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A Study of Problem Solving Ability among Undergraduate Mathematical Gifted Students

KEYWORDS: Problem Solving Ability, Gifted Students

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ABSTRACT *The present investigation focuses on the study of problem solving ability among the undergraduate mathematical gifted students of Jabalpur, Madhya Pradesh. Normative survey method used to collect data. By using random sampling technique, 40 mathematical gifted students (20 boys and 20 girls), studying in different Government and Private Colleges selected. The collected data has been studied and subjected to statistical analysis. The results revealed that (i) the problem solving ability of mathematical gifted students are high in colleges at Jabalpur. (ii) This investigation also reveals that there is significant difference in respect of the sub samples, gender, mother's education, category of educational institutions, while in respect of fathers" education there is no significant difference on their problem solving ability.*

Introduction-

Problem solving ability is highly correlated with intelligence, reasoning ability and mathematical ability. It is the ability to think and reason on given level of complexity. Students who have learned effective problem solving techniques are able to solve complex problems, a higher level of complexity than more intelligent student, who has not such trainings. Lester (1982) defines problem solving as a process of coordinating previous experience, knowledge and intuition in an effort to determine an outcome of a situation for which a procedure for determining the outcome is unknown. Finding students with mathematical giftedness is a challenge for both educators and society. School education has long focused on problem solving. (Dillon, 1982; Ramirez, 2002). Terman (1925) and Holling Worth (1929) defined intellectual gifted children as most intelligent top 1% of population who are at or above 130 I.Q. Problem solving in mathematics is a fruitful exercise for the development of one's mental faculties as the process of problem solving involves the scientific method of thinking and reasoning.

Mathematical problem solving has occupied very important place in the teaching of mathematics. The primary goal of mathematics teaching and learning is to develop the ability to solve a wide variety of complex mathematics problems. A thorough understanding of mathematical concepts is essential for solving problems in mathematics (Pathak, 2013). That, is the power in mathematics will help an individual to develop specific skills such critical thinking and a reasoning ability, and these skills are very essential for developing problem solving ability. A student having good problem solving ability, will be properly adjust in the class as well as at home.

Ganandevan (2006) found out that the problem solving ability of higher secondary students is low. The male and female students and the students residing at rural and urban area differ significantly in their problem solving ability. Lee et al. (2004) found significant differences between gifted students and regular students on their mathematical problem solving ability. Hoovinabhavi et al. (2004) studied on problem solving ability of college students and found that the girls of both science and arts faculty are better in their problem solving ability. Sanjaikandhi (2005) during the M.Ed. dissertation identified that the problem solving ability of the higher secondary students is low. Pandey and Manjula (2012) found the problem solving ability of matriculation students is low. The male and female students and the students residing at rural and urban area differ significantly in their problem solving ability. Sharma (2007) studied on problem solving ability and scientific attitude as determinant of academic achievement of higher secondary students and found out higher secondary students have shown average problem solving ability. Bandhana and Darshana (2012) found that emotional intelligence and home environments have significant impact on the problem solving ability of adolescents.

Objective of the study:

1. To find out the level of problem solving ability of undergraduate gifted students
2. To find out if there is any significant difference between the following pairs of sub-samples with respect to problem solving ability

a. Sex (Boys/Girls)
b. College's category (Government/Private)
c. Fathers' Education (School Level / College Level)
d. Mothers' Education (School Level / College Level)

Hypothesis:

1) Problem solving ability of gifted students is low
2) There will be no significant difference in problem solving ability among boys and girls
3) There will be no significant difference in problem solving ability due to category of college
4) There will be no significant difference in problem solving ability due to level of fathers' education
5) There will be no significant difference in problem solving ability due to level of mothers' education

Method of the study:

The sample for the present study comprised of 40 mathematical gifted students randomly from different government and private college of Jabalpur, Madhya Pradesh, India. (20 boys and 20 girls) in the age group of 17 to 19 years of B.Sc. 1st year (Physics, Chemistry, Mathematics group) selected.

Tools employed:

1. Group Test of General Mental Ability:

In the present study, the tool employed for the collection of data of gifted students was Group Test of General Mental Ability prepared by Dr. S. Jalota (1972). The Test was prepared in 1950 with 100 item divided into a vocabulary group of ten similar plus 10 opposite items and 9 groups of 20 classification items.

2. Problem Solving Ability Test-

In the present study, the tool employed for the collection of data was Problem Solving Ability Test developed and stand-

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ardized by L. N. Dubey (2006). This test is in Hindi and English and contains 20 unsolved questions. Every question has four given responses out of which only one answer is correct. If the pupil ticks the correct answer then he/she given one mark and if he/she ticks a wrong answer, zero mark is given. At the end, the marks are added. The maximum marks are 20.

Data Collection Procedure:
A Group Test of General Mental Ability (11-16 years) prepared by Dr. S. S. Jalota (1972) administered to all the sample subjects in different sittings. The subjects scoring above 75th percentile on the I.Q. Test (I.Q.>130) were termed as mathematical gifted (N=40). Tool No. 2, Problem solving ability test was administered to all (N=40) sample subjects to study the problem solving ability of mathematical gifted students.

Statistical technique used:
The collected data subjected to statistical analysis by using Mean, Standard Deviation and T test in order to facilitate analysis and interpretation.

Result and discussion:
TABLE -1 MEAN, STANDARD DEVIATION, and T-VALUES OF MATHEMATICAL GIFTED STUDENTS IN THEIR PROBLEM SOLVING ABILITY

Variables	Sub Variables	N	Mean	Std Deviation	df	t-value	Significant level
Gender	Boys	20	14.49	2.41	38	2.171*	significant
	Girls	20	16.20	2.57			
Category	Government	20	14.72	2.61	38	2.202*	significant
	Private	20	16.43	2.29			
Fathers education	School level	18	14.97	2.37	38	1.412	insignificant
	College level	22	16.19	2.97			
Mothers education	School level	16	13.95	2.55	38	3.176**	significant
	College level	24	16.78	2.89			
Entire sample		40	15.46	2.58			

*** Significant at 0.05 level; ** Significant at 0.001 level**

It is evident from the above table that the calculated mean score of net sample is 15.46 and value of standard deviation is 2.58.

As regards levels of problem solving ability, result of above table revealed that mathematical gifted undergraduate students have high level of problem solving ability (M=15.46). It was found that persons having higher intelligence, creativity, thinking ability and reasoning ability could solve the complex problems quickly. Therefore, hypothesis 1 not accepted in the present study.

As regards Gender the calculated t-value is 2.171, which is significant at 0.05 levels and it is concluded that there is significant difference between mathematical gifted boys and girls with respect to problem solving ability. It was found that female students scored higher on problem solving ability (M=16.20) as compared to the male students (M=14.49). Therefore, hypothesis 2 not accepted in the present study.

As regards category of the college, the calculated t value 2.202, which is significant at 0.05 levels and it, is concluded that there is significant difference between Government and Private College's mathematical gifted student with respect to problem solving ability. After comparing their mean scores, it was found that mathematical gifted students of private colleges scored more (M=16.43) as compared to the students of government colleges (M=14.72) on their problem solving ability test score. Above result may be because private colleges have more infrastructure like up to date library, play ground, electronic gadgets such as multimedia or audio visual aids. Moreover, in private colleges there are so many extra co–curricular activities for the gifted students, like mathematical quiz; debates; seminars; workshops etc. All these co –curricular activities inspire students to bring forth their hidden talent. Therefore, hypothesis 3, that there will be no significant difference in problem solving ability due to category of college not accepted in the present study.

As regards father's education, the calculated f value is 1.412, which is, insignificant at 0.05 levels and it is concluded that there is no significant difference among the undergraduate mathematical gifted students with respect to problem solving ability. Therefore, hypothesis 4 that there will be no significant difference in problem solving ability due to level of fathers' education accepted.

As regards mother's education, the calculated f value is 3.176, which are significant at 0.001 levels, and it is concluded that there is significant difference among the undergraduate mathematical gifted students with respect to problem solving ability. Therefore, hypothesis 5 that there will be no significant difference in problem solving ability due to level of mothers' education rejected.

IMPORTANT FINDINGS-
Major findings of the present investigation are-

1) The level of Problem solving ability of gifted students is high
2) There are significant difference in problem solving ability among boys and girls
3) There are significant differences in problem solving ability due to category of the college
4) There are no significant differences in problem solving ability due to level of fathers' education
5) There are significant differences in problem solving ability due to level of mothers' education

CONCLUSION-
Problem solving ability is highly correlated with intelligence, creativity, reasoning ability, numerical ability and mathematical ability. Therefore, it is necessary that we should develop the problem solving ability through proper education and training of our young boys and girls. Computer programming enhances problem-solving abilities and promotes creativity and reasoning ability of students. Teachers who teach mathematics to mathematical gifted students need a strong background in mathematics content. Inquiry-oriented mathematics instruction, tasks and activities, can assist gifted students to develop his/her talents.

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