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Scientific Attitude Among Secondary School Students: A Comparative Analysis by School Type, Gender, Class, and Achievement Level

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Abstract:

The main objective of the study was to study Scientific Attitude among Secondary School Students: A Comparative Analysis by School Type, Gender, Class, and Achievement Level. The study used a descriptive survey approach to examine how secondary school students' attitudes towards science vary by demographic factors. A total of 162 students participated in the study, comprising 80 students from the CBSE school and 82 students from the State Board school. The Scientific Attitude Scale developed and standardized by Avinash Grewal was used. The collected data were analyzed using independent samples t-tests. The study found a significant difference in the scientific attitude of secondary school students with respect to school type and academic achievement level, whereas no significant difference was observed with respect to gender and class level.

Keywords: *Secondary school, Students, Science, Scientific Attitude, NCF*

Introduction

Science is one of the most important disciplines in school education, as it plays a vital role in developing students' scientific thinking abilities. Students exhibit curiosity and interest in understanding phenomena around them through a scientific approach. Sharma (1990) rightly defined science as "an accumulated and systematized body of knowledge, generally restricted to natural phenomena, and emphasized that the progress of science is marked by the emergence of the scientific method and scientific attitude (as cited in Meenakshi, 2019). The National Curriculum Framework (NCF-2005) also highlights that good science education should be true to the learner, true to life, and true to the environment (Bai, 2023). One of the primary objectives of science education is to develop scientific attitude among

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students. A scientific mindset encourages learners to experiment, adapt to new situations, and overcome challenges, thereby promoting a sense of achievement and self-efficacy (Bhan and Khanduri, 2025). Scientific attitude involves the tendency to think and act scientifically and reflects the ability to respond rationally, objectively, and consistently to novel or problematic situations (Banerjee, 2024). The development of scientific attitude is a central goal of science education, as it promotes rational thinking, objectivity, and problem-solving skills among students. In this background, the present study was undertaken to examine the scientific attitude of secondary school students.

Review of Related Literature

Chandel, (2016) carried out a scientific attitude among senior secondary school students. The study revealed that boys students were better in their scientific attitude as compared to girls students. The senior secondary school students showed equal level of overall scientific attitude as well as on different dimensions of scientific attitude. Revati and Meera (2017) made an investigation of scientific attitude among secondary school students in Kottayam District of Kerala. The study found that, the secondary school students were identically distributed among each group based on scientific attitude. There was no significant difference in scientific attitude of secondary school based on gender, type of management and locality. Parasurama, (2020) studied investigating variables influencing difference in an attitude of secondary school students towards science. The study found that government school showed higher attitude towards science than the private school. Related to overall sample Gender wise analysis revealed that no difference in the attitude of boys and girls towards science. Whereas specifically girls showed higher attitude towards science than the boys of government school. Whereas gender difference is not observed in attitude of science in private school students. Victoria, (2022) applied descriptive survey research for a study on the scientific attitude of the secondary school students. The study found that the private students had significantly higher levels of scientific attitude compared to the government students, the rural students had similarly high and low levels of scientific attitude like of urban students and the girls students had significantly similar, more or less levels of scientific attitude like that of the boys students. Ahammad and Islam, (2023) conducted research on a study of scientific attitude among secondary school students in Murshidabad District. The study exhibited that the level of Scientific attitude among secondary school students in Murshidabad District was varied. And there was a significant difference scientific attitude among boys and girls, government-aided and private schools, urban and rural students. Whereas no significant difference in scientific attitude among secondary schools students of Bengali

medium d English medium in Murshidabad district. Peseyie, (2024) a study on the scientific attitude of secondary school students in Mokokchung District, Nagaland. The study found that secondary students possessed low level of scientific attitude. Students from private secondary schools exhibited greater scientific attitude compared to students from government secondary schools. Students from urban schools also showed significant difference in scientific attitude in comparison to rural schools.

From the review of related literature, it was observed that several studies have examined the scientific attitude of secondary school students. In the present study attempted to examine the scientific attitude of secondary school students drawn from CBSE and State Board schools located in Bangalore city and to make a comparative analysis based on school type, gender, class, and achievement level.

Statement of the Problem

Scientific Attitude among Secondary School Students: A Comparative Analysis by School Type, Gender, Class, and Achievement Level

Objectives of the Study

1. To determine whether a significant difference exists in the scientific attitude of secondary school students from CBSE and State Board schools
2. To establish whether a significant difference exists in the scientific attitude of VIII and IX class secondary school students.
3. To identify whether a significant difference exists in the scientific attitude of boys and girls secondary school students.
4. To verify whether a significant difference exists in the scientific attitude of low- and high-achievement secondary school students.

Hypothesis of the Study

1. There is no significant difference in scientific attitude of CBSE and State board background secondary school students
2. There is no significant difference in scientific attitude of VIII and IX class secondary school students
3. There is no significant difference in scientific attitude of boys and girls secondary school students
4. There is no significant difference in scientific attitude of Low and High achievement secondary school students

Research Design

The study used a descriptive survey approach to examine how secondary school students' attitudes towards science vary by school type school type, gender, class, and achievement level.

Sample of the Study

The data for the present study were collected from two secondary schools located in Bangalore city, of which one school was affiliated with the CBSE

Board and the other with the State Board. A total of 162 students participated in the study, comprising 80 students from the CBSE school and 82 students from the State Board school. The sample included students studying in the VIII and IX standards.

Tool Used in the Study

The Scientific Attitude Scale developed and standardized by Avinash Grewal was used for data collection in the present study. The scale consists of 20 items rated on a five-point Likert scale, ranging from Strongly Agree to Strongly Disagree, to measure the scientific attitude of students.

Statistical Techniques Used in the Study

Collected data was analyzed by computing independent sample t-test.

Analysis and Interpretation of Data

Hypothesis-1: There is no significant difference in scientific attitude of CBSE and State background secondary school students

Table-1: Comparison of scientific attitude of CBSE and State background secondary school students

Schools	N	Mean	SD	df	t-value	p-value	S/NS
CBSE	80	72.1250	4.6399	160	6.229	.001	S (p<.05)
State Board	82	66.8049	6.1110				

To test Hypothesis-1, which stated that there is no significant difference in the scientific attitude of CBSE and State background secondary school students, an independent samples t-test was applied. The analysis included a total sample of 162 secondary school students, comprising 80 students from CBSE schools and 82 students from State Board schools.

The mean scientific attitude score of CBSE school students was 72.1250 with a standard deviation of 4.6399, whereas the mean scientific attitude score of State Board school students was 66.8049 with a standard deviation of 6.1110. The calculated t-value was 6.229 with 160 degrees of freedom. The corresponding p-value was .001, which is less than the level of significance 0.05.

Since the obtained p-value (.001) is less than 0.05, the difference between the mean scores is statistically significant. Therefore, the null hypothesis stating that there is no significant difference in the scientific attitude of CBSE and State background secondary school students is rejected. The results clearly indicate that CBSE school students possess a significantly higher level of scientific attitude than State Board school students.

Hypothesis-2: There is no significant difference in scientific attitude of VIII and IX class secondary school students

Table-2: Comparison of scientific attitude of VIII and IX class secondary school students

Class	N	Mean	SD	df	t-value	p-value	S/NS
VIII Class	78	68.5769	6.3788	160	1.7478	.082	NS (p>.05)
IX Class	84	70.2262	5.6277				

To examine Hypothesis-2, which stated that there is no significant difference in the scientific attitude of VIII and IX class secondary school students, an independent samples t-test was employed. The total sample comprised 162 secondary school students, including 78 students from VIII Class and 84 students from IX Class.

The mean scientific attitude score of VIII Class students was 68.5769 with a standard deviation of 6.3788, whereas the mean scientific attitude score of IX class students was 70.2262 with a standard deviation of 5.6277. The calculated t-value was 1.7478 with 160 degrees of freedom. The obtained p-value was .082, which is greater than the level of significance 0.05.

Since the p-value (.082) exceeds .05, the difference between the mean scores of VIII and IX Class students is not statistically significant. Therefore, the null hypothesis stating that there is no significant difference in the scientific attitude of VIII and IX class secondary school students is accepted. This indicates that class level does not significantly influence the scientific attitude of secondary school students.

Hypothesis-3: There is no significant difference in scientific attitude of boys and girls secondary school students

Table-3: Comparison of scientific attitude of boys and girls secondary school students

Gender	N	Mean	SD	df	t-value	p-value	S/NS
Boys	90	69.2889	6.0061	160	.3365	.737	NS (p>.05)
Girls	72	69.6111	6.1175				

To examine Hypothesis-3, which stated that there is no significant difference in the scientific attitude of boys and girls secondary school students, an independent samples t-test was employed. The total sample comprised 162 secondary school students, including 90 boys students and 72 girls students.

The mean scientific attitude score of boys students was 69.2889 with a standard deviation of 6.0061, whereas the mean scientific attitude score of girls students was 69.6111 with a standard deviation of 6.1175. The calculated t-value was .3365 with 160 degrees of freedom. The obtained p-value was .737, which is greater than the level of significance 0.05.

Since the p-value (.737) exceeds .05, the difference between the mean scientific attitude scores of boys and girls secondary school students is not statistically significant. Therefore, the null hypothesis stating that there is no significant difference in the scientific attitude of boys and girls secondary school students is accepted. This indicates that gender does not have a significant influence on the scientific attitude of secondary school students.

Hypothesis-4: There is no significant difference in scientific attitude of Low and High achievement secondary school students

Table-4: Comparison of scientific attitude of Low and High achievement secondary school students

Achievement	N	Mean	SD	df	t-value	p-value	S/NS
Low Achievement	74	66.6757	5.9544	160	5.8514	.001	S (p<.05)
High Achievement	88	71.75	5.0838				

To examine Hypothesis-4, which stated that there is no significant difference in the scientific attitude of secondary school students with respect to their level of achievement, an independent samples t-test was employed. The total sample comprised 162 secondary school students, including 74 students with low achievement and 88 students with high achievement.

The mean scientific attitude score of low achievement students was 66.6757 with a standard deviation of 5.9544, whereas the mean scientific attitude score of high achievement students was 71.7500 with a standard deviation of 5.0838. The calculated t-value was 5.8514 with 160 degrees of freedom. The obtained p-value was .001, which is less than the level of significance 0.05.

Since the p-value (.001) is less than .05, the difference between the mean scientific attitude scores of low and high achievement secondary school students is statistically significant. Therefore, the null hypothesis stating that there is no significant difference in scientific attitude with respect to achievement level is rejected. This indicates that secondary school students with high achievement possess a significantly higher level of scientific attitude compared to students with low achievement.

Major Findings of the Study

The study found that 1] A significant difference was found in the scientific attitude of secondary school students belonging to CBSE and State Board schools ($t = 6.229$, $p < .05$). CBSE school students ($M = 72.125$, $SD = 4.6399$) exhibited a higher scientific attitude than State Board students ($M = 66.8049$, $SD = 6.111$). 2] No significant difference was observed in the scientific attitude of secondary school students of IX and VIII classes ($t = 1.7478$, $p > .05$). IX Class students ($M = 70.2262$, $SD = 5.6277$) and

VIII Class students (M = 68.5769, SD = 6.3788) showed nearly similar levels of scientific attitude. 3] The scientific attitude of boys and girls secondary school students did not differ significantly (t = 0.3365, p > .05). Boys students (M = 69.2889, SD = 6.0061) and girls students (M = 69.6111, SD = 6.1175) possessed comparable scientific attitude levels. 4] A statistically significant difference was found in scientific attitude with respect to achievement level (t = 5.8514, p < .05). Students with high achievement (M = 71.75, SD = 5.0838) demonstrated significantly higher scientific attitude than low achievement students (M = 66.6757, SD = 5.9544).

Discussion and Conclusion:

The present study examined the scientific attitude of secondary school students with reference to school board, class, gender, and achievement level. The findings revealed that school board and academic achievement level significantly influence scientific attitude, as students studying in CBSE schools and those with high academic achievement exhibited a higher level of scientific attitude compared to their State Board and low-achieving counterparts. These differences may be attributed to variations in curriculum emphasis, instructional strategies, and learning opportunities that promote scientific thinking and inquiry. In contrast, no significant differences were observed in scientific attitude between VIII and IX class students or between boys and girls, indicating that class level and gender do not substantially affect the development of scientific attitude at the secondary stage. Overall, the study concludes that enhancing instructional practices and academic support, particularly in State Board schools and among low-achieving students, is essential for fostering a stronger scientific attitude and promoting scientific temper among secondary school students.

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