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Effect of the teaching through problem solving and inquiry training in comparison to the traditional method of teaching

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Abstract
The present study investigate the effect of the teaching through problem solving and inquiry training in comparison to the traditional method of teaching sampling method. In all initially 400 female 9th grade students were taken up and a Divergent Production Abilities Test developed by K. N. Sharma was administered to them to identify their scores on divergent thinking. To minimise the variance among different groups, the subjects (students) were equated on general mental ability, scholastic achievement and parental education by administering tests of intelligence and socio-economic status scale. Mixed type group test of intelligence developed by P. N. Mehrotra was used to collect the data on the verbal and non-verbal intelligence of the subjects.

Keywords: teaching, problem solving, traditional method of teaching

Introduction

The creative acts affect enormously not only scientific and technological processes, but society in general. The nations who learn best how to identify, encourage, and develop the creative potential in their people may find themselves in a very advantageous position. On the contrary, the nations that are still under developed are rather differently motivated towards the identification and development of this rare talent. Prior to 1950, there were only trickle of research articles on creativity. The Russian threat in technological advancement was probably the immediate reason for American Scientists to sensitize the need of creativity in technological competition. The credit goes to Guilford who opened the present era of research in creativity. He in his presidential address in 1950 to the American Psychological Association alerted the psychologists to the need of studying creativity scientifically. It is he, who in his "Structure of Intellect Model", has effectively redefined intelligence to include creative behaviours. With a consistent and cumulative effort, he succeeded in evolving a battery of tests, which operationally specify dimensions of intelligence that go for beyond that of traditional tests of intelligence. Using factor analysis, he has isolated 120 separate, measurable factors of mind. Guilford first of all focussed in adults in military establishments and concluded that concern for creativity is a basic concern in the national interest that needs to be and can be productively pursued. Having opened the field to the adults, he also opened it for the children and youth. His concepts and tests were used by educators and others in school situations and devised further tests on creativity.

The educational environment in any society should place a high value upon the divergent thinking potential of its school children. This has been necessitated by the stepped up cultural changes in the world characterised by population explosion and explosion of knowledge, which is becoming specialised day by day due to technological advancements and scientific innovations.

Divergent thinking is regarded the greatest asset of mankind. It is an ability that is most vital for shaping the future of man. Creativity contributes towards the mental health, education, vocational success and many other important areas in life, namely, in the works of great artists, successful painters, scholars and the like.

Creativity has been approached differently by different thinkers. Philosophically, creative thinking is not a peculiar type of thinking that has different non-publicly observable features from other types of thinking. For a philosopher a creative thinker is one who's thinking leads to a result, which confirms to criteria of value in one dimension or another. While discussing creativity, Plato made a distinction between artificial art and true art. He said, artists, for him are those who bring into birth some new reality. They are creative as they enlarge human consciousness. Scientifically, creativity involves an imaginative leap to a new perspective. The scientist searches for a hypothesis, which is likely to fit the facts he is concerned with. Pioneer has expressed creativity as the capacity to be surprised, as many scientific discoveries are made just in this way. The scientist observes phenomenon, which many others before him have without getting puzzled. A scientist has the capacity to be surprised anything obvious for others becomes a problem for him, his mind starts working on it and it becomes the beginning of his discovery. What makes him a creative scientist is only partially his ability to solve the problem and the ability to getting puzzled is largely responsible for making him different from the average scientist. Social scientists approach creativity with respect to interpersonal relationships. For him, creativity is a social invention whose product is not an object but persons, creativity in human relationships. Such a person is regarded creative who is intelligent and possesses sharp perceptions, subtle sensitiveness and respect for the individual person, boldness to explain one's point of view and to stand for one's convictions psychologists and psychoanalysts have also approached the creativity but they too differ in their views. Some have equated it with mental health; one has related it to the personality development; while others have restricted it to

interplay of unconscious and conscious. Simnot (1959) [1, 2, 9] equates creativity with life itself by virtue of its organising, pattern forming and questing quality. It is only with the imagination, which is a quality of mind, makes possible the creativeness in a man.

Related literature

Jarial and sansanwal (1984) tested the effect if verbal and non-verbal instructional material along with the interaction effects of socio-economic status and sex on the verbal and non-verbal creative thinking abilities of the students. The study was carried out o 160 urban students of class IX. He training programme for developing verbal as well as non-verbal creativity contained 25 exercises each. The verbal creativity training exercise had the content from the immediate environment of the students, i.e. home, school and society providing training in the whole process of creativity, whereas, the non-verbal creative training exercises had content based upon geometrical figures and sketches and it intended to provide training to the students in combinatory thought processes. The conclusions reported are: the treatment in verbal and non-verbal instructional materials has proven to be significantly effective in developing the mean verbal and non-verbal creativity scores of students respectively; and the interaction between the treatment and SES significantly affects the student's mean gain in verbal creativity score (with mean differences between high and low SES groups showing significantly only under the controlled conditions and not in the case of treatment.

Maltzman and his association in 1959 [1] at the University of California conducted a series of research studies on originality training and asserted that the results support the hypothesis that "originality is a learned form of behaviour which does not differ in principal from other forms of operant behaviour".

Meadows and Parnes (1959) [1, 2, 9] Evaluated the creative problem solving courses developed by them in terms of gain in creativity. They found that the group receiving instruction through the experimental programme attained significant increments on the measures of quantity and quality of ideas. The results were interpreted to indicate that the creative problem-solving course produces significant increase on certain ability measures associated with practical creativity as well as on personality variable dominance. In another evaluative study, the same investigators,

Parnes and Meadows (1959) [1, 2, 9] studied the effects of brainstorming on creative problem solving by trained and untrained subjects. Two problems designed to measure creative ability were given to both the groups. One problem was administered under deferred judgment instructions and the other under on current judgement. The result indicated that the subjects trained in a creative problem-solving course emphasizing deferred judgement principle produced a significantly greater number of ideas of good quality. The findings are intercepted to indicate that the deferred judgement instruction is an effective method of extending the incubation period and thereby increasing the production of ideas.

Nirpharak (1980) [3] developed a special training programme and pre-test, post -test, experiment was designed to study efficacy in developing creative appreciation. The independent variable in the experiment was training in creative appreciation, lasting for twenty-five school periods of thirty-five minutes each and the dependent variable was creativity as measured by Torrance test of creativity thinking. It was found that the experimental group as compared to central group showed marked improvement in all aspects of creativity after receiving training over the control group as well as over its own pre-test scores.

Olten, *et al.* (1969) [4] conducted study with self instructional material for development of creativity, to find out the extent to which the productive thinking programme can develop creative thinking among fifth grade students. The sample was of 740 students studying in the fifth grade in different schools. The students showed significant increments in thinking and problem solving performance on wide variety of productive thinking measures. These instructional benefits occurred virtually for all types of students regardless of sex or general I. Q level.

Bhaskara (1982) prepared verbal creativity instructional material for enhancing creative thinking abilities of 6th standard children and to determine the relationships of verbal creativity instructional materials with certain variables, viz. different creative potentials, levels of socio-economic status, sex and rural-urban background and their interaction on the students of 6th standard in Bangalore district of Karnataka. The experimental study revealed the following conclusions. Verbal creativity instructional material significantly improved the creative thinking abilities of middle and low creative potential students, high middle SES students and boys excelled girls in terms of significant gains on verbal creativity.

Objective of the Study

The study is carried out with following objectives in view:

- To study the effect of the teaching through problem solving in comparison to the traditional method of teaching on divergent thinking adolescents female students.
- To assess the impact of teaching through inquiry training in comparison to the traditional method of teaching on divergent thinking adolescents female students.

Methodology

The study was taken in Kashmir region of J&K state. Schools and students were selected through random sampling method. In all initially 400 female 9th grade students were taken up and a Divergent Production Abilities Test developed by K. N. Sharma was administered to them to identify their scores on divergent thinking. To minimise the variance among different groups, the subjects (students) were equated on general mental ability, scholastic achievement and parental education by administering tests of intelligence and socio-economic status scale. Mixed type group test of intelligence developed by P. N. Mehrotra was used to collect the data on the verbal and non-verbal intelligence of the subjects.

Result and Discussion

Table 1: Pre-Test Divergent Thinking in Respect to Problem Solving, Inquiry Training and Traditional Method of Teaching of Different Groups

Group	Problem Solving	Inquiry Training	Traditional Method
World Fluency	39.21	20.22	33.24
Ideational Fluency	42.82	21.34	40.50
Associational Fluency	32.91	31.20	27.14
Expressional Fluency	29.13	32.53	40.18
Spontaneous Flexibility	33.48	22.45	32.62
Adaptive Flexibility	43.31	19.88	43.16
Originality	39.60	23.16	37.06
Elaboration	37.36	20.22	22.96
Total Divergent Thinking	51.23	25.42	40.22

Table 2: Post-Test Divergent Thinking in Respect to Problem Solving, Inquiry Training and Traditional Method of Teaching of Different Groups

Group	Problem Solving	Inquiry Training	Traditional Method
World Fluency	40.24	34.82	24.10
Ideational Fluency	32.14	42.04	27.43
Associational Fluency	41.29	26.26	29.04
Expressional Fluency	28.31	46.81	29.75
Spontaneous Flexibility	35.89	34.26	25.55
Adaptive Flexibility	51.13	46.06	20.98
Originality	42.65	41.60	23.61
Elaboration	38.72	26.69	19.42
Total Divergent Thinking	53.43	45.32	28.21

After exposing different groups to different treatments—Inquiry Training, and Creative Problem solving for 06 weeks, the Divergent Production Abilities' Tests were again administered to the subjects. The scores, thus, obtained were put to suitable statistical techniques, the description of which has been given in the Tables 1 and 2:

Table 4.1 shows the pre-test divergent thinking in respect to problem solving, inquiry training and traditional method of teaching of different groups. It is found that through problem solving method of teaching, adaptive flexibility and ideational fluency attain the highest scores of mean by 43.31 and 42.82 respectively. Whereas, expressional fluency acquired least mean score by 29.13. However, on inquiry training, the high mean score is obtained by adaptive flexibility by 43.16, followed by ideational fluency and expressional fluency at 40.50 and 40.18 mean scores respectively. The least mean score on inquiry training is obtained by elaboration by 22.96. In case of traditional method of teaching, the least mean score of 19.88 is found on adaptive flexibility and highest mean score of 32.53 is obtained by expressional fluency. Overall, it is found that the problem solving method of teaching has attained highest mean score of 51.23, as compared to Inquiry training and traditional method of teaching, where the mean scores of 40.22 and 25.42 are attained respectively.

Table 4.2 observes post-test divergent thinking in respect to problem solving, inquiry training and traditional method of teaching of different groups. In case of problem solving method, the highest mean score is obtained by adaptive flexibility by 51.13, followed by originality by 42.65. However, the least mean score on problem solving method of teaching is obtained by ideational fluency by 32.14, followed by spontaneous flexibility by 35.89 respectively.

In case of inquiry training method, the highest mean score id attained by expressional fluency by 46.81, followed by adaptive flexibility by 46.06. Moreover, the least mean score on inquiry training method is obtained by associational fluency by 26.26, followed by elaboration by 26.69.

However, in traditional method of teaching, the highest mean score is obtained by expressional fluency by 29.75, followed by associational fluency by 29.04. The least mean score on traditional method of teaching is obtained by elaboration by 19.42, followed by adaptive flexibility by 20.98.

Summary and Conclusion

The post test and pre test comparisons have shown highly significant differences at:

- Word fluency
- Associational fluency
- Expressional fluency
- Spontaneous flexibility
- Adaptive flexibility, and
- Originality

Significant pre-test and post-test differences are found on:

- Ideational fluency, and
- Elaboration

The total divergent thinking is found highly significant in its differences at pre-test and post-test stages for:

- Traditional method of teaching
- Inquiry training method of teaching, and
- Problem solving method of teaching

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