gathering consist of the creative problem-solving having 34 parameters and have been arranged in accordance with Likert range as: Always ever, most occasion, sometimes, rarely, nearly never which

degrees ranging from 1 to 5 have been considered for scoring each parameter. The method of scoring for a number of contrast parameters and durability of test is through the 0.72 Alpha of Korenbakh. The agent's analysis showed that this test has been consisted of four main components which are one of the characteristics of creative thinking. Such components include: Simple decision-making, initiative, flexibility and independence. For data analysis, after scoring data questionnaires by using SPSS software, they were analyzed and the descriptive statistics were used for drawing up of frequency distribution tables, drawing charts and percentage, and test of T was used for reviewing hypotheses.

**Research Findings**

**The research programs and plans of students' research-houses influences on the process of creative problem-solving of secondary level students.**

$H_0$  : The mean of creative problem solving among the students of both trial and control groups is the same.

$H_1$ : The mean of creative problem solving is not the same among the students in both trial and control groups.

A comparison of creative problem solving among the students of trial and control groups based on calculations has been obtained through test of T and since  $-p$  as the above variable (significance amount) is equal to 0.0001 and smaller than  $\alpha=0.05$  significance level in students of both trial and control groups, therefore, the hypothesis of  $H_0$  fails at this level and as a result, it can be said that there is a significant difference between the average of creative problem solving among the students of trial group with those of control one. Comparing both means demonstrates that the creative problem-solving scores of trial group students are higher than the scores of control group or, in other words, the research activities and programs of students' research-houses have influences on the secondary level students.

**Table 1: Statistics of T test for comparing the mean of scores related to creative problem solving amongst both the trial and control groups' students**

Significance	Liberty degree	T Statistic	Control			Test			Group Variable
			Standard Deviation	Mean	No	Standard Deviation	Mean	No	
.0010	158	3.274	15.18	0.21	80	15.19	8.08	80	Creative problem solving (The score difference of pretest and post test)

**The participation of secondary level students in programs and activities of the research-houses affects their simple decision makings.**

$H_0$ : The mean of simple decision making is the same among students of both groups of trial and control

$H_1$ : The mean of simple decision making is not the same among students of both trial and control groups.

A comparison of simple decision making among the students of both trial and control groups based on calculations has been obtained through T test and since  $-p$  amount of the above variable (significance level) is equal to 0.010 and smaller than  $\alpha=0.05$  of significance level in students of both trial and control groups, thus, the hypothesis of  $H_0$  fails at this level and as a result, it can be said that there is a significant difference between the average of initiative scores among the students of trial group with those of control one. A comparison of the both means demonstrates that the simple decision-making scores of the trial group students have a significant difference with that of the control group. The comparison of means shows that the simple decision-making scores in the trial group students is higher than the control group or, in other words, the participation of the students of secondary level in programs and activities of the research-houses will influence on their simple decision makings.

**Table 2: Statistics of T test for comparing the mean of scores of the simple decision-making amongst the students of both trial and control groups**

Significance	Liberty degree	T Statistic	Control			Test			Group Variable
			Standard Deviation	Mean	No	Standard Deviation	Mean	No	
.0100	158	2.60	7.02	0.15	80	6.34	2.90	80	Creative Simple decision making (score difference of pretest and post test)

**Participation of the students of secondary level in research programs and activities of research-houses affects their initiative**

$H_0$ : The mean of initiative is the same among students of both groups of trial and control

$H_1$ : The mean of initiative is not the same among students of both trial and control groups.

A comparison of initiative amongst students of both trial and control groups has been obtained based on calculations made through T test and since amount of  $-p$  (significance level) of the above variable in students of both trial and control groups is equal to 0.025 and smaller than  $\alpha=0.05$  of significance level, thus,  $H_0$  hypothesis fails at this level. As a result, it can be said that the average of initiative scores in the students of trial group is higher than the scores of students in the control group, or in other words, the participation of students of secondary level in research programs and activities of research-houses affects on their initiative.

**Table 3: Statistics of T test regarding comparing the mean of scores of initiative related to both the trial and control groups' students**

Significance Level	Liberty degree	T Statistic	Control			Trial			Group Variable
			Standard Deviation	Mean	No	Standard Deviation	Mean	No	
.0250	158	2.264	4.82	-0.35	80	4.46	1.31	80	Initiative(score difference of pretest and post test)

#### The participation of secondary level students in all research programs and activities affects on their own flexibility

$H_0$ : The mean of flexibility is the same among students of both groups of trial and control

$H_1$ : The mean of flexibility is not the same among students of both trial and control groups.

A comparison of flexibility amongst the students of both trial and control groups has been obtained based on calculations made through T test and since amount of  $-p$  (significance level) of the above variable in students of both trial and control groups is equal to 0.001 and smaller than  $\alpha=0.05$  of significance level, thus,  $H_0$  hypothesis fails at this level. As a result, it can be said that the average of the flexibility scores has a significant difference amongst the students of trial group and control group. In other words, participation of the secondary level students in all the research programs and activities of research-houses affects on their flexibility.

**Table 4: T test statistics for comparing the mean of scores of flexibility among both the trial & control group students**

Significance level	Liberty degree	T Statistic	Control group			Trial group			Group Variable
			Standard Deviation	Mean	No	Standard Deviation	Mean	No	
.0010	158	3.468	4.56	-0.57	80	5.13	2.09	80	Flexibility(score difference of pretest and post test)

#### The participation of secondary level students in research programs and activities of houses affects on their independence

$H_0$ : The mean of independence is the same for both trial and control group students.

$H_1$ : The mean of independence is not the same for both trial and control group students.

A comparison of independence amongst students of both trial and control groups has been obtained based on calculations made through T test and since amount of  $-p$  (significance level) of the above variable in students of both trial and control groups is equal to 0.325 and larger than  $\alpha=0.05$  of significance level, thus,  $H_0$  hypothesis does not fail at this level. As a result, it cannot be said that the average of independence scores in the students of trial group is higher than the scores of students in the control group, or in other words, the participation of students of secondary level in research programs and activities of research-houses affects on their independence.

**Table 5: Statistics of T test regarding comparing the mean of scores of independence amongst both the trial and control groups' students**

Significance Level	Liberty degree	T Statistic	Control			Trial			Group Variable
			Standard Deviation	Mean	No	Standard Deviation	Mean	No	
.3250	158	0.987	7.24	0.99	80	5.99	2.02	80	independence(score difference of pretest and post test)

**The creative problem solving process (post test score) demonstrate difference amongst the secondary level male and female students.**

$H_0$ : The mean of creative problem solving is the same amongst both male and female secondary students.

$H_1$ : The mean of the creative problem solving is not the same amongst male and female students.

A comparison of creative problem solving amongst male and female secondary level students has been obtained based on calculations done through T test and since amount of  $-p$  (significance level) of the above variable in both male and female students is equal to 0.004 and smaller than  $\alpha=0.05$  of significance level, thus,  $H_0$  hypothesis fails at this level. As a result, it can be said that the average of creative problem solving scores is significantly different amongst male and female students. Comparing the means demonstrates that the creative problem solving scores is higher amongst the female group students than the male group.

**Table 6: T test statistics for comparing the mean of scores of creative problem solving (post test scores) amongst both female & male group of students**

Significance level	Liberty degree	T Statistic	Control group			Trial group			Group Variable
			Standard Deviation	Mean	No	Standard Deviation	Mean	No	
.0040	158	2.955	16.94085	7.7125	80	13.40770	.5750	80	Creative problem solving (post test score)

**Conclusion**

By review of the hypothesis of “research programs and activities of students’ research-houses influences on creative problem solving process amongst the secondary level students” which is made based upon calculations through T test, the mean of scores amongst both trial and control groups of students shows a significant difference and a comparison of the means shows that the creative problem solving scores of trial group students are higher than that of control group and this indicates the effectiveness of research programs and activities of students’ research-houses on creative problem solving process of secondary level students.

By studying the creative problem solving components including simple decision making, initiative, flexibility, independence the following results were achieved:

The simple decision making average in both trial and control group of students shows a significant difference and comparisons shows that the participation of secondary level students in research-houses’ programs and activities influences on their simple decision makings.

Compared to the level of initiative amongst students of both trial and control groups based on calculations, the scores of initiative in the students of trial group is higher than control group or, in other words, participation of secondary level students in programs and activities of research-houses affects on their initiatives.

The flexibility scores’ mean also demonstrates a significant difference amongst students of trial and control groups and the flexibility scores in the trial group students is higher than control group and indicates the influence of research-houses’ research programs and activities on flexibility.

In review and comparison of the mean of independence scores amongst the trial and control groups of students, although the scores of independence in trial group is higher than control group, the difference is not significant. Perhaps, one of the main reasons for this is team-based research activities in research-houses by which the students may become dependent to each other.

Results of research results are consistent with comments and results of Torrance (1990), Jawi (1990), Kramvand and Martin (1991), Amabil (1996), Cassidy and Lank (1996), Berg (2000), Bilenger and Smith (2001), Isaksen and Tarfingar (2007), Samad Aghayee (2001), Saki (2005), Payandeh (2010), Mansourian (2010) and Nezhad Hussein (2010).

Comparing the process of creative problem solving among students of secondary school boys and girls, according to calculations by T-test shows that the mean scores of creative problem solving in the boys and girls differ significantly, and mean comparisons indicate that scores of creative problem solving among female students is more than boys.

Generally the research programs and activities of research centers have a comparative effect on the process of creative problem solving among the high schools and since the creative thought is more complicated of the manifestations of human thought and the individual and social which is the development key in the current world, so the Education Organization needs to provide an appropriate field of creative problem solving through the development of quantitative and qualitative research centers for the students.

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