MATHEMATICAL PROBLEM SOLVING ABILITY OF ELEVENTH STANDARD STUDENTS

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ABSTRACT

There is a general assertion among mathematics instructors that learners need to acquire problem solving expertise, figure out how to communicate using mathematics knowledge and aptitude, create numerical reasoning and thinking, to see the interconnectedness amongst mathematics and other subjects. Based on this perspective, the present study aims to examine the mathematical problem solving ability of eleventh standard students. A sample of 810 Eleventh standard students (406 boys and 404 girls) was selected from different schools of Chennai district, using the stratified random sampling technique. Survey method of research has been adapted. The Mathematical Problem Solving Ability test constructed by the investigator was used to collect data from the eleventh standard students. Mean, standard deviation,'t' test, and one-way ANOVA were used to analyze the data with the help of SPSS (Version 20.0). The analysed data were tabulated and tested with hypothesis. Finding shows that the mathematical problem solving ability of girl students is significantly higher than boys. There is no significant difference among government, government aided, and self-financing higher secondary school students in their Mathematical Problem Solving Ability. It is also observed that the students from high socio-economic status found to be higher than their counterparts in their mathematical problem solving ability.

Keywords: Mathematical Problem Solving Ability, Eleventh Standard Students, Gender, Type of School, Socio-Economic Status.

INTRODUCTION

Education is the manifestation of perfection that already exists in man (Vivekananda1863-1902). It is really a means to discover new things and which serves to augment the knowledge of an individual. Education is a product of experiences. Accumulation and effective utilization of those experiences through interactive strategies with the community, blossom an individual into a well balanced person. Proper education is indispensable for tuning the mind to develop intellectual ability, creative and critical thinking, and manipulative strategies. Educating every citizen is the foremost responsibility of a society. Indeed from the very beginning of education, children start with both language and numerical skills. The rationale for teaching and learning mathematics is manifold because study of mathematics subject develops discipline of thought, logical reasoning, and intellectual and aesthetic satisfaction.

School mathematics is basic to undergraduate, postgraduate and to undertake research in mathematics; it is also fundamental for the growth of science and technology in the country. One cannot live without the use of basic processes of mathematics in daily life. The preliminary requirement of a human being to acquire knowledge on mathematics is to know its fundamental processes and the ability to use them. Due to its nature, mathematics also develops reasoning and thinking powers (Sidhu, 1995). It prepares the psyche to be diagnostic and gives establishment to intelligent and exact reasoning. Mathematics, when shown well, is a subject of excellence and style, energizing in its rationale and lucidness. The mathematics learnt in schools should

transform students to become "mathematical problem solvers" an outcome that moves beyond the traditional goal of getting correct answers to arithmetic exercises (Seeley and Harold, 2004). Students ought to rise up out of arithmetic classes with thankfulness for when and how the utilization of mathematics in their day-by-day or individual lives is justified, and with an ability to think numerically in important circumstances. Students must learn mathematics with comprehension, actively constructing new information as a matter of fact and from past knowledge. It is more useful to know how to mathematise than to know a lot of mathematics (Wheeler, 1982). Thus, it is imperative that the school students should receive a high-quality grounding in mathematics.

1. Review of Related Studies

In the past few decades, researchers have repeatedly reported gender differences in mathematical problem solving ability. The studies of Halpern (2000), Vermeer et al., (2000), Jangala (2008), and Manohara and Ramganesh (2009) have showed that boys outperformed girls and some found that there was no gender differences in mathematical problem solving ability (Baskaran, 1991; Nagalakshmi, 1995; Hyde et al., 2000; Caplan, 2005; Tsapa and Dorasami, 2002; Horvinabhavi et al., 2004; Adeleke, 2007; Sharma, 2007; and Shankar, 2010). The type of management of the school in which, the students enrolled were also showed some inconsistency in the findings. Government school students performed better than other management school students (Jangala, 2008); self – financing students outperformed government school students (Tsapa and Dorasami, 2002 and Manohara and Ramganesh, 2009); and there was no difference among students belonging to different management with respect to their mathematical problem solving ability (Baskaran, 1991 and Shankar, 2010). The socio – economic status of the students also had a great impact on students' performance in mathematics. Increased income (Nagalakshmi, 1995), higher educational qualification (Nagalakshmi, 1995 and Tsapa and Dorasami, 2002), and higher social status of the parents (Prakash, 2000) have facilitated students in many ways to do well in mathematical problem solving. The other demographic variables, such as stream of study (Horvinabhavi et al., 2004), community (Nagalakshmi, 1995), and location (Tsapa and Dorasami, 2002) were also attempted to observe the significant difference in mathematical problem solving ability.

The studies conducted in India and aboard have also revealed that knowledge in application of appropriate problem solving strategies (Krishanan, 1990; Dhillon, 2000; Gallagher et al., 2000; and Johan, 2002), attitude towards problem solving (Baskaran, 1991), vocabulary, comprehension, confidence in learning mathematics (Davis, 1995), mathematical creativity (Singh, 1993; Prakash, 2000), science processing skills (Chang and Taipei, 2002), memory updating (Passolunghi and Pazzaglia, 2004), emotions (Eynde et al., 2006), scientific attitude (Sharma, 2007), students' belief systems (Callejo and Vila, 2009 and Sangcap, 2010), mathematics anxiety (Karasel et al., 2010), conceptual understanding (Mech and Patral, 2011), oral reading fluency (Walker, 2012), academic stress, problem solving belief (Guven and Cabakcor, 2013), efficient representation (Sajadi et al., 2013), paraphrasing relevant information, visual representation, and problem-solving accuracy (Krawec, 2014) were positively correlated with mathematical problem solving ability. The factors, such as intelligence (Singh, 1993 and Horvinabhavi et al., 2004), education, heredity, curriculum (Horvinabhavi et al., 2004), computation, nonverbal reasoning skills, attentive behaviour (Tolar et al., 2012) and mathematical vocabulary instruction (Kurshumlia and Vula, 2012) were also found by the researchers as a contributory aspects for the development of mathematical problem solving ability.

The experimental studies attempted by the researchers in India and abroad were also shown that the following techniques, such as teaching via problem solving (Erickson, 1993 and Redgeway et al., 2002), Scheme – Based Instruction (Fuchs et al., 2004 and Jitendra et al., 2007), Cross Proportion Method, (Cook and Cook, 2005), Polya's heuristic approach (Ayodhya, 2007 and Yalla and Ayodhya, 2010), multimedia whiteboard system (Hwang et al., 2007), schematic representation (Edens and Potter, 2008), validated classroom Instruction (Fuchs et al., 2008), bilingual proficiency (Kempert et al., 2011), instruction on

alternative solutions (Lee, 2011), Computer-Based Story (Gunbas, 2014), mathematics vocabulary (Sepeng and Madzorera, 2014), verbal and visual strategy instruction (Swanson, 2014), pattern-seeking strategy (Erdogan, 2015) and empirical mathematical reasoning (Papadopoulos, 2015) has enhanced mathematical problem solving ability when compared to traditional method of teaching and learning.

2. Significance of the Study

Many initiatives to reform mathematics education have been happening over last decades. Instead of learning abstract concepts and procedures in mathematics, transformation has to be made to engage students in doing more concrete and problem solving activities. This transformation based on modeling of reality should change the learners from the passive absorption of decontextualised mathematical knowledge towards an active construction of knowledge. To act against the visible decline of interest in mathematics, acquisition of a mathematical disposition should be claimed as an ultimate goal of learning mathematics. The major reasons for carving out such a huge interest in learning and teaching mathematics are growing needs for mathematical skills and proficiency in modern society and at the same time difficulties in learning mathematics and a large number of low achieving students.

It is an ascertained fact that the study of mathematics develops imagination, trains in clear and logical thought, and challenges varieties of difficult ideas and unsolved problems as it deals with the questions arising from complicated structures. It also has a proceeding with drive to simplification, to locate the right ideas and techniques to make troublesome things simple, to clarify why a circumstance must be as it may be. In doing as such, it builds up a scope of dialect and insights, which may then be connected to make a critical commitment to our comprehension and appreciation about the world, and our capacity to discover and advance in it. As a consequence, the issues concerned with learning and teaching of mathematics has become a matter of the highest importance for everyone involved in education, training and publishing. It has also been taken up at the highest policy level. Mathematical competence has been identified by the National Council of Teacher of Mathematics as one of the key competencies necessary for personal fulfillment, active citizenship, social inclusion, and employability in modern society. In particular, making mathematical learning without any misery to the students is the vital need and social responsibility of the researchers in the area of mathematics education.

As an outcome, the study of mathematics has been unendingly modified, revised, and updated with the help and support of the amassed researches in mathematics in the field of mathematics education. Thus, the significance of continuous research in the area of mathematics education has become imperative to this society and world enclosed by mathematical thoughts and concepts.

3. Operational Definition of the Key Term

3.1 Mathematical Problem Solving Ability

Mathematics problem solving ability refers the ability of the students to read the problem carefully, analyze the information it has, and examine the appropriate strategy that will help to find a solution.

4. Objectives of the Study

On the basis of the comprehensive conceptual framework and early research works, the following objectives are framed for the present study by the investigator:

- To assess the mathematical problem solving ability of eleventh standard students.
- To find out the significant differences if any on mathematical problem solving ability of eleventh standard students with respect to certain demographic variables, such as gender, type of management, and socio economic status.

5. Hypothesis

- There is no significant difference between boys and girls in their Mathematical Problem Solving Ability.
- There is no significant difference among government, government aided, and self-financing higher secondary school students in their Mathematical Problem Solving Ability.
- There is no significant difference among students from

low, moderate, and high socio-economic status in their Mathematical Problem Solving Ability.

6. Methods and Procedures

Survey method of research has been used in the present study. Using the simple random sampling technique, 810 Eleventh standard students (406 boys and 404 girls) were selected from different schools of Chennai district. The data were collected from the eleventh standard students by using a tool Mathematical Problem Solving Ability test constructed by the investigator. The collected data were scored according to the scoring scheme and the score were tabulated for the data analysis. Mean, standard deviation, 't' test, and one-way ANOVA were used to analyze the data with the help of SPSS (Version 20.0). The analysed data were tabulated and tested with hypothesis as below;

7. Hypothesis Testing

$H_0$1: There is no significant difference between boys and girls in their Mathematical Problem Solving Ability.

It could be inferred from Table 1 that the mathematical problem solving ability of boys and girls are differing significantly. It is also observed that the mathematical problem solving ability of girl students is significantly higher than boys. Hence, in the formulated hypothesis, "There is no significant difference between boys and girls in their mathematical problem solving ability" is rejected.

$H_0$2: There is no significant difference among government, government aided, and self-financing higher secondary school students in their Mathematical Problem Solving Ability.

It could be inferred from Table 2 that the mathematical problem solving ability of government, government aided, and self-financing higher secondary school students are not differing significantly. Hence, in the formulated hypothesis, "There is no significant difference among government, government aided, and self-financing higher secondary school students in their Mathematical Problem Solving Ability" is accepted.

$H_0$3: There is no significant difference among students from low, moderate, and high socio-economic status in their Mathematical Problem Solving Ability.

It could be inferred from Table 3 that the mathematical problem solving ability of higher secondary school students from low, moderate, and high socio-economic status are differing significantly. It is observed that the students from high socio-economic status found to be higher than their counterparts in their mathematical problem solving ability. Hence, in the formulated hypothesis, "There is no significant difference among students from low, moderate, and high socio-economic status in their Mathematical Problem Solving Ability" is rejected.

8. Findings and Discussion

From the above analyses and interpretation, this research investigation with respect to comparison has arrived at conclusion with the following discussions. It is revealed from the results that there is a significant difference between boys and girls in their mathematical problem solving ability. The mathematical problem solving ability of girls are found to be higher than boys and this finding is contradictory with the results of Halpern (2000), Vermeer et al., (2000), Jangala (2008), Manohara and Ramganesh (2009), who have found that the boys are dominant in solving

Variables	Groups	N	Mean	SD	't'-Value	P - Value
Mathematical Problem Solving Ability	Boys	406	63.33	15.495	2.430	0.015*
	Girls	404	65.73	12.468		

* - Significant at 0.05 level

Table 1. Significance of Mean Difference Between Boys and Girls in their Mathematical Problem Solving Ability

Variables	Groups	N	Mean	SD	't'-Value	P - Value
Mathematical Problem Solving Ability	Government	278	63.30	17.49	2.114	0.121
	Government Aided	274	65.77	12.35		
	Self-financing	258	64.51	11.48		

Table 2. Significance of Mean Difference among Government, Government Aided and Self-financing Higher Secondary School Students in their Mathematical Problem Solving Ability

Variables	Groups	N	Mean	SD	't'-Value	P - Value
Mathematical Problem Solving Ability	Low Socio-Economic Status	236	60.33	14.35	29.582	0.000**
	Average Socio-Economic Status	310	63.48	13.89		
	High Socio-Economic Status	264	69.49	12.65		

** - Significant at 0.01 level

Table 3. Significance of Mean Difference among the Students from Low, Moderate and High Socio-economic Status in their Mathematical Problem Solving Ability

mathematical problems and it is also contradictory with the findings of Baskaran (1991), Nagalakshmi (1995), Hyde et al., (2000), Caplan (2005), Tsapa and Dorasami (2002), Horvinabhavi et al., (2004), Adeleke (2007), Sharma (2007), and Shankar (2010), who have found that the boys and girls are similar in solving mathematical problems.

It is found that the mathematical problem solving ability of students belonging to different types of school management do not differ significantly. The finding with respect to mathematical problem solving ability substantiates the findings of Baskaran (1991) and Shankar (2010), but it is in disagreement with the findings of Tsapa and Dorasami (2002) and Manohara and Ramganesh (2009), who have stated that the self-financing school students' mathematics ability was higher than government school students.

In the comparison of students belonging to low, moderate, and high socio-economic status with respect to mathematical problem solving ability, it is found that the variable is differencing significantly. The mathematical problem solving ability of students belong to high socio-economic status are higher than low and moderate socio-economic status. This finding authenticates the findings of Nagalakshmi (1995), Prakash (2000), and Tsapa and Dorasami (2002) who have reported that the increased income, higher educational qualification, and occupation of parents have significant influence on mathematical problem solving ability.

9. Educational Implications

Mathematics is an essential discipline, because of its practical role to the individual and society and in which problem solving is an important component. Through a problem solving approach, practical aspect of mathematics can be developed. Presenting a problem and developing the skills needed to solve that problem is more motivational than teaching the skills without a context. Such motivation gives problem solving special value as a vehicle for learning new concepts and skills or the reinforcement of skills already acquired. Approaching mathematics through problem solving can create a context which simulates real life and therefore justifies the mathematics rather than treating it as an end in itself. This approach contributes to the practical use of mathematics by helping students to develop the facility to be adaptable when, for instance, technology breaks down. It can thus also help student to transfer into new environment.

Though mathematics curriculum is organized around problem solving, it is recommended that due focus should be given in developing skills and the ability to apply these skills to unfamiliar situations, gathering, organising, interpreting, communicating mathematics information, formulating key questions, analyzing and conceptualizing problems, defining problems and goals, discovering patterns and similarities, seeking out appropriate data, experimenting, transferring skills and strategies to new situations, developing curiosity, confidence, and open-mindedness. Teachers must also teach problems via problem solving approach and should make the students aware of all strategies that can apply to solve a problem. Hence, it is a challenge for teachers, at all levels to develop the process of mathematical thinking alongside the knowledge and to seek opportunities to present even routine mathematics tasks in problem-solving contexts.

10. Suggestions and Recommendations

It is fair to suggest that the teaching styles and mathematical tasks should be planned to benefit the different learning styles of learners. There must be more than a balance in various forms of mathematics concepts, that is, the integration of algebraic, verbal, and visual thinking should be intended. Balance is to be an aim for integration and to achieve this, visual reasoning needs to be given parity alongside algebraic and analytic reasoning if mathematics instructors wish to improve students' understanding. However, it may be reasonable to note that the nature of many mathematical tasks indicates that students should cope well with systematic and intuitive thinking in the problem solving situations. In fact, at the beginning of a solution they need to think openly and then follow systematic step by step procedure to arrive at the necessary answer. Textbooks and current teaching methods of mathematics in schools and higher education institutions favour various ways of thinking. The environment of students in which the learning of mathematics take place must also be made effective and monitored

continuously both by parents and teachers.

Conclusion

The research has presented a clear picture on the Mathematical problem solving ability of eleventh standard students. The mastery of problem solving skills, among the students is still at moderate level. Efforts to upgrade and thus help students to mastery the problem solving ability should be planned and implemented. It is hoped that the data generated by this research can contribute towards the upgrading of teaching and learning mathematics in India.

References

[1]. Adeleke, M. A. (2007). Gender disparity in mathematical performance revisited: Can training in problem solving bring difference between boys and girls? *Essays in Education,* 21, 435- 449.

[2]. Ayodhya, P. (2007). Problem solving skills – Effectiveness of conventional and Polya's heuristic approach. *Edutracks,* 7(3), 34-39.

[3]. Baskaran, K. (1991). *Achievement motivation, attitude toward problem-solving and achievement in mathematics of standard X students in Devakottai educational district* (Unpublished Doctoral Dissertation, Alagappa University. Karaikudi).

[4]. Callejo, M. L., & Vila, A. (2009). Approaches to mathematical problem solving and students' belief systems: Two case studies. *Educational Studies in Mathematics,* 72(1), 111–126.

[5]. Caplan, J. B. (2005). The preservative search for sex differences in mathematics abilities. In A. M. Gallagher & J. C. Kaufman (eds.) *Gender Differences in Mathematics: An Integrative Psychological Approach.* Cambridge: Cambridge University Press.

[6]. Chang, C. Y., & Taipei, Y. H. (2002). Exploring interrelationship between problem solving ability and science process skills of Earth sciences students in Taiwan. *International Journal of Science Education,* 24(5), 441-451.

[7]. Cook, E., & Cook, R. L. (2005). Cross-Proportions: A conceptual method for developing quantitative problem-solving skills. *Journal of Chemical Education,* 82(8), 1187-1189.

[8]. Davis, D. J. N. (1995). The relationship between reading and attitudes and mathematical verbal problem solving ability of introductory algebra college students. *Dissertation Abstracts International,* 568, 3039-A.

[9]. Dhillon, A. S. (2000). Individual differences within problem-solving strategies used in Mathematics. *Science Education,* 82(3), 379-405.

[10]. Edens, K., & Potter, E. (2008). How students unpack the structure of a word problem: Graphical representations and problem solving. *School Science and Mathematics,* 108(5), 184–196.

[11]. Erdogan, A. (2015). Turkish primary school students' strategies in solving a non-routine mathematical problem and some implications for the curriculum design and implementation. *International Journal for Mathematics Teaching and Learning,* 15, 414.

[12]. Erickson, D. K. (1993). Middle school mathematics teachers views of mathematics and mathematics education, their planning and classroom instruction, and student beliefs and achievement. *Paper submitted at the Annual Meeting of the American Educational Research,* Atlanta, GA.

[13]. Eynde, P. O., Corte, E. D., & Verschaffel, L. (2006). Accepting emotional complexity: A socio-constructivist perspective on the role of emotions in the mathematics classroom. *Educational Studies in Mathematics,* 63(2), 193-207.

[14]. Fuchs, L. S., Fuchs, D., Prentice, K., Hamlett, C. L., Finelli, R., & Courey, S. J. (2004). Effect of Schema based instruction in promoting mathematical problem solving. *Journal of Educational Psychology,* 96(4), 635–647.

[15]. Fuchs, L. S., Fuchs, D., Stuebing, K., Fletcher, J. M., Hamlett, C. L., & Lambert, W. (2008). Problem solving and computational skill: Are they shared or distinct aspects of mathematical cognition? *Journal of Educational Psychology,* 100(1), 30-47.

[16]. Gallagher, A. M., DeLisi, R., Holst, P. C., McGillicuddy, A. V., Morely, M. & Cahalan, C. (2000). Gender differences in advanced mathematical problem solving. *Journal of Experimental Child Psychology,* 75, 165-190.

[17]. Guven, B., & Cabakcor, B. O. (2013). Factors influencing mathematical problem solving achievement of seventh grade Turkish students. *Learning and Individual Differences,* 23, 131–137.

[18]. Halpern, D. F. (2000). *Sex Differences in Cognitive Abilities* (3rd ed.). New Jersey: Erlbaum.

[19]. Horvinabhavi, B. L., Kattamani V. N., & Digar A. E. (2004). *Problem Solving Ability of College Students* (Unpublished M.Ed Dissertation, Regional institute of Education, Mysuru).

[20]. Hwang, W. Y., Chen, N. S., Dung, J. J., & Yang, Y. L. (2007). Multiple representation skills and creativity effects on mathematical problem solving using a multimedia whiteboard system. *Educational Technology and Society,* 10(2), 191-212.

[21]. Hyde, J. S., Fennema, E., & Lamon, S. J. (2000). Gender differences in mathematics performance: A meta-analysis. *Psychological Bulletin,* 107(2), 139-155.

[22]. Jangala, P. R. (2008). *Problem solving ability in mathematics of seventh standard students* (Unpublished M.Ed Dissertation, Regional institute of Education, Mysuru).

[23]. Jitendra, A. K., Griffin, C. C., Haria, P., Leh, J., Adams, A., & Kaduvettor, A. (2007). A comparison of Single and Multiple Strategy Instruction on third grade students' mathematical problem solving. *Journal of Educational Psychology,* 99(1), 115-127.

[24]. Johan, D. (2002). Everyday problem solving in engineering: Lessons for engineering educators. *Journal of Engineering Education,* 95(2), 139-151.

[25]. Karasel, N., Ayda, O., & Tezer, M. (2010). The Relationship between Mathematics Anxiety and Mathematical Problem Solving Skills among Primary School Students. *Procedia Social and Behavioral Sciences,* 2, 5804-5807.

[26]. Kempert, S., Saalbach, H., & Hardy, I. (2011). Cognitive benefits and costs of bilingualism in elementary school students: The case of mathematical word problems, *Journal of Educational Psychology,* 103(3), 547-561.

[27]. Krawec, J. L. (2014). Problem representation and mathematical problem solving of students of varying math ability. *International Journal of Educational Research,* 68, 15–26.

[28]. Krishanan, N. J. (1990). Problem solving strategies in Mathematics among high students in Devakottai District. *Third Survey of Research in Education,* 543.

[29]. Kurshmlia, R. & Vula, A. E. (2012). Mathematics word problem solving for third grade students. *Education for the Knowledge Society,* 389-401.

[30]. Lee, S. H. (2011). Working memory, attention, and mathematical problem solving: A longitudinal study of elementary school children. *Journal of Educational Psychology,* 103(4), 821-837.

[31]. Manohara, J. L., & Ramganesh, E., (2009). Creative problem solving ability of standard XI students. *Edutracks,* 9(4), 29-31.

[32]. Mech, A., & Patral, K. (2011). A comparative study of scholastic achievement in mathematics examinations in relation to conceptual understanding and mathematics ability. *A Quarterly Journal of Science Education,* 49(1), 44-51.

[33]. Nagalakshmi, K. (1995). Construction of problem solving ability test in mathematics for secondary students and study of problem solving ability of tenth class students in twin cities of Hyderabad. Osmania University, Sixth Survey of Educational Research (c.f. Devi Ahilya University, http:/edusearch.dauniv.ac.in).

[34]. Papadopoulos, I. (2015). Beliefs and mathematical reasoning during problem solving across educational levels. In *Views and Beliefs in Mathematics Education* (pp. 183-195) Springer Fachmedien Wiesbaden Publisher, Published Online, 183-195. DOI 10.1007/978-3-658-09614-4_15.

[35]. Passolunghi, M. C., & Pazzaglia, F. (2004). Individual differences in memory updating in relation to arithmetic problem solving. *Learning and Individual Differences,* 14(4), 219-230.

[36]. Prakash, S. (2000). A study of mathematical creativity and achievement of elementary school students in relation to problem solving ability, anxiety and socio-demographic variables. Punjab University, Sixth Survey of Educational Research (c.f Devi Ahilya University, http:/edusearch.

dauniv.ac.in)

[37]. Redgeway, J. E., Zawojewski, J. S., Hoover, M. N., & Lambdin, D. V. (2002). Student attainment in connected mathematics curriculum. In S. L. Senk & D. R. Thompson (Eds.), *Standards-based school mathematics curricula: What they are? What do students learn?* Mahwah, New Jersey: Lawrence Erlbaum Associates.

[38]. Sajadi, M., Amiripour, P., & Rostamy-Malkhalifeh, M. (2013). The examining of mathematical word problems solving ability under efficient representation aspect. *Mathematics Education Trends and Research,* 1-11.

[39]. Sangcap, P. G. A. (2010). Mathematics-related beliefs of Filipino college students: Factors affecting mathematics and problem solving performance. *International Conference on Mathematics Education Research,* 8, 465-475.

[40]. Seeley, C., & Harold, P. (2004). *Designing mathematics or science curriculum programs.* National Academy of Sciences, Washington, D.C: National Academies Press.

[41]. Sepeng, P., & Madzorera., A. (2014). Sources of difficulty in comprehending and solving mathematical word problems. *International Journal Educational Science,* 6(2), 217-225.

[42]. Shankar, S. (2010). *A study of problem solving ability of IX standard students in mathematics of Ranga Reddy district of AP* (Unpublished M.Ed Dissertation, Regional institute of Education, Mysuru).

[43]. Sharma, I. (2007). Problem solving ability and scientific attitude as determinant of academic achievement of higher secondary students. *Journal of All India Association for Educational Research,* 19 (1&2), 68-69.

[44]. Sidhu, K. S. (1995). *The Teaching of Mathematics.* New Delhi: Sterling Publishers Pvt. Ltd.

[45]. Singh, V. P. (1993). Efficiency of intellectual and mathematical creative thinking abilities for mathematical problem solving performances of high school students. *Indian Educational Review,* 28, 2-4.

[46]. Swanson, H. L. (2014). Cognitive strategy interventions improve word problem solving and working memory in children with math disabilities. *Frontiers in Education,* 6, 1099-1105.

[47]. Tolar, T. D., Fuchs, L., Cirino, P. T., Fuchs, D., Hamlett, C. L., & Fletcher, J. M. (2012). Predicting development of mathematical word problem solving across the intermediate grades. *Journal of Educational Psychology,* 104(4), 1083–1093.

[48]. Tsapa, R. S., & Dorasami, K. (2002). *Problem solving ability in mathematics of students at the terminal stage of elementary education* (Unpublished M.Ed Dissertation, University of Mysore, Mysuru).

[49]. Vermeer, H. J., Boekaerts, M., & Seegers, G. (2000). Motivational and gender differences: Sixth-grade students' mathematical problem-solving behaviour. *Journal of Educational Psychology,* 92(2), 308-315.

[50]. Walker, A. M. (2012). *The Relationship between Reading Fluency and Mathematical Word Problem Solving: An Exploratory Study* (Unpublished Doctoral Dissertation, Indiana State University).

[51]. Wheeler, D. (1982). Mathematisation Matters. *For the Learning of Mathematics,* 3(1), 45- 47.

[52]. Yalla, T. S. J., & Ayodhya, P. (2010). Gender difference in Mathematics Problem solving. *Edutracks,* 9(9), 40–44.

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