

# **An Investigation into Comparison of Scientific Attitude of Science Students of Class XI<sup>th</sup> Studying In Private and Government Schools**

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## **ABSTRACT**

The objective the study is to compare the scientific attitude of science students of class 11<sup>th</sup> studying in private and government schools. The research is consisted of 100 science students of 11<sup>th</sup> grade Scientific attitude scale developed by Shailza Bhagwat was used in the research. In order to analyze data obtained from the survey various stastical tools were used such as t –Test, ANOVA Test in order to reach out the final conclusion . . In conclusion it can be said that good number of students are goal oriented. They have high level of scientific attitude .This also makes them to do well in their studies especially in science .The finding reported in this study justify the importance of scientific attitude . The findings have implication for the teacher of science that they should try as much they could do to develop scientific attitude among the students during the course of instruction.

## **INTRODUCTION**

Purpose of science education is to enable individuals to use scientific process skills; in other words, to be able to define the problems around them, to observe, to analyze, to hypothesize , to experiment , to conclude, to generalize and apply the information they have with the necessary skills. Pioneering researches have been conducted in science education to give a synoptic view of the trends. Veerappa (1958), for the first time, conducted a study to examine the position of science education in India and assessed the developing trends on the basis of observations in the USA, UK, etc, The feasibility of introducing these trends in Indian institutions was also investigated. He found that teaching

science through Herbartian plans, the lecture demonstration method, and essay type questions in the examinations were the then trends. Barman (1983) studied the origin and development of modern science in pre-independent India while Sharma (1984) studied school science from 1947 to 1977. The journey has been from teaching science through the integrated or concept approach, shifting from general science to separate subjects and inclusion of environmental study programmes. These studies have highlighted the various shifts in the development of modern science curricula. The development of science education in the states has been studied only by Bhattacharya (1979) in Assam and Meghalaya and Sharma (1982) in Bihar. The former study is quite comprehensive and includes school teaching, teachers, scientists and educationists, colleges and their science teachers and even examination results in arts and science, while the latter study is confined to school-level students, teachers and teacher educators. Science education in secondary schools in Bangladesh and Nepal is studied by Aziz (1984) and Bajracharya (1986) respectively. [www.education.nic.in]

### **THE ETHICS OF 21<sup>ST</sup> CENTURY SCIENCE :**

This century could see scientific discoveries ranging from designer babies to thinking machines, and such discoveries will raise profound ethical questions.

In the 20<sup>th</sup> century, the world saw huge scientific and technological advances. In physics, quantum theory and the theory of relativity revolutionized the established view of how the Universe works. In biology, the structure of DNA was discovered, establishing such fields as genetic engineering.

Technology, too, saw huge advances, such as the invention of the aero plane, nuclear power, artificial satellites, manned space-flight, medical imaging, global communications, etc.

When this progress is plotted over the period of human civilization, it appears to be increasing at an exponential rate. This suggests that the 21<sup>st</sup> century could see an even greater number of scientific and technological breakthroughs than the 20<sup>th</sup> century. The fantastic power of some of these breakthroughs will require significant ethical debate, as humanity goes from understanding nature, to fully controlling it. Predicting what new knowledge will be uncovered during this century is difficult, but some experts have speculated on where they see their fields moving over the next 100 years.

### **21<sup>ST</sup> CENTURY SCIENCE – PHYSICS :**

Physicists are trying to establish the ToE, or Theory of Everything. This all-

encompassing theory will possibly merge quantum theory with Einstein's general theory of relativity, along with new knowledge from the areas of cosmology and particle physics. The theory would be a complete scientific theory of how the Universe works. This would leave significantly less room than today for debate as to such questions as the origin of the Universe, the origin of life, and the nature of consciousness. Substantial ethical objects may be felt by some.

### **21<sup>ST</sup> CENTURY SCIENCE – CHEMISTRY :**

Chemistry, to a huge extent, drives medicine, disease, life and death. Advances in this field will have huge impacts on people's lives, possibly eradicating many of today's diseases. This increased power, however, could be used for harm, and the potential will lead to numerous ethical concerns.

### **21<sup>ST</sup> CENTURY SCIENCE – BIOLOGY :**

Biology, beyond all other areas, is likely to lead to the majority of ethical scientific debates in the 21<sup>st</sup> century. It is predicted that within a few decades, babies will be designed – key traits added, and other removed, from the unborn child's genetic makeup. This is good news for the battle against genetic disease, but a moral grey-area when tinkering with strength, intelligence, and appearance.

The science behind the origin of life is likely to be uncovered, plus the further advancement of the theory of evolution, still objected to by some religious groups

### **21<sup>ST</sup> CENTURY SCIENCE – TECHNOLOGY:**

Finally, the technology of this century will both amaze and terrify. It is expected that mind-reading devices will become a reality, leading to questions over personal freedom, as well as artificial body- parts, giving some individuals massive physical advantages over others. The area of artificial intelligence is also a potential ethical mine-field, with questions over artificial life and the nature of consciousness hitting the headlines. The above examples are no doubt the tip of the iceberg, but whatever advances are made, it is clearly going to be a fascinating period in human history. . [www.Indiauniversity.me]

### **AIMS OF TEACHING SCIENCE:**

#### **ACCORDING TO VARIOUS RECOMMENDATIONS OF NCERT**

- It should be specific and precise.
- It should be attainable.
- To explore immediate environment of the pupil.

- To formulate precise questions about various things in environment
- To classify objects, events, phenomenon.
- To arrange objects and data in a sequence as to ascertain a pattern.
- To analyze data and make a inference. (sood 2005)

### **SIGNIFICANCE OF THE STUDY :**

After the completion of secondary education, the students enter the higher secondary stage, which is the feeder stage for learning both or academic and professional lends. Consequently the learning outcomes at this stage became very important as they form the further learning at higher levels. Desirable learning outcomes not only stand for the conceptual development, namely masterly of the subject matter and related process skills, but also include the development appreciation in respect to the various subjects of study.

Now a day's many drastic changes have taken place in science throughout the world. New branches of knowledge have been searched,

new content has been accumulated and new problems have crapped up science growth both inward and outward. Experts have realized that the study of scientific attitude should serve personal as well as the social needs of the learner.

### **STATEMENT OF THE PROBLEM :**

“An investigation into comparison of scientific attitude of science students of class XI studying in private and government schools.”

### **OBJECTIVES :**

- To compare the scientific attitude of class XI Science students of Gov. and private schools.
- To compare the scientific attitude of boys and girls of class XI science students of private school.
- To compare the scientific attitude of boys and girls of class XI science students of Gov. School.
- To find out the effect of fathers occupation on scientific attitude of science students of class XI.
- To find out the effect of Mothers occupation on scientific attitude of science students of class XI.

- To find out the effect of father's qualification on scientific attitude of science students of class XI.
- To find out the effect of Mothers qualification on scientific attitude of science students of class XI.
- To compare the scientific attitude of science students of class XI on basis of medium.

## **METHOD ADOPTED IN THE PRESENT STUDY**

present study is concerned with 'survey type' the investigator has adopted the survey method to study the scientific attitude of senior secondary school students objectives. Survey is a "fact finding" study. Jhon W. Best(2006) states, "The survey method gathers data from a relatively large number of cases at particular time". It involves interpretation, measurement, classification, evaluation and generalization. All directed towards the proper understanding and solution of significant educational problems. Thus survey approach is necessary for the collection of facts information relevant to the problem, the investigator deals with.

## **POPULATION AND SAMPLE**

Random sampling method applied for the selection of sample of this study. At first list of all senior secondary schools located in Patna was prepared in order to randomly select the schools to be included in the study. The investigator used lottery method to draw sample. The investigator in present study has selected 100 students of senior secondary school studying in class XI science. Out of which 50 students are from government school and 50 students are from private school. Out of these 100 sample 60 students are male and 40 students are female.

## **TOOLS USED IN PRESENT STUDY**

For present study investigator has used scientific attitude scale constructed by Dr. Shailaja Bhagwat [SBSAS]. The scale was constructed by the Likert method of summated rating. Initially 40 items were constructed by considering previous literature and all aspects related to scientism. On the basis of item analysis finally only 24 items [12 favorable and 12 unfavorable to the issue] were selected on the criterion of the discriminative value. "1" representing strongly disagree and "5" representing strongly agree for positive items. Weightings for negative items were reversed in computation.

## METHOD OF DATA ANALYSIS

Data collected for this study were analyzed using *Median, Standard Deviation ,t – Test and ANOVA Test.*

## RESULTS:

### NULL HYPOTHESIS 1:

There is no significant difference in the scientific attitude of science students of class XI of Government and Private school.

TABLE 1. shows the summary of t-value between students of Private and Government school in there Scientific Attitude .

TABLE 1:

Showing t-ratio

Back ground	N	Mean	S.D	t- ratio	Level of significance
Govt. school	50	84.06	10.07	1.41	N.S*
Private school	50	80.52	14.58		

\* Not significant

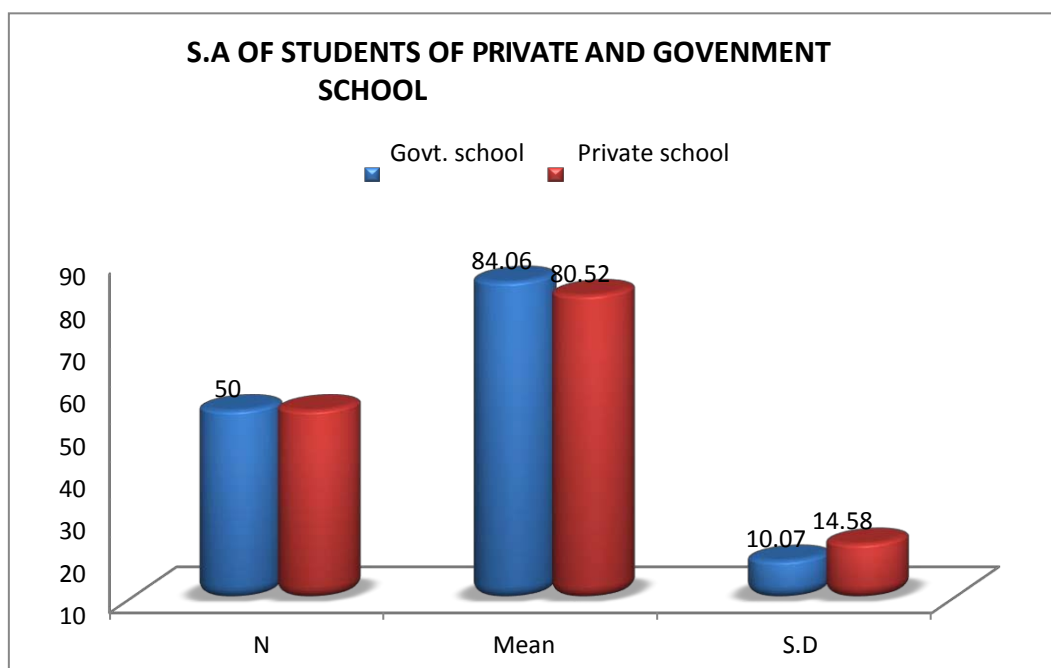


FIG 1.

For 98 degree of freedom at 5% level of significance ,the table value of ‘t’ is 1.98. The calculated value of ‘t’ is 1.41. which is less than the ‘t’ value of the table . Hence the Null hypothesis is not rejected. There is no significant difference in scientific attitude of science students of class XI of Government and private school.

**NULL HYPOTHESIS 2:**

There is no significant difference in scientific attitude of science students of class XI on the basis of medium.

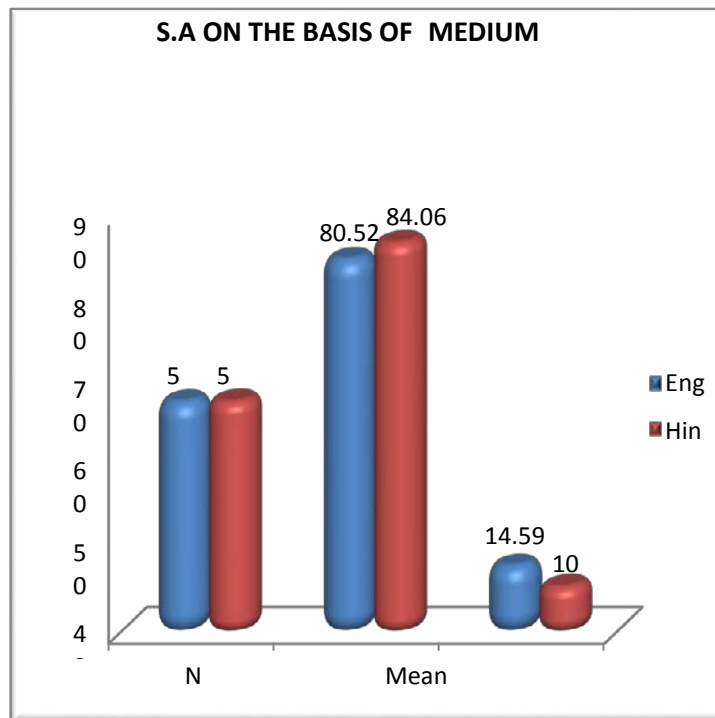
TABLE 4.2 shows the summary of t-value with regard to scientific attitude of science students of class XI on the basis of medium.

**TABLE 2:**

Showing t-ratio

Back ground	N	Mean	S.D	t-ratio	Level of significance
Eng	50	80.52	14.59	1.41	N.S*
Hindi	50	84.06	10.07		

N.S\* = Not significant



**FIG:2.**

For 98 degree of freedom at 5% level of significance , the table value of ‘t’ is 1.98 and calculated value ‘t’ is 1.41 which is less than the t value of the table .Hence the Null hypothesis is not rejected .There is no significance difference in the scientific attitude of science students of class XI on the basis of medium.

**NULL HYPOTHESIS 3:**

There is no significant difference in scientific attitude of class XI science boys and girls of Government school.

TABLE .3: Shows the summary of t – value with regard to scientific Attitude of class XI science boys and girls of Government school.

TABLE .3:

showing t-ratio

Back ground	N	MEAN	S.D	t-value	Level of significance
Girls	20	84.75	7.63	0.59	N.S*
Boys	30	82.83	82.83		

N.S\* = Not significant

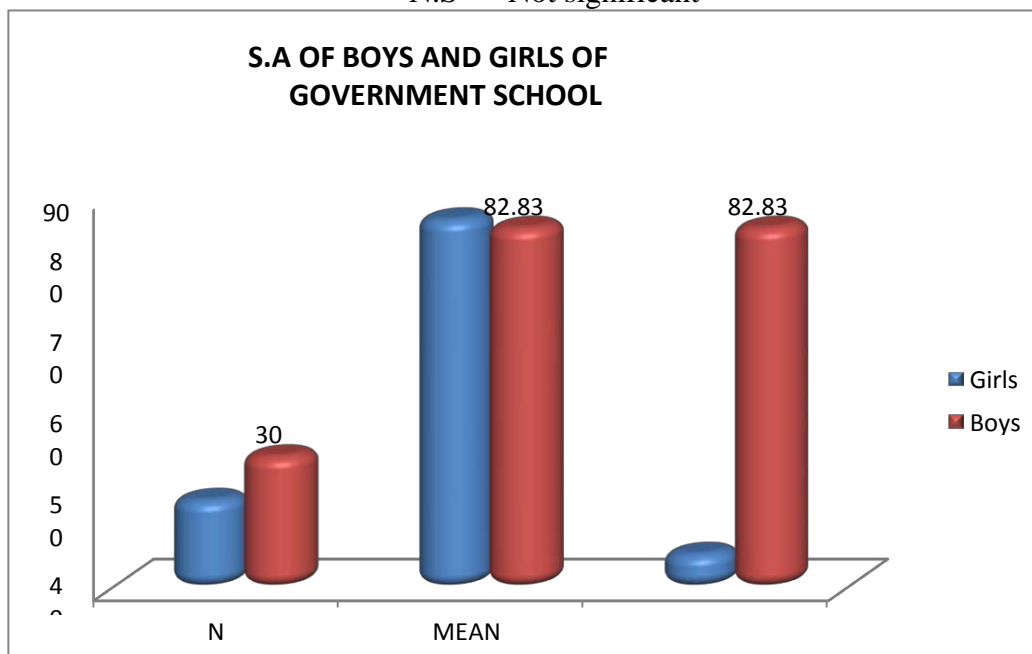


FIG:3.

For 48 degree of freedom at 0.05 level of significance , the table value of ‘t’ is 2.01 and calculated value ‘t’ is 0.59 which is less than the t – value of the table .Hence the Null



hypothesis is not rejected. There is no significant difference in the scientific attitude of class XI science boys and girls of government school.

**NULL HYPOTHESIS 4 :**

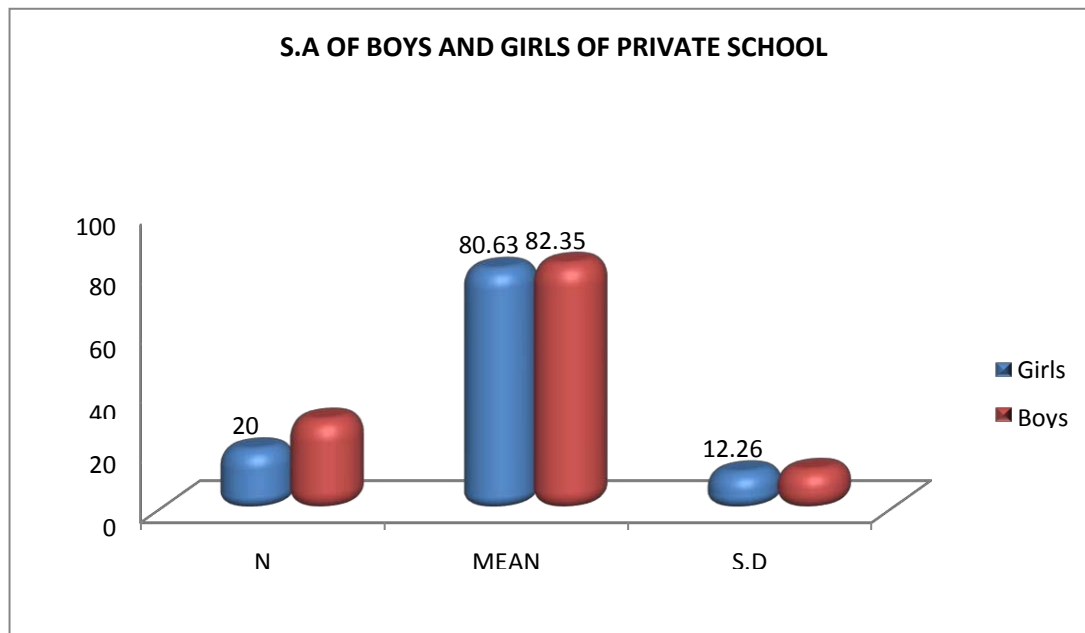
There is no significant difference in scientific attitude of class XI science boys and girls of Private school.

**TABLE 4:** Shows the summary of t – value with regard to scientific Attitude of class XI science boys and girls of Private school.

**TABLE 4**  
showing t-ratio

Back ground	N	MEAN	S.D	t-value	Level of significance
Girls	20	80.63	12.26	0.46	N.S*
Boys	30	82.35	13.11		

N.S\* = Not significant



**FIG: 4**

For 48 degree of freedom at 0.05 level of significance, the table value of 't' is 2.01 and calculated value 't' is 0.46 which is less than the t – value of the table. Hence the Null

hypothesis is not rejected. There is no significant difference in the scientific attitude of class XI science boys and girls of Private school.

**NULL HYPOTHESIS 5 :**

There is no significant difference in scientific attitude of science students of class XI on the basis of their father’s occupation.

TABLE 4.2 shows the summary of F- value with regard to the effect of father’s occupation on scientific Attitude of class XI science students.

TABLE 5 SHOWING  
F-RATIO

Source of variation	df	Sum of square	Mean variance	F-ratio	Level of significance
Between group	2	1009.26	504.63	3.98	Beyond 0.01 level
Within group	94	11889.7	126.48		

For 2/94 df at 5% level of significance the table value of F is 3.10 For 2/94 degree of freedom at 0.05 level of significance, the table value of ‘F’ is 3.10 and the calculated value of ‘F’ is 3.98 which is more than the ‘F’ value of table. Hence the null hypothesis is rejected. Thus, there is significant difference in the scientific Attitude of science students of class XI on the basis of their Father’s occupation. It means Father’s occupation influences the vocational choice.

**NULL HYPOTHESIS 6 :**

There is no significant difference in scientific attitude of science students of class XI on the basis of their mother’s occupation.

TABLE 6. shows the summary of F- value with regard to the effect of mother’s occupation on scientific Attitude of class XI science students.

**TABLE 6 SHOWING  
F-RATIO**

Source of variation	df	Sum of square	Mean variance	F-ratio	Level of significance
Between group	2	688780.3	344390.2	57.37	Beyond 0.01 level
Within group	97	582209	6002.15		

For 2/97 df at 5% level of significance, the table value of F is 3.10.

For 2/97 degree of freedom at 0.05 level of significance, the table value of ‘F’ is 3.10 and the calculated value of ‘F’ is 57.37 which is more than the ‘F’ value of table. . Hence the null hypothesis is rejected .Thus, there is significant difference in the scientific Attitude of science students of class XI on the basis of their mother’s occupation .It means mother’s occupation influences the vocational choice.

**NULL HYPOTHESIS 7 :**

There is no significant difference in scientific attitude of science students of class XI on the basis of their father’s qualification.

TABLE 7. shows the summary of F- value with regard to the effect of father’s qualification on scientific Attitude of class XI science students.

**TABLE 7. SHOWING  
F-RATIO**

Source of variation	df	Sum of square	Mean variance	F-ratio	Level of significance
Between group	4	682061.3	170515.32	23.95	Beyond 0.01 level
Within group	94	669096	7118.05		

For 4/94 df at 5% level of significance the table value of F is 2.47

For 4/94 degree of freedom at 0.05 level of significance, the table value of 'F' is 2.47 and the calculated value of 'F' is 23.95 which is more than the 'F' value of table . Hence the null hypothesis is rejected .Thus, there is significant difference in the scientific Attitude of science students of class XI on the basis of their Father's qualification. It means Father's qualification influences the scientific Attitude.

**NULL HYPOTHESIS 8 :**

There is no significant difference in scientific attitude of science students of class XI on the basis of their mother's qualification.

TABLE 8. shows the summary of F- value with regard to the effect of mother's qualification on scientific Attitude of class XI science students.

TABLE 8. SHOWING F-RATIO

Source of variation	df	Sum of square	Mean variance	F-ratio	Level of significance
Between group	3	663688.03	221229.34	31.88	Beyond 0.01 level
Within group	94	652282.42	6939.17		

For 3/94 df at 5% level of significance the table value of F is 2.70.

For 3/94 degree of freedom at 0.05 level of significance, the table value of 'F' is 2.70 and the calculated value of 'F' is 31.88 which is more than the 'F' value of table . Hence the null hypothesis is rejected .Thus, there is significant difference in the scientific Attitude of science students of Class XI on the basis of their mother's qualification. It means mother's qualification influences the scientific Attitude.

**FINDINGS :**

- The ‘t’ test reveals that there is no significant difference in the scientific Attitude of science students of class XI of Government and Private school.
- The ‘t’ test reveals that there is no significant difference in scientific Attitude of science students of class XI on the basis of medium. It means medium does not influence the scientific attitude.
- The ‘t’ test reveals that there is no significant difference in scientific Attitude of class XI science boys and girls of Government school.
- The ‘t’ test reveals that there is no significant difference in scientific Attitude of class XI science boys and girls of Private school.
- The ANOVA test reveals that there is that is significant difference in scientific Attitude of science students of class XI on the basis of their father’s occupation. It means father’s occupation influences the vocational choice.
- The ANOVA test reveals that there is significant difference in scientific Attitude of science students of class XI on the basis of their mother’s occupation. It means father’s occupation influences the vocational choice.
- The ANOVA test reveals that there is significant difference in scientific Attitude of science students of class XI on the basis of their father’s qualification. It means father’s qualification influences scientific attitude.
- The ANOVA test reveals that there is significant difference in scientific Attitude of science students of class XI on the basis of their mother’s qualification. It means mother’s qualification influences scientific attitude.

**LEVEL OF SCIENTIFIC ATTITUDE :**

- 15% of students have very high, 61% of them have high, 19% moderate, 5 % of them

have low and nil % them have very low level of Scientific Attitude in total.

- 17 % male students have very high, 70% of them have high .  
23% moderate , 7% low and nil % of them have very low level of Scientific Attitude in total.
- 12 % female students have very high, 70% of them have high . 20% moderate , nil % low and nil % of them have very low level of Scientific Attitude in total.
- 10 % government school student have very high, 60% of them have high . 22% moderate , 8% low and nil % of them have very low level of Scientific Attitude in total.
- 12 % private school students have very high, 64% of them have high . 16% moderate , 2% low and nil % of them have very low level of Scientific Attitude in total.

### **INTERPRETATIONS :**

Out of 100 students, 15% of them have very high ,61 % have high,19% have moderate and 5% have low level of scientific attitude. This may be due to that their parents may not have time, resources or they don't know how to help them. Also, parents may be not in a position to provide all the facilities needed due to financial constraints.

The 't' test reveals that there is no significant difference in the scientific Attitude of science students of class XI of Government and Private school. This may be due to the advancements in science and technology , both is getting equal opportunity to develop and expose their capabilities without much social hindrances.

The 't' test reveals that there is no significant difference in scientific attitude of science students of class XI on the basis of medium. It means medium does not influence the scientific attitude.

The 't' test reveals that there is no significant difference in scientific Attitude of class XI science boys and girls of Government school and Private school. This may be due to that parents, friends, elders and the society treat and give equal importance to both boys and girls to bring out their potentialities.

According to F – test there is significant difference in the Scientific Attitude of Science students of class XI on basis of their parent's socioeconomic status. It means that their socioeconomic status influences the Scientific Attitude and their vocational choice. This may be due to the number of factors such as:

- i) Interest of their parents towards education.
- ii) Some genetic factor.
- iii) Lack of scientific attitude and aptitude. .

### **CONCLUSION :**

This study is concerned with the study of scientific attitude of the senior secondary school students. In conclusion it can be said that good number of students are goal oriented. They have high level of scientific attitude .This also makes them to do well in their studies especially in science .The finding reported in this study justify the importance of scientific attitude . The findings have implication for the teacher of science that they should try as much they could do to develop scientific attitude among the students during the course of instruction.

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