Effectiveness of Activity-based Learning Practices on Creativity of Prospective Teachers of Secondary School

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Abstract

The paper is aimed to explore the creativity in context of fluency, flexibility and originality through activity-based practices of prospective teachers of secondary school. Previously educational institutions exist to provide instructions, but now-a-day by they exist to ensure learning with expected learning outcomes. During this advance technology dominated world learners and teachers need to learn new techniques, skills and knowledge for adapting in changing environment throughout the life. Creativity is one of the important ways to energise the brain of learners. Creativity exists in everyone, and teachers are required to brush up and bring it out from the inner core. Thus, the objective of the study is to observe the effect of learning practices of 60 prospective teachers from College of Teacher Education, Bhagalpur, Bihar, on fluency, flexibility and originality with respect to traditional teaching method. It is found from the study that there is significant difference between the development of creativity through activities related to creativity and traditional method.

Introduction

Education prepares an individual to the level of perfection by drawing out the best skills and habits for ideal citizen from them in the era of globalisation, knowledge explosions, enormous scientific growth and technological innovations. Education system has gradually changed during the past few decades where the teaching-learning process go beyond the chalk-talk in the classroom and

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contents are not confined only in the textbooks. Hand gestures and lecture of teachers also have been replaced by projectors and presentations. During this era, the teaching profession becomes more challenging. The teachers become more facilitators in the entire teaching-learning gamut. In this changing scenario, a teacher is someone who builds the fabric of the society, and students are the bricks and mortar of the future. Prospective teachers are required to equip with innovations, motivations and multitasking. Although, we always talk about technocrats and artificial intelligence, all these cannot replace the presence of a teacher. Only teachers have their own intellectual property, cognitive and creative thinking with human touch. The creative teacher can create opportunities for creativity through arranging activities like field trips, special days, pictures, dramatisations, pets and animals, and growing plants. The creative teacher provides ideas to develop, and these ideas can become the substance of the creative productions of learners (Torrance, 1965). Creativity is a powerful weapon which fits the learners in digital, changing, challenging and emerging world. Creativity is something to create from nothing and from something we wish to create everything with excellence. It is a path of reflection of new imaginative ideas into reality. Actually, creativity is the ability to excel hidden pattern and then make connection between related phenomenon and solutions of the problems (Raajan, 2018). Every learner has creative potential and this potential nourished by proper care to nurture and culture the creative activities. Learners have varieties of skills like questioning, inquiring, searching, manipulating, experimenting, expressing and playing which are to be elicited by teachers. They need time for the creative encounter.

Review of Literature

Danielle E. Kaplan (2019) revealed that creativity theories should be included in the teaching of teachers, in developing their knowledge and skills needed to shape student development, particularly creativity development. Teachers and teacher candidates create such a learning environment for creative activities where they transform imaginative ideas into realistic actions resulting in expected outcomes.

Deepty Gupta (2011) found from her study that students were highly creative on the dimension fluency and lowest creative on the dimension originality. It is found from the study that t-value of different variables — sex, area, schooling, mother and father occupation, on creativity dimension fluency, flexibility and originality do not differ significantly.

Mc Fadzean (1998), Johnston, James, Lye and McDonald (2000) found that team collaboration in problem solving enhances creativity, and allows for better outcomes than

problem solving when performed individually.

Stein (1974, 1975) summarised studies of mid 1970s, where researchers evaluated attempts to stimulate adult creativity at the individual and group level, using a range of techniques, including role play, brainstorming, psychotherapy and hypnosis.

Torrance (1973) reflected that the creative teacher is an accepting, tolerant and humanist and allow the learners to develop to their maximum. Teacher should respect the originality of learners by praising them for their initiated thinking and learning, giving them freedom to learn through creative problem solving activities.

Need and Significance of the Study

Creativity is a process of divergent thinking, where learners think in different ways with different perspectives. Majority of learners are not exposed to face the challenges which would develop their potential for creativity and innovations because the outcome of whole education system is based on classroom activities and teaching-learning process. Present examination system emphasises on 'eating and vomiting', i.e., rote learning and repeated exercises which doesn't support the creativity among learners and leads to crushingly crippled, dishonest and neurotic patient. Practices of creativity in the classroom facilitate learners to ventilate their creativity, divergent thinking and distinctive quality, encourage for critical and constructive thinking which encourage performing each and every related work creatively. These practices also develop a sense of appreciations among the learners towards the creative, innovative and new avenues available. The present education system focuses on examination system rather than the actual process of learning as well.

NEP 2020 advocates ensuring learning with excellence and applications. Teachers are criticised and blamed that they do not provide necessary environment for nurturing creativity among learners. So, the responsibility and duty of Teacher Education Institutions is increased to prepare prospective teacher armed with creativity and divergent thinking, so that they accept and solve all the challenges of life. They also transform learners capable to face and handle the challenges boldly. The importance and necessity of creativity and ever developing process in the present time has attracted the attention of researchers and educational planner toward the study and analysis of creativity from educational point of view. Thus, researchers aim to work on 'Effectiveness of activities-based learning practices on creativity of prospective teachers of secondary school' at C.T.E, Bhagalpur.

Operational Definition of Important Terms

Creativity: It is the ability to produce new and useful ideas, imagination with originality, productive and value-based and a capacity to join two or more elements to form a new unity or purposes.

Fluency: It is defined as the ability to think effortlessly to generate a quantum of ideas with responses for solutions of problems.

Flexibility: It is defined as the ability to easily abandon old ways of thinking, adopt new ones and produce ideas, responses, questions and solutions in a variety of categories. Flexibility generates verities of ideas.

Originality: It is the ability to develop ideas that are statistically unusual, novel and unique.

Prospective teacher: Teacher candidates who are enrolled in teacher education programme and spend more time in real teaching situations.

Teacher education institution: This institution prepares teachers of tomorrow who learn how to learn, think and teach. Here, prospective teachers are to be trained to face challenges and issues of teaching-learning process.

Objectives of the Study

Objectives of the study are—

- to study the development of creativity among prospective teachers through chalk-talk and visual aids (control group prospective teachers).
- to study the development of fluency among prospective teachers by using activities of creativity (experimental group prospective teachers).
- to study the development of flexibility among prospective teachers by using activities of creativity (experimental group prospective teachers).
- to study the development of originality among prospective teachers by using activities of creativity (experimental group prospective teachers).
- to study the development of creativity among the experimental and control group prospective teachers.

Null Hypotheses

Researchers formulate the following null hypotheses:

- $H0_1$—There is no significant difference between the pre-test score of control and experimental group prospective teachers.
- $H0_2$—There is no significant difference between the post-test score of fluency of experimental control group prospective teachers.
- $H0_3$—There is no significant difference between the post-test score of flexibility of experimental and control group prospective teachers.
- $H0_4$—There is no significant difference between the post-test score of originality of experimental and control group prospective teachers.

- $H0_5$—There is no significant difference between the post-test score of creativity of experimental and control group prospective teachers.

Material and Method

In the present study, the researchers manipulate the effect of independent variables that is activities of creativity and traditional method in order to observe the effect of manipulation upon the dependent variable that is fluency, flexibility and originality of prospective teachers of secondary school. So, the researchers selected pre-test, post-tests design under the true experimental methodology. Experiment was conducted in three phases. During first phase the researchers administered the achievement test on science to observe the prior experiences as a pre-test. On the basis of pre-test scores the prospective teachers were divided into two groups consisting of high achiever, average and underachiever. One group was named as control group and other as experimental group. During second phase, treatment was administered where control group prospective teachers were taught through traditional method and the experimental group prospective teachers were taught same contents by activities of creativity. For controlling the effects of teachers' quality both groups worked under supervision and guidance of researchers themselves. During third phase, the same test as a post-test in similar control condition as in pre-test was conducted on both groups.

Sample and Sampling Technique

In present study, researchers selected 60 prospective teachers of secondary school from college of teacher education, Bhagalpur, Bihar through simple random sampling technique. Researchers applied two types of tools— testing/measuring and non-testing/instructional. Testing tool was achievement test on science and instructional tools were learning plan based on traditional method and activities-based practices. These tools were standardised by verifying their reliability and validity. The learning plans were discussed with subject experts, educational technology friendly and skilled resource persons and accordingly alteration and modification had been done. Learning plans were ready for final administration. The testing instrument's reliability was verified by test-retest method of coefficient of correlation and validity was checked by experts' opinions.

Level assigned	Independent variable	Post-test
Experimental group Prospective teachers of secondary school	Taught through activity-based practices of creativity	T2E

Control group Prospective teachers of secondary school	Taught through traditional method	T2C

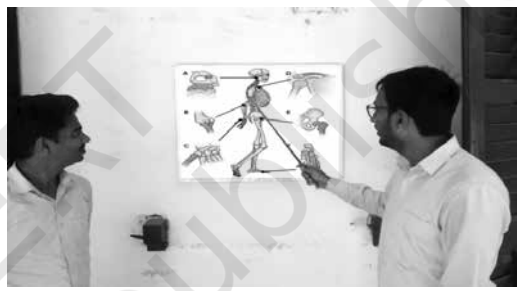
EXPERIMENTATION

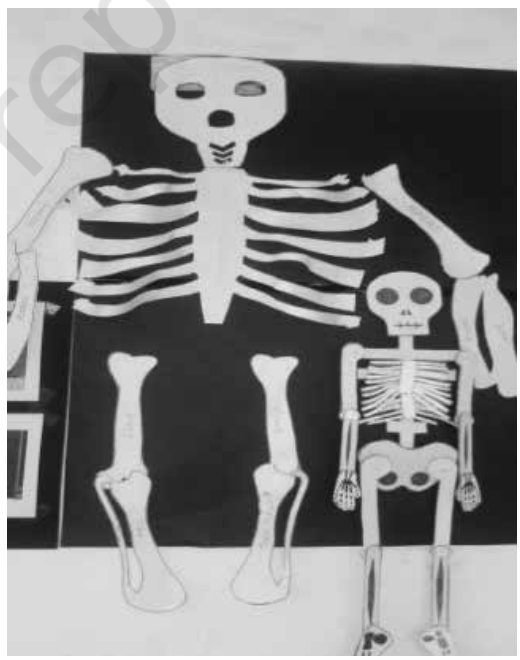
The control group was taught structure and function of skeleton system by using chalk-talk and visual aids while the treatment group was taught activities of creativity. Researchers applied preparation of 2D and 3D models and posters, run and paste competition, roleplay with conversation in Hindi or English and *NukkarNatak*. These activities involved active participation and contribution of each and every individual in groups. The total numbers of participants were 30 in experimental group, so five homogenous groups consisting six members each were formed. Each group was now engaged in performing their task in activities as mentioned below:

Activity 1

Preparing 2D and 3D models and posters

Each group was assigned a task to discuss and asked to prepare charts, posters and model of skeleton system explaining in explicit way. Researchers observed and checked the groups and helped to understand the structure and function of skeleton system. Then each group prepared 2D and 3D models by clay and brown carton box and displayed presentations before other groups. After that a healthy quiz competition was carried out in which each member of every group had to answer at least one question. This was made to avoid snubbing of shy respondents and then group who secure high marks was announced winner.





Activity 2

'Run and paste'

In this activity, each group was assigned task to run and paste bones of skeleton system on body of an individual. They are allowed to discuss and plan for 30 minutes. They prepared different bones, ribs and skull separately with combined efforts from chart paper in guidance of researchers. Now they asked to paste the different organs on body of an individual at their respective place one by one. Researchers observed and gave clues whenever they went wrong. There was healthy competition among groups and those who performed best were announced winner.

Activity 3

Roleplay

In this activity, each group was asked to play drama through role play and simulation on skeleton system. They were allowed to discuss and plan for 30 minutes. Then they performed the character of different bones, ribs, skull and joints. During the act, each bone made conversation between them to convey structure and physiology. They not only explained the body system but also the values of collaboration and unity to society. There was healthy competition among groups and those who performed well were announced winner.

Activity 4

Nukkar Natak

Each group was asked to play *Nukkad Natak* to aware common people about the values of life. There were two scenes— 'hell' and 'heaven'. Narad Muni came to hell and observed that everybody was in trouble and show them sad because no one has joint between bones and all were hungry instead of plenty of tasty food. Now he moved to heaven and found that all were very happy rather they also didn't have joints between bones. They helped each other and enjoy the life happily.

Data Collection

The same achievement test was administered on both groups for post-test. After completion of experiment, two types of scores were obtained. Both pre-test and post-test scores were used for statistical analysis of the data.

Result and Discussion

Analysis technique is the heart of any research. Here description and interpretation of the data were analysed based on the elements of creativity

Table 1
The 'T' Value for the Comparison between the Pre-Test Scores of Experimental and Control Group Prospective Teachers of Secondary School

Level compared	Number of Prospective teachers	M	SD	SEM	SED	df	Calculated value	Tabulated value	HO1
Experimental group Prospective teachers	30	38.83	10.44	1.9	2.9	58	0.40	2.66	A*
Control group Prospective teachers	30	39.5	12	2.1					

*A=fail to rejectH0=Null Hypothesis

examined. These elements were fluency, flexibility and originality with values. The result showed that there was development of creativity when the above said activities were practiced by the prospective teachers at Teacher Education Institution.

The result shows that the calculated value of 't' is 0.40 at df58 at 0.05 level of confidence. This indicates that the null hypothesis fail to reject thus it means there is no significant difference between the pre-test scores of experimental and control group prospective teachers.

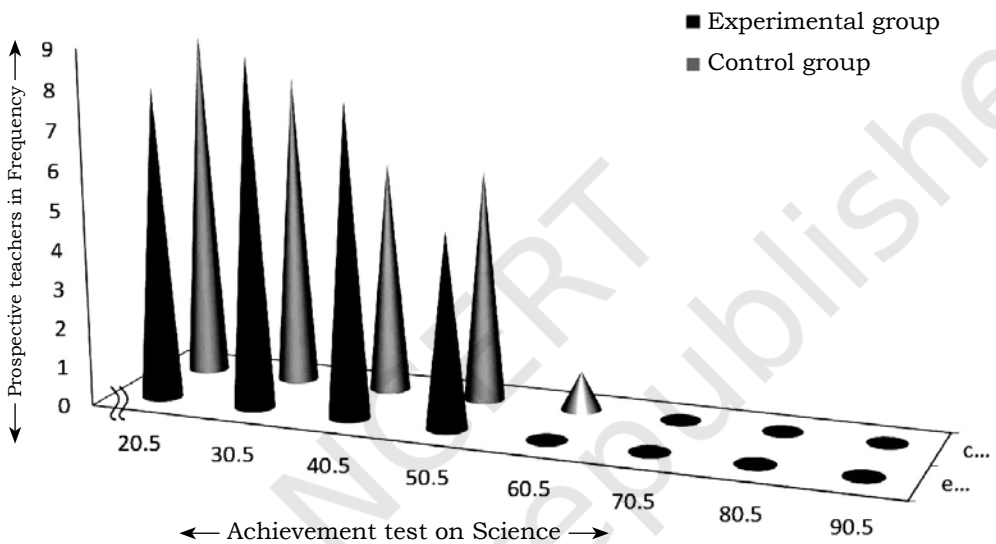


Figure1: Comparison between the pre-test scores of experimental and control group prospective teachers of secondary school.

Table 2

The 'T' Value for the Comparison Between the Post-test Scores of Fluency of Experimental and Control Group Prospective Teachers of Secondary School

Level compared	Number of prospective teachers	M	SD	SEM	SED	df	Calculated value	Tabulated value	H02
Experimental group prospective teachers	30	17	3.26	0.59	0.94	58	3.53	2.66	R*
Control group prospective teachers	30	13.66	4.02	0.73					

*R=Reject

H0=Null Hypothesis

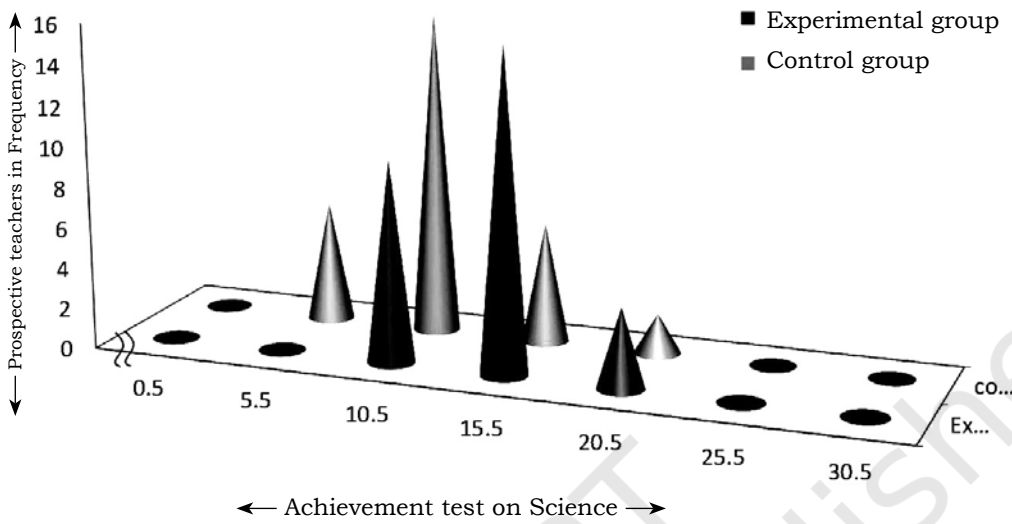


Figure 2: Comparison between the post-test scores of fluencies of experimental and control group prospective teachers of secondary school.

Table 3
The 'T' Value for the Comparison Between the Post-test Scores of Flexibility of Experimental and Control Group Prospective Teachers of Secondary School

Level compared	Number of prospective teachers	M	SD	SEM	SED	df	Calculated value	Tabulated value	H03
Experimental group prospective teachers	30	18	2.89	0.52	0.88	58	4.71	2.66	R*
Control group prospective teachers	30	13.83	3.89	0.71					

*R=Reject H0=Null Hypothesis

The result shows that the calculated value of 't' is 4.71 at df 58 at 0.05 level of confidence. This indicates that the null hypothesis is rejected which means there is significant difference between the post-test scores of flexibility of experimental and control group prospective teachers.

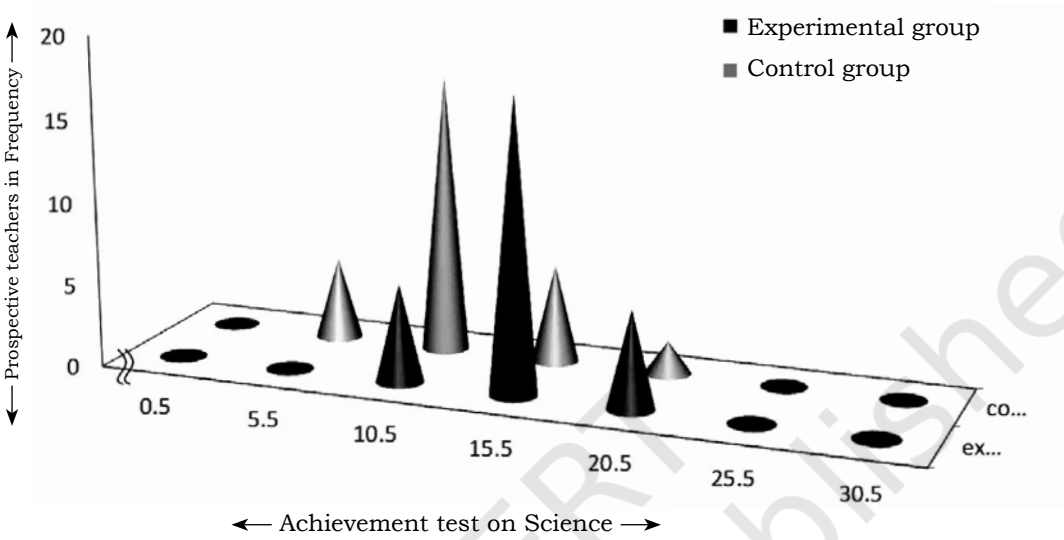


Figure 3: The 't' value for the comparison between the post-test scores of flexibility of experimental and control group prospective teachers of secondary school

Table 4
The 'T' Value For the Comparison Between the Post-test Scores of Originality of Experimental and Control Group Prospective Teachers of Secondary School

Level compared	Number of prospective teachers	M	SD	SEM	SED	df	Calculated value	Tabulated value	H04
Experimental group prospective teachers	30	17.33	3.81	0.69	0.86	58	4.24	2.66	R*
Control group prospective teachers	30	13.66	2.81	0.51					

*R=Reject H0=Null Hypothesis

The result shows that the calculated value of 't' is 4.24 at df 58 at 0.05 level of confidence. This indicates that the null hypothesis is rejected which means there is significant difference between the post-test scores originality of achievement test of experimental and control group prospective teachers.

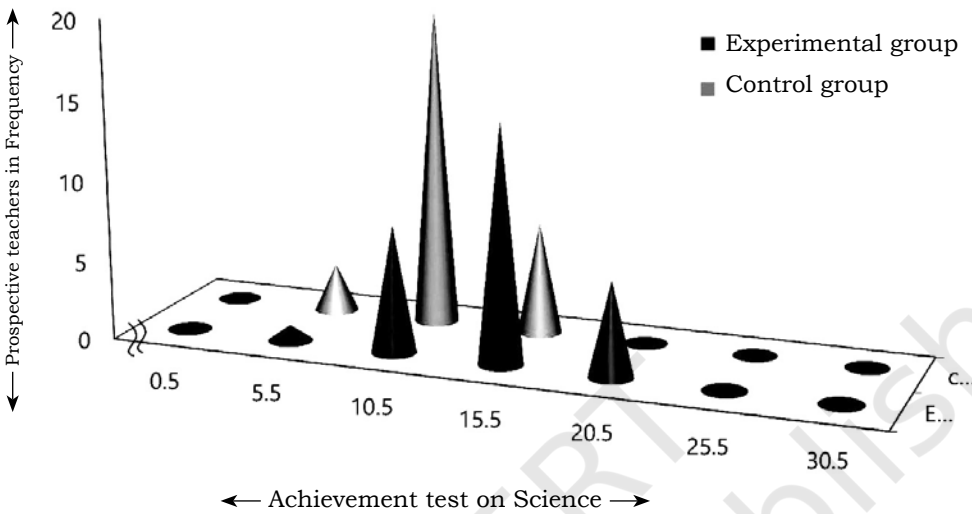


Figure 4: The 't' value for the comparison between the post-test scores of originality of experimental and control group prospective teachers of secondary school

Table 5
The 't' Value for the Comparison Between the Post-test Scores of Creativity Test of Experimental and Control Group Prospective Teachers of Secondary School

Level compared	Number of prospective teachers	M	SD	SEM	SED	df	Calculated value	Tabulated value	H05
Experimental group prospective teachers	30	52.83	11.81	2.1	2.8	58	4.08	2.66	R*
Control group prospective teachers	30	41.17	10.22	1.8					

*R=Reject H0=Null Hypothesis

The result shows that the calculated value of 't' is 4.08 at df 58 at 0.05 level of confidence. This indicates that the null hypothesis is rejected which means there is significant difference between the post-test scores of creativity of experimental group prospective teachers and control group prospective teachers.

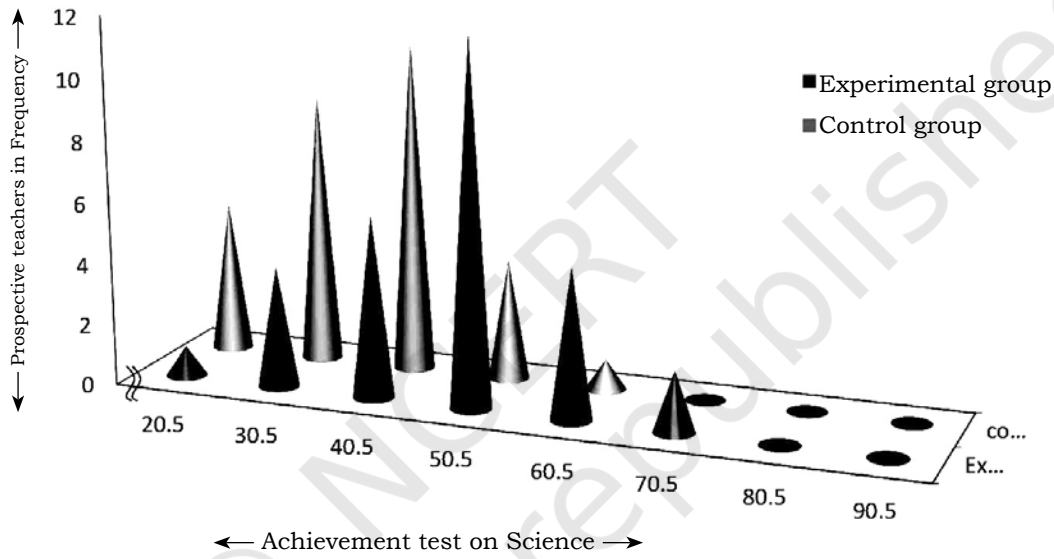


Figure 5: The 't' value for the comparison between the post-test scores of creativity of experimental and control group prospective teachers of secondary school

Major Findings of the Study

It was found from the paired ogive as shown above that both groups are heterogeneous prospective teachers of high achiever, average and underachiever which reflects the result of the effect of activities of creativity over traditional method accurately.

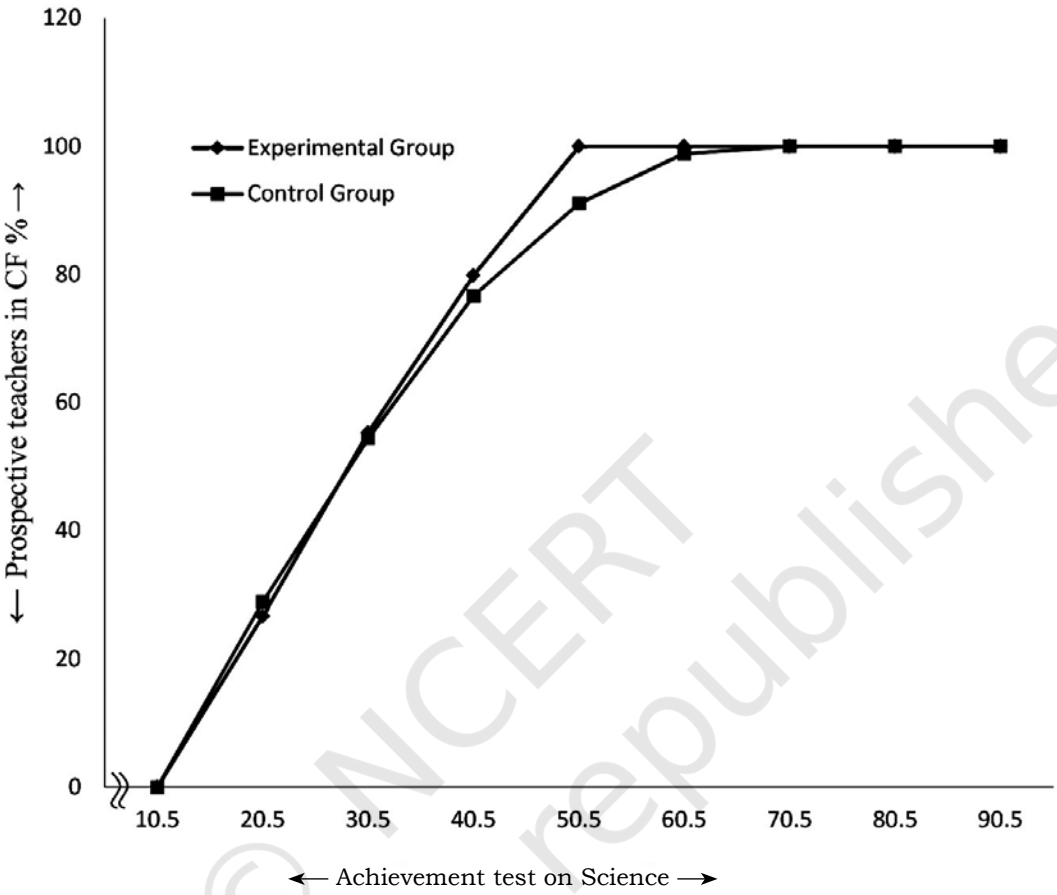


Figure 6: Comparison between the pre-test scores of experimental and control group prospective teachers of secondary school in achievement test on science

The paired ogive revealed the comparison between the post-test scores of fluency of experimental and control group prospective teachers. It was found that prospective teachers develop better fluency in ideas through activities of creativity than learning practices through traditional method.

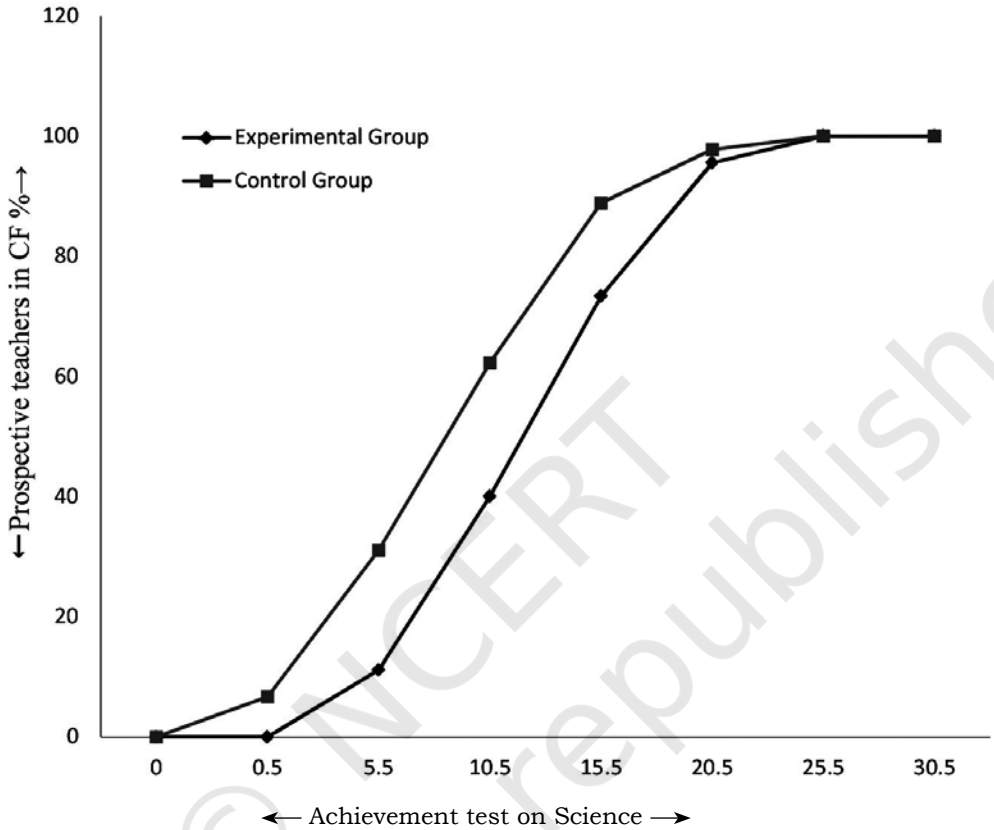


Figure 7: Comparison between the post-test scores of fluency of experimental and control group prospective teachers of secondary school in achievement test on science

The paired ogive revealed the comparison between the post-test scores of flexibility of experimental and control group prospective teachers. It was found that prospective teachers develop better flexibility in ideas through various activities of learning practices of creativity than learning practices through traditional method.

The paired ogive revealed the comparison between the post-test

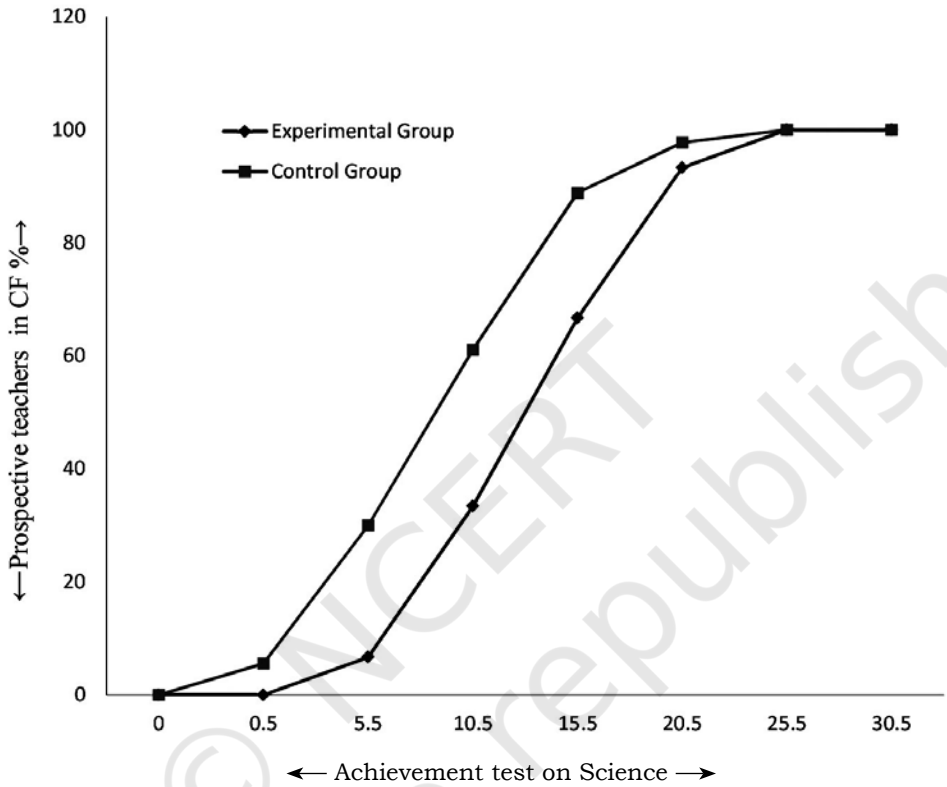


Figure 8: Comparison between the post-test scores of flexibility of experimental and control group prospective teachers of secondary school in achievement test on science

scores of originality of experimental and control group prospective teachers. It was found that prospective teachers develop better originality in thinking through various activities of learning practices of creativity than learning practices through traditional method.

The paired ogive revealed the comparison between the post-test scores of creativity of experimental group and control group prospective

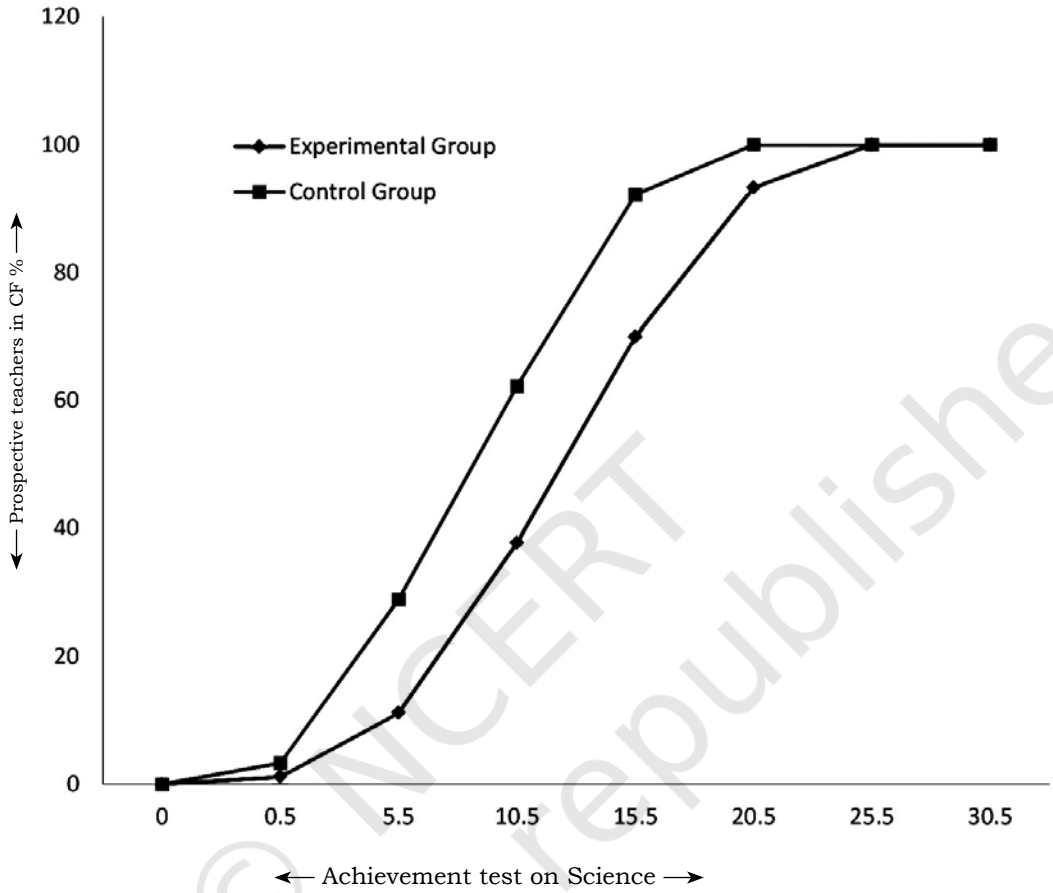


Figure 9: Comparison between the post-test scores of originality of experimental and control group prospective teachers of secondary school in achievement test on science

teachers. It is found that prospective teachers develop better creative thinking by participating in various activities of learning practices than learning practices through conventional method.

Conclusion

A creative teacher is seen as one who is consistently curious and constantly seeks out new ways to improve their abilities for transmitting knowledge. Creative thinking skill becomes the priority of the emerging era which is characterised by an explosion of knowledge and technology in all fields. Educational Institutions prepare learners to face challenges of individual and society creatively. Creativity prepares learners to

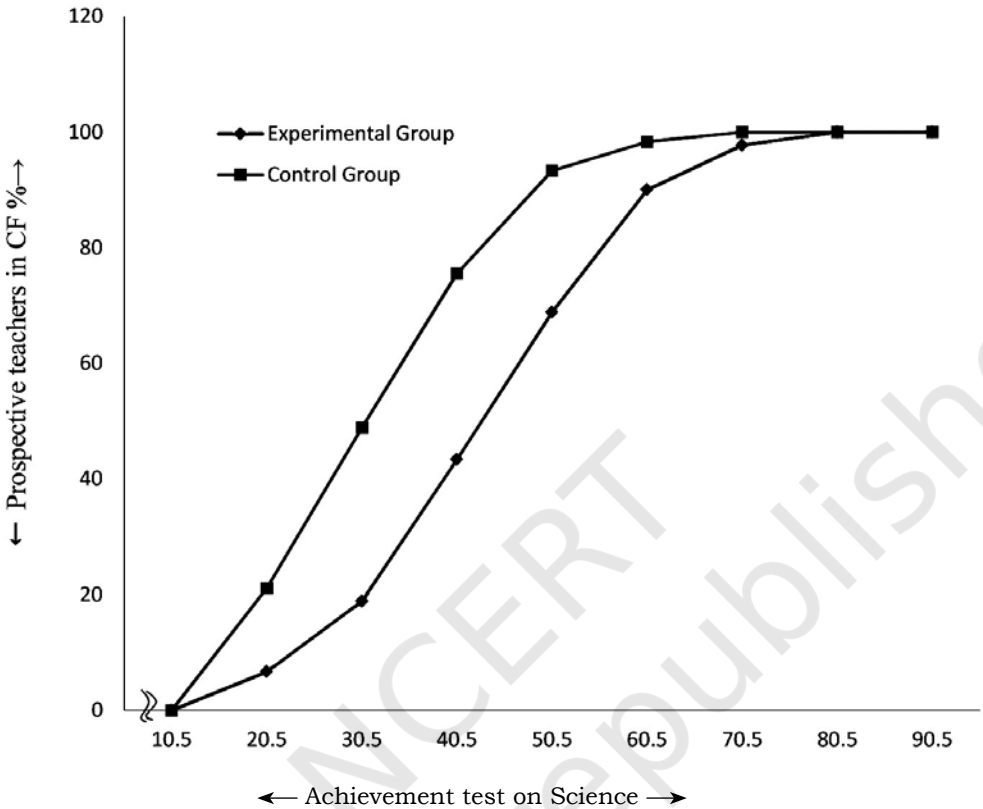


Figure 10: Comparison between the post-test scores of creativity test of experimental and control group prospective teachers of secondary school in achievement test on science

produce ideas, solutions, concepts and theories that are characterised by uniqueness and originality (Rebel 1985, Fault, 2000).

In present study, it is concluded that whenever prospective teachers practice various activities of creativity, they enhance capacity to develop a suitable learning environment full of interest, active participation with fluency, flexibility and originality in ideas. The most important aspect is that these ideas are novel with values. These prospective teachers exercise their brain in various activities with divergent thinking. These activities actually transform fossilised mind into curious mind. Preparing charts, posters and models enhances their capability of very fine observation. Use of clay and carton to prepare 3D models reflect their flexibility and originality of divergent thinking. It also develops their motor skills. In 'run and paste' activity, they got the opportunity to express the

amalgamation of remembering of difficult bones' name with own understanding and enjoyed a lot with full active participation. This activity enhances their fluency of thinking with originality and live concept. The prospective teachers were very excited to play a character of bones, joints, ribs and skull during the drama or act of 'structure and function of skeleton system'. They got opportunity to express themselves with reflections. This act made them extrovert by leaving the shy nature. It helps to remove hesitation to express them and energise their mind. *Nukkad natak* gives massage to common people about values of cooperation and coordination of each unit of social system. As the skeleton system functions smoothly whenever different bones and joints integrate and play their role with coordination, we will survive very smoothly in society whenever we work with coordination of each and every members of society. It also reflects the problem solving nature with fluency, flexibility, originality with values without sufficient resources.

The practices of creativity perform a significant role in increasing the participation of learners with their own interest with common goal and promote the expected learning with development of positive thought. The experimental group prospective teachers who were exposed for creative thinking outperformed the control group prospective teachers that received less creative thinking and creative performance. Thus, learners should be given opportunity and it should be made clear that whatever ideas they give will be accepted in very supportive ways and whatever opinion they have, it should be expressed freely. A teacher is a facilitator, resource manager, enthusiast, guide, prompter and the agent of expected changes. They should provide warm supportive atmosphere and all learners to make choice and to be a part of decision making process. Learners not only get the satisfaction of participation but self-motivate and come forward to attempt other assigned activities in their future life.

Educational Implications of the Study

On the basis of findings of the study, relevant literature and observations during the study, following are the educational implications which may help in developing creativity among learners—

- Prospective teachers must be motivated to have some original ideas.
- Teacher educators should focus on training of prospective teachers for the development of innovative ecology so that their creativity should be enhanced.
- Learners should be allowed adequate freedom in responding to a situation and to have their own way when they need a particular

kind of novel expression strongly enough.

- Learning experiences must be designed to foster creativity among learners. Curriculum should be quite flexible with provision for studying and working without threat of evaluation.
- There should be organisation of seminar, symposium, workshop and orientation programme time to time to exchange and reform their creative and innovative ideas on a particular platform.
- Teacher educators should themselves use inductive method to enhance the imagination of prospective teachers.
- The prospective teachers should provide independency and flexible learning environment so that they generate their novel ideas with free a mind set.

Recommendations

- There should be networking of Teacher Education Institutions through which each and every teacher get link with different activities of learning practices for creativity enrichment.
- This was conducted at Teacher Education Institution but it can be applied on schools and other higher educational institutions.
- Here only four types of activities are applied; other activities should also be applied for better results.
- The research should be conducted on large sample for generalisations of the findings.
- This research is conducted on 'science discipline'. It may be applied on other disciplines.

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