

Scientific Aptitude and Academic Achievement: A Study on Tribal Students

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Abstract- The present study used the descriptive-correlation research design, the study aimed to examine the relationship between the scientific aptitude and academic achievement in science of tribal 12th grade students. The population of the study comprised of 298 class-XII science students from nine Govt higher secondary schools. Out of all the 298 class-XII science students, the researcher selected 221 12th grade science students through random sampling technique. Pearson's product moment were used to treat the data as statistical tool. Finding shows that except for the science vocabulary, all other dimensions of scientific aptitude such as reasoning, numerical ability and scientific vocabulary shows moderate positive correlation with academic achievement in science. Science vocabulary alone showed low but positive correlation. Therefore, pertaining to overall scientific aptitude and science achievement of govt higher secondary school 12th grade student positively co-related to each other.

Index Terms- Scientific Aptitude, Academic Achievement, Tribal Students

I. INTRODUCTION

Scientific aptitude plays a vital role in science education and in the lives of students pursuing science education. The first and foremost aspect of the present study is to examine the influence and important of scientific aptitude of students on their achievement in science.

Aptitude is a component of a competency to do a certain kind of work at a certain level. Outstanding aptitude can be considered "talent". Aptitudes may be physical or mental. Aptitude is inborn potential to do certain kinds of work whether developed or undeveloped. Ability is developed knowledge, understanding, learned or acquired abilities (skills) or attitude. The innate nature of aptitude is in contrast to skills and achievement, which represent knowledge or ability that is gained through learning. Aptitude is a special skill or ability in a person to perform a particular task in a better way. It differs from general intelligence.

The aptitude was distinguished from general intelligence and was considered as the capacity to acquire proficiency with the given amount of training, formal or informal, likewise scientific aptitude is concerned with proficiency in science. Scientific aptitude includes curiosity, observation, identification, description, experimental investigation, and theoretical explanation of phenomena. Factors such as creative abilities,

capacity for critical thinking, ability to see relationships, open-mindedness, suspended judgment, physical development, social and emotional maturity, moral character, interest, attitudes and skills were also facets of scientific aptitude. And these factors may be immensely responsible for achievement in science which will helps in tracing out the problems concerned in study.

The present study aims to understand scientific aptitude as determinants of achievement in science. There are many studies conducted on science achievement and scientific aptitude. One study conducted by Stanly S. Leo, (2016) on achievement of science shows that the level of scientific aptitude is low of standard ix students in Pondicherry region as their mean score 38.64 is below low average. The study also found that girls and boys differ significantly in their scientific aptitude and achievement. Manichander, T, Brindhamani, M, (2014) on Academic achievement and scientific aptitude among the students of standard X revealed that the aided school students are having higher scientific aptitude as compared to the government school students. The urban school students are having higher scientific aptitude as compared to the rural school students. The female students are having higher scientific aptitude as compared to the rural schools students. The urban school students are having higher academic achievement in science as compared to the rural school students. Rao, Digmurthy Bhaskara, (1990), has also conducted a research study entitle "A comparative study of scientific attitude, scientific aptitude and achievement in biology at secondary school level". The study found that scientific aptitude in secondary school pupils was average. The pupils of private schools, residential schools, English medium schools and urban schools held a bit more scientific aptitude. There was also a highly significant and positive association among scientific aptitude and achievement in biology. The achievement in biology was average. The rural schools, residential schools, English medium schools and government schools were better achievement. As such many studies were conducted on secondary school level thereby few reviewed were conducted on higher secondary level. Therefore, it is very much necessary to look into the various determinants which affect science achievement in higher secondary level.

II. STATEMENT OF THE PROBLEM

"Scientific Aptitude and Academic Achievement: A Study on Tribal Students".

Operational terms used

1. **Scientific Aptitude:** It refers to the score obtained in SABT manual by the class-XII science students.
2. **Academic Achievement in science:** The term achievement refers to the mark score on final examination of class-XII science students.
3. **Tribal Students:** Students belonging to scheduled tribes of Arunachal Pradesh.

Objectives of the Study: The main objectives of the study are put as under:

1. To find out the relationship between the academic achievement of 12th grade students in science subject and their scientific aptitude.
2. To find out the relationship between academic achievement of 12th grade students in science subject and different variables of scientific aptitude.
3. To find out the relationship between the academic achievement of 12th grade students in different science subject and their scientific aptitude.

Hypotheses of the study

1. There will be no relationship between the academic achievement of 12th grade students in science subject and their scientific aptitude.
2. There will be no relationships between academic achievement of 12th grade students in science subject and different variables of scientific aptitude.
3. There will be no relationships between the academic achievement of 12th grade students in different science subject and their scientific aptitude.

Methodology:

The present study adopts descriptive survey method of educational research.

Population: The population of the present study comprised of 229 class-XII science students of Govt higher secondary school.

Sample: Out of all the 229 class-XII science students, the researcher selected 221 science students through random sampling technique.

Tools used:

4. Scientific Aptitude Test Battery (SATB) developed by Agarwal K.K and Aurora, S. (2005)
5. Mark scored on final examination of class-xii science students.

Statistical technique used:

The data obtained were analysed by employing Pearson's Product Moment Method, 'r'-technique was used to employ to find out the relationship between the academic achievement of 12th grade students in science and their scientific aptitude.

III. RESULT AND INTERPRETATION:

Objective 1: To find out the relationship between the overall Academic Achievement of 12th Grade Students in Science and their Scientific Aptitude.

Hypothesis 1: There will be no relationship between the Academic Achievement of 12th grade Students in Science Subject and their Scientific Aptitude.

The following table shows the coefficient of correlation between academic achievement of 12th grade students in science subject and their scientific aptitude.

Table 1.1: Correlation between Academic Achievement and Scientific Aptitude

Variables	Mean	SD	df	Compute d r	Description
Academic Achievement	208.12	65.95	(2, 219)	0.67	Moderate
Scientific Aptitude	188.36	41.59			

Interpretation of the result

The mean and the standard deviation of academic achievement of 12th grade students in science and their scientific aptitude were calculated as 208.12, (65.95) and 188.36, (41.59) respectively. This indicates that the overall academic achievement and scientific aptitude of 12th grade students fall in average category. A low standard deviation indicates that the marks scored by 221 12th grade students in science subject and scientific aptitude scale tend to be very close to the mean scores.

From the above table 1.1, it can be clearly observed that there exists moderate positive relationship between overall academic achievement of 12th grade students in science and their scientific aptitude, $r = 0.66$ with $df (2, 219)$. These positive relationships imply that as any of the variables increases, then the 12th grade students' academic achievement in science increases and vice-versa.

Objective 2: To find out the relationship between Academic Achievement of 12th Grade Students in Science Subject and different variables of Scientific Aptitude.

Hypothesis 2: There will be no relationships between Academic Achievement of 12th Grade Students in Science Subject and different variables of Scientific Aptitude.

Table 2.1: correlation between Academic Achievement and different variables of Scientific Aptitude

Variables	Mean	SD	df	Compute d r	Description
Reasoning ability	35.83	12.72	(2,219)	0.67	Moderate
Numerical ability	22.24	8.14		0.49	Moderate
Scientific information ability	45.48	14.13		0.47	Moderate

Scientific vocabulary ability	84.8 1	20.7 7	0.39	Low
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Interpretation of the Result

The mean and the standard deviation of academic achievement of 12th grade students in science and different variables of their scientific aptitude were calculated. The mean of reasoning ability, numerical ability, scientific information ability and scientific vocabulary ability were found as 35.83, 22.24, 45.48 and 84.81 respectively. A low standard deviation indicates that the marks scored by 221 12th grade students in science subject and

different variables of scientific aptitude scale tend to be very close to the mean scores.

From the above table 2.1, it can be clearly observed that academic achievement of 12th grade students in science subject and different variables of scientific aptitude scale shows moderate positive correlation with df (2, 219) except for the scientific vocabulary ability. These positive relationships imply that as reasoning ability, numerical ability and scientific information ability increase then the 12th grade students' academic achievement in science increases and vice-versa. The relationship between academic achievement of 12th grade students in science and scientific vocabulary is low.

Table A: Correlation Matrix between Achievement of 12th Grade Students in Science and Scientific Aptitude

Variables		Overall Academic Achievement	Overall scientific Aptitude	Reasoning test	Numerical test	Science information test	Science vocabulary test
Overall Achievement	Academic	1					
Overall Aptitude	scientific	0.6574	1				
Reasoning ability		0.6721	0.7283	1			
Numerical ability		0.4987	0.6321	0.4389	1		
Science ability	information	0.4744	0.7571	0.4588	0.4631	1	
Science ability	vocabulary	0.3866	0.7936	0.3619	0.2898	0.3732	1

Interpretation of the Result:

From the above matrix table A, it can be clearly observed that there exists significant positive relationship between overall academic achievement of 12th grade students in science and their scientific aptitude, $r = 0.66$ with df (2, 219). These positive relationships imply that as any of the variables increases, then the 12th grade students' academic achievement in science increases and vice-versa. Except for the science vocabulary all the other variables such as reasoning ability, numerical ability and science information show moderate positive correlation with achievement of 12th grade students in science subject. However, science vocabulary shows low but positive correlation and hence no strong association with academic achievement. Regardless of 12th grade students' science vocabulary, academic achievement may be low, average or high.

Objective 3: To find out the relationship between the academic achievement of 12th grade students in different science subject and their scientific aptitude.

Hypothesis 3: There will be no relationships between the academic achievement of 12th grade students in different science subject and their scientific aptitude.

Table 3.1: Correlation between Scientific Aptitude and different Science Subject

Variables	df	Mean	SD	Computed r	Description
Achievement in Physics	6	48.3	17.4	0.54	Moderate
Achievement in Chemistry	7	51.2	17.5	0.71	High
Achievement in Biology	4	57.1	17.7	0.72	High
Achievement in Maths	(2,219)	50	19.5	0.36	Low

Interpretation of the Result:

From the above table it is observed that:

From the above correlation table 3.1, it can be clearly observed that there exists significant positive relationship between scientific aptitude and academic achievement of 12th grade students in different science subject. The calculated r value for physics, chemistry, biology and mathematics was found to be 0.54, 0.71, 0.72 and 0.36 respectively at df=(2, 219). These positive relationships imply that as scientific aptitude scores increase, then the 12th grade students' academic achievement in

different science subject such as physics, chemistry, biology and mathematics increases and vice-versa.

Result also indicates that correlation between scientific aptitude and achievement in chemistry and biology subject are high while correlation between physics and mathematics subject showed moderate and low but positive relationship respectively.

IV. DISCUSSION AND CONCLUSION:

The present study was undertaken to analyze the scientific aptitude and science academic achievement of tribal population and also attempt was made to find out any relationship between different science subject such as physics, chemistry, biology and mathematics.

From the above findings, it is evident that the relationship between overall scientific aptitude and academic achievement of tribal students was found to be positive ($r=0.67$). This shows that higher the scientific aptitude better will be the science achievement. The studies also revealed that the other dimension of scientific aptitude like, reasoning, numerical ability, science information and scientific vocabulary shows positive correlation and affect the students' academic achievement. Therefore, pertaining to overall scientific aptitude and academic achievement among tribal students of 12th grade students showed low to moderate correlation. It means that the student who have high scientific aptitude may achieved higher marks in science subject as the findings of the study revealed that scientific aptitude and academic achievement in science subject are positively correlated to each other. The studies conducted by Synrem E., and Syiem Ibadani S., (2018), Standly (2016), Hilal A, and Omer E., (2008), and Esther Sui Chu Ho, (2006) shows positive relationship between scientific aptitude and science achievement.

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