Effect of Constructivist Approach in Fostering Creativity of Primary School Children

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Abstract

The purpose of this study was to determine the effect of constructivist approach on students' creative ability. The study was a pre-test, post-test quasi experimental design and it was conducted in winter 2009 where 125 class-V students participated from two different English medium schools of Bhubaneswar city, Odisha. Learning in constructivist framework has been applied to experimental group and traditional teaching method followed by control group. The Creative Ability Test (CAT) used by the researcher to estimate the students' creativity from both the groups. The hypothesis was tested at 0.05 level using t-tests. The result showed that learning in constructivist strategy improve students' overall creative ability as well as other two different dimensions (Fluency, Flexibility) and no such difference found in case of Originality aspect of CAT. The researcher concluded that the constructivist approach is an effective strategy, which teachers need to incorporate in their teaching.

Introduction

Creativity is often viewed as the notions of genius or exceptional ability, but it can be enhanced, nurtured through students' active involvement on different learning activities in the classroom (Gulati, 1995). From the beginning, and especially now, our social and cultural system has been characterised by changes, renovations and restructuring. For the future development of our knowledge society we need creative and innovative people who can give answer to all the future challenges. Knowledge from neuroscience and investigation about creativity, reflect that the traditional learning models are a block to learning directed at future problems (DeHaan, 2009). So we have to strive for creative thinking and learning, which can stimulate the development of a quickly changing system not only in design but also with new perspectives. The constructivist approach offers a

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theoretical basis for developing a learning model in which students are led to active and reflective and which could codetermine their creativity (Tchimmel, 2004).

Constructivism is a theory of learning in which students construct their own knowledge on the basis of their prior experiences with meaningful interaction of learning activities (Tolman & Hardy, 1995). Learning in the constructivist framework contributes to intellectual, social and psychological development of learners unlike other methods of instruction and enable the learners to construct a valid knowledge and also enable to transmit it in different context (Kim, 2006). The results of Scott et al. (2004) suggest that constructivist learning theory that use strategies of scientific teaching to enhance content mastery can be effective in promoting creativity and cognitive flexibility. McGregor (2001), McFadsean (2002) cited that learning in brainstorming and students active construction of knowledge increase students score on tests of creative thinking abilities. Scottetal (2004) confirmed that creativity instruction can be highly successful in enhancing divergent thinking, problem solving and imaginative performance.

The creative process is impacted by distinctive interrelated items, the classroom learning methods and the classroom learning environment , D'Aloisio(2006); Dembo and Eaton (2000); Kostelecky and Hoskinson (2005); Riverio, Cabanach, and Aria, (2001). Again Sungur and Tekkaya (2006); Baer (1996) formulated three ways where creativity can be supported and nurtured in the classroom environment. The first way is to encourage imaginative questioning. Second, assign creative tasks and finally, reward the student who demonstrates creativity and imagination. In the area of creativity in school education, only a few studies have investigated the relationship between the teaching strategies and the fostering creativity skills; and the results found in such studies are encouraging. Breger (1958) reported teaching through demonstration increase in dimension originality of creativity. Meadow (1959) showed that training in brain storming increased the dimension of fluency in scores on creative problem solving.

All above studies focused on students' learning in a collaborative effort, explores the four factors impacting creativity in classroom environment (person, process, environment and product) and focuses on how the students' creativity may have increased, developed, or changed due to different strategies of learning process. Most of the studies in favour of learning in constructivist framework which enhanced students divergent thinking and hence there is an urgent need to integrate such approach in classroom teaching. The present study was designed to investigate the effect of Constructivist Approach (CA) over Traditional Method of Teaching (TMT) in enhancing creative abilities amongst class-V primary school children. The study was based on the assumption that learning in constructivist framework is considered as a better strategy than traditional method of teaching for developing competency wise creative abilities (fluency, flexibility, originality)

Objective of the study

- To study the effect of Constructivist approach on creative ability of primary school children

Hypothesis of the study

- Students taught through Constructivist approach will gain significantly higher score on Creative Ability Test (CAT) than their counterparts in control group

Sample and Sampling Technique

The sample consists of 125 class-V students from two different English medium schools in Bhubaneswar city. The selections of these two schools were through purposive sampling method. One section of each school was taken as experimental group and other one as control group. The decision about control group and experimental group was taken randomly from each school. Out of 125 class-V students, 74 students were randomly assigned to the experimental group and the other 51 students to control group.

Materials/Tools Used

In order to collect the relevant data for the present study, the investigator prepared and used the (i) Instructional materials and (ii) Measuring instruments.

- *Instructional materials:*
  The researcher developed different instructional materials which help in imparting instruction and facilitation for learning. Two types of instructional tools were used in this present study. The experimental group was exposed to constructivist approach (CA) and the control group was exposed to Traditional method of teaching (TMT).

The instructional strategies of Traditional teaching was limited to the control group where a teacher centred environment prevailed, and course instruction emphasised content recitation, without allowing time for students to reflect upon the material presented, relate it to previous knowledge, or apply it to real life situations (Fig – I).

"Experimental teaching" was based on the constructivist learning model as describe by Yager (1991), the 5E" (Engage, Explore, Explain, Elaborate, Evaluate) model developed by Bybee (1993) and applied by Lord (1998, 1999, 2001). The learning situation consisted of a series of activities in which the researcher introduced new material (Engage), followed by the formulation of a problem or exercise (Explore). Then the learners were asked to explain and elaborate followed by evaluation. Depending on the nature of the task involved or the degree of difficulty, students were given to solve these problems with the members of their co-operative group. This provided an opportunity for interaction with other classmates as they tried to make sense of the new information relevant to past experiences or previous knowledge. Then researcher listens carefully the students expanded concepts what they have learned and how they make connection to the world around them. At the end Evaluation, the fifth 'E' is an ongoing diagnostic process that allows the researcher to determine whether the learners have attained understanding of discussed concept.

TEACHING STRATEGY

Control Group	***Experimental Group***
Teacher-Centred	Student-Centred
Passive learning through teacher's lectures	Active learning through constructivist activities
No co-operation groups	Formal co-operative groups
No interaction among students	Constant interaction among students
Sporadic assessment learning	Daily assessment of learning

Figure 1: Table showing the differences in teaching methods between the control and experimental group.

- *Measuring instrument and validation:*

Creative Ability Test (CAT) was used to measure fluency, flexibility and originality. Test-Re Test formula was used to calculate the reliability coefficient of CAT and the co-efficient of internal consistency for CAT was 0.71 which was highly reliable.

Experimental Design and Procedure

The experiment was set up according to the non-equivalent pre-test post-test quasi experimental design. The design as follows:

Randomly Assigned Group	**Pre-Test**
Experimental Group	A1
Control Group	A3
Treatment	**Post-Test**
Learning constructivist framework	A2
Traditional Method of Teaching	A4

A1, A3 – Pretest of Creative Ability Test (CAT)
A2, A4 – Post test of Creative Ability Test (CAT)

Before starting the experiment the researcher conducted CAT pre-test to ensure whether the two groups had achieved the same levels of creativity performance.

During the treatment process, the experimental group participated in the constructivist approach and the control group participated in the normal traditional instructional strategy. The researcher himself taught to both the experimental group and control group in each school separately. In experimental class in order to create the constructivist learning situation, the researcher followed the 5E' instructional model (engage- explore- explain-elaborate-evaluation) and continuous students growth was measured through tests, observations, portfolios. The treatment was given for a period of 12 weeks to both the experimental and control group. At the end of the experiment, the same Creative Ability Test (CAT) post-test was administered to the two classes to compare their creative ability and to ensure the effect of intervention.

Results and Discussion

Analysis was carried out using both descriptive and inferential statistics. In order to determine the effect of Constructivist Approach, the data were analysed taking in to consideration the overall creativity scores of students as well as different dimension (fluency, flexibility and originality) of CAT.

TABLE 1
Pre-test T-value and Descriptive Statistics of Creativity Scores for Two Groups

Test	*Groups*	*Mean*	*SD*	*df*	*t-value*
Creative Ability Test (CAT)	Experimental group (N=74)	81.78	32.54	123	1.50
	Control group (N=51)	76.01	24.78		

TABLE 2
Post-test T-value and Descriptive Statistics of Creativity Scores for Two Groups

Test	*Groups*	*Mean*	*SD*	*Df*	*t-value*
Creative Ability Test (CAT)	Experimental group (N=74)	88.85	25.84	123	4.11
	Control group (N=51)	83.12	21.11		

TABLE 3
Pre-test Mean, SD and T-value of Different Dimensions of CAT for the Two Groups

Test	*Dimension*	*Group*	*Mean*	*SD*	*Df*	*t-value*
Creative Ability Test (CAT)	Fluency	Exp. (N= 74)	24.16	10.22	123	0.23
		Cont. (N= 51)	23.93	8.34		
	Flexibility	Exp.(N= 74)	15.59	6.10	123	0.87
		Cont. (N= 51)	16.46	5.42		
	Originality	Exp.(N= 74)	33.45	13.53	123	1.19
		Cont. (N= 51)	35.60	12.93		

Table-1 indicates that the mean creativity scores of experimental and control group are (M1= 81.78 and M2= 76.01 respectively. The t- value of 1.50 with df 123 reveals that the difference between the two mean creativity scores is not statistically significant at 0.05 level. Hence both the groups are found almost equal in their creativity abilities.

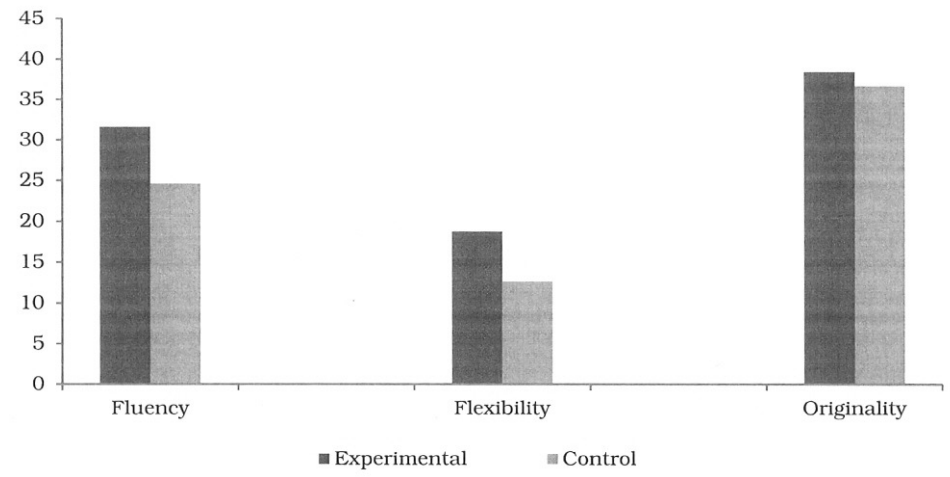
The Table-2 reports that the mean creativity score of the experimental group (88.85) is greater than that of the control group (83.12). The t-value of 4.11 with df 123 is significant at 0.01 level which is in favour of experimental group. In other words the Constructivist Approach has a significant effect on the development of overall creativity of the learners.

Further, to study the effect of Constructivist Approach on different aspects such as- fluency, flexibility and originality of creativity of the learners, the creativity scores of both the groups in fluency, flexibility and originality were analysed separately.

Table-3 result shows that, the t-value of 0.23, 0.87, and 1.19 with df 123 on creativity test of fluency, flexibility and originality is not significant at 0.05 level. Hence there is no significant difference in the pre-test mean score of fluency, flexibility and originality among experimental group and control group.

TABLE 4
Post-test Mean, SD and T-value of Different Dimensions of CAT for Two Groups

Test	*Dimension*	*Group*	*Mean*	*SD*	*Df*	*t-value*
Creative Ability Test (CAT)	Fluency	Exp. (N= 74)	31.60	10.39	123	6.99
		Cont. (N= 51)	24.61	7.97		
	Flexibility	Exp.(N= 74)	18.81	6.01	123	4.12
		Cont. (N= 51)	12.69	4.68		
	Originality	Exp.(N= 74)	38.43	11.73	123	0.75
		Cont. (N= 51)	36.68	12.87		



Mean score of the students of experimental group and control group on fluency, flexibility and originality of class-V students

Table 4 reveals that the t-value of 6.99 with df 123 is significant at 0.05 level. It shows that there is significant difference between the mean score of experimental group and control group and the constructivist approach has a significant effect in enhancing fluency of the class-V students. The t-value of 4.12 with df 123 is significant at 0.05 level. It reveals the fact that the constructivist approach has a significant effect in enhancing flexibility of class V students. The t-value of 0.75 with df 123 is not significant at 0.05 level. It reveals the fact that the constructivist approach has no significant effect in enhancing the originality of class-V students.

TABLE 5

Analysis of Co-variance (ANCOVA) for Fluency Dimension of Creativity Test of the Two Classes

Dependent variable post-test on fluency scores

Source of variation	*Sum of squares*	*df*	*Mean squares*	*f-value*
Corrected model	13.902.62	1	13902.62	374.11
Co-variate (pre test scores)	13902.62	1	13902.62	374.11
Main effect	1914.48	1	1914.48	51.51
Error	8435.71	123	37.16	
Total	203896.00	125		
Corrected total	22338.34	124		

TABLE 6

Analysis of Co-variance (ANCOVA) for Flexibility Dimension of Creativity Test of the Two Classes

Dependent variable post-test on flexibility scores

Source of variation	*Sum of squares*	*df*	*Mean squares*	*f-value*
Corrected model	44.08.03	1	4408.03	377.28
Co-variate (pre test scores)	4408.03	1	4408.03	377.28
Main effect	822.15	1	822.15	70.36
Error	2652.15	123	11.68	
Total	79396.00	125		
Corrected total	7060.19	124		

TABLE 7

Analysis of Co-variance (ANCOVA) for Originality Dimension of Creativity Test of the Two Classes

Dependent variable post-test on originality scores

Source of variation	*Sum of squares*	*df*	*Mean squares*	*f-value*
Corrected model	16.095.18	1	16095.18	318.74
Co-variate (pre test scores)	16095.18	1	16095.18	318.74
Main effect	5326.21	1	5326.21	1.28
Error	11462.57	123	50.49	
Total	333995.00	125		
Corrected total	7060.19	124		

Table 5, 6 and 7 result shows that the experimental group which was exposed to Constructivist Approach, had a significantly higher creative ability in both fluency and flexibility dimension of CAT but no such different found on originality dimension as indicated by the F-value: 51.51, 70.36 and 1.28.

From the above analysis, it is concluded that Constructivist Approach (CA) is an effective strategy than Traditional Method of Teaching (TMT) for developing fluency, flexibility competency, but not the originality competency. Though originality is an important component of creative ability, the present study of Constructivist Approach did not show any significant effect than TMT for achieving this. This failure of Constructivist Approach for achieving the target level of originality competency may be due to two reasons, (i) originality ability is an in-depth and unique ability of individual which requires a long term training for its development, but the existing strategy of teaching was only meant for 12 weeks which could not develop the originality ability of the learner; and (ii) the learning situations/ activities in Constructivist Approach may have some sorts of limitations to develop the originality competency.

Conclusion

The main objective of this study was to investigate whether the meta-learning strategy of Constructivist Approach could be used to enhance creative ability among the class-V students. Two different school of Bhubaneswar city were chosen to participants in the experiment. The results showed that students in the constructivist class significantly improved in their creative ability as a whole and also in fluency and flexibility dimension of CAT as compared to the students in the traditional expository teaching class. This finding is in agreement with earlier findings such as Gulati (1995), Tchimmel, (2004), Scott et al. (2004), McGregor (2001), McFadsean (2002).

This study provides substantiated evidence that teaching in a constructivist, active learning environment is more effective than traditional instruction in promoting creativity and enhancing students interest in mathematics. In their final course evaluations, students in the experimental section commented that they enjoyed this class much more than their traditional classes, they had learned more, made valuable friendships in their collaborative groups. Although the constructivist method of instruction requires a greater investment of time and effort for preparation, organisation, grading and majority of this investment is made the initial part of teaching but after subsequent effort, students themselves to start how learning ought to be. Such meta-learning strategy of Constructivist Approach and the experimental design in this study can be easily extrapolated to different school subject like language, social science & sciences. The teacher should try to create learning situation in the classroom, guide learners' learning process and provide opportunities to learners to reflect their learned concepts, so that creativity can be enhanced through classroom learning process. 'Creative spirit' and generous, joy are key in childhood both of which can be distorted by an unthinking adult world (NCF 2005).

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