



A STUDY OF ACHIEVEMENT IN MATHEMATICS OF SECONDARY SCHOOL STUDENTS IN RELATION TO THEIR INTEREST AND ATTITUDE TOWARDS MATHEMATICS

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Abstract

The present study is based on the achievement in Mathematics of secondary school students to their interest and attitude towards Mathematics in the Guntur district.

Objectives: 1. To study the impact of the variables i.e. Class study and Type of management on the achievement in Mathematics of secondary school students. 2. To study the impact of the variables i.e. Class study and Type of management on the interest in the Mathematics of secondary school students. 3. To study the impact of the variables i.e. Class study and Type of management on the attitude of secondary school students towards Mathematics.

Tools used in this investigation: To determine the academic achievement in Mathematics of the students in classes VIII and IX, the researcher used their scores on their Formative-I for the academic year 2019–2020 in this research. The Mathematics Interest Inventory was constructed and standardized by Dubey, L. N. (2004). The attitude towards Mathematics Scale was constructed and standardized by Shreedevi, T. (2015). Sample: From six secondary schools including rural and urban in Krishna District's Vijayawada city, 321 students were chosen as a sample. Data Analysis: The following statistical techniques were employed in the analysis of the data collected Mean, S.D., and Critical Ratio were used in this study to analyze the data. Findings: The class study (8th and 9th classes) by students of secondary schools makes no significant difference in their achievement in Mathematics, interest, and attitude towards Mathematics. Type of management makes a significant difference in secondary school students' achievement in Mathematics, interest, and attitude towards Mathematics.

Keywords: Achievement, Interest, attitude, and Secondary School students

Introduction

Everyone's life is strongly influenced by education. Every student should place the same importance on all academic courses, including science, math, English, Hindi, and social studies. But because it helps with daily tasks, having a solid understanding of maths is incredibly important for everyone. Life cannot exist without it. Another name for Mathematics is "Ganita," which translates to "science of calculation." We may solve challenges in life that call for math

and numeracy by using the science of numbers and space, the science of measurement, amount, and magnitude. The value of Mathematics has expanded rapidly, and it is now used in every aspect of life. For the contemporary world to survive and advance, Mathematics is crucial. One of the required disciplines in secondary education is Mathematics. The basic goal of teaching Mathematics is to increase students' capacity for knowledge and critical thought. Fundamentally, Mathematics is an educational curriculum that encourages higher-order brain functions including inquiring, questioning, reasoning, analyzing, and logical thinking.

Achievement in Mathematics

Mathematical accomplishment includes both the acquisition of mathematical abilities and skills as well as receiving outstanding scores on the higher-level final test. According to the goals of teaching Mathematics, mathematical aptitude is the capacity to quickly and accurately answer complicated problems. This involves knowledge of and application of the mathematical ideas and abilities that students have learned during their whole academic career. The knowledge and abilities acquired via academic study, which are evaluated by school officials through achievement exams, are referred to as the student's mathematical achievement. In contrast to skill growth, we define an individual's mathematical achievement as their capacity for writing, thinking, reasoning, and arithmetic. The grasp of mathematical ideas, their application to new circumstances, and logical reasoning as engaged in the interpretation of data, the discovery of missing links, etc. are all examples of what Kulkarni et al. (1970) define as a mathematical achievement. Good (1959) described the mathematical achievement as "acquired knowledge or acquired abilities in the academic fields. Teachers typically issue exam results or grades."

Interest in Mathematics

As there are writers to describe it, interest as a variable has taken on a wide variety of interpretations. An individual's love for a certain thing is referred to as an interest. Silvia (2005) defined interest as emotion and used the cognitive appraisal theory to explain why interest occurs in particular circumstances. As attributes of people that are established and maintained over a long length of time and are nearly considered to be personality traits, the author also mentioned interests. It is crucial to highlight that there may be distinguishing characteristics among interests. The key contrast between the various conceptualizations of interest relates to the temporal frame under consideration (Jansen, et al. 2016). Mathematics teachers have long been concerned about students' enthusiasm for learning Mathematics and how it can affect how math is taught. Mathematics interest has long been recognized as a key element affecting involvement and performance in the subject. Every person's existence is based on a collection of concepts, facts, principles, and operations that makeup Mathematics (Hafiz and Hina, 2016). In addition, it has been suggested that gender influences pupils' aptitude for and interest in Mathematics. Females demonstrate less interest in Mathematics than their male classmates, according to research by Eccles and Wang (2015).

Attitude towards Mathematics

Students' attitudes have an impact on how they think. The pupils will believe that Mathematics is important and will work harder to enhance their Mathematics learning outcomes if they have a good attitude toward the subject. It might be challenging to pay attention to students in arithmetic who have poor attitudes. Simply said, attitude may be thought of as a positive or negative degree of feeling related to certain situations. It is evident in the way a student views certain areas of study, of course. Positive or negative emotional dispositions are referred to as attitudes (Aiken,

2000; McLeod, 1992). By "mental and neurological state of readiness, organized by experience, having a directive or dynamic impact over the individual's behaviour to all objects and circumstances to which it is connected," Allport (1935) meant attitude. Students' attitudes toward Mathematics are described by Zan and Di Martino (2007) as the emotional reaction, either good or negative, connected with Mathematics, confidence to succeed in studying Mathematics, and coping mechanisms.

Attitude towards Mathematics has three components:

1. The cognitive component is what a person understands or believes about Mathematics.
2. The emotional components of Mathematics are referred to as the "affective component."
3. The behavioural intents or behavioural tendencies a person has toward Mathematics are referred to as the cognitive component.

Statement of the Problem:

The topic of the present research is "*A Study of Achievement in Mathematics of Secondary School Students in Relation to Their Interest and Attitude Towards Mathematics*".

Operational definition of the terms:

a) Achievement in Mathematics: According to Verma (2016), "academic accomplishment may be characterized as effective achievement in a given subject area and is defined as a measure of knowledge, understanding, or abilities in a single topic or combination of subjects."

b) Interest in Mathematics

An active mathematical interest, which is demonstrated by problem-solving, study, and participation in mathematical activities during free time, is what is meant when a student expresses interest in learning Mathematics and engaging in mathematical activities.

c) Attitude towards Mathematics

The inclination to respond favourably, positively, or unfavourably, adversely, to the topic of Mathematics is what is meant by this. Jovanovic and King (1998) assert that pupils' attitudes toward Mathematics are a reflection of their emotional responses to their thoughts, feelings, and perceptions, whether those emotions be good or negative. Neal (1969) asserts that students' attitudes are determined by how they feel about Mathematics and whether they engage in or avoid mathematical activities (as cited in Sarmah & Das, 2020).

d) Secondary School Students: The secondary students in the current study include those enrolled in classes VIII and IX in Vijayawada City's Krishna district.

Need and Significance of the Study

Numerous researches have been conducted in India and overseas to comprehend the nature of the topic of Mathematics and its significance in both individual and societal daily life. The long history of humanity shows that the positive attitude of the ancient civilizations toward Mathematics and their sincere interest in achieving higher levels of perfection in the application of Mathematics to daily life enabled them to achieve greater heights in their endeavours to comprehend the laws of nature and apply the knowledge and skills for the welfare of humans. Therefore, it is important to periodically conduct studies to dig deep and understand the relationship between mathematical achievement, mathematical attitude, and mathematical interest to improve judgments and develop more useful processes that will make Mathematics education more and more relevant. As a result, the current researcher has taken up the current project.

Review of the Related Literature

A) Studies related to Achievement in Mathematics

Benjamin and Murugaraju (2021) investigated the Mathematics proficiency of pupils in the IX standard. Results indicated that gender and location had little impact on the mathematical proficiency of pupils in the IX standard. Maamin et al. (2021) examined the relationship between student engagement and Mathematics achievement among secondary school students. The results of the study of multiple linear regression showed that effective engagement has the largest estimate of Mathematical practice, followed by behavioural engagement and cognitive engagement.

B) Studies related to Interest in Mathematics

Lakshmi Karthika and Suresh Kumar (2018) researched the Tirunelveli district's higher secondary students' interests in Mathematics. The findings showed that higher secondary pupils' interest in Mathematics varied greatly depending on their gender and geographic location. Poudel (2020) investigated ethnic Nepalese people's interest in Mathematics. According to the research, 0.8% of ethnic kids showed interest in practicing Mathematics. Math is typically not as interesting to students in Nepal. Therefore, a significant challenge, particularly for children of that race, is how to improve pupils' interest in arithmetic. To enhance interest in Mathematics among all students in Nepal's schools and universities, the instructor should adapt their teaching strategy.

C) Studies related to Attitudes towards Mathematics

Sarmah and Das (2020) explored how pupils in a conventional and digital classroom in Guwahati city felt about learning Mathematics. According to the study, male students' opinions regarding learning Mathematics in a regular classroom versus a digital classroom differ significantly. The opinions of female students regarding learning Mathematics in a digital classroom versus a traditional classroom differ significantly. Academic achievement of students in the digital classroom is strongly correlated with their attitude toward Mathematics; hence level of academic achievement of students is mostly determined by their attitude. Academic achievement and students' attitudes toward Mathematics in the traditional classroom are unrelated. The influence of computer games on improving primary school students' attitudes toward Mathematics was examined by Pius, P. A., and Yusuf in 2021. The outcome showed that the defendant's attitude toward Mathematics was impacted by the computer game. In light of this, the study concluded that computer games are a crucial instrument for encouraging children, especially those in elementary school, to have a favourable attitude toward Mathematics.

Objectives of the study:

The following objectives were formulated for the present investigation.

1. To study the impact of the following variables on the achievement in Mathematics of secondary school students.
 - a) Class study
 - b) Type of management
2. To study the impact of the following variables on the interest in Mathematics of secondary school students.
 - a) Class study
 - b) Type of management
3. To study the impact of the following variables on the attitude of secondary school students towards Mathematics.
 - a) Class study
 - b) Type of management

Hypotheses of the study:

The following hypotheses were formulated to test the stated objectives.

1. The following variables make no significant difference in the achievement in Mathematics of secondary school students.
 - a) Class study
 - b) Type of management
2. The following variables make a significant difference in the interest in Mathematics of secondary school students.
 - a) Class study
 - b) Type of management
3. The following variables make a significant difference in the attitude of secondary school students towards Mathematics.
 - a) Class study
 - b) Type of management

Limitations of the Research:

1. The geographical scope of the research was likewise limited to Vijayawada, comprising both urban and rural regions in the Krishna district of A.P.
2. The scope of the current investigation is just 6 secondary schools.
3. Only secondary school students in classes VIII and IX are included in the current study.
4. For the following demographic variables: class study and the type of management, the study is limited to three variables: performance/achievement in Mathematics, interest in Mathematics, and attitude toward Mathematics among secondary school students.

Methodology: The following sub-headings provide details on the study's methodology:

a) Research Design: A descriptive survey approach was used to carry out the current investigation. If the study is based on the criteria given below, expand its design.

b) Sample: From six secondary schools including rural and urban in Krishna District's Vijayawada city, 321 students were chosen as a sample.

c) **Sapling technique:** Using random sampling techniques, the necessary sample was chosen.

d) Research tool:

1. **Achievement in Mathematics:** To determine the academic achievement of the students in classes VIII and IX in Mathematics, the researcher used their scores on their Formative-I for the academic year 2019–2020 in this research.
2. **Interest in Mathematics:** Dubey, L. N., constructed and standardized the Mathematics Interest Inventory (2004). There are 40 items in this inventory, 20 of which are positive and 20 of which are negative. The list consists of 40 items. There are two alternatives for each item: "YES" and "NO." Yes, answers are to be scored as 1, while No answers are to be scored as zero. Using rational equivalence or the K-R formula, the reliability coefficient of the Mathematics interest inventory was found to be 0.89.
3. **Attitude towards Mathematics Scale:** By Shreedevi, T., the Attitude toward Mathematics Scale was developed and standardized (2015). There are 50 items total on this scale, 27 of which are positive, and 23 of which are negative. These claims can be divided into three groups: cognitive, emotional, and behavioural. The five-point Likert categories on this attitude scale are strongly agree, agree, undecided, disagree, and strongly disagree. Positive responses that receive the respondent's "strongly agree" response is given a 5-point weight. Similar to how points 4, 3, 2, and 1 are "agree," "undecided," "disagree," and "strongly disagree," respectively, the score for negative items changes from 1 (strongly agree) to 5 (strongly disagree). This attitude was

determined to have a correlation value of 0.71, making it reliable.

e) Statistical Techniques Used: Mean, S.D., and Critical Ratio was used in this study to analyze the data.

Analysis of Data and Interpretation of Results

Table 1: Data and Result of Test of Significant Difference in The Mean Score of Achievement in Mathematics, Interest in Mathematics and Attitude towards Mathematics Based On Class studying, and Type of management

Variables	Demographic Variables	Sub-variables	N	Mean	SD	D	$\square D$	C.R.
Achievement in Mathematics	Class study	8th	113	48.18	15.98			0.36*
		9th	208	48.81	13.61	0.63	1.77	
	Type of management	Govt.	165	45.13	14.76			4.78***
		Private	155	52.27	13.22	7.14	1.56	
Interest in Mathematics	Class study	8th	113	28.56	6.61	1.13	0.77	1.46*
		9th	208	27.43	6.50			
	Type of management	Govt.	165	26.60	6.52			3.44***
		Private	155	29.08	6.38	2.48	0.72	
Attitude towards Mathematics	Class study	8th	113	183.46	26.95	5.36	3.05	1.76*
		9th	208	178.10	24.52			
	Type of management	Govt.	165	176.17	24.73			2.81***
		Private	155	184.10	25.74	7.93	2.82	

***Significant at 0.01 level

*Significant at 0.05 level

Table 1 shows that the computed critical ratio value (0.36) is lower than the table value of 1.96. As a result, it is insignificant at the 0.05 level. The null hypothesis is therefore accepted. Secondary school students' Mathematics achievement is impacted significantly by the class they studied (8th and 9th grades). And also, another calculated value of the critical ratio (4.78) is greater than the table value of 2.58. Therefore, it is significant at 0.01 level. Hence, the null hypothesis is rejected. The type of management makes a significant difference in secondary school students' achievement in Mathematics. The mean difference (7.14) is in favour of private students. Therefore, it can be assumed that private students possess better achievement in Mathematics than government students.

The obtained value of the critical ratio (1.46) is less than 1.96. Therefore, it is not significant at 0.05 level. Hence, the null hypothesis is retained. The class studying (8th class and 9th) by children of secondary schools makes no significant difference in their interest in Mathematics. And also, the obtained value of the critical ratio (3.44) is greater than 2.58. Therefore, it is significant at 0.01 level. Hence, the null hypothesis is rejected. The type of management of secondary school students makes a significant difference in their interest in Mathematics. The mean difference (2.48) is in favour of private students. Therefore, it can be

assumed that private students possess more interest in Mathematics compared to government students.

The obtained value of the critical ratio (1.76) is less than 1.96. Therefore, it is not significant at 0.05 level. Hence, the null hypothesis is retained. The class study doesn't make a significant difference in the attitude of secondary school students towards Mathematics and also, the obtained value of the critical ratio (2.81) is greater than 2.58. Therefore, it is significant at 0.01 level. Hence, the null hypothesis is rejected. The type of management makes a significant difference in the attitude of secondary school students towards Mathematics. The mean difference (7.93) is in favour of private students. Therefore, it can be assumed that private students possess a positive attitude towards Mathematics compared to government students.

Major Findings of the Study

1. Students in secondary schools do not significantly differ in their mathematical achievement, interest in, and attitude toward Mathematics based on the classes they study (8th and 9th grades).
2. This type of management makes a significant impact on secondary school students' achievement in math as well as their interest in and attitude toward it. When compared to government students, it may be asserted that private students have higher math achievement, more interest in math, and a more favourable attitude towards Mathematics.

Educational Implications:

This type of management has a big impact on secondary school students' competence in math, interest in math, and attitude toward Mathematics. To make wise decisions and execute better programmes, it is essential to adopt and apply individual learning methodologies and focus on proper evaluation methods. This again emphasizes the necessity for individualized or learner-entered methods of Mathematics instruction that give proper consideration to each student's unique interests. It is imperative to abandon mass-teaching techniques.

Conclusion

The academic achievement of students is said to be greatly influenced by the topic of Mathematics. As a result, it is declared a topic that must be studied during the first 10 years of school. From an early age, parents start teaching their children mathematical fundamentals like counting additions and subtractions, and number ideas. As a subject of formal education, Mathematics plays a miraculous role in the development of all subjects, including engineering, physics, chemistry, biological sciences, social sciences, fine arts, drawing, agriculture, logic, etc. Mathematics also influences the continuous progress of all the subjects, whether directly or indirectly.

The fundamental operations of addition, subtraction, multiplication, and division make Mathematics an extremely significant topic for addressing issues in daily life. All persons involved in any line of work demand a very high level of mathematical proficiency. A person might be a salesperson, a merchant, a vendor, a farmer, a housewife, a clerk, a mason, a carpenter, a tailor, a driver, a labourer, etc. Math offers a clear method of logical reasoning. Children who study Mathematics acquire the mindset necessary to work methodically, consistently, and correctly. Around the world, numerous approaches to studying the various facets of Mathematics teaching and learning are being used, and every day, more and more motivated academics are posing new questions to research and offering their meager assistance to improve the teaching of Mathematics. The study emphasized the need for individualized instruction, updated assessment methods, age- and class-appropriate teaching and testing,

gender-sensitive tools, modernized teaching and assessment methods, a greater emphasis on play-based methods of instruction, adequate emphasis on group activities and project work to allow for individual differences, and increasingly learner-centered instruction.

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