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A Study Of Mathematical Aptitude Of Students In Relation To Achievement Motivation At Secondary Level

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Abstract

The research paper has aimed to study the mathematical aptitude of students in relation to achievement motivation at secondary level. The study was conducted at two districts- Fatehabad and Yamunanagar, Haryana on the sample of 480students.Standardized mathematical aptitude testwas developed by the investigator and a standardized achievement motivation scale was used to study the achievement motivation of students. On the behalf of findings it was concluded thatthere was significant difference between the mathematical aptitude of government and private; boys and girls; and the achievement motivation of government and private schools' students atsecondary level respectively but no significant difference was found between the achievement motivation of boys and girls; urban and rural; and the mathematical aptitude of urban and rural schools' students at secondary level respectively. Also significant relationship was found between achievement motivation and mathematical aptitude of students at secondary level.

Key Words:Mathematical Aptitude, Secondary School Students, Achievement Motivation

Introduction

In this world, Education and society are two aspects of same coin. Both have been linked from the beginning. But education is more inspirable because it has two dimensions personal and social. In this world of technical and scientific era, education plays a paramount role. A country depends on the optimum use of human resources for its overall development. Education is helpful for social regeneration and revitalization of human resources. Education moulds every individual since birth to end of life. Education not only expends ideas, awareness, imagination and the disciplined behaviours but also literary ability among them. Therefore,education cultivates the inborn abilities and capacities of an individual. It is only education that brings success by removing the curtain of ignorance, brings light over darkness and removes reason over superstition. Education plays a regard role in building each nation.

All our great educationists accepted that mathematics represents a symbol of developed culture. Also Hogben said that mathematics reflects the progress of a culture like a mirror. Mathematics makes systematic and organized our life. It engages and develops a habit of reasoning in our minds. Many misconceptions are there about mathematics among people. One of them is, many people think that only few gifted can read mathematics and get knowledge of it. Another one is that only few concepts of mathematics are uses as its application beyond the classroom in our day today life. Mathematics accelerates the life of an individual in many ways than that of actually perceived. The National Policy on Education

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(1986) suggested that mathematics should be worked as to encourage the learner think more and more, enables to analyze the concept and explained with logically. Mathematics motivates for scientific behaviour and develops higher order thinking skills among learners.

Mathematics Learning

Mathematics should be taught in learner's language and with the help of live, interesting and relevant examples of real life situations beyond the textbook which is significant for learners, said by Sharma, J. (1993). Although mathematics has its own beauty but in school, it is counted as hated and feared subject by the learners. Also Ravindra, director of NCERT (2000) was suggested that there is a long gap between the determination and practices of mathematics curriculum at ground level. Even today, learning in mathematics is text-book and route methods centric. Classroom teaching about mathematics occurred in routine with constantly pattern or method and appropriate time is not given to mathematics teaching-learning in classroom, said by Prasad, R. &Sarawat, P. (2011). Rarely one or two questions are asked by students in mathematics class during teaching. Also, the situation is even worse at the secondary level regarding mathematics teaching. This infers that mathematics learning takes place in classroom very rarely. Now, the question arise what type of mathematics learning is there in all respect?

In classroom, a teacher really taught mathematics to students on the basis of answer that may be right or wrong. The only importance is given to right answer's students. Maximum school teachers follow only one right approach to solve the mathematical problem, but not focus on other approaches which are appropriate for the same problem suggested by students. So, a teacher should encourage the students for learn new approaches, doing new experiments with problem, taking risks and try to find new algorithms rather than a fixed approach.

Additionally, a mathematics teacher has to focus on its hidden approaches and basic fundamentals which are lies in every learner, animals, birds, in the structure of nature and universe. For example a flock of migratory birds that leaves their nests and go thousands of miles away. But when the season changes it returns unerringly to its place again after a long period. Therefore, birds also have subconscious mathematical aptitude which works very well. Similarly, human beings also function as a complete unit of different logical abilities. He possesses logically data from certain instances of a problem; makes hypothesis with the help of different types of reasoning; then test the hypothesis and come to a conclusion. So,think with the approach of inductive-deductive reasoning that indicates innate tendency of an individual to think mathematically, termed as mathematical aptitude.

An ability among children to determined high keen observations; unusual quickness about numeric information and in learning process; highly curious about reasoning based knowledge; better understanding, analysing and application of mathematical concepts & ideas; an ability to think abstractly; an ability to construct mathematical patterns and see & think about their relationship is refer to high mathematical aptitude.

This is an inborn and self-perceived ability of children which gives them unprecedented success in the field of mathematics. Therefore, it is very important to focus on the concept of mathematical aptitude and to develop among students. Further, we also need to identify the

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specific factors which are directly influencing mathematical aptitude. Some of the factors that influence mathematical aptitude are learning styles, mathematics phobia, intellectual abilities, achievement motivation, attitude towards mathematics, mathematical anxiety, teacher's attitude toward students and academic achievement in mathematics etc.

The today's world is more competitive. For achieving something in this world every man has to need motivation. The achievement motivation for success starts more effectively from school at secondary level. Students become more mature at this level. Achievement motivation is a wider term. It is the need or desire of an individual towards achievement. From various source, it is found that mathematics aptitude play an important role in making future career of students at secondary level. Because schooling at this level is a bridge between elementary education and higher education. But at this level, achievement motivation of students influences their mathematical aptitude. Researches in this area have revealed that achievement motivation, learning styles, intellectual abilities, mathematical anxiety, mathematics phobia, performance and problem solving skills are the important correlates of mathematical aptitude of students especially at secondary level.

Need and Significance of the study

Mathematics is the one of the oldest science. The future career of every learner is depending upon the essential knowledge of mathematics. In fact, its knowledge is helpful to lay a strong foundation in other subjects. But it is a subject which is directly linked with problem solving.It engages the mind of students; trains them and enhance the abilities to solve the problems in their real life.Today problem solving abilities are required on a large scale in various professions e.g. teaching at different levels- school, college and university,in computer programming, medical science, systematic analysis, and statistics, different kind of researches, trade, banking and commerce etc. In recent years, it has been seen in this world that every country has to depend on the statistical data for their economic planning, trade, budgeting and marketing. Each country government needs talented mathematicians on a large scale to take vital decisions on the basis of its statistical data. Why do students have fewer scores or they fail in mathematics? Why high scores in other subjects? Answering these questions was a major challenge for psychologists.After going through the review of the related literature, discussion with fellows, research associate and various sources it is observed that mathematics aptitude play an important role in making future career of students. But it is directly linked with achievement motivation of students. Researches in this area have revealed that achievement motivation, learning styles, intellectual abilities, mathematical performance and problem solving skills are the important correlates of mathematical aptitude of students especially at secondary level.

Therefore, seeing this important relationship of achievement motivation and mathematical aptitude of students at secondary level, the investigator has chosen the study for research. The investigator makes up his mind to conduct the study on this topic. The present study is very useful in guiding the students, teachers and parents in their educational and vocational careers and also for providing the proper environment at home and school for improving their reasoning ability, problem solving skills, creativity and mental aptitude.

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Statement of the Problem

The problem under investigation was stated as ***"A Study of Mathematical Aptitudeof Students in relation to Achievement Motivation at Secondary Level".***

Operational Definitions of the Terms Used

Achievement Motivation: In the present study achievement motivation implies the desire or need of student towardshis/her achievement. It is characheritized by a desire to attain the high standard of excellence and accomplishing something worthwhile and unique.

Mathematical Aptitude: Mathematical aptitude refers to the ability of an individual that how quickly he/she can learn to meet and solve the mathematical problems.

Secondary School Students: Secondary school students are those boys and girls who are studying in class 10^{th} standard in government and private schools of Haryana affiliated to Board of School Education Haryana, Bhiwani.

Objective of the Study

The objectives of the study were:

- To compare the achievement motivation of students of government and private schools at secondary level.
- To compare the mathematical aptitude ofstudents of government and private schools at secondary level.
- To compare the achievement motivation of male and female students of schools at secondary level.
- To compare the mathematical aptitude of male and female students of schools at secondary level.
- To compare the achievement motivation ofurban and ruralstudents of schools at secondary level.
- To compare the mathematical aptitude ofurban and rural students of schools at secondary level.
- To study the relationshipbetween achievement motivation and mathematical aptitude of students of schools at secondary level.

Hypotheses

The hypotheses formulated for this study were as following-

- There exists no significant difference between the achievement motivation of students of government and private schools at secondary level.
- There exists no significant difference between the mathematical aptitude ofstudents of government and private schools at secondary level.
- There exists no significant difference between the achievement motivation of male and female students of schools at secondary level.
- There exists no significant difference between the mathematical aptitude of male and female students of schools at secondary level.

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- There exists no significant difference between the achievement motivation of urban and rural students of schools at secondary level.
- There exists no significant difference between the mathematical aptitude of urban and rural students of schools at secondary level.
- To study the relation/correlation between achievement motivation and mathematical aptitude of students of schools at secondary level.

Methodology

Researchers adopted a normative survey method to study the problem

Sample

For the purpose of the study 480 students of 10th standard at secondary level from the districts- Fatehabad and Yamunanagar of Haryana state were selected as a sample.

Tool

Researchers used self constructed and standardized *Mathematical Aptitude Test* (MAT) and a standardized *Achievement Motivation Scale* developed by Prof. Pratibha Deo & Dr. Asha Mohan to collect data for the present study.

Statistical Techniques Used

The collected data was subjected to statistical analysis namely means, standard deviation, correlation and t-test to test the framed hypothesis.

Results and Discussions

The researcher collected relevant data and subjected to statistical analysis and interpreted according to the norms.

Table-1: Achievement Motivation and Mathematical Aptitude of Students (Overall)

Group	N	Mean	SD
Mathematical Aptitude	480	17.82	5.62
Achievement Motivation	480	142.63	17.12

Table-2: Achievement Motivation of Students (Overall)

Group	N	Mean	SD
Government Schools Students	240	139.34	16.66
Private Schools Students	240	145.91	16.97
Urban	240	143.20	16.96
Rural	240	142.06	17.29
Male	240	140.77	17.79
Female	240	144.48	16.25

Table-3: Mathematical Aptitude of Students (Overall)

Group	N	Mean	SD
Government Schools Students	240	15.98	4.93
Private Schools Students	240	19.63	5.57
Urban	240	17.61	5.27
Rural	240	18.04	5.95
Male	240	16.91	5.19
Female	240	18.63	5.78

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Table-4: Achievement Motivationof Government and Private school students

Group	N	Mean	S.D.	t score	df	Level of Significance	Interpretation
Government	240	139.34	16.66	4.280	478	0.01	**SD**
Private	240	145.91	16.97				

Above table-4 shows that mean score of achievement motivation of government and private school students are 139.34 and 145.91 respectively. Obtained t score is 4.280 which is significant at 0.01 level of significance. So, the hypothesis "There exists no significant difference between the achievement motivation of the students of government and private schools at secondary level" is rejected. Mean value deduce that private school students are having more achievement motivation in comparison to government school students. One reason its behind may be that private schools paidmore attention towardsacademic achievements/ educational competition of students in comparison to government schools.Private schools have a delicately infrastructure and have to face more competitions among themselves. On other hand government schools have lack of infrastructure and they do not have to face any competition among themselves.

Table-5:Mathematical Aptitudeof Government and Private school students-

Group	N	Mean	S.D.	t score	df	Level of Significance	Interpretation
Government	240	15.98	4.93	7.605	478	0.01	**SD**
Private	240	19.63	5.57				

Table no.-5 shows that obtained t scoreis 7.605 which is significant at 0.01 level of significance. So hypothesis- "There exists no significant difference between the mathematical aptitude of the students of government and private schools at secondary level" is rejected. Mean value statistics is inferring that mathematical aptitude of private school students are more in comparison to the students of government school. There may be few reasons i.e. most of private schools provide extra classes or zero period and more focus is to enhance students' problem solving or problem encounter skills about mathematics in comparison to government schools. Most of the parents of private schools students are richer; much aware of his/her child's academic progress in subjects- mathematics, science and English; and pay heavy fees for coaching but on other side most of students' parents are below poverty line; lack of awareness.

Table-6: Achievement Motivation of Male and Femalestudents-

Group	N	Mean	S.D.	t Score	df	Level of Significance	Interpretation
Male	240	140.77	17.79	2.387	478	0.01	**NS**
Female	240	144.48	16.25				

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This above table shows that t score is 2.387 which is not significant at 0.01 level of significance. So hypothesis- "There exists no significant difference between the achievement motivation of male and female students of school at secondary level" is accepted. The statistics of mean value is inferringthat achievement motivation of female students is more in comparison to male students. Possible reasons behind this may be-in Indian society a girl student has to follow many social restrictions as compare to boy student. In free time female students are more involved in house-hold activities and less engagement with social media. Consequently, they pay more attention to their study.

Table- 7: Mathematical Aptitude of Male and Femalestudents-

Group	N	Mean	S.D.	t score	df	Level of Significance	Interpretation
Male	240	16.91	5.19	3.555	478	0.01	**SD**
Female	240	18.63	5.78				

Obtained t score in above table-7 is 3.555 which issignificant at 0.01 level of significance. So, hypothesis- "There exists no significant difference between the mathematical aptitude of male and female students of school at secondary level" is rejected. Mean value infer that female students are having more mathematical aptitude than that of male students. Some possible reasons for this may be- in present scenario, governments and parents are as much aware about girl child's education as they were for boy's education. Scope of job for female students is very limited so their mathematical aptitude is high because they are very sincere towards their mathematical reasoning and problem solving skills.

Table- 8: Achievement Motivationof Urban and Rural students-

Group	N	Mean	S.D.	T Score	df	Level of Significance	Interpretation
Urban	240	143.20	16.96	0.725	478	0.01	**NS**
Rural	240	142.06	17.29				

Table no.-8 shows that t score is 0.725 which is not significant at 0.01 level of significance. So hypothesis- "To compare the achievement motivation of urban and rural students of school at secondary level" is accepted. On the basis of mean value it can be concluded thatachievement motivation of urban students is more than that of rural students. Achievement motivation of urban students is high because most of the their parents are above poverty line; much aware of his/her child's academic progress in different subjects; and able topay fees for coaching but on other side most of students' parents are below poverty line; lack of awareness. Another possible reason may be-an urban student has more opportunities and facilities than a rural student.

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Table- 9: Mathematical Aptitude of Urban and Rural students-

Group	N	Mean	S.D.	t score	df	Level of Significance	Interpretation
Urban	240	17.61	5.27	0.847	478	0.01	**NS**
Rural	240	18.04	5.95				

The t score in table-9 is 0.847 which is not significant at 0.01 level of significance. So hypothesis- "There exists no significant difference between the mathematical aptitude of urban and rural students of school at secondary level" is accepted. Here mean value infer that rural students are having more mathematical aptitude in comparison to urban students. Some possible reasons may be- rural students have more opportunities to use mathematical knowledge and skills beyond the classroom due to more practical lifestyle. Another one, they now get the opportunities to interact with recorded lectures of mathematics in addition to class due to the more advancement of ICT. So, mathematical aptitude of rural students is high than that of urban students.

Table- 10: Mathematical Aptitude and Achievement Motivation of Students

Group	N	Mean	S.D.	Cor. Coff. (r)	Level of Significance	Interpretation
Mathematical Aptitude	480	17.82	5.62	r=1	0.01	**SD**
Achievement Motivation	480	142.63	17.12			

Table no.-7 shows that valueof correlation coefficient (r) is 1.00 which is significant at 0.01 level of significance. So hypothesis- "To study the relationship between achievement motivation and mathematical aptitude of students of schools at secondary level" is rejected. On the basis of correlation coefficient (r) it can be infer that there is highly positive correlation between mathematical aptitude andachievement motivation of students at secondary level. Thus, the correlation between both variables implies that mathematical aptitude of students' increases as achievement motivation increases and decreases by decreasing.

Educational Implications

The findings revealed that it will be provide a useful resource to school authorities, parents, mathematics researchers, mathematics educators, mathematicians, counsellors, psychologists, state and centre governments, educationists and more significant to those who are directly or indirectly concerned with students' progress. It would be provide a resource material for policymakers to understand the relationship between achievement motivation and mathematical aptitude of students at secondary level. The study will be enhancing more

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knowledge of school teachers to identify the responsible factors for high achievement motivation and mathematical aptitude of students. The study also focuses on some improved teaching strategiesby which teachers can improve the encounter skills among students towards mathematical problems. Also findings will be helpful to organize panel discussion, symposiums, workshops, seminars etc. on the importance and relationship between achievement motivation and mathematical aptitude' at different level of education for stockholders, educationists, administrations and teachers. The achievement motivation of rural students found to be low because most of their parents are below poverty line; not much aware of his/her child's academic progress in different subjects; lack of proper monitoring, and not able to pay fees for coaching. So, there is an immediate need to revitalize the achievement motivation of rural students by providing proper monitoring to parents, more aware to parents about government schemes and policies, aware for scholarships schemes, proper monitoring of teaching by heads in schools.

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