

Differences in Creativity across Gender among Undergraduate Students

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ABSTRACT

Creative people are the wealth of society. Creativity not only improves one's performance but also plays an important role in the development of the entire society as well as the country. The purpose of this present study was to find out whether there was any difference in creativity due to gender differences. The population of this study was the Undergraduate students of the Presidency Division of West Bengal. A total of 244 students were taken as samples from the Arts, Commerce and Science streams of Barrackpore Rastraguru Surendranath College and Chakdaha College. The Purposive sampling technique was used to select the samples. The sample consisted of 109 Males and 135 Females. A self-constructed Creativity Test was administered to the students for data collection. Students' Verbal creativity was measured in terms of Fluency, Flexibility, and Originality. Students' Non-Verbal creativity was measured in terms of Fluency, Flexibility, Originality, and Elaboration. Mann-Whitney U test was applied for statistical analysis of data. The present study found that there were significant differences between Male and Female undergraduate students in terms of Fluency and Flexibility in both Verbal and Non-Verbal Creativity. No significant differences were found in both Verbal and Non-Verbal Originality and Non-Verbal Elaboration of Undergraduate students.

Keywords: Gender, Creativity, Verbal Creativity, Non-Verbal Creativity

INTRODUCTION

Creativity is a human ability that helps people to think or create completely new things. Spearman (1931) defines creativity as the "power of the human mind to create new contents by transforming relations and thereby generating new correlates". It is the creativity of creative people that turned the primitive world into the modern world. Everything that emerges in this world is the result of the creative power of the human mind. The infinite power of creative human imagination is the key to all the beautiful works that man has invented on this earth. According to Torrance (1962, as cited in Singh, 2013) "A nation's progress, greatness depends not only on its material achievements but also upon its great thinkers. Artist & scholars' that are regarded as Creative genius. And in fact, historical records provide evidence that cultures have collapsed because of Failure to utilize, intelligent & imagination methods for solving their problems." But creativity is not equally distributed among all. Different studies show differences in human creativity in various aspects. Just as various studies have shown the influence of different personality traits on creativity, differences in creativity have also been found for gender differences.

About 50 years ago Kogan (1974) studied gender differences in creativity. Among the

studies he reviewed, he noted that some studies found higher creativity in males (e.g., Torrance, 1962; Hudson, 1968), some studies found higher creativity in females (e.g., Guilford, 1967; Wallach-& Wing, 1969), and some studies found no gender differences (e.g., Feldhusen & Denny, 1965; Klausmeier & Wiersma, 1965; Torrance, 1965; Wallach & Kogan, 1965).

Baer and Kaufman (2008) found no gender differences in many of the studies (eg., Parish and Eads,1977; Amabile,1983; Runco, Okuda, and Thurston,1987; Rajendran and Krishnan,1992; Lee,2002; Harris,2004; etc.) they reviewed. They reviewed several studies (eg., Singh,1979; Jaquish and Ripple,1980; Kershner and Ledger,1985; Hines,1990; Rejskind, Rapagna, and Gold,1992; Kim and Michael,1995; McCrae et al.,2002; Misra, 2003) in which women scored higher than men on creativity.

Nakano et al. (2021) analyzed 133 publications in which articles were published between 1975 and 2020. There were 45.20% studies in favour of females and 23.28% in favour of males. Another 31.50% was according to the assessed content.

The research on gender differences in creativity conducted at different times outside India or India did not give similar results. Research results have been found to be different at different times, different at different places, and different for different classes of students. Based on this background, interest has arisen in researching gender differences in creativity. Also, the number of studies on undergraduate students' creativity is very few in India and researchers have not found such studies on undergraduate students of West Bengal. Because of that inquiry, the present study investigated gender differences in the creativity of undergraduate students of the Presidency Division of West Bengal.

LITERATURE REVIEW

Here are some reviews of research on gender differences in creativity.

Naderi et al. (2009) conducted a study titled "Gender Differences in Creative Perceptions of Undergraduate Students". 48 female and 105 male undergraduate students from Malaysian Universities aged 19 to 27 years participated as respondents in this study. The Khatena-Torrance Creative Perception Inventory Test (KTCPI) was administered to all the students. This study found no significant difference in the overall creative perception of male and female students.

Lin et al. (2012) examined how gender and personality traits were related to divergent thinking and insight problem-solving. 320 undergraduate students from five Universities in Taiwan were the participants in this study. The Abbreviated Torrance Test for Adults was used for divergent thinking measurement. The result revealed that female participants performed better in most of the divergent thinking indexes than male participants.

Mitra Ghosh (2013) in her study aimed to find out gender differences in creativity among school students. Fifty boys and fifty girls aged 14 to 16 years from different schools in Ranchi town were taken as samples. A Creativity Test developed by Chouhan and Tiwari (1974) was used to measure students' creativity in this study. The study found a significant difference between boys and girls in creativity. Boys were found to be more creative than girls.

Goswami & Phukon (2014) investigated the creativity level of students of 12th standard and 10th standard in Dibrugarh district of Assam, India. In their study, they looked for gender differences in students' creativity. A total of 847 female and male students were taken as samples for this study. Torrance Test of Creative Thinking was used to measure the creativity level of the students. The significance value of the t-test was found to be 0.171 which is greater than 0.05. The study found no significant difference between the creativity scores of girls and boys.

Paul et al. (2017) conducted a study to provide information on creativity related to gender and residence. A sample of 244 9th standard students from Purulia district including male, female, urban, and rural areas was selected. This study found that boys were more creative than girls.

Objectives of the Study:

1. To explore gender differences in verbal components of creativity in terms of fluency, flexibility, and originality of undergraduate students.
2. To explore gender differences in Non-Verbal components of Creativity in terms of Fluency, Flexibility, Originality, and Elaboration of Undergraduate Students.
3. To explore gender differences in Total Verbal Creativity, Total Non-Verbal Creativity, and Total creativity of undergraduate students.

Hypothesis of the Study:

For objective 1

According to the objectives of the present study the following Null Hypotheses were formulated.

For objective 1

● Hypotheses related to differences in the verbal components of creativity for gender difference

H_{0.1}: There exists no significant difference between male and female undergraduate students in Fluency scores of verbal Creativity in Presidency division of West Bengal.

H_{0.2}: There exists no significant difference between male and female undergraduate students in flexibility scores of verbal Creativity in Presidency division of West Bengal.

H_{0.3}: There exists no significant difference between male and female undergraduate students in originality scores of verbal Creativity in Presidency division of West Bengal.

For objective 2

● Hypotheses related to differences in the Non-verbal components of creativity for gender difference

H_{0.4}: There exists no significant difference between male and female undergraduate students in Fluency scores of non-verbal Creativity in Presidency division of West Bengal.

H_{0.5}: There exists no significant difference between male and female undergraduate students in flexibility scores of non-verbal Creativity in Presidency division of West Bengal.

H_{0.6}: There exists no significant difference between male and female undergraduate students in elaboration scores of non-verbal Creativity in Presidency division of West Bengal.

H_{0.7}: There exists no significant difference between male and female undergraduate students in originality scores of non-verbal Creativity in Presidency division of West Bengal.

For objective 3

● Hypotheses related to differences in the Total scores of creativity for gender difference

H_{0.8}: There exists no significant difference between male and female undergraduate students in Total scores of verbal Creativity in Presidency division of West Bengal.

H_{0.9}: There exists no significant difference between male and female undergraduate students in Total scores of non-verbal Creativity in Presidency division of West Bengal.

H_{0.10}: There exists no significant difference between male and female undergraduate students in Total Creativity in Presidency division of West Bengal.

MATERIALS & METHODS

❖ **Method of the Study:** Descriptive survey method was adopted to fulfil the objectives of the present study and the nature of the study was quantitative.

❖ **Population of the Study:** All undergraduate students of Arts,

Commerce, and Science streams of Presidency Division of West Bengal were considered as the population of the present study.

❖ **Sample of the Study:** 244 Undergraduate Students were taken as the sample of this study. 109 male and 135 female students were selected from the Arts, Commerce, and Science streams of Barrackpore Rastraguru Surendranath College and Chakdaha College in West Bengal.

❖ **Sampling Techniques:** The researcher used the Purposive sampling method to collect data.

❖ **Variables involved in the Study:**

A. Main Variable:

▪ Creativity

The following are the Sub-Variables under Creativity in this study:

Verbal Creativity: Fluency, Flexibility & Originality

Non-Verbal Creativity: Fluency, Flexibility, Originality & Elaboration

B. Categorical Variables:

▪ Gender: Male & Female

Tools used for the study:

In the present study, a creativity test was constructed to measure the verbal and nonverbal creativity of undergraduate students, following previously developed instruments by various researchers and psychologists. This creativity test consists of 9 activities. Activities one to five and nine were for verbal creativity and activities six to eight were for nonverbal creativity. There were 19 items in total to test students' verbal fluency, verbal flexibility, verbal originality, nonverbal fluency, nonverbal flexibility, nonverbal originality, and nonverbal elaboration.

The fluency score was determined from the total number of responses generated by the participant on the test's activities. The flexibility score was determined from the total number of different categories of responses generated by the participant on the test's activities. Responses were given an originality score of zero to five based on

specific norms for how uncommon they were. Both verbal and non-verbal creativity scores were given as per above. The nonverbal elaboration scores of the responses were given as the number of elaborated decorations in each reaction.

This self-constructed instrument was standardized by determining validity and reliability. The validity of the instrument was established through expert opinion and reliability was assessed by evaluating internal consistency. The internal consistency of the instrument was assessed using Cronbach's alpha. Cronbach's alpha values calculated for verbal fluency, verbal flexibility, and verbal originality were found to be 0.840, 0.839, and 0.712 respectively.

Cronbach's alpha values calculated for Non-verbal fluency, non-verbal elaboration, and non-verbal originality were found to be 0.814, 0.744, and 0.553 respectively.

STATISTICAL ANALYSIS

IBM SPSS Statistics 25 software was used for the data analysis.

Since the data of all components of Creativity were not normally distributed, Parametric tests were not used for hypothesis testing in this study. Since no specific distribution was required for Non-parametric tests, the researchers in this study conducted hypothesis testing with the help of Non-parametric tests. In this study, Mann-Whitney U test (Wilcoxon Rank-Sum test) was used to compare two independent groups. The label of statistical significance 0.05 was used.

RESULT

Exploring differences in Creativity for Gender differences:

The null hypotheses $H_{0.1}$ to $H_{0.10}$ were formulated to explore the difference between the Creativity of Male and Female Undergraduate students. Those hypotheses were tested using the Mann-Whitney U Test. The test results are shown in Table -1, Table - 2 and Table - 3.

★ Differences in the Verbal components of Creativity for gender difference:

The Verbal components of Creativity of Undergraduate Male students, and Female

students were arranged in Table-1. The null hypotheses $H_{0.1}$ to $H_{0.3}$ were tested here.

Table - 1: Gender differences in Verbal components of Creativity

Components of Creativity	Ranks			Test Statistics			Inter-pretation	
	Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)		Decision
Verbal Fluency	Male	109	108.05	11777.00	5782.000	0.004	Reject the null hypothesis	Female > Male
	Female	135	134.17	18113.00				
Verbal Flexibility	Male	109	108.27	11801.50	5806.500	0.005	Reject the null hypothesis	Female > Male
	Female	135	133.99	18088.50				
Verbal Originality	Male	109	115.90	12633.00	6638.000	0.189	Retain the null hypothesis	No significant difference
	Female	135	127.83	17257.00				

Observation:

The calculated Sig. values in Table 1 were found to be less than 0.05 for Verbal fluency and Verbal flexibility and greater than 0.05 for Verbal Originality. Hence, depending on the significance value, null hypotheses $H_{0.1}$ and $H_{0.2}$ were rejected and $H_{0.3}$ was accepted.

Interpretation:

✍ Thus, there was a significant difference between Male and Female Undergraduate students in Fluency scores of Verbal Creativity in the Presidency division of West Bengal. The Mean Rank of Verbal fluency was found to be higher in Females than in Males.

✍ There was also a significant difference between Male and Female Undergraduate

students in flexibility scores of Verbal Creativity in the Presidency division of West Bengal. The mean rank of Verbal flexibility was found to be higher in Females than in Males.

✍ No significant difference was found between Male and Female Undergraduate students in originality scores of Verbal Creativity in the Presidency division of West Bengal.

★ Differences in the Non-Verbal components of Creativity for gender difference:

The Non-Verbal components of Creativity of Undergraduate Male students, and Female students were arranged in Table-2. The null hypotheses $H_{0.4}$ to $H_{0.7}$ were tested here.

Table - 2: Gender differences in Non-Verbal components of Creativity

Components of Non-Verbal Creativity	Ranks				Test Statistics			
	Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)	Decision	Inter-pretation
Non-Verbal Fluency	Male	109	109.61	11947.00	5952.00	0.010	Reject the null hypothesis	Female > Male
	Female	135	132.91	17943.00				
Non-Verbal Flexibility	Male	109	110.64	12059.50	6064.50	0.018	Reject the null hypothesis	Female > Male
	Female	135	132.08	17830.50				
Non-Verbal Elaboration	Male	109	113.90	12415.00	6420.00	0.085	Retain the null hypothesis	No significant difference
	Female	135	129.44	17475.00				
Non-Verbal Originality	Male	109	127.60	13908.00	6802.00	0.310	Retain the null hypothesis	No significant difference
	Female	135	118.39	15982.00				

Observation:

The calculated Sig. values in Table-2 were found to be less than 0.05 for Non-Verbal fluency and non-verbal flexibility and greater than 0.05 for Non-Verbal elaboration, and Non-Verbal originality. Hence null hypotheses $H_{0.4}$, and $H_{0.5}$ were rejected and null hypotheses $H_{0.6}$ and $H_{0.7}$ were accepted.

Interpretation:

Thus, there was a significant difference between Male and Female Undergraduate students in Fluency scores of Non-Verbal Creativity in the Presidency division of West Bengal. The Mean Rank of Non-Verbal fluency was found to be higher in Females than in Males.

There was also a significant difference between Male and Female Undergraduate students in flexibility scores of Non-Verbal

Creativity in the Presidency division of West Bengal. The mean rank of Non-Verbal flexibility was found to be higher in Females than in Males.

No significant difference was found between Male and Female Undergraduate students in Elaboration scores of Non-Verbal Creativity in the Presidency division of West Bengal.

No significant difference was found between Male and Female Undergraduate students in originality scores of Non-Verbal Creativity in the Presidency division of West Bengal.

★ Differences in the Total scores of Creativity for gender difference:

The Total scores of Creativity of Undergraduate Male students, and Female students were arranged in Table-3. The null hypotheses $H_{0.8}$ to $H_{0.10}$ were tested here.

Table - 3: Gender differences in Total score of Creativity

Creativity	Ranks				Test Statistics			
	Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)	Decision	Inter-pretation
Total Verbal Creativity	Male	109	109.02	11883.50	5888.500	0.007	Reject the null hypothesis	Female > Male
	Female	135	133.38	18006.50				
Total Non-Verbal Creativity	Male	109	112.93	12309.00	6314.000	0.057	Retain the null hypothesis	No significant difference
	Female	135	130.23	17581.00				
Total Creativity	Male	109	108.06	11779.00	5784.000	0.004	Reject the null hypothesis	Female > Male
	Female	135	134.16	18111.00				

Observation:

The calculated Sig. values in Table-3 were found to be less than 0.05 for Total Verbal

Creativity, and Total Creativity and greater than 0.05 for Total Non-Verbal Creativity. Hence, null hypotheses $H_{0.8}$, and $H_{0.10}$ were

rejected, and null hypothesis $H_{0.9}$ was accepted.

Interpretation:

✍ Thus, there was a significant difference between Male and Female Undergraduate students in Total Verbal Creativity. The mean rank was found to be higher among Females than among Males.

✍ There exists no significant difference between Male and Female Undergraduate students in Total Non-Verbal Creativity.

✍ A significant difference was found between Male and Female Undergraduate students in Total Creativity. The mean rank was found to be higher among Females than among Males.

DISCUSSION

In the present study, Total creativity and Total verbal creativity of undergraduate students were found to be higher in females than in males. This finding is consistent with many other studies (eg., Lin et al., 2008; Lather et al., 2014; Prabha, 2017).

Paul et al. (2017) found that boys were more creative than girls. Stoltzfus et al. (2011) found Male participants' performance was better than that of females. On the other hand, many studies have not found gender differences in creativity (eg., Naderi et al., 2009; Goswami & Phukon, 2014; Potur & Barkul, 2009). The findings of the present study are not consistent with the findings of the aforementioned studies.

In this study, in terms of Total non-verbal creativity, the score of undergraduate female students was higher than that of male students, but the difference was not significant as the significant value was greater than 0.05. That is, no difference was found between women and men in Total non-verbal creativity.

This study found gender differences in both verbal and non-verbal components of creativity in terms of fluency and flexibility. Data analysis revealed that both verbal and non-verbal fluency and flexibility scores were higher among female undergraduates than male undergraduates.

Burton and Henninger (2013) studied university students and found that females scored higher than males on verbal fluency tests. Matud et al. (2007) found in their study that females scored higher than males in verbal fluency. Cheung & Lau (2010) observed girls in the junior high grades excelled over boys in verbal flexibility, figural fluency, and figural flexibility. Hines (1990, as cited in Baer, John & Kaufman, James, 2008) found undergraduate women scored higher on associational fluency. Bharadwaj (1985, as cited in Baer, John & Kaufman, James, 2008) observed that females had higher fluency scores than males at both ages 19 and 21 and higher flexibility scores at age 19. The above findings obtained in previous studies are consistent with the findings of the present study.

Chan et al. (2001) revealed in their study that boys consistently scored higher on ideational fluency than girls on verbal tasks and Ai, X. (1999) noted that in some studies (eg., Mayhon, 1966; Torrance, 1969) boys were ahead of girls in flexibility, which contradicts the present study.

The present study found no gender differences in both verbal and non-verbal originality scores. There was also found no significant difference between male and female students in nonverbal elaboration scores.

CONCLUSION

The present study showed results consistent with many previous studies and inconsistent with some studies. Based on the results of the present study and various previous studies, it is not possible to make a final decision about the gender difference of students in creativity. Some studies have found gender differences in student creativity while some studies have not found gender differences in student creativity. In terms of gender differences, some studies have shown that girls are ahead and some studies have shown that boys are ahead. The present study showed gender differences in the creativity of

undergraduate students of the Presidency Division of West Bengal. An undergraduate student after completing his/her studies engages himself/herself in various professions. It is the creativity of the students that enhances the excellence of their work after being engaged in the profession. In today's society where boys and girls are engaged in roughly the same professions, there should be no gender difference between men and women. In the present study creativity of undergraduate female students of the West Bengal Presidency Division was found to be higher than males. Based on the current research, future research can be done to find the reasons for gender differences in creativity in this area. If the cause is found, it will be possible to find out the way to resolve the difference. All in all, it will be possible to adopt different ways to develop students' creativity.

Declaration by Authors

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