Shaikshik Parisamvad (An International Journal of Education)
SPIJE, ISSN 2231 – 2323 (Print), 2231 – 2404 (Online)
Vol. 5, No. 1, January 2015, pp - 75-79 .

A Comparative Study of Scientific Creativity among Boys and Girls of Class IX

Hans Raj, Research Scholar, Faculty of Education (K) Banaras Hindu University

Abstract

The purpose of this study was to investigate the differences among boys and girls in terms of different aspects of scientific creativity. A sample of 53 boys and 43 girls studying in five secondary schools of Varanasi city was randomly selected. The investigator had personally met the participants and administered the tool, i.e. Test of Scientific Creativity (Verbal) designed by the investigator. Means, S.D.s and t-test were calculated to analyze the data. The findings reveal that boys do not differ significantly in all the variables of verbal scientific creativity from the girls.

Key words: Scientific Creativity, Secondary school students

Introduction

Creativity is a multidimensional construct which should be indicated by the ability to produce more associations and to produce more that are unique. In the initial period, the concept of creativity was appearing more often in art theory. It was linked with the concept of imagination. **It has something in itself like creation**. Creativity has been conceptualized as divergent thinking by **Guilford (1950).** According to Guilford, divergent thinking is such as a kind of mental operation in which we think in different directions, sometimes searching, some times seeking variety.

There are four distinct approaches of creativity: (a) product (b) person (c) press and (d) process. **The product** approach to creativity focuses on outcomes and those things that result from creative process. It is concerned with important characteristics that distinguish more creative from less creative products as perceived by different people for different purposes. Creative products are emphasized for elements of newness, freshness and inventiveness they have.

The quality of originality is represented in these products involving fusion of perception in new way, finding new connections and relationships, producing new insights, and moulding of experiences in new organizations. Creative products are novel-they are not imitations, nor are they mass produced (Barron 1988 & Torrance 1981).

The person approach is based on research on personal characteristics. The press approach to creativity typically includes the total complex situation (press) in which creative processes are initially stimulated and sustained through completion. Research concerning the situation in which scientific creativity occurs has explained a large array of psychological, social, cultural, political and historical factors assumed to be related to creative achievement. The process approach has been less personal and more behavioural and has been more oriented to delineate various steps, styles and strategies within the creative process. The creative process has these steps; first, the selection of the problem; second, the extended effort to solve the problem, constraints must be set on the solution of the problem, here some constraints will prove to be wrong so there must be a process of changing constraints. This process is related to what is called “restricting” in Gestalt psychology and often

occurs as a sudden illumination. Finally, a process of verification and elaboration is required, in which the scientist ascertains the value of the new set of constraints and put that set into a form and it can be presented to the public (Stumpf, 1995).

In 1966, Torrance developed a benchmark method for quantifying creativity with his Torrance tests of creative thinking (TTCT). Building on J.P. Guilford's work, Torrance involved simple tests of divergent thinking and other problem solving skills, which were identified by four factors:

(a) Fluency: Total number of interpretable, meaningful and relevant ideas generated in response to the stimulus.

(b) Flexibility: The number of different categories of relevant responses.

(c) Originality: The statistical rarity of the responses.

(d) Elaboration: The amount of detail in the responses.

Generally, creativity is a multidimensional (verbal and non verbal) attribute differentially, distributed among people and includes chiefly the factors of seeking problems, fluency, flexibility, originality, inquisitiveness and persistency. Moravesik (1981) has defined scientific creativity as "Scientific Creativity may be viewed as the attainment of new and novel steps in realizing the objectives of science. Scientific creativity can manifest itself in the conception of new ideas contributing to new experiments to probe nature's law, in the development of scientific ideas applied to particular domains of practical interest, in the realization of new organizational features of scientific research and the scientific community, in the novel implementation of plans and blue prints for scientific activities in trail-blazing undertakings to transmit the scientific outlook in to the public mind and in many other realms."

Hu and Adey (2002) proposed the three-dimensional scientific structure creativity model (SSCM) for measuring scientific creativity. They defined scientific creativity as "*a kind of intellectual trait or ability producing or potentially a certain product that is original and has social or personal value, designed with a certain purpose in mind, using given information.*" Thus, scientific creativity is different from general creativity. It is more based on objectivity and takes a longer route of time than the general creativity in the creation of final output.

Need and Significance of the Study

According to National Policy of Education (1986), "science education programmes will be designed to enable the learner to acquire problem solving and decision-making skills and to discover the relationship of science with health, agriculture, industry and other aspect of daily life." Thus, science education should be provided to the students such that scientific creativity can be developed and sparked new ideas for innovations and inventions.

Creativity is essentially a multifaceted phenomenon. It is found in every human less or more degree at every stage of development. Fostering creativity in the classroom demands a special climate. The objective of this climate is to enhance creative thinking in the students through enrichment activities running across a wide range of school subjects. We need to satisfy the intellectual curiosity of children which is generally not satisfied within the framework of regular educational system.

Mackinnon (1978) acknowledged that most school environments don't support creative development and many even suppress creative expression. It has been noted that schools emphasize knowledge acquisition and little attention has been placed on the development of strategies and techniques that can foster student's creative potential. The teacher is a nation builder, so it is responsibility to encourage creative talents even if sometimes he may have to bear difficulties due to divergence behaviour of the students.

Genderwise comparative studies of general creativity have been accomplished by many researchers, but a few researches are found on comparative analysis of scientific creativity along with gender differences. Therefore, it is need of present time to compare boys and girls on the basis of scientific creativity So that, it will be clear whether there is need of different teaching-learning environment for boys and girls due to their gender differences or not.

Statement of the Problem

The present work is entitled as "A Comparative Study of Scientific Creativity Among Boys and Girls of Class IX."

Objective

- To compare the boys and girls on the basis of scientific creativity and its components, i.e. fluency, flexibility & originality.

Hypothesis of the Study

- There is no significant difference between the boys and the girls on the basis of scientific creativity and its components, i.e. fluency, flexibility & originality.

Methodology

Sample: A sample of 53 boys and 43 girls studying in five secondary schools of Varanasi city of Uttar Pradesh was selected on random basis for the present study. The sample was equal on age and socio-economic status.

Design of the study: In the present study descriptive survey method was used.

Tool Used: To assess the scientific creativity of the students, the test of scientific creativity (TSC) was used. It was developed by the investigator. The test retest reliability of total scientific creativity was found to be.864. The content validity index (Mean CVR) was found to be .94.

Result and Discussion

Obtained data were analyzed using descriptive statistics (Mean, Standard deviation and C-Ratios). Frequency distribution of scientific creativity scores was computed to ascertain the normalcy of data and C-ratios were computed to find out the gender difference in fluency, flexibility, originality and overall scientific creativity.

In the analysis of data pertaining means, SD's of fluency, flexibility, originality and total scientific creativity were computed separately. Table no. 1 showing the mean differences in fluency, flexibility, originality and composite scientific creativity were presented in relation to gender.

Table 1: Showing The Mean Differences In Fluency, Flexibility, Originality And Composite Scientific Creativity

Variables	Boys (N=53)		Girls (N=43)		t-value	Level of significance
	Mean	S.D.	Mean	S.D.		
Fluency	21.79	7.98	19.34	8.42	1.45	**N.S.**
Flexibility	17.50	5.81	15.57	6.19	1.57	**N.S.**
Originality	17.27	15.85	13.84	13.09	1.16	**N.S.**
Total Scientific Creativity	56.56	28.41	48.75	26.37	1.40	**N.S.**

N.S. = Not Significance

From the above table no. 1, it is clear that obtained mean scores of boys and girls are similar in all components, i.e. fluency, flexibility and originality. It shows no significant differences in boys and girls in all components of verbal scientific creative thinking. Earlier, similar findings were reported by Meetai & Chandra (2012) who found no significant difference in fluency, flexibility and overall scientific creativity on the basis of gender. Singh (1992) also found that boys are not differed significantly from girls in all components of verbal scientific creativity.

Here, it is found that there is no significance difference in the fluency scores. This indicated that there is no significant difference in cognition level of boys and girls, by which an individual retrieves items of information from his personal information in storage and no significant difference in the flexibility scores show that the boys and the girls are similar in the fluidity of information or striking out new directions. It is also shown by the table that there is no significant difference in the originality scores. It points out that there is no significant difference in the creative thinking of boys and girls. They have similarities in creative thinking and generating original and novel outputs.

Thus, the comparison of boys and girls of secondary schools in terms of their performance on verbal measures of scientific creative thinking suggests that the boys have similar scores to girls on all measures of scientific creativity i.e. fluency, flexibility and originality. It suggests that boys and girls are similar in simulating and prompting environment and freedom for the cultivation and enhancement of original ideas.

Conclusion

Thus, it is concluded on the basis of data analysis of scientific creativity of secondary school students that boys and girls have equal level of scientific creative thinking. They also have similarities in all aspects of scientific creativity i.e. fluency, flexibility & originality. So, it is the responsibility of parents at home and teachers in schools to give them equal opportunities and to avoid discrimination based on gender..

References

Barron, F. (1988). Putting creativity to work. In R.J. Sternberg (Ed.). The nature of creativity, Pp.76-98. New York: Cambridge University Press.

Bronowski, J. (1970). In Roslansky, J.D. (Ed.). Creativity: A discussion at the Nobel conference. Amsterdam: North-

Holland.

Foster John (1971). Creativity and Teacher. Basingstoke: MacMillan Education.

Guilford, J.P. (1950). Creativity. American psychologist. 5 (9), 444-454.

Hota, A.K. (1998). Talent and Creativity. New Delhi: Sarup and Sons.

Hu, W. & Adey, P. (2002). A Scientific Creativity Test for secondary school students. International Journal of Science Education, 24 (4), 389-403.

MacKinnon, D. W. (1978). In search of human effectiveness: Identifying and developing creativity. Buffalo, NY: Creative Education Foundation.

McAlindon, H.R. (1995). Effective Creativity. Delhi: Jaico Publishing house.

Meetai, N.R. & Chandra, C. (2012). Comparative study of scientific creativity of students at secondary level. Shaikshik parisamvad, 2 (1), 79-84.

Moravesik, M. J. (1981). Creativity in science education. Science education, 65(2), 221-227.

National Policy on Education. (1986). Government of India. New Delhi: Department of Education, Ministry of Human Resource Development.

Rudduck, W.J. (2001). Innovation and Change. Buckingham: Open University press.

Silvano, A. (1976). Creativity. New York: Basic books publishers.

Singh, R.C. (1992). A comparative study of scientific creativity, problem solving and risk taking in tribal and urban students. In M.B. Buch (Ed.). Fifth survey of educational Research, vol. 2, part 1, pp. 1074. New Delhi: NCERT.

Stumpf, H. (1995). Scientific creativity: A short overview. Educational psychological review, 7 (3), 225-241.

Taylor, C. W. (1964). Widening Horizon in Creativity. New York: John Wiley & Sons.

Torrance, E.P. (1969). Guiding creative talent. New Delhi: Prentice-Hall.

Torrance, E.P. (1988). Putting creativity to work. In R.J. Sternberg (Ed.). The nature of creativity, Pp.43-73. New York: Cambridge University Press.

Torrance, E.P. (n.d.). Rewarding Creative Behaviour. New Delhi: Prentice-Hall.

Tripathi, S.N. (2004). Creativity. In J.S. Rajput (Ed). Encyclopedia of Indian Education (Vol. 1, A-K, pp. 402-412). New Delhi: National Council of Educational Research & Training.

Weisberg, R.W. (1993). Creativity: Beyond the myth of genius. New York: W.H. Freeman.