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A Study on Mathematical Achievement of Secondary School Students in Relation to Reasoning Ability

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Abstract

This study was conducted to find out the impact of academic achievement in mathematics on reasoning ability of secondary school students. The sample consisted of 1000 secondary school students from Vijayapur district of Karnataka state. Mathematical Interest Inventory and Reasoning Ability Test were used to collect data. The statistical techniques were used the Mean, Standard-Deviation, t-test and Pearson's Product Moment Method of Coefficient of Correlation. The result showed that there exists no significant difference in mathematical achievement of secondary school students.

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Introduction

Civilized people have always recognized mathematics as an integral part of their cultural heritage. Mathematics is the oldest and most universal part of our culture, in fact, for we share it with the entire world and it has roots in the most ancient of times and the most distant of lands. Many people think mathematics is a difficult subject to study. However, there a few who like it and even create fun in it. The good thing is that all of them accept that it is a very useful subject because of its utilitarian nature especially in science and technology. A lot of people talk about mathematics but very few do mathematics.

Mathematical reasoning is a broad term containing many perspectives and meanings. Each researcher dealing with mathematics education has his or her own perspective on this topic. Most researchers, mathematicians and mathematics educators define mathematical reasoning as a process, which contains at least one of the mental and math-related activities such as reasoning, abstracting, conjecturing, representing and switching between different representations, visualizing, deducing, inducing, analyzing, synthesizing, connecting, generalizing, and proving (Schoenfeld, 1992; Tall, 1991; Burton, 1984). In this study, Mathematical reasoning is defined as "the development of a mathematical point of view- valuing the process of mathematization and abstraction and having the predilection to apply them; and the development of competence with tools of the trade and using those tools in the service of the goal of understanding structure" (Schoenfeld, 1992, p. 335) Student achievement is seen as the most important indicator of national development. A country cannot develop its socioeconomic situation without enhancing students' achievement (Greaney & Kellaghan, 2008) focused to increase student achievement that is the key to alleviating poverty and improving economic competitiveness. In the Standards for test construction achievement is viewed basically as the competence a person have in an area of content. This competence is the result of many intellectual and nonintellectual variables. The Mathematics Achievement is seemed as the marks obtained on mathematics subjects by the students.

Therefore if one wants to learn something he should try to catch hold from the very beginning the grand mother is the interest. It is equally true for the learning of mathematics. In a mathematics class a teacher should try to inculcate sufficient interest in his classroom teaching so that the subject mathematics may not be treated as dull, tiresome and difficult.

Review of Related Literature

Hidi (2011) Studying entitled "Interest and Its Contribution as a Mental

Resource in Learning" stated that our preference in processing certain types of information is determined by our interest most of the time. She continued that our interest can also affect our cognitive functions and learning. She proposed that there is a huge difference in psychological and physiological processes when the information received is interesting or not. Study is an essential in everyday life .When we have to make a decision in a surrounding that is new to us or when the decision refer to contact that is unknown we tend to relate to similar past experiences to find an answers. This distinguishing feature of mathematical is called mathematical reasoning, reasoning that makes use of the structural organization by which the parts of mathematics are connected to each other and not just to the real world object of our experience, as when we employ mathematics to calculate some practical result.

Diaynostica (2000) study on working memory capacity explain reasoning ability and a little bit more and suggest that specific working memory resources as opposed to general capacity are the limiting factors for corresponding counterparts in the structure of mental abilities .

Manger and Rolf (2010) study on reasoning and academic performance in this study found that belonging to classes with a numerical majority of boys or girls did not affect the achievement of the either roxes.

Yenilmz and Sungur (2011) study of revealed statistically significant mean different b\w students at high and low formal levels with respect to achievement, and stepwise multiple regression analysis revealed that reasoning ability, prior knowledge and gender were significant predatory of students achievements in photo synthesized reparation plants explaining 41% of the variance 997 the variance.

The Problem

The present investigation is titled as: **"A Study on Mathematical Achievement of Secondary School Students in Relation to Reasoning Ability".**

Objectives of the Study

1. To study the significant difference between boys and girls of secondary schools in relation to achievement in mathematics.
2. To study the significant difference between students of urban and rural secondary schools in relation to achievement in mathematics.
3. To study the significant difference between boys and girls of secondary schools in relation to reasoning ability.
4. To study the significant difference between students of urban and rural secondary schools in relation to reasoning ability.

Variables of the Study

In the present study the following variables were considered:

Independent Variable

- Reasoning Ability

Moderator Variable

- Gender (Boys and Girls)
- Location (Rural/Urban)

Method of Research

The present study is a Descriptive survey research method.

Research Design

The present study is a descriptive survey research. The research design specifies the questions to be investigated, the process of sample selection, methods of procedure to be followed, measurements to be obtained and comparison and other analyses to be made. Secondary school students were considered for the study.

Hypotheses of the Study

1. There is no significant difference between boys and girls of secondary schools in relation to achievement in mathematics.
2. There is no significant difference between students of urban and rural secondary schools in relation to achievement in mathematics.
3. There is no significant difference between boys and girls of secondary schools in relation to reasoning ability.
4. There is no significant difference between students of urban and rural secondary schools in relation to reasoning ability.

Research Tools Used

The following tool was used for collection of data.

- Reasoning Ability Test by Sadhna Bhatnagar
- Mathematical Interest Inventory by L.N.Dubey

Sample of the Study

The study consists of 1000 samples of students of secondary schools selected from Government, Aided and Un-aided schools by using stratified random sampling technique.

Statistical Techniques

In the present study 't' test is used to know the difference between logical thinking in mathematics of the secondary school students

Data Analyses and Interpretation

Table-1: Mean, SD, SE, t-value and p-value Urban and Rural Secondary school students with respect to Achievement in Mathematics

Location	Mean	SD	SE	t-value	P-value	Signi.
Urban	43.15	11.40	0.48	8.2402	0.0001	S
Rural	38.86	10.42	0.54			

From the results of the above table, it can be observed that, the students of urban and rural secondary schools differ significantly with respect to their academic achievement scores (t=8.2402, p=0.0001) at 5 percent level of significance. The chance for the wrong rejection of null hypothesis is zero. Therefore, it may reject H_0. Hence, it is concluded that, the students of urban secondary schools have significantly higher academic achievement as compared to students of rural secondary schools. The mean and SD are also presented in the following figure.

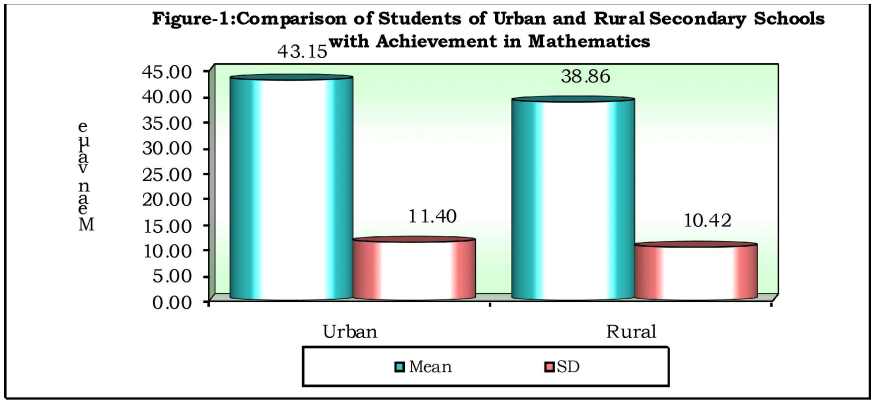


Table-2: Mean, SD, SE, t-value and p-value of Urban and Rural Secondary School Students with respect to Reasoning Ability

Variable	Location	Mean	SD	SE	t-value	P-value	Signi.
Reasoning Ability	Urban	70.03	14.70	0.72	7.0237	0.0001	S
	Rural	64.20	20.60	0.83			

From the results of the above table, it can be observed that,

Ø The students of urban and rural secondary schools differ significantly with respect to reasoning ability scores (t=7.0273, p=0.0001) at 5 percent level of significance. The chance for the wrong rejection of null hypothesis is zero. Therefore, we may reject H_0. Hence, it is concluded that the students of urban secondary schools

have significantly higher reasoning ability as compared to students of rural secondary schools. The mean and SD are also presented in the following figure.

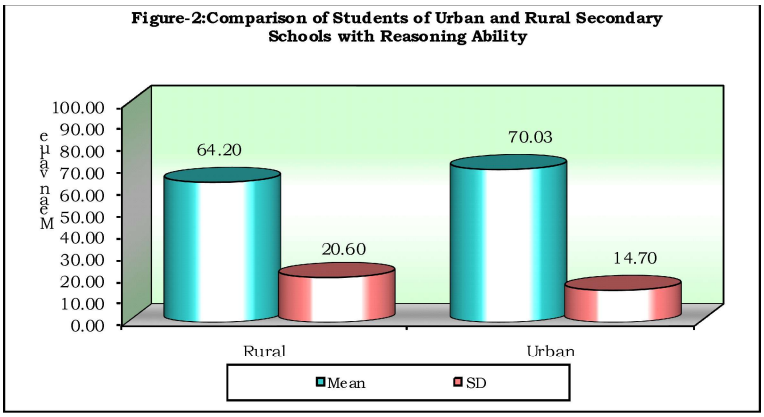


Table-3: Mean, SD, SE, t-value and p-value among Boys and Girls of Secondary Schools with respect to Academic Achievement

Gender	Mean	SD	SE	t-value	P-value	Signi.
Boys	33.25	11.19	0.54	7.2514	0.0001	S
Girls	38.80	12.83	0.48			

From the results of the above table, it can be observed that, the Boys and girls of secondary schools differ significantly with respect to their academic achievement scores (t=7.2514, p=0.0001) at 5 percent level of significance. The chance for the wrong rejection of null hypothesis is zero. Therefore, we may reject H_0. Hence, it can be concluded that the girls of secondary schools have significantly higher academic achievement as compared to boys of secondary schools. The mean and SD are also presented in the following figure.

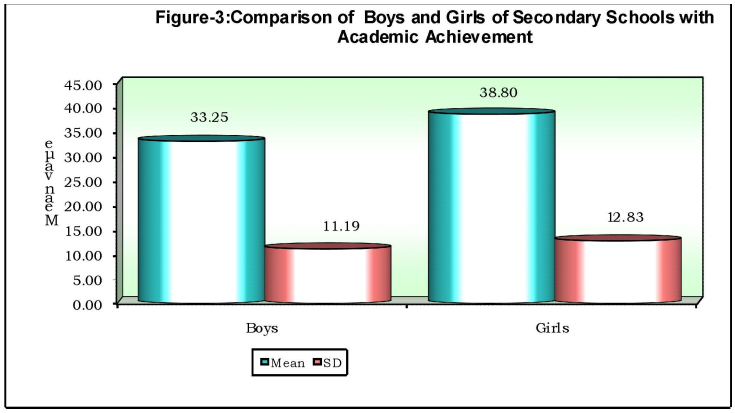
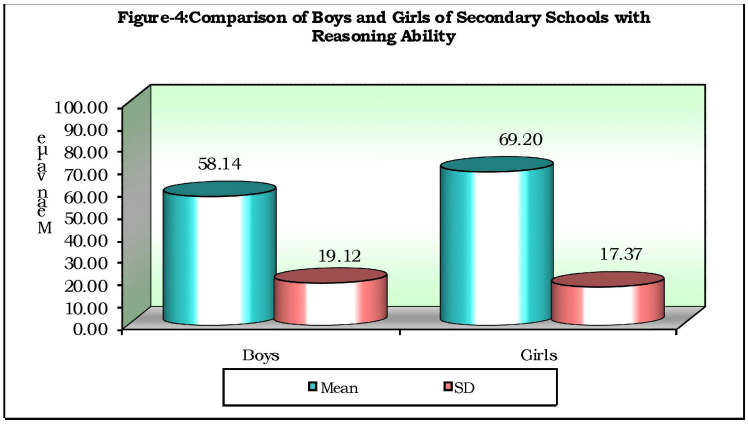


Table-4: Mean, SD, SE, t-value and p-value between Boys and Girls of Secondary Schools with respect to Reasoning Ability

Variable	Managements	Mean	SD	SE	t-value	P-value	Signi.
Reasoning Ability	Boys	58.14	19.12	0.81	6.2401	0.0001	S
	Girls	69.20	17.37	0.79			

From the results of the above table, it can be observed that,

Ø The Boys and Girls of secondary schools differ significantly with respect to reasoning ability scores (t=6.2401, p=0.0001) at 5 percent level of significance. The chance for the wrong rejection of null hypothesis is zero. Therefore, we may reject H_0. Hence, we concluded that, the girls of secondary schools have significantly higher reasoning ability as compared to boys of secondary schools. The mean and SD are also presented in the following figure.



Findings of the Study

1. The students of urban secondary schools have significantly higher academic achievement as compared to students of rural secondary schools.
2. The students of urban secondary schools have significantly higher reasoning ability as compared to students of rural secondary schools.
3. The girls of secondary schools have significantly higher academic achievement as compared to boys of secondary schools.
4. The girls of secondary schools have significantly higher reasoning ability as compared to boys of secondary schools.

Conclusions

In the light of analysis and interpretation of the data following conclusions

were drawn from sample taken in the present study:

There was a significant difference in mathematical achievement and reasoning ability of secondary school students. It was also found that there is a significant difference in academic achievement in mathematics and reasoning ability of boys and girls.The students of urban secondary schools have significantly higher academic achievement in mathematics and also they are higher reasoning ability as compared to students of rural secondary schools.The result of the study shows that the girls of secondary schools have significantly higher academic achievement as compared to boys of secondary schools.The girls of secondary schools have significantly higher reasoning ability as compared to boys of secondary schools.

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