

# Problem solving and creative thinking ability of High School children

■ PRIYA KUMARI AND LATA PUJAR

Received: 27.01.2014; Accepted: 09.11.2014

See end of the paper for authors' affiliations

## PRIYA KUMARI

Department of Human  
Development and Family Studies,  
Rural Home Science College,  
University of Agricultural  
Sciences, DHARWAD  
(KARNATAKA) INDIA  
Email: priyakumari044@gmail.  
com

■ **ABSTRACT :** The study was conducted to know the problem solving and creative thinking ability of High School children. Sample of 300 High School children from teenage group 13-16 years of both sex, studying in 8<sup>th</sup> and 9<sup>th</sup> standard were selected from government and private schools of Dharwad district. General problem solving ability of the students was assessed by using check list and mathematical problem solving ability of children was assessed by Problem solving ability inventory developed by Dubey (2010). Creative thinking scale developed by Mehdi (1989) was used to assess the creative thinking ability of children. Results revealed that majority of the children had medium level of general and mathematical problem solving ability and high level of creative thinking ability. Gender has significant influence on problem solving ability however girls performed better in general problem solving ability than boys, whereas boys performed better than girls in mathematical ability.

■ **KEY WORDS:** Problem solving, Creative thinking, Inventory

■ **HOW TO CITE THIS PAPER :** Kumari, Priya and Pujar, Lata (2014). Problem solving and creative thinking ability of High School children. *Asian J. Home Sci.*, 9 (2) : 594-597.

Childhood is a vital stage of growth and development characterized by rapid physiological changes and psychological maturation. Noticeable changes in intellectual development take place during this period. These are also years of taking risk, solving their own problems, taking decision on crucial issues. Problem solving is a process in which a person perceives and resolves a gap between a present situation and a desired goal. It is a mental process that includes problem finding and problem shaping and is considered the most complex of all intellectual functions.

Man has been endowed with many unique and uncommon powers. Among all the power that man possesses, creative thinking and finding solutions to their problems are the supreme and the most important element of life skills. Creative thinking helps to promote mental well being and competence in children as they encounter real life situation. Problem solving refers to the activities/skills that one attempts to understand the problem and identify effective solutions. From the higher-primary school stage onwards the acquisition

of knowledge and the ability to think logically and draw conclusions becomes important objectives of mathematics learning. Mathematics is compulsory subject in every system of school education right from the elementary level in India. Nobody questions its inclusion as a subject in the school curriculum as man's life today is influenced by mathematics in one way or the other. Mathematics knowledge is the basis for the technical achievements. Mathematics provides training in the scientific methods and also helps to develop a scientific aptitude in the learner. Two important factors that influence problem solving are nature of task and kind of knowledge brought to the problem by solver. The problem solving skills is a step by step development process as children grow and develop their ability to solve problem.

The word creative is derived from the verb to create. This means "the ability to create," which is a specific thought process which improves the ability to be creative. It is a series of mental action which produces change and development of thought. Now-a-day's problem solving and creative thinking

ability has become the topic of wide interest and discussions among psychologists, educationists and other intellectuals. Each individual has the capacity to solve and create. This potential varies from one person to other both in amount of initial disposition and in the degree to which his potential is realized and developed. Thus, the need to identify intellectual and creative person is felt because these creative and intellectual persons are responsible for future scientific and technological developments. Therefore, there is great need to point out the students and factors which influence the development of life skills like problem solving and creative thinking ability. The present study was conducted with the objective in mind :

To know the problem solving and creative thinking ability among high school children.

## ■ RESEARCH METHODS

### Population and sample :

Children studying in 8<sup>th</sup> and 9<sup>th</sup> standard from government, private and aided schools of Dharwad taluka, Karnataka formed the population. A preliminary survey was carried out to collect the information regarding the total number of High Schools prevailing in Dharwad taluk. The list of schools was obtained from the office of the Block Education Officer, Dharwad. There were 56 High Schools in Dharwad taluk, among them, 23 were private, 24 were aided and 9 government High Schools. It was decided to take government, aided and private schools of Kannada/English medium, co-educational and single sex school situated within 10-15 km from Dharwad city. There were six governments, 12 aided and 8 private schools within a distance of 5-10 km. Further among these of 26 schools, it was decided to select twenty per cent schools for the study. Hence, two private, two aided and one government High School were selected on the basis of popularity and strength of children attending the school. A sample of thirty children comprising 15 boys and 15 girls were randomly selected from eighth and ninth standard from each school for the study. The final sample constituted 300 High School children out of which 150 were boys and 150 were girls.

### Research design :

A differential research design to compare the general, mathematical problem solving and creative thinking between boys and girls were undertaken in 2011-2012.

### Tools used for the study :

Check list developed by AICRIP-CD (2010) was used to assess the general problem solving ability of children. The questionnaire consisted of 16 items with a scoring of 3, 2, 1 for positive statements and reverse scoring for negative statements. The maximum score of 48 and minimum of one could be obtained from the scale. Based on total scores children

were classified as high (38-48), medium (27-37), and low (16-26) level of problem solving ability.

Problem solving ability inventory developed by Dubey (2010) was used to assess the mathematical ability of children. This scale included 20 problems with four alternative answers. The total score ranged with a minimum of zero and maximum of 20. Based on total scores children were classified as high (15 and above), medium (9-14), and low (8 and below) level of mathematical problem solving ability.

Creative thinking scale developed by Mehdi (1989) and creative thinking check list by AICRIP-CD Dharwad centre (2010) together with slight modification were used to assess the creative thinking ability of children. The checklist consisted of 10 statements with the maximum score of "30" and minimum of "zero". Based on total scores children were classified such as high (21-30), medium (11-20), and low (0-10).

### Statistical analysis :

#### Frequency and percentage :

These were calculated to interpret the demographic characteristics of children.

#### 't' test :

It was used to compare means of the two groups *i.e.*, boys and girls on problem solving and creative thinking ability.

#### The Chi-square :

Non-parametric test of independence was applied to determine the association between dependent and independent variables.

## ■ RESEARCH FINDINGS AND DISCUSSION

It is seen from the Table 1 that majority of children (51%) were in the category of medium problem solving and 49 per cent were in the category of high general problem solving ability and none of them belonged to low category. In case of mathematical problem solving ability, high percentage of children (75.7%) belonged to the medium level followed by 24 per cent children who were in low

**Table 1 : Frequency distribution of children according to general, mathematical problem solving ability and creative thinking ability (n=300)**

Category	GPS	MPS	CT
High	147 (49.0)	01 (0.3)	224 (75.3)
Medium	153 (51.0)	227 (75.7)	76 (24.7)
Low	–	72 (24.0)	–
Total	300 (100)	300 (100)	300 (100)

G.P.S – General problem solving ability

M.P.S – Mathematical problem solving ability

C.T – Creative thinking ability

Figure in the parentheses indicate percentages. Percentages were calculated row-wise.

category, and only 0.3 per cent children had high mathematical problem solving ability.

With regard to creative thinking ability of children, majority (75.3%) were in the category of high creative thinking ability group, 24.7 per cent were in medium creative thinking ability group and none of them belonged to low category of creative thinking ability.

An appraisal of Table 2 reveals general, mathematical problem solving and creative thinking ability of children according to the gender. It is seen that 60.7 per cent of boys showed medium level and 39.3 per cent showed high level of general problem solving ability. Among female children, 58 per cent of girls showed high level and 42 per cent girls showed medium level of general problem solving ability.

Regarding mathematical problem solving, 80 per cent boys showed medium level of mathematical problem solving ability and 20 per cent had high level and none of them had low level of mathematical problem solving ability. About 71 per cent girls showed medium level of mathematical problem solving followed by high level (28%) and low level (0.7%).

In case of creative thinking, it is seen that 76 per cent of boys showed high level of creative thinking ability, 24 per cent showed medium level of creative thinking ability. When female children were considered, it was seen that high percentage of girls (74.7%) showed high level of creative thinking and 25.3 per cent showed medium level of creative thinking ability. None of the boys and girls showed low level of creative thinking ability.

The modified Chi-square test showed highly significant association between child gender and general problem solving ability. The mean scores of general problem solving ability of girls (37.45) was more than mean score of boys (36.47) and 'Z' value was found to be highly significant. The result is in line with Walker *et al.* (2002) who reported that girls responded

more than boys in problem solving whereas boys use aggressive response than girls when they face any problem in life. Similarly Guccray (2003) and Brand (2010) also observed significant difference among male and female adolescence, in problem solving ability.

Regarding mathematical problem solving modified Chi square test showed highly significant association between child gender and mathematical ability of children. The mean scores of boys was higher (8.18) compared with girls (7.69). Again 'Z' value 2.21 was found to be significant. Thus, there was influence of gender on mathematical problem solving ability. The result is in line with Wassey *et al.* (2007) who reported the difference in mathematical ability of children which was in favour of male children due to difference in nurturing practices and environment provided to both male and female children in home and schools. Boys get good nurturing practices and home environment which make them able to cope with computation than girls.

Similarly Kolowole (2007) and Tella (2007) indicated that boys performed significantly better than girls in mathematics tasks. Basseyy *et al.* (2010) also revealed that there was gender difference in mathematical ability of rural senior secondary students.

In case of creative thinking ability of children, the modified Chi square test revealed non-significant relationship between child's gender and creative thinking ability. The mean score of girls was 22.78 as compared to the mean score of boys (22.29). However, "Z" value was found to be non-significant. The finding is in conformity with Saeki *et al.* (2001) who observed no difference in the creative thinking ability of male and female college children in American and Japanese culture. Similarly, Potur and Barkul (2009) and Ogunyemi (2010), Hamek and Manjit (1988), Markey (1985) also reported that gender did not influence the creative thinking ability of children.

**Table 2: Influence of gender on general, mathematical problem solving and creative thinking ability (n=300)**

Children's gender	General problem solving ability			Total	Mean	SD	Z value	Modified <sup>2</sup>
	High	Medium	Low					
Boys	59 (39.3)	91 (60.7)	-	150 (100)	36.47	3.12	2.928**	10.461**
Girls	87 (58)	63 (42)	-	150 (100)	37.45	2.65		
Total	146 (48.7)	154 (51.3)	-	300 (100)				
<b>Mathematical problem solving ability</b>								3.744NS
Boys	30 (20)	120 (80)	0	150 (100)	8.18	1.80	2.210*	
Girls	42 (28)	107 (71.3)	1 (0.7)	150 (100)	7.69	2		
Total	72 (24)	227 (75.7)	1 (0.3)	300 (100)				
<b>Creative thinking ability</b>								
Boys	114 (76)	36 (24)	-	150 (100)	22.29	3.14	1.22NS	0.07NS
Girls	112 (74.7)	38 (25.3)	-	150 (100)	22.78	3.78		
Total	74 (24.7)	226 (75.3)		300 (100)				

Figure in the parentheses indicate percentages. Percentages were calculated row-wise.

NS – Non-significant

\* and \*\* indicate significance of values at P=0.05 and 0.01, respectively.

**Conclusion :**

Study showed that most of the children had medium level of general and mathematical problem solving ability whereas in case of creative thinking, majority of the children had high level of creative thinking ability. Gender has significant influence on general problem solving and mathematical problem solving ability but not in case of creative thinking ability of children. The gender difference in mathematical ability of children was in favour of boys. The female students should be motivated to solve the mathematical problems which could be studied and passed just like other subjects. Guidance in school and home should be energized to encourage female participation in effective mathematical problem solving ability. Parents-teachers association should contribute to the creation of positive learning environment for better performance of children. There is need to involve parents in children's academic work and give them proper encouragement and assistance and teacher should also provide opportunities for free expression of thought and ideas in classroom. Teachers' appreciations of imaginative ideas encouragement to implement and try new modes of doing things are well known ways of enhancing the creativity of children. Thus, there is a need to organize training programmes on life skills development for children.

## Authors' affiliations:

**LATA PUJAR**, Department of Human Development, College of Rural Home Science, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA  
Email: latapujar09@gmail.com

**■ REFERENCES**

Anonymous (2010). Creative thinking checklist developed by All India Coordinated Research Project on Child development, Department of Human Development and family studies, College of Rural Home Science, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Anonymous (2010). Problem solving checklist developed by All India Co-ordinated Research Project on Child development, Department of Human Development and family studies, College of Rural home science, University of Agricultural Sciences, Dharwad, KARNATAKA

(INDIA).

**Bassey, S.W., Joshua, M.T., and Asim, A.E. (2010).** Gender differences and mathematics achievement or rural senior secondary students in cross river state, Nigeria. *Proc. Episteme*, **3**: 56-60.

**Brand, A. (2010).** A study of the problem solving activity in high school students: Strategies and self-regulated learning. *Acta Didact. Napocensia*, **4**(1) : 21-29.

**Dubey, L.N. (2010).** *Problem solving ability test*. National Psychological Corporation, Agra (U.P.) INDIA.

**Gucray, S.S. (2003).** The analysis of decision making and perceived problem solving skills in adolescence. *J. Edu. Tech.*, **2**(2) : 29-37.

**Harneek, S. and Manjit, K. (1988).** Creativity in relation to sex and birth order. *Edu. Rev.*, **54**(11) : 195-197.

**Kolowole, E.B. (2007).** Gender issues and academic performance of senior secondary school students in mathematics computation tasks in Ekiti state, Nigeria. *Pakistan J. Soc. Sci.*, **4**(6) : 701-708.

**Markey, F.V. (1985).** *Imaginative behaviour in pre-school children*. Bureau Publisher, NEW YORK, U.S.A.

**Mehdi, B. (1989).** *Creative thinking ability test*. National Psychological Corporation, Agra (U.P.) INDIA.

**Ogunyemi, A.O. (2010).** Provocation and emotional mastery techniques as strategies for fostering creative thinking competence among Nigerian adolescents. *J. Soc. Sci.*, **22**(1) : 25-32.

**Potur, A.A. and Barkul, O. (2009).** Gender and creative thinking in education: A theoretical and experimental overview. *Faculty Architec. Kocaeli, Turkey*, **6**(2) : 44-57.

**Saeki, N., Fan, X. and Dusen, L.V. (2001).** A comparative study of creative thinking of American and Japanese college students. *J. Creative Beh. Utah*, **35**(1) : 45-49.

**Tella, A. (2007).** The impact of motivation on student's academic achievement and learning outcomes in mathematics among secondary school students in Nigeria. *Eurasia J. Mathematics, Sci. Tech. Edu.*, **3**(2) : 149-156.

**Walker, S., Irving, K. and Berthelsen, D. (2002).** Gender influences on pre-school children's social problem solving strategies. *J. Genetic Psychol.*, **163**(2) : 197-209.

**Wassey, P.M., Aumola, G. and Nuri, S. (2007).** The mathematic ability in children. *Edu. Psychol.*, **28**(3) : 409-426.

9<sup>th</sup>  
Year  
★★★★★ of Excellence ★★★★★