

Components of Creativity and Mathematical Achievement in Undergraduate Students

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As students' progress through the educational system their interest in mathematics diminishes. Yet there is an ever increasing need within the workforce for individuals who possess talent in mathematics. The literature suggests that mathematical talent is most often measured by speed and accuracy of a student's computation with little emphasis on problem solving and pattern finding and no opportunities for students to work on rich mathematical tasks that require divergent thinking. Such an approach limits the use of creativity in the classroom and reduces mathematics to a set of skills to master and rules to memorize. Doing so causes many children's natural curiosity and enthusiasm for mathematics to disappear as they get older. Keeping students interested and engaged in mathematics by recognizing and valuing their creativity may reverse this tendency. The identification of creative potential is challenging. Prior research into the identification of creativity has focused on the development of measurement instruments. Scoring of these instruments is time consuming and subject to scorer interpretation due to the variety of possible responses. Thus, their use in schools has been very limited, if used at all, since their creation. This study seeks a simpler means to obtain indicators of creative potential in achievement of mathematics. In answering the question, *why measure creativity?* Treffinger (2003) offered eight general roles for creativity measurement. Of those eight, two are relevant to this study: Help to recognize and affirm the strengths and talents of individuals and enable people to know and understand themselves, and Help instructors, counselors, or individuals discover

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unrecognized or untapped talents. Hong and *Aqui* (2004) studied academically gifted mathematics students and students with creative talent in mathematics and found significant differences in cognitive strategies with the creatively talented group being more cognitively resourceful. Resourcefulness, persistence, and the desire to explore alternative methods of solution are all characteristics of the potentially creative mathematical thinker identified by *Carlton* (1959). Traditional tests to identify mathematically gifted students do not identify creativity (*Kim, Cho, & Ahn, 2003*), but rather value accuracy and speed. This implies that mathematical talent is measured by computation with little emphasis on problem solving and pattern finding and no opportunities for students to work on rich mathematical tasks that require divergent thinking. Limiting the identification of mathematical talent to the current methods ignores the very group of students who offer the greatest potential for the advancement of mathematics. *Runco* (1993) describes creativity as a multifaceted construct involving both "divergent and convergent thinking, problem finding and problem solving, self-expression, intrinsic motivation, a questioning attitude, and self-confidence". *Haylock* (1987) summarized many of the attempts to define creativity. One view "includes the ability to see new relationships between techniques and areas of application and to make associations between possibly unrelated ideas". The Russian psychologist *Krutetskii* characterized creativity in the context of problem formation (problem finding), invention, independence, and originality (*Haylock; Krutetskii, 1976*). Others have applied the concepts of fluency, flexibility, and originality to the concept of creativity. The academically gifted student may excel in the classroom by demonstrating high achievement, or schoolhouse giftedness, which is valued in traditional educational settings.

OBJECTIVE- The objectives of the study are as follows-

To study the relationship between Achievement in Mathematics and Components of Creativity of Undergraduate students.

1. To study the relationship between achievement in Mathematics and Components of Creativity of Undergraduate students (Boys & Girls).
2. To study the relationship between achievement in Mathematics and Components of Creativity of Undergraduate students (Rural & Urban).

HYPOTHESIS- Keeping the above objectives in view following null hypothesis have been framed-

1. There is no significant relationship between achievement in Mathematics and Components of Creativity of Undergraduate students (Boys & Girls).

1.1. There is no significant relationship between achievement in Mathematics and Fluency Component of Creativity of Undergraduate students (Boys & Girls).

1.2. There is no significant relationship between achievement in Mathematics and Flexibility Component of Creativity of Undergraduate students (Boys & Girls).

1.3. There is no significant relationship between achievement in Mathematics and Originality Component of Creativity of Undergraduate students (Boys & Girls).

2. There is no significant relationship between achievement in Mathematics and Components of Creativity of Undergraduate students (Rural & Urban).

2.1. There is no significant relationship between achievement in Mathematics and Fluency Component of Creativity of Undergraduate students (Rural & Urban).

2.2. There is no significant relationship between achievement in Mathematics and Flexibility Component of Creativity of Undergraduate students (Rural & Urban).

2.3. There is no significant relationship between achievement in Mathematics and Originality Component of Creativity of Undergraduate students (Rural & Urban).

METHODOLOGY- In this study field survey method was used to gather relevant data. Population of the present study consists of all the B.Sc. Part Two students studying in district Prayagraj. Sample of the present study consisted of (50 Boys & 50 Girls) and (32 Rural & 68 Urban) students of University of Allahabad. Components of Creativity were measured using the *Tests of Creative Thinking* developed by K.S. Misra and Mathematical Achievement was measured using the *Mathematical Achievement Test* developed by Researcher. The analysis explored the relationship between Components of Creativity and mathematical achievement. Interpretation of the relative importance of the independent variables was complicated by correlations between them. The researcher applied Mean, Standard deviation and Karl Pearson's Product Moment Correlation statistical technique for the analysis of data.

ANALYSIS AND INTERPRETATION-

1. Correlation between Achievement in Mathematics and Components of Creativity of Undergraduate students (Boys & Girls)

Groups	N	Fluency	Flexibility	Originality	Table Value
Boys	50	-0.111	-0.032	-0.107	0.231
Girls	50	0.051	0.072	0.277*	0.231

1.1. Thus, above Table shows that the value of correlations between achievement in Mathematics and Fluency Component of Creativity of Undergraduate students (Boys & Girls) at 0.05 levels is no significant so, the null hypothesis can be accepted. It means that, there is no significant relationship between achievement in Mathematics and Fluency Component of Creativity of Undergraduate students (Boys & Girls).

1.2. From above Table shows that the value of correlations between achievement in Mathematics and Flexibility Component of Creativity of Undergraduate students (Boys & Girls) at 0.05 levels is no significant so, the null hypothesis can be accepted. It means that, there is no significant relationship between achievement in Mathematics and Flexibility Component of Creativity of Undergraduate students (Boys & Girls).

1.3. From above Table shows that the value of correlations between achievement in Mathematics and Originality Component of Creativity of Undergraduate Boys student at 0.05 levels is no significant so, the null hypothesis can be accepted. It means that, there is no significant relationship between achievement in Mathematics and Originality Component of Creativity of Undergraduate Boys student and also from above Table shows that the value of correlations between achievement in Mathematics and Originality Component of Creativity of Undergraduate Girls student at 0.05 levels is significant so, the null hypothesis can be rejected. It means that, there is positively significant relationship between achievement in Mathematics and Originality Component of Creativity of Undergraduate Girls student.

2. Correlation between Achievement in Mathematics and Components of Creativity of Undergraduate students (Rural & Urban)

Groups	N	Fluency	Flexibility	Originality	Table Value
Rural students	32	0.016	0.031	-0.024	0.275
Urban students	68	-0.038	0.051	-0.032	0.195

* Significant at 0.05 level

2.1. Thus, above Table shows that the value of correlations between achievement in Mathematics and Fluency Component of Creativity of

Undergraduate students (Rural & Urban) at 0.05 levels is no significant so, the null hypothesis can be accepted. It means that, there is no significant relationship between achievement in Mathematics and Fluency Component of Creativity of Undergraduate students (Rural & Urban).

2.2. From above Table shows that the value of correlations between achievement in Mathematics and Flexibility Component of Creativity of Undergraduate students (Rural & Urban) at 0.05 levels is no significant so, the null hypothesis can be accepted. It means that, there is no significant relationship between achievement in Mathematics and Flexibility Component of Creativity of Undergraduate students (Rural & Urban).

2.3. From above Table shows that the value of correlations between achievement in Mathematics and Originality Component of Creativity of Undergraduate students (Rural & Urban) at 0.05 levels is no significant so, the null hypothesis can be accepted. It means that, there is no significant relationship between achievement in Mathematics and Originality Component of Creativity of Undergraduate students (Rural & Urban).

CONCLUSION AND IMPLICATIONS-This study examined several factors in the educational setting and their relationships to Components of creativity. The following research question with its subcomponents formulated the basis of the research: *Does a measure of student achievement in mathematics contribute to the prediction of student performance on the general Components of creativity student perception of his/her creative ability and gender?* Using existing instruments, several factors within the educational setting were examined that may be indicative, individually or collectively, of a student's creativity potential. The factors considered included achievement in mathematics, attitude towards mathematics, self-perception of creative ability, and teacher perception of mathematical talent and creative ability. Conceptual knowledge and heuristic strategy components, among other factors, interact in successful creativity thinking. It is not simply computational skill and the knowledge of how to apply algorithms that are important in creativity thinking ~ It is also important for a student to be able to plan effectively and to use other heuristics such as organizing data into tables and drawing effective diagrams.

As a result of the study students spent larger amounts of time in more active, self-directed and creative behavior. Another finding is that these students had higher means on basic skill tests, and significant positive attitudes toward mathematics. However, in the present study there

is significant relationship between achievement in Mathematics and Originality Component of Creativity of Undergraduate Girls students only.

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