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ASSESSMENT OF MATHEMATICAL ACHIEVEMENT OF SECONDARY SCHOOL PUPILS

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Abstract:

Academic Achievement or Academic performance is a significant factor in achieving educational goals with the involvement of students, teachers and institutions. Academic Achievement primarily relates to how successfully a student completes the assigned tasks. Academic Achievement also refers to a person's remarkable success in a specific academic discipline. Mathematics has become the cornerstone for success in all facets of life in the twenty-first century. In this study, the researchers made an attempt to assess the mathematical achievement of 10th class pupils in Srikakulam district of Andhra Pradesh. A sample of 1000 pupils of 10th class was drawn randomly from Secondary schools located in rural as well as urban areas in Srikakulam district. The researchers developed and standardized the research tool; and then administered it to the students. In the current study, descriptive research method was adopted. The data were analyzed using statistical measures such as Mean, Standard Deviation and t-test. The findings of the study demonstrate a substantial difference in the performance of class 10th students in secondary schools in Mathematics in relation to gender, location of the school and type of school management. The students' achievement in rural schools has been observed lower than those of studying in urban schools. The results also revealed that government school students have exhibited lower achievement than those studying in private schools.

Keywords: *Mathematical achievement, Secondary School Students, Gender, Academic achievement, instructor, educational objectives*

Introduction

Man becomes a perfect person through education. Education gives the individual a clear view and path of how to face problems in day to day life. Education is a life-long process; it may be formal or informal—every individual gains proper knowledge through critical observation and logical reasoning ability. Interpersonal interactions lead to the proper understanding of the person's ideology and nature. Education helps the individual show his/her logical ability to estimate the other person's personality. It is generally viewed that the ability of students in the acquisition of 3R's is the main aim of any educational system. Reading, writing and arithmetic are the skills essential in daily life. A person has little arithmetic skills, and it is not enough to deal with several situations. Mathematical knowledge is necessary for sustainable development. An individual initially learns from his family, his social surroundings and finally from school, where he receives his formal education. Educational institutions play a vital role in guiding pupils to emerge from the darkness of ignorance to the light of knowledge. Academic Achievement or Academic performance is a significant factor in achieving educational goals with the involvement of students, teachers and institutions. Academic achievement is frequently assessed through tests or continuous evaluation. There is no clear cut view on how to assess the acquired knowledge, skills and abilities of pupils. Academic achievement is firmly based on the performance of pupils in the concerned subject area. Academic achievement of pupils can be measured through their performance exhibited in the examinations during a specific academic year.

Mathematics is an integral part of students' life all over the globe; it serves as a bridge to science, technology and other courses given in any formal educational system. Mathematics is regarded as an essential subject in the school curriculum since information and abilities gained in this subject will aid in acquiring knowledge in other disciplines. Mathematics has become one of the essential subjects at the secondary level. Some students enjoy learning mathematics. They thoroughly understand the subject and reach the goals. At the same time, other pupils are afraid of learning mathematics and exhibit an aversion towards learning mathematics.

In the twenty-first century, mathematics has become the foundation for success in all aspects of life. Mathematics is widely regarded as the "Father of All Sciences." It is hard to conceive about any scientific topic without considering mathematics. To learn Mathematics, the knowledge of 3R's - reading, writing and arithmetic is essential. Mathematics is the basis in the educational system; every stage of education is essential in its own way. The secondary school serves as the foundation for all sorts of higher education. Success in mathematics at the secondary level, particularly in the class 10, is required for better academic achievement at the higher level. Good performance in Mathematics is a crucial component of academic achievement in the process of learning. It is the key to success in many professions.

Gender issues in mathematics learning:

Isn't it true that men and women have equal rights? It is observed that girls and boys share the same approach to mathematics. Girls are accomplishing equally as much as boys do. In schools throughout the world, both girls and boys excel in mathematics. However, comprehensive investigation reveals that these views, frequently depicted in the media, are not necessarily correct (Vale et al., 2004). They are, without a doubt, not applicable in all nations, at all levels of education, in all types of mathematics, or all socio-economic classes of girls and boys. It is critical to recognize that discussions and research on gender equality occur in a global setting. In fact, at the turn of the century, two-thirds of the world's population had no access to or had been denied elementary education (UNESCO, 2003).

Until recently, gender disparities in Arithmetic practice appeared distinctly. Male members have exhibited better practices in Arithmetic more than the women in high schools. Gender inequalities in success studies conducted in industrialized nations in the late twentieth century tend to provide comparable outcomes in mathematical practice (Locon et al., 1996, 1997). However, around the turn of the century, a recent review of performance by Australasian research yielded equivocal data on gender discrepancies in mathematical accomplishment (Vale et al., 2004).

The Third International Mathematics and Science (TIMS), in a study on 'Equity and Diversity in Mathematics Education', discovered no significant gender differences in mathematical practice among thirteen-year-old ones in Australia (Locon et al., 1997). Furthermore, there were no significant gender differences on the International Assessment of Mathematical Literacy (PISA) exam at the age of fifteen. On the other hand, boys outperformed girls (Lokan et al., 2001). Gender differences, on the other hand, favored boys and were substantial in the 9th year of Australian mathematics education (Rothman, 2002).

In practice, equality is accomplished by implementing numerous measures that have been developed throughout time to correct gender disparities. Goodell and Parker (2001, pp. 419–21) suggested twelve techniques for teachers and curriculum designers to use in order to create the "Connected Equitable Mathematics Classroom (CEMC)": Academic math programmes that are demanding for all pupils are available. Basic abilities are built helping children to be mathematically literate in the world outside the school. Students are encouraged to acquire confidence in their mathematical talents and form good attitudes about mathematics. Teachers create high expectations for all pupils in the classroom environment allowing them to develop their tone and knowledge.

Teachers link mathematics with the actual world. The consistencies in the classroom can be identified and resolved by teachers.

Need and Significance of the study:

As in the past, most people believe that mathematics is all about computations. On the other hand, computation is only a tool for comprehending the structures, linkages, and patterns of mathematical concepts and so providing answers to complex real-world problems for mathematicians. Mathematicians' viewpoints have gained increased attention and importance as information and communication technology has advanced rapidly. People of all ages must reach, analyse and apply mathematical information effectively and efficiently. Students, in particular, must be well-versed in higher-order mathematics.

Educators are very concerned about the quality of mathematics instruction and learning. For the past 20 years, there has been significant concern about math achievement. Scholars are now arguing what subjects children should learn to be successful in mathematics. The discussion focuses on creative instructional design techniques for producing individuals capable of learning and applying fundamental mathematical ideas. A significant and ongoing challenge is how to design educational settings, scenarios, strategies and solutions that satisfy learning objectives for students of diverse skills and ability levels. Innovative teaching methods and tactics should be developed among children.

To obtain better performance rates in mathematics, educators must use instructional design strategies. Marrongelle and Rasmussen (2006), considering students' requirements and understanding of higher-order mathematical knowledge, provide a systematic approach and framework for analytically designing, creating and changing mathematics teaching (Saritas, 2004). "Instructional design is a powerful tool for addressing many urgent issues in education. It is a connecting science — a body of knowledge that prescribes instructional behaviours to maximise desired instructional outcomes like success and impact" (Reigeluth, 1983, p.5).

Better learning and accomplishment cannot be achieved only via instructional design. The instructional designer must be aware of critical aspects that influence student learning and must bridge the gap between goals and student achievement. Identifying these elements can allow them to use better their limited resources, such as money and time (Libiński & Gutierrez, 2008).

Researchers have studied many aspects to understand better the elements linked with mathematical performance [Kellaghan and Madaus (2002); Dwyer and Beaton (2002); Kifer (2002)]. Educators and academics continue to be fascinated by the influence of numerous demographic, social, economic and educational factors on pupils' arithmetic proficiency. For example, Israel et al. (2001) indicated that a child's educational success is connected to his or her parents' socio-economic level. Seltzer and Jensen (2000) discovered that variables such as individual study, parental involvement and social environment had a considerable impact on young students' "further education" decisions and outcomes. Eccles Wigfield and Meece (1990) studied motivating cognitive characteristics that impact high school students' decisions to enroll in advanced mathematics classes. Their research demonstrated that students' opinions of arithmetic competence influence their value of math and their accomplishment expectations.

An increasing body of research suggests that additional factors such as gender, family structure, parents' educational level, socio-economic situation, parent and student attitudes toward school and parent participation may influence children's accomplishment [(Fennema & Sherman, 1976, Epstein, 1991; Fluty, 1997; Campbell et al. 2000)]. Demographic Determinants (gender, socio-economic position, parents' educational level), Instructional Factors (teacher competency, instructional tactics and approaches, curriculum, school setting and facilities) and Individual Factors are the three predictors in math accomplishment (self-directed learning, arithmetic ability, motivation). As a result, the investigators felt compelled to investigate secondary school pupils' mathematical achievement.

Objective of the study:

1. To find out the mathematical achievement of 10th class students with respect to the following variables:
 - a. Gender : Male/ Female
 - b. Area : Rural / Urban
 - c. School management : Government/ Private

Hypotheses:

1. There is no significant difference in the mathematical achievement of Male and Female 10th class students
2. There is no significant difference in the mathematical achievement of 10th class students studying in rural and urban schools.
3. There is no significant difference in the mathematical achievement of 10th class students studying in Government and Private schools

Method of Research:

The descriptive survey research approach was employed for this study.

Population of the study:

The population of the study consists of all students in the 10th class from government and private secondary schools in Srikakulam District of Andhra Pradesh.

Sampling method:

1000 students of 10th class from government and private secondary schools located in rural as well as urban areas in Srikakulam district were chosen for the study using Random Sampling method.

Research tool:

The researchers prepared a question paper from the math subject and assessed their academic performance. The question paper consists of 50 questions. There is one mark for each question and the total marks are 50. The screening test is conducted at the end of the academic year before the students appeared for their annual examination.

Procedure:

The investigator obtained permission from the headmasters of secondary schools and fixed the programme. Before conducting the test, students were explained in detail about the study and all the students voluntarily participated in this programme. The questions papers were distributed to the students; and they were asked them to submit the filled-in answer sheets. A maximum of 30 minutes time is given to the students to provide answers to the questions in the question paper itself. The collected data were entered into a Microsoft excel database sheet and analyzed. The mean, cross-tabulation, standard deviation and t-test were used for the data analysis.

Data Analysis:

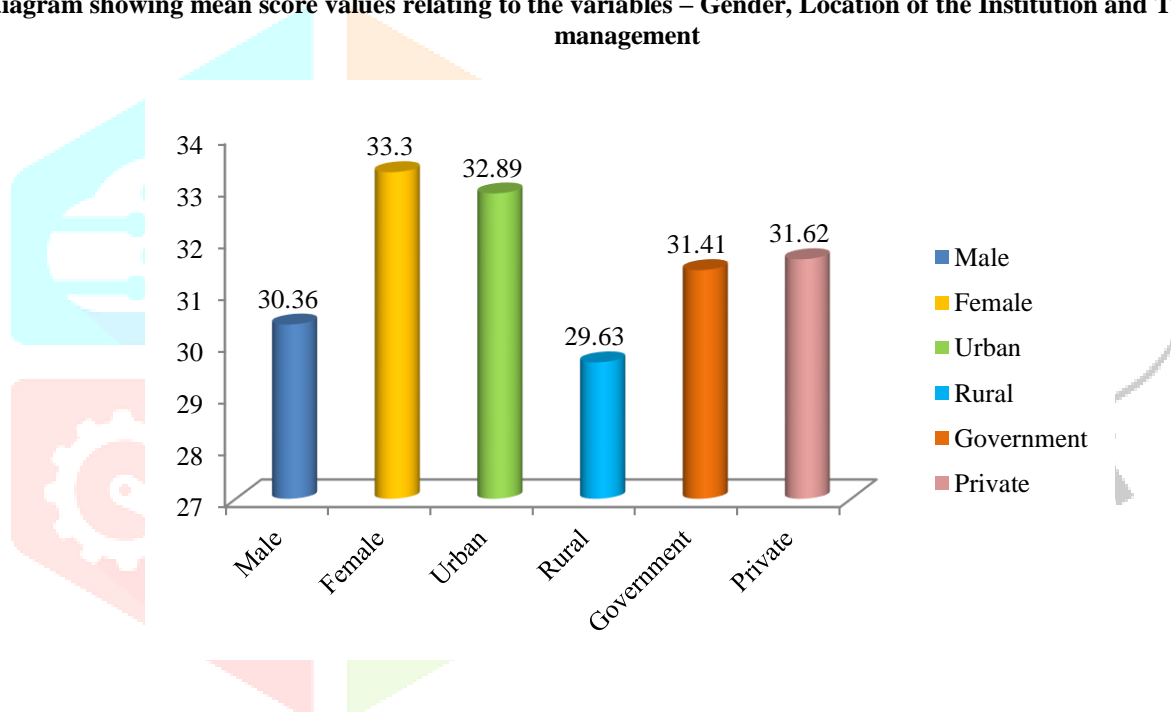
The hypotheses formulated for the present investigation have been verified using different statistical techniques. Mean scores and Standard Deviations were calculated for different groups of students. From these values, Standard Error of Difference (SE_D) and Critical Ratios (CRs) were calculated to know whether there is any significant difference in the mathematical achievement of different groups of students considered for the present study.

Table showing the significant differences in the mathematical achievement of different groups of 10th class students

S.No.	Variable	Group	N	Mean	SD	SE _D	"t"	Hypotheses
11	Gender	Male	611	30.36	10.78	0.67	4.38*	The null hypothesis is rejected
		female	389	33.30	9.98			
2	Area	Urban	574	32.89	9.98	0.68	4.86*	The null hypothesis is rejected
		Rural	426	29.63	11.05			
3	School Management	Government	567	31.41	10.81	0.67	.304*	The null hypothesis is rejected
		Private	433	31.62	10.25			

* Significant at 0.05 and 0.01 levels.

Bar diagram showing mean score values relating to the variables – Gender, Location of the Institution and Type of school management



Findings and Conclusions:

1. Male and Female students of Class 10 in Secondary Schools differed significantly in their Achievement in Mathematics.

Female students (Mean=33.30) of 10thclass performed better in mathematics than male (Mean=30.36) students of 10thclass in secondary schools. These results are in tune with the findings of the studies conducted by Roach (1979), Sood (1999) and (Kimball, 1989). However, the results contradict with the findings of the studies conducted by Mehra (2004), Thomas (1991), Patel (2002) Patel (2012), Wajih (2000); and Pattison and Grieve (1984).

2. The students of Class 10 studying in Urban and Rural secondary schools differed significantly in their Achievement in Mathematics.

The students of Class 10 in urban (Mean=32.89) secondary schools performed better in Mathematics as compared to their counterparts studying in rural (Mean=29.63) secondary schools. These results are in tune with the findings of the studies conducted by Mehra (2004), Prakash (2000), Baskaran (1991), Dr Sunil Sumar Singh et al. (2003). However, the results contradict with the findings of the studies conducted by Patel (2012); and Feroze & Balasubramanian (1966), who reported that there is no significant difference in the achievement of students in Mathematics in the urban and rural secondary schools.

3. The students of Class 10 studying in Government and Private secondary schools differed significantly in their Achievement in Mathematics.

The students of Class 10 in the Private secondary schools (Mean=31.62) performed better in their achievement in Mathematics as compared to their counterparts studying in Government secondary schools (Mean=31.41).

Recommendations:

1. It is observed that there are students with positive and negative complexes with mathematics in every classroom. The negative complexes attached with the students can eliminate if teachers could pay attention to such students by showing a little bit of interest, apathy, and concern in the regular classrooms. There will be slow progress in bringing attitudinal change and fostering achievement. For such children, teachers can adapt techniques like mentoring, co-operative learning, peer tutoring, small group teaching etc.

2. Teachers have to make mathematics teaching exciting and recognize standard in capability, attitude and background during their teaching-learning process. They have to improve learners' feelings of admiration by improving learning experiences and inculcating self-confidence and a sense of belief that they can work with mathematics without any prejudices.

3. In The present study, students belonging to a rural area government school had a low level of achievement in mathematics. Parents and teachers need to help in understanding that mathematics is derived from real-life situations and has many implications in day-to-day living. Teachers must integrate mathematical concepts with history and expose them to ethno-mathematics.

4. Equal opportunity for children, regardless of gender, colour, nationality, religion, or other factors, is one strategy to deliver quality education. As a result, in order to minimize individual inequalities between pupils, teachers must eliminate stratification within the classroom. Teachers' purpose is to facilitate learning so that pupils can attain optimum learning in the classroom. Poor gender learning is affected by gender disparities in mathematics, and comparable impacts can arise on their opponents. That is why teachers can encourage healthy competition based on individual abilities and skills rather than groupings.

References:-

- [1]. Anthony, B. &Walshaw, M. (2007). Effective pedagogy in mathematics/ pangarau: Best evidence synthesis iteration [BES]. Wellington: New Zealand Ministry of Education.
- [2]. Balasubramanian, T. and Feroze, M. (1966): "A Comparative Study of the Academic Achievement in Mathematics of Urban and Rural Students of Standard X in the High Schools of Coimbatore", Journal of Educational Research and Extension, Vol. 3, No.1, p. 25.
- [3]. Baskaran, K. (1991): Achievement motivation, attitude towards problem-solving and achievement in mathematics of standard X students in Devekottai Educational District. In NCERT, Fifth Survey of Educational Research (p. 1863). New Delhi: NCERT.
- [4]. Becker, J., & Jacob, B. (2000, March). California school mathematics politics: The anti-reform of 1997-1999. Phi Delta Kappan, pp. 529-537.
- [5]. Belenky, M. P., Clinchy, B. M., Goldberger, N. R., & Tarule, J. M. (1986). Women's ways of knowing: The development of self, voice and mind. New York: Basic Books.
- [6]. Boaler, J. (1997b). Reclaiming school mathematics: The girls fight back. Gender and Education, 9(3), 285-306.
- [7]. Burton, L. (2003). Which way social justice in mathematics education? Westport, CT: Praeger.
- [8]. Gakhar, S.C. (1982): "A Study of Acquisition of Mathematical concepts among 8th Grader of different types of schools experiments in education, Vol.11, N0.9, pp. 164-167.
- [9]. Gilligan, C. (1982). In a different voice: Psychological theory and women's development. Cambridge, MA: Harvard University Press.
- [10]. Goodell, J. & Parker, L. (2001). Creating a connected, equitable mathematics classroom: Facilitating gender equity. In B. Atweh, H. Forgasz & B. Nebres (eds), Sociocultural research on mathematics education: An international perspective (pp. 411-31). Mahwah, NJ: Lawrence Erlbaum.
- [11]. Head, J. (1995). Gender identity and cognitive style. Paper presented at UNESCO / ULIE Colloquium. Is there a pedagogy for girls? London: UNESCO.
- [12]. Kimball, M. M. (1989). A New Perspective on Women's Math Achievement. Psychological Bulletin 105, 198-214.
- [13]. Mangal, S.K. (2008): Educational Psychology, New Delhi : Prentice Hall of India Pvt Ltd., Eds.2008, pp.393- 398.
- [14]. Mangal, S.K. (2009): Teaching of mathematics, Arya Book Depot: New Delhi, Eds. 2009, pp 3-11.
- [15]. Olof Bjorg Steinthorsdóttir, Bharath Sriraman (2003): Iceland and rural/urban girls- PISA examined from an emancipatory viewpoint The Montana Mathematics Enthusiast, Monograph 1, pp. 169-178
- [16]. Panda, B.N. (2002): "A study of Factors Affecting Pupils Achievement in primary schools of Orissa". Research project. RIE, Bhubaneswar, (N C E R T, ERIC funded): Indian Educational Abstracts: Vo1.2, No.2, July 2002, Abstract No: 185, PP 52-53.

- [17]. Patel, B. C. (2012). A Study of academic achievement of students in mathematics of Std-IX in relation to some psycho-social factors (Unpublished doctoral dissertation). Ganpat University, Ganpat Vidyanagar (Kherva).
- [18]. Patel, V. S. (2002): An investigation into the proficiency in the subject of mathematics of the primary school teachers. In NCERT, Sixth Survey of Research in Education. New Delhi: NCERT.
- [19]. Pattison, P. and Grive, N. (1984): "Do spatial skills contribute to sex differences in different types of mathematical problems"; Journal of Educational Psychology, 76, P. 678-689.
- [20]. 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. In NCERT, Sixth Survey of Research in Education. New Delhi: NCERT.
- [21]. Roach, D.A. (1979): "Effects of conceptual style Preference, Related cognitive variables and sex on Achievement in Mathematics" British Journal of Educational Psychology, Vol. 49, pp. 79-82.
- [22]. Sood, S. (1999): "A study of creativity, Problem solving Ability and personality characteristics as correlates of Mathematical Achievement of students of Residential and Non-Residential schools" Ph.D. in Education, Punjab, University; Chandigarh.
- [23]. Suneel Sumar Sing, Shaheen Mali. and Dr. A.K. Sing (2003): "Achievement difference in class II students in Maths, with regard to Area, Gender, and social grounds during B.A.S and M.A.S in Gonda District". The Educational Review, March, Vol. 46, No. 3, PP55-57.
- [24]. Thomas, K.J. (1991): A Study of Attitude Towards and Achievements Among Secondary School Students in Aizawl in Mathematic Town. Aizwal: North Eastern Hill State. Unpublished M.A. (Education) Dissertation
- [25]. UNESCO (2003). Summary report. Gender and education for all: The leap to equality. Paris: UNESCO.
- [26]. Vale, C., Forgasz, H. & Horne, M. (2004). Gender and mathematics: Back to the future? In B. Perry, C. Diezmann & G. Anthony (eds) Review of Research in Mathematics Education in Australasia 2000–2003 (75–102). Flaxton, Qld: Post Pressed.
- [27]. Wajiha, A.H. (2002): 'Factors Affecting Academic Achievement of IX Standard Students in Mathematics', Unpublished Ph. D. Thesis Submitted To Karnatak University, Dharwad- 580 003.