A Comparison of Creative Thinking Abilities of High and Low Achievers Secondary School Students

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***Abstract*—** Creative thinking is an important human characteristic. It is the best thought as a process, requiring a mixture of ingredients, including personality traits, abilities and skills. This article compares the differences in creative thinking abilities between students with high and low levels of academic achievements. A total number of 208 secondary school students participated in this study. Two groups were formulated i-e high achievers (n=104) and low achievers (n=104). Analysis of data was done using t-test for independent sample to estimate the comparison at 0.05 levels. A self developed instrument was used to measure the creative thinking potential. Results of the study revealed that there was no difference between high achievers and low achievers in terms of creative thinking abilities. However, girls and the students belonging to urban areas found better in their creative thinking.

***Keywords*—** Creative thinking, High achievers, Low achievers, Secondary school students

I. INTRODUCTION

CREATIVITY means having the power or quality to express yourself in your own way. It is a topic of ever-increasing interest, given its importance and applicability to literally every field. In this knowledge and technology era, the concerns and needs of an individual, and perspective about education as well, are changing. According to Piaget, the most initial aim of education is not to train individuals who repeat the previous generations, but to train inventors who have the skill of producing new things and who are creative. At the beginning of the nineteenth century the verb 'to create' was rarely used. It was accepted at that time what human beings did rationalize, rearrange and construct. Now a day's creativity is increasingly gaining importance. Professionals from all fields are becoming aware of its importance for the development of creative thinking [1].

Many creativity theories have raised the question, what drives creativity? There is no one universally agreed definition of creativity, however, creativity is best described as the human capacity to solve problem or to fashion products in a domain, in a way that is initially novel but ultimately accepted in a culture. It is an effective resource that resides in all people [2].

Changes in the field of creativity research have inspired numerous definitions, for example, Torrance [3] known as a leader in creative research, defined creativity as "the process of forming ideas or hypotheses, testing hypotheses, and communicating the results" (p. 23).

Sternberg and Lubart [4] assumed that the universal factors needed for creativity are novelty (i-e originality and newness) and appropriateness. Van Hook and Edwards [5] added that creativity involves "the openness to ideas and the willingness to encourage the exploration of the unknown, even if not easily manageable".

Creativity is still perplexing to many psychologists with many theories unable to completely explain the construct. Research into creative thinking can be divided into the creative product, process, person and place (environment). Torrance [3] defines creative thinking as the ability to sense problems, make guesses, generate new ideas, and communicates results. According to Torrance [6], creative potential exists among all people, and can be improved through learning. According to Anwar [7] learning is taking place through process of education, and it has been said that education should help the individual towards the full development of their talent. If the intellectual capacities of the individual are to be fully developed, the abilities involving in creative thinking cannot be ignored. Certainly, we cannot say that an individual is fully functioning intellectually, if the abilities involved in creative thinking remained underdeveloped, undeveloped or paralyzed. Researchers have found that creative thinking can contribute importantly to the acquisition of information and educational skills. The idea of the level of student's creative thinking has been expressed by experts, such as [8], [9].

Silver [10] pointed out an indicator to identify students' creative thinking by using problem solving and problem posing. There are the three components that assessed different parts and were independent of each other. Students have various backgrounds and different abilities. They possess different potentials in thinking pattern, imagination, fantasy and performance. Therefore, students have different levels of creative thinking. A student may either achieve three components, two components, or only one component. Much research pertaining to an individual's creative level has been attributed to the work of Guilford [11; 12] and

Torrance [6] in developing constructs such as fluency, flexibility, originality, elaboration and redefinition. The Torrance Test of Creative Thinking (TTCT) is an instrument used to measure these constructs. More specifically the TTCT measures creative thinking capabilities including: fluency, flexibility, originality, elaboration, abstractness of title, resistance to closure, emotional expressiveness, articulateness, movement or action, expressiveness, synthesis or combination, unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, and fantasy.

It is reasonable to assume that people are creative, but the degree of creativity is different [13]. This fact was shown by someone who created technology or knowledge at the disposal of others using it. This observation points to the existence of different levels or degrees of creativity or creative thinking for different people. The idea of the level of students' creative thinking has been expressed by De Bono [14] and Barak & Doppelt [15]. They expressed four achievement levels of creative thinking skills development. These are awareness of thinking, observation of thinking, thinking strategy, and reflection on thinking. Torrance, Orlow, and Safter [16] stated that creative thinking is not solely determined by these abilities and that the process of creating requires additional knowledge, attitude and skills. Educators have constant concerns about the relationships between academic achievement and creative performance [17]; [18]; [3]; [19]. Many studies [20]; [21]; [22] support the concept of creativity as a facilitator of achievement.

Previous research has inconclusive results about the relationship between creativity and academic achievement. Some research suggests that creativity is positively related to academic achievement [23]; [24]; [25], whereas other research suggests that creativity is not related or negatively related to academic achievement [26]; [27]; [28]; [29]; [30]; [31]; [32].

There have been numerous interesting studies made on creative thinking including the relationship with performance or achievement revealed that various variables i-e gender, age, intelligence etc, had been identified as correlates of academic achievement such as [33], [34], [35], [36], [37], [38], [39], [40].

Creative abilities have been recognized as essential in solving complex individual, social, and global problems through a significant amount of research. With this recognition, promoting creativity has emerged as a major educational issue in several countries, including Pakistan. It is obvious that existence of creative thinking is not confined to be having high achievements. Every person has creative thinking abilities that vary from person to person. Students differ from one another in a wide variety of ways. They have different backgrounds, different levels of motivation, different attitudes about teaching and learning, and different responses to specific classroom environments and instructional practices.

There has been little research presented concerning creative thinking and levels of academic achievement i-e high and low. Therefore, in order to promote creative thinking, this study attempted to examine the creative thinking abilities of high and low achievers secondary school students. The objectives for this study were to:

1. Compare high achievers and low achievers' creative thinking abilities
2. Identify the differences in students' creative thinking and level of achievement based on gender
3. Identify the differences in students' creative thinking and level of achievement based on residential area

II. METHODS

A. Subjects

A survey method was used for this research. The target population for this study included all secondary school students enrolled in 10^{th} class in government schools of Gujranwala, Pakistan. A stratified random sampling was used to determine the sample from intact 10^{th} classes. Four strata were formulated: (1) urban boys' high schools, (2) rural boys' high schools, (3) urban girls' high schools, and (4) rural girls' high schools. From each stratum five schools were randomly selected in first stage and then fifty two students of 10^{th} class were conveniently taken from each school. In this way 208 secondary school students were participated; out of which 104 belong to urban area and 104 to rural area, including both sexes. They were further split into high achievers and low achievers according to the stated norms of academic achievement that is the students obtained 80% and above marks in the 9^{th} class from Board of Intermediate and Secondary Education, Gujranwala were to be considered high achievers while those students who obtained less than 40% marks were taken to be low achievers. The summary of the sample is shown in Table I:

TABLE I
DISTRIBUTION OF THE SUBJECTS BY THE RESIDENTIAL AREA

Level of Achievement	Sex wise category of schools	Urban	Rural	Total
High achievers	Boys High Schools	52	52	104
Low achievers	Girls High Schools	52	52	104
Total		104	104	208

B. Hypothesis

The results were interpreted in two sets. First, the level of creative thinking abilities and academic achievements, and then creative thinking between high achievers and low achievers was compared. For this purpose following hypothesis were formulated:

Ho There is no statistically significant difference in students' creative thinking abilities due to the level of academic achievement

Ho There are no statistically differences in students' creative thinking abilities and the level of academic achievement due to gender

Ho There are no statistically differences in students' creative thinking abilities and the level of academic achievement due to residential area

C. Measurement

Creative thinking was mostly assessed using an abbreviated version of the Torrance Tests of Creative Thinking (TTCT). The TTCT was developed within an educational context to test for creativity [41]. The TTCT was developed in 1966, and it has been renamed four times: 1974, 1984, 1990 and 1998. The creativity test measures four elements of the creative thinking process: 1) fluency (the number of ideas produced, 2) flexibility (the different categories of ideas produced, 3) originality (the unusualness or the infrequency of an idea), 4) elaboration (embellishment and development of an idea). Another instrument that used by Khatena & Torrance [42] named as "What Kind of Person Are You? (WKOPAY) was a 50- item self-report checklist, used to assess individuals' perception of their own creative behavior. An instrument "Test Your Creativity Level Scale" (TYCL) was also used for measuring creativity. This instrument consisted of 50 items organized in a five points Likert scale format that ranged from strongly agree to strongly disagree.

In the light of above, researchers developed an instrument named as ITCT (Instrument for Testing the Creative Thinking). It was comprised of a self-reported 48-items organized on a five points Likert scale format that ranged from strongly agree to strongly disagree. The instrument indicated the four creative abilities, fluency, originality, elaboration, and flexibility. The instrument was finalized after pilot study on a small sample drawn from same population to test the feasibility of the research questions and clarity of the instrument. Item responses were carefully examined to see how the respondents performed. Accordingly, the instrument was modified and Cronbach's alpha used to measure the reliability that was found 0.79.

A demographical performa soliciting information on respondent gender and residential area (urban or rural) was compiled. The data with respect to these demographic questions were subsequently presented in tables and discussed to provide an indication of the most salient findings with respect to these variables.

III. RESULTS

The primary purpose of the study was to compare creative thinking abilities between high and low achievers. Table II shows the descriptive statistics of student's creative thinking and level of achievement (High and Low). As shown in Table II, and III, of the participants 35% were originality (the unusualness or the infrequency of an idea), 33% were elaboration (embellishment and development of an idea), 19% were flexibility (the different categories of ideas produced), and 13% were fluency (the number of ideas produced). The distribution of aspects of creative thinking between high and low achievers was also very similar. As it can be seen, the most common abilities of the creative thinking among the students were originality and elaboration.

TABLE II
PARTICIPANTS' HIGH & LOW ACHIEVEMENT AND ASPECTS OF CREATIVE THINKING

Aspects of Creative Thinking	High Achievers		Low Achievers		N
	N	Age%	N	Age%	
Fluency	15	56	12	44	27
Flexibility	20	51	19	49	39
Originality	38	51	36	49	74
Elaboration	35	51	33	49	68
Total	104	50	104	50	208

TABLE III
PARTICIPANTS' OBTAINED MARKS AND ASPECTS OF CREATIVE THINKING

Aspects of Creative Thinking	N	Age %	Marks	
			Mean	SD
Fluency	27	13	23.17	4.54
Flexibility	39	19	24.46	6.48
Originality	74	35	32.10	6.80
Elaboration	68	33	33.88	5.34
Total	208	100	28.40	5.79

As shown in Table III, participants' marks from 9th class in terms of their creative thinking were Mean = 13.74 for flexibility, Mean = 14.37 for elaboration, Mean = 13.68 for fluency, and Mean = 14.95 for originality, respectively. Interestingly, elaboration and originality were found outperformed. Combine difference of different aspects of creative thinking with level of achievement was not statistically significant [$F_{(3,204)} = 0.342$, $p>0.05$].

TABLE IV
COMPARISON OF MEAN AND SD OF HIGH ACHIEVERS AND LOW ACHIEVERS IN THE TEST OF CREATIVE THINKING

Groups	Mean	SD	t	Sig. (1-tailed)
High Achievers	22.39	6.72	1.23	0.105
Low Achievers	20.41	5.43		

The mean score of high achievers on test of creative thinking was significantly higher than the mean score of low achievers (Mean/SD = high achievers 22.39/6.72 > low achievers 20.41/5.43). However, the difference between means of the two groups was not significant at 0.05 levels (Table IV). Hence Table II, III and IV indicated that the

hypothesis "there is no statistically significant difference in students' creative thinking abilities due to the level of academic achievement" is accepted in favor of high and low achievers. This indicates high achievers were not significantly different from low achievers in terms of creative thinking abilities.

In the group of high achievers, the Mean/SD = boys 3.04/1.33 and girls = 3.59/1.23 as shown in Table V. The score of girls' students significantly higher than boys, moreover, the value of t-test i-e 2.21 at p= 0.05, found significant difference between genders in creative thinking. Girls looked better in their creative thinking abilities among higher achievers.

TABLE V
GENDER DIFFERENCES BETWEEN HIGH ACHIEVERS AND LOW ACHIEVERS IN SCORES OF CREATIVE THINKING

Creative Thinking		Mean	SD	T-test Sig
High Achievers	Boys	3.04	1.33	2.21*
(n = 104)	Girls	3.59	1.23	
Low Achievers	Boys	3.19	1.36	2.04*
(n = 104)	Girls	3.32	1.15	

* Significant at 0.05 level df = 206 t ≥ 1.96

Same trend has been found in the sample for low achievers, the Mean/SD = boys 3.19/1.36 and girls = 3.32/1.15. Girls scored significantly higher than that of boys. In addition, the t-test found significant difference between genders in creative thinking. Among low achievers girls appeared better in their creative thinking abilities. However, the gender difference between high achievers and low achievers in terms of creative thinking was significant at p=0.05 as shown in Table V. Hence, the hypothesis "there are no statistically differences in students' creative thinking abilities and the level of academic achievement due to gender" is rejected in favor of girls' students. This indicates girls either belong to the group of high achievers or low achievers, are significantly different from boys in creative thinking abilities.

TABLE VI
RESIDENTIAL DIFFERENCES BETWEEN HIGH ACHIEVERS AND LOW ACHIEVERS IN SCORES OF CREATIVE THINKING

Creative Thinking		Mean	SD	T-test Sig
High Achievers	Urban	3.97	1.22	2.36*
(n = 104)	Rural	3.33	1.52	
Low Achievers	Urban	3.90	1.12	2.28*
(n = 104)	Rural	3.03	1.28	

* Significant at 0.05 level df = 206 t ≥ 1.96

For the group of high achievers, the Mean/SD = urban 3.97/1.22 and rural = 3.33/1.52 as shown in Table VI. It is obvious, that urban secondary school students scored significantly higher than rural. Furthermore, the value of t-test found significant difference between areas of residence in terms of creative thinking. Students belonging to urban area found better in their creative thinking abilities among higher achievers. Similar trend has been found in the sample for low achievers, the Mean/SD = urban 3.90/1.12 and rural = 3.03/1.28. Students of urban area scored significantly higher than that of students belonging to rural area. In addition, the value of t-test i-e 2.36 at p=0.05, found significant difference between areas of residence and creative thinking. Among low achievers, urban students appeared better in their creative thinking abilities.

However, the residential difference between high and low achievers was significant at p=0.05 as shown in Table VI. Hence, the hypothesis "there are no statistically differences in students' creative thinking abilities and the level of academic achievement due to residential area" is rejected in favor of students belonging to urban area. This indicated urban secondary school students either falling into the group of high achievers or low achievers, are significantly different from rural students in terms of creative thinking abilities.

IV. DISCUSSION AND CONCLUSION

This study attempted to provide empirical evidence about the difference in creative thinking of high and low achievers. The emanating results indicated that high achievers are not significantly different from low achievers in terms of creative thinking abilities. The equivalent creativity scores obtained by high and low achievers groups support the findings reported by [20]. According to Ai [27] the relationship between creativity and academic achievement is consistent with each other. Previous research has inconclusive results about the relationship between creativity and academic achievement. Some research suggests that creativity is positively related to academic achievement [23]; [24]; [25].

It was revealed that girls high and low achievers were more creative than boys, therefore, gender difference was found. Gender differences in creativity are debatable, according to Charyton & Snelbecker [43] male and female described their images of creativity differently. Findings are supported by McKinnon [44] Torrance [45]; Kyung-Hwa, [46], Habibollah, et al, [47], [48]. Some studies reported that there is no gender difference in creativity [43]. Significant residential differences were also found. No study has been found about residential differences.

Creativity has been shown to be distinct from intelligence. Children scoring high on intelligence tests are not necessarily highly creative. This research provides empirical evidence that creative thinking abilities are independent from the level of achievement either achievement was high or low. Significant gender and residential differences were found. Both girls high achievers and low achievers, found more creative than boys. Students either high achievers or low achievers belong to urban area were better in creative thinking than students residing in rural areas. Further studies need to be carried out to confirm the nature of this comparison. However, before considering the implications of this study, it is important to consider the size of the

sample, the environmental setup and some other variables may be playing some role for such findings. Therefore, care should be taken when generalizing from the results.

Creativity is an important human characteristic. It is perhaps the best thought as a process, requiring a mixture of ingredients, including personality traits, abilities and skills. Early years staff can help young children to develop their creativity by providing a creative environment, helping children to build up their skills through play, behaving creatively themselves and praising children's creative efforts. It was considered that education was merely informative, and child was being treated as a pitcher into which teacher poured gallons of empirical facts. Perhaps, most importantly in today's information age, creative thinking is viewed as crucial for educated persons to cope with a rapidly changing world. Many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information. Findings clearly support the importance of instruction in creative thinking skills to increase the probability of academic success for all students, especially those having low grades or I-Q level. The study revealed important result to educators, program designers, evaluators, and counselors who are aiming and targeting the preparation of students.

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