

## Exploring Attitude Towards Science Among Higher Secondary School Science Students

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**ABSTRACT** Many students choose science because of parental pressure, so this study aims to investigate the attitude of students who have chosen science at the higher secondary level. The investigator constructed an attitude scale with 26 items, standardised using statistical tools. The data was collected from 2,899 students studying in various government and private higher secondary schools in Manipur. The finding shows that students have a positive attitude towards science. The result also shows that even though students have a positive attitude towards science, there is a significant difference in attitude between male and female students. However, no significant difference is found regarding the type of school and the school's location.

### INTRODUCTION

Science education is the key to the development of any nation. Therefore, every country tries to strengthen its science education. A positive attitude towards science helps acquire knowledge of it. However, often parents stress their children to pursue science subjects without considering their interests and understanding their children's attitudes towards science education. In a small state like Manipur, India, especially the Meitei community, parents give the science subject top priority. Therefore, parents and students choose the science discipline in the higher secondary stage even though the school may have limited infrastructure to offer the science discipline. In this regard, Ornek (2015) highlights that social and cultural background influences the student development of attitude towards science in the classroom. The study also focuses on Asian students' preference for science and considers it a prestige within the community. Mansour (2025) mentioned cultural factors, particularly ethnicity, that influence job preference and students' perceptions about science and career choices in science. A similar result was also

found by Abe and Chikoko (2020) that family, personality, and expectation play important roles in choosing a career in science. Therefore, some students will choose science out of parental and societal pressure. Such choices will make the students demotivated or cause burnout later in life. In this regard, Dadlani (2019) highlights the prevalent mindset of today's society where education is seen as the only means to secure high-paying jobs, overlooking the intrinsic value of learning and exploration. However, fostering a genuine appreciation for science requires a mentor who can ignite curiosity, encourage experimentation, and foster a craving for knowledge. Unwillingness or a negative attitude can ruin a student's career even if parents force them to take science. Attitudes toward science is recognised as a significant factor influencing the learning process in science education. While the concept of attitudes has been borrowed from psychology, its application in science education has faced challenges due to vague definitions and inconsistencies in measurement and analysis methods (Fishman et al. 2021). However, despite these challenges, scholars have a consensus regarding the need of promoting a positive attitude toward science for facilitating learning in science education.

To address this issue, Fraser (1981) proposed a comprehensive classification of aims in science education, which includes six categories of attitudes toward science:

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1. Distinctions between attitudes toward science and scientists
2. Attitude toward inquiry
3. Adoption of scientific attitudes such as curiosity and open-mindedness
4. Enjoyment of science learning experiences
5. Interest in science beyond learning experiences
6. Interest in a career in science

Therefore, attitudes toward science significantly impact students' engagement and achievement in science education. Fostering positive attitudes requires deliberate efforts from educators to incorporate attitude-building strategies alongside traditional content delivery. By recognising the importance of attitudes in science education and implementing effective pedagogical practices, educators can empower students to develop a lifelong appreciation for science and its applications.

Since higher secondary education is a crucial milestone in a student's academic journey, this stage will open many gateways to a more competitive platform in the job market. By equipping students with essential competencies and knowledge, this educational phase empowers individuals to pursue diverse career paths and contribute meaningfully to society. Moreover, for students hailing from disadvantaged backgrounds or families entrenched in poverty, higher secondary education offers a pathway towards socio-economic mobility and empowerment (Rose and Dyer 2008). This stage is crucial as students choose a school subject to shape their careers. If students choose science with a positive attitude, they will succeed in finding a job related to science. However, if they have a negative attitude and have taken the subject due to parental and peer pressure, they may be unable to secure a science-related job. Therefore, the study is carried out to investigate the science students' attitudes towards science education.

### Objectives

The study's objectives are:

1. To investigate the attitude of secondary school science students towards science.
2. To investigate if there is any significant difference in attitude among the gender (male and female) toward science education.
3. To investigate if there is any significant difference in attitude among the students based on type of school (private and government).
4. To investigate if there is any significant difference in attitude among the students based on location of school (hill and valley).

### Hypotheses

The study aimed to explore the following hypotheses.

1. There is no significant difference between the attitude among the gender (male and female) toward science education.
2. There is no significant difference between the attitudes among the students based on the type of school (private and government).
3. There is no significant difference between the attitude among the students based on location of school (hill and valley).

### Review of Literature

Dosanjh (2015) conducted a study on secondary school students' attitudes towards life science. The finding showed that girls exhibited a higher level of interest in life science than boys across all dimensions. This suggests that girls are more inclined towards subjects or topics related to life science. Additionally, the study shows no significant difference among the mean scores of students from different age groups on the attitude questionnaire.

Gupta et al. (2015) proposed that there were positive correlations between students' perceptions of their laboratory learning environments and their attitudes towards science. The study also noted gender differences, with female students scoring higher on Science Laboratory Environment Inventory (SLEI). The female score was found higher for the Attitude Towards Science Scale also.

Sethi (2015) investigated students' attitudes towards science related to non-school factors. A sample of 100 students was taken. The study findings were based on mean, standard deviation, and t-tests concerning the gender, locality, and socio-economic status of students. Results indicated significant differences among the urban and rural students, while no significant differences were found on gender and socio-economic rank.

Asiri (2018) conducted a study on the attitudes of secondary school students in Saudi Arabia towards science, with a sample size of 150 students, including 78 boys and 72 girls. The result revealed that secondary school students generally have

positive attitudes towards science in Saudi Arabia. Additionally, no significant difference in attitudes was found towards science between male and female students.

Suman and Sinha (2019) conducted a study indicating a significant difference in the level of interest in science among secondary school students based on their parents' education. Specifically, they found that students whose parents have higher levels of education demonstrate a higher interest in science compared to those whose parents have a lower educational level. This suggests that parental educational background plays a role in developing students' attitudes and interests in science.

Lalrinpuui and Ngente (2020) conducted a study that revealed a low overall attitude of students towards science, particularly in the city of Aizawl. The results indicated that students from the private high school exhibited a better attitude than government high school towards science. The study concluded that teachers should take extraordinary measures to motivate students to develop a positive attitude towards science.

Binwal (2020) conducted a study to investigate the attitude towards science among adolescent students of 9<sup>th</sup> grade, focusing on both rural and urban areas. The research revealed a significant difference among the students in rural and urban areas towards science. A more positive attitude towards science was seen in students in urban than rural areas.

Singh (2020) conducted a study to investigate differences in science achievement and attitude towards science practicals among secondary school students in Patna, considering factors such as gender and location of schools. The research revealed disparities in science achievement between both genders and school locations, whereas differences in attitude towards science practicals were only found among school locations.

Bajaj and Devi (2021) conducted a study to evaluate secondary school students' attitudes towards science in selected government and private schools within the Jammu district. The study's findings indicated that all the students from government and private schools exhibited a positive attitude. Notably, a significant difference was observed in students' attitudes based on their academic achievement levels, showing female students to be more favourable than male. Moreover, pri-

ivate school students displayed a more positive attitude than the students in government schools.

Lalhmingangi (2022) conducted a study to assess whether students in upper secondary schools have developed positive attitudes toward science as a discipline and for its advancement in education. The study's findings indicate that many students view science positively.

AlAli and Al-Barakat (2024) investigated the young children's attitude toward learning of science. The study suggested that in order to nurture positive attitudes toward science education, knowledge acquisition should be done by enabling children to acquire skills to use scientific concepts in daily life situations, and it should also encourage hands-on learning, both in the classroom and beyond the classroom. The study also suggests prioritising child-centred approaches to learning to develop a positive attitude towards science.

Laksmana et al. (2025) explored students' attitude towards science in a junior high school. 190 students aged 12-16 years were taken as the sample from North Sumatra and West Java, Indonesia. The result revealed a positive attitude towards science among the students. However, no significant differences in attitudes could be established between male and female students towards science.

## METHODOLOGY

The investigator had chosen a descriptive survey method for the current investigation. The investigator constructed an attitude scale consisting of 26 items, wherein 16 items were positive statements and 10 items were negative statements. The reliability of the attitude scale was established by using the test-retest method on 39 students from a higher secondary school with a science stream. Pearson correlation coefficient of the test was found to be 0.86, showing high reliability. Furthermore, Cronbach's alpha test was used to find internal consistency. The result is given in Table 1.

**Table 1: Internal consistency (Cronbach's Alpha)**

| <i>Cronbach's <math>\alpha</math></i> | <i>Cronbach's <math>\alpha</math> based on standardised items</i> | <i>Number of statements</i> |
|---------------------------------------|-------------------------------------------------------------------|-----------------------------|
| 0.898                                 | 0.906                                                             | 26                          |

The Cronbach's alpha value of 0.898 indicates high internal consistency, suggesting that the scale is reliable.

### Sample

The samples for the present study are students enrolled in higher secondary schools offering science education across all eight districts of Manipur, India. The sample included a total of 2,899 students, comprising 908 male students and 1,991 female students.

**Table 2: Sample of the study**

| <i>Sample and sub-sample</i> | <i>Number of respondents</i>     | <i>Total</i> |
|------------------------------|----------------------------------|--------------|
| Gender                       | Male: 908<br>Female: 1991        | 2899         |
| Type of school               | Government: 989<br>Private: 1910 |              |
| Location of school           | Hill: 689<br>Valley: 2210        |              |

### RESULTS

The data obtained after the survey were analysed to test the hypotheses using SPSS. The average attitude of students towards science can be interpreted from Table 3 based on the students' responses.

**Table 3: Standard deviation and mean score of the students' attitude towards science**

| <i>Sample and sub-sample</i> | <i>N</i> | <i>Mean</i> | <i>S.D</i> |
|------------------------------|----------|-------------|------------|
| Entire sample                | 2899     | 99.80       | 11.61      |
| Male                         | 908      | 100.08      | 11.74      |
| Female                       | 1991     | 99.68       | 11.55      |
| Government                   | 989      | 97.49       | 11.98      |
| Private                      | 1910     | 101.01      | 11.23      |
| Hill                         | 689      | 99.20       | 10.65      |
| Valley                       | 2210     | 99.99       | 11.89      |

The mean score of the total sample is 99.80, which is relatively high, as any response can have a score of 26 to 130. It shows that the students have a positive attitude towards science. It is observed that the male students' attitude mean score is slightly higher than the total sample mean score and also the female students' mean score. It can be interpreted that the male students are found having more positive attitudes towards science. In case of students coming from the private and government schools, the mean score of private school students is much higher at 101.01, compared to students in government schools at 97.49. There-

fore, a more positive attitude towards science is found among the students in private schools than the government schools. Further, based on the location, the mean of the students in the valley region is 99.99, which is little higher than the mean of students in the hill region, that is, 99.20. It is also observed that the students' mean in the hill region is lower than the mean of the entire sample.

### Result of Hypothesis 1: There is no significant difference between the attitude of male and female students towards science education

**Table 4: Differences among gender**

| <i>Gender</i> | <i>N</i> | <i>Mean</i> | <i>S.D</i> | <i>p value</i> |
|---------------|----------|-------------|------------|----------------|
| Male          | 908      | 100.08      | 11.74      | 0.197          |
| Female        | 1991     | 99.68       | 11.55      |                |

Table 4 presents a comparison of attitudes towards science education among male and female students. The male students' mean score is 100.08 and standard deviation (SD) is 11.74, while for female students the mean score is 99.68 with an SD of 11.55. Therefore, the mean score of the males is slightly greater than the female students' mean score. The difference found is minimal. It is also seen that the standard deviation of both groups is very similar, indicating data variability is consistent. Further, the p-value, which indicates the difference of the two groups, is 0.197. Since this value is higher than the conventional significance level of 0.05, the researchers did not reject the null hypothesis. Therefore, there is no significant difference in the attitude towards science education between male and female students. This finding suggests that gender has no role in shaping attitudes towards science education in the present study.

### Result of Hypothesis 2: There is no significant difference between the attitude of students studying at government and private higher secondary schools towards science education

**Table 5: Difference among schools**

| <i>Type of school</i> | <i>N</i> | <i>Mean</i> | <i>S.D</i> | <i>p-value</i> |
|-----------------------|----------|-------------|------------|----------------|
| Government            | 989      | 97.49       | 11.98      | <.001          |
| Private               | 1910     | 101.01      | 11.23      |                |

Table 5 compares attitudes towards science education among the students studying at gov-

ernment and private higher secondary schools. The mean score for students in government schools is 97.49 with a standard deviation (S.D.) of 11.98, while for students in private schools, the mean score is 101.01 with an S.D. of 11.23. It is observed that private school students' mean score is 101.01, which is higher than that of government schools (97.49), so it can be interpreted that the students studying in private schools have a greater positive attitude towards science than students studying in government schools. Further, the *p*-value, indicating the significance level of the difference between the two groups, is less than 0.001. Since this value is smaller than the conventional significance level of 0.05, the researchers reject the null hypothesis. Therefore, there is a significant difference in the attitude towards science education between students in government and private higher secondary schools. This current finding shows that the type of school, that is, government or private, influences students' attitudes towards science education.

**Result of Hypothesis 3: There is no significant difference between the attitude of students studying at higher secondary schools located at hills and valley districts towards science education.**

**Table 6: Differences as per location of school**

| Location of school | N    | Mean  | S.D   | <i>p</i> -value |
|--------------------|------|-------|-------|-----------------|
| Hill               | 689  | 99.2  | 10.65 | 0.05            |
| Valley             | 2210 | 99.99 | 11.89 |                 |

Table 6 compares the attitudes of students located in the hills and those in valley districts towards science education. The mean score for students in hill districts is 99.20 with a standard deviation (SD) of 10.65, while for students in valley districts, the mean score is 99.99 with an S.D. of 11.89. It is observed that the mean score for students in the valley districts is higher than that of students in the hills district, so the students from the valley have a more positive attitude. Further, the *p*-value, which indicates the difference between the two groups, is 0.05. The researchers reject the null hypothesis since the value is the same as the conventional significance level of 0.05. Therefore, there is a significant difference in the attitude towards science education between students in hill and valley districts. This finding suggests that the

school's geographical location significantly influences students' attitudes towards science education.

## DISCUSSION

The study was put forth to investigate the attitude of students, especially those who have chosen science at the higher secondary level. The key finding helps understand the students' perceptions about science because it is observed that many students chose science under the pressure of their parents and family members, even though students may have chosen science due to various reasons. The present study found them to have a positive attitude towards science. This finding aligned with many studies that students hold a positive attitude towards science. Bajaj (2024) in a paper explores the students' attitude towards science in Jammu. It was found that students generally have a positive attitude. In a similar study, Canlas (2025) also observed students' positive attitude towards science. The finding also contradicts the unfavourable attitude reported in similar context on secondary students in Aizawl, (Lalruatpuii et al 2024) but aligns with the broader goal that positive attitude is essential for engagement and persistence in STEM fields (Tsai et al. 2025). An important observation in this study was the lack of significant gender differences in attitude towards science. This finding resonates with a study conducted in Nagaland, which also reported no significance difference between male and female students (Jorlim 2025). Therefore, gender differences are minimal, pointing out that females are also given the same opportunities by parents and society, and are encouraged to take up careers in STEM. Similarly, Rajput et al. (2025), in their study about scientific attitudes with respect to gender, also found no gender differences. However, this finding contradicts a study in Aizawl where female students were found to have more positive attitude than male (Lalruatpuii et al 2024) and male students were shown significantly higher interest and expectancy in math and science compared to their female peers (Tsai et al. 2025). The absence of gender gap in the present study is encouraging, particularly given the historical underrepresentation of women in STEM and the persistent stereotypes where science is often viewed as a masculine pursuit (Mansour 2024). In the case of the type of school, a significant difference was found between the at-

titudes of students studying in government and private schools. The private schools' students are found to be showing a better positive attitude than those in government schools. A similar finding was observed in a study conducted by Berkman and Renuka (2024). Their findings also reveal that private school students exhibit more positive attitudes than government schools. It also aligns with findings from Chilean educational system, where students in private schools demonstrated higher scientific literacy and better attitude compared to those in state schools attributed to resources segregation, better funding, teacher effectiveness and better infrastructure in private schools (Sanchez 2025). This difference in the present study context may be due to several factors, such as inadequate infrastructure, lack of equipment, and materials in the laboratory. In general, private schools usually have better infrastructure and mostly parents who can afford the high fees send their children to such schools. Therefore, the schools under the state government need to look closely at the resource requirements, be it laboratory equipment or material, and the lack of science teachers.

Furthermore, the study shows a significant difference in attitude amongst the students belonging to hill and valley districts. This finding reveals that geographical location and socio-cultural factors may also shape perceptions towards science education and related careers in science. While the specific reason for this difference was not explored in the current study, it may be linked to various factors like a lack of infrastructure, teacher unavailability, and less exposure to science-related activities. In a similar study comparing the rural and urban students, Binwal (2020) finds a significant difference among the attitudes of students concluding that students from rural areas have less in comparison with the urban students. The same finding was also reported by Astalini et al. (2020), revealing a difference in attitude held by students who are studying in urban and rural areas, where children from rural areas are more positive about science than their urban counterparts. Based on these results, while the overall attitude is promising the disparities in regards to school type and geographical location of schools indicate equity gaps. To address this gap stakeholder, need to intervene and plan strategy that could bridge the gap.

## CONCLUSION

In the present study, even though students may have chosen science education for various reasons, they have a positive attitude towards it. Such positivity will help in making a career in the chosen science subject. It was also seen that there was no significant difference between male and female students' attitude, even though the male students' mean score was slightly higher than that of female students. In the context of the chosen sample population, both the genders favour science education. On the basis of type of school, a significant difference between the attitude of students studying at higher secondary schools, whether government and private, was found. Further the mean score of students from the private schools was found to be much higher, showing more positive results than the students from government schools. The investigation also shows a significant difference between the students' attitude based on the location of higher secondary, that is, hills and valley district. The reasons for such differences could not be established with the current study. These results collectively suggest that while the students are positively disposed towards science, structural inequalities related to the types of school and geographical location remain significant barrier. To bridge these gaps intervention should be focus on improving the physical and psychosocial environment in government and remote hills districts.

## RECOMMENDATIONS

Based on the result of the present study, to address differences identified among students and to enrich their positivity towards science education, it is recommended that the government should prioritise funding in government higher secondary schools with science by expanding their classrooms and supplying sufficient resources for the laboratories. The government must also provide proper connectivity and infrastructure for schools in the hill district. It is a well-known fact that the infrastructure for government schools located in the hill district is not up to the mark, so the government should ensure fair distribution of resources and make science education more accessible in the hill district as well. Teachers should be professionally trained to facilitate hands-on and inquiry-

based learning of science. This will encourage students to take science in the hill districts. Also, further study can be done on the socio-cultural differences in attitude and learning of science.

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