



EXPLORING SCIENTIFIC TEMPERAMENT AMONG SECONDARY SCHOOL STUDENTS: A GENDER BASED STUDY

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Abstract

Scientific temperament refers to an individual's ability to use reason, think logically, question ideas and evaluate information based on scientific principles. For the present study the investigator selected a sample of 80 secondary school students (40 male and 40 female) using random sampling method. The scientific temper scale developed by Prof. N.A. Nadeem and Showkat Rashid Wani was administered. The data was analyzed using percentage statistics, mean, standard deviation, and t-test. It was found that male and female secondary school students vary significantly in terms of scientific temper at a significance level of 0.01. Female secondary school students exhibited a higher level of scientific temper than male secondary school students. Among secondary school students (both male and female), the majority exhibited higher levels of scientific temper and none were found to have poor scientific temper.

Keywords: *Scientific Temper, Gender, Secondary School Students, Curiosity, Open-mindedness, Objectivity, Rationality and Aversion to superstition.*



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Introduction

Scientific temper is an attitude of logical, rational, and critical thinking. Someone who frequently makes decisions using a scientific approach is said to have a scientific temperament. Jawaharlal Nehru, the first Prime Minister of India, supported scientific temper, emphasizing science and technology for the cultural and economic growth of the nation. Nehru used the phrase “scientific temper” in his book “The Discovery of India” and in 1976, India became the first country to include it in its constitution. The National Education Policy (NEP) 2020 of India recognizes the significance of promoting scientific temper among students from the foundational stage onwards, to develop curiosity and creativity. The scientific temperament is vital for the holistic growth of contemporary society free from superstitions and irrational

customs, for the country's advancement in all sectors and for encouraging tolerance of different ideas. Scientific temper is not the same as scientific knowledge, as it involves the application of scientific knowledge to everyday life. This includes the search for truth and new knowledge, the refusal to accept anything without testing and trial, the ability to change previous conclusions based on new evidence, reliance on observed facts and the hard discipline of the mind. Scientific temper points to the way forward, as it is the attitude of a free individual, a value system, an outlook on the world and an approach to one's actions and deeds. Scientific temper is a value as well as a method of achieving human rights under humanism, the only value worth striving for in socially troubled situations from domestic to international levels. The purpose of this study is to help policy makers, teachers, counselors, and researchers by promoting public understanding of science through highlighting the importance of scientific temper in everyday life. This will lead to improved quality of teaching and learning in secondary schools, as well as guidance to parents on supporting their children's development of scientific temper by better understanding their learning needs and providing appropriate support at home.

Review of Literature

In a study conducted by Biswal and Pandey (2021), it was found that secondary school students had an above average level of scientific temper overall and in all eight components, with high deviation. There were no significant differences observed between the mean scores of male and female students in terms of scientific temper as a whole and in all eight components. Thirunarayanan and Gayathri (2020) found that students who demonstrated higher levels of scientific temper achieved higher scholastic scores. Adeniyi and Oyewunmi (2021) also found a positive correlation between scientific temper and academic achievement. Ridwana (2018) revealed a significant difference between rural and urban secondary school students on various dimensions of scientific temper, while Nadeem and Sabahat (2015) found insignificant differences between rural and urban students on scientific temper. Aezum and Wani (2013) and P. Sekar and S. Mani (2013) found that there were significant differences between rural and urban secondary school students on scientific temper. Farhana Qadir (2010) and Gupta (2007) found that there were no significant differences between urban and rural secondary school students on scientific temper. Nadeem and Ridwana, (2012) found that girls showed better scientific temper than boys. There is positive relation between scientific temper and creativity. Maqbool and Sofi (2013) found that there was significant difference between science and arts students on the Curiosity and Objectivity dimensions of scientific temper. The

study further revealed that the two groups do not differ on the Open-mindedness, Rationality and Aversion to Superstition dimensions of scientific temper. Maqbool and Hafiz (2014) found that there is significant difference between Govt. and private school students on curiosity, objectivity, rationality Aversion to superstitions dimensions of scientific temper scale. Watson and Quqtman (2002) found that the high achieving girls exceeded the aspirations of average achieving girls and boys. Despite the vast research, it has been observed that there are only a few studies conducted on secondary school students in terms of scientific temper, particularly on the basis of gender.

Objectives of the Study

1. To study scientific temper of male and female Secondary School students.
2. To compare male and female Secondary School Students on scientific temper.

Hypotheses of the Study

H₀ There is no significant difference between male and female Secondary School Students on scientific temper.

Delimitation of the Study

The study was delimited to Eight Government Secondary Schools of Srinagar. The study was further delimited to class X students only in order to avoid any intervention in the results.

Operational Definition of Variables

For the purpose of present study, scientific temper has been operationally defined as the score which the investigator has got by administrating Prof. N.A. Nadeem and S.R.Wani's scientific temper scale. Secondary school students for the present study mean those students who are enrolled in Government Secondary Schools of district Srinagar and studying in class X.

Methodology

A descriptive study was selected for the present research to explore the current scenario. The population for the study comprises 798 class X students from government secondary schools in district Srinagar. A sample of 80 secondary school students was selected using Random Sampling technique. The sample was selected in a way that each unit of the population had an equal chance of being selected. To collect data from the respondents, the Scientific Temper Scale by Prof. N.A. Nadeem and Showkat Rashid Wani (2007) was employed. The scale consists of five dimensions, namely curiosity, open-mindedness, objectivity, rationality, and aversion to superstition. The scale is highly reliable, with a reliability coefficient of 0.89 (test-retest method). Percentage statistics were calculated to study the level of scientific temper of male and female secondary school students. Mean, standard deviation, and t-test were used to

find the mean difference between male and female secondary school students on scientific temper.

Analysis and Interpretation of Data

The analysis of the present study can be divided into two sections:

Descriptive Analysis

Table 1: Percentage of Secondary School Students on various levels of Scientific Temper.

Level of Scientific Temper	N	Percentage
High	11	13.75
Above Average	46	57.5
Average	22	27.5
Below Average	1	1.25
Poor	0	0
TOTAL	80	100.0

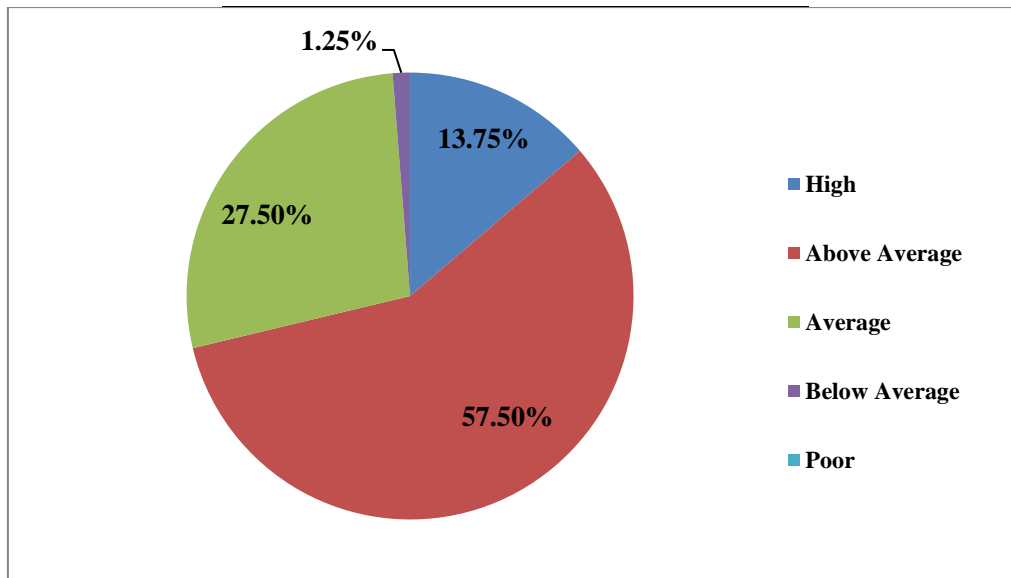


Fig. 1: Percentage of Secondary School Students on various levels of Scientific Temper.

Table 2: Percentage of Male and Female Secondary School Students on various levels of Scientific Temper.

Level of Scientific Temper	Male Students		Female Students	
	N	Percentage	N	Percentage
High	2	5	9	22.5
Above Average	17	42.5	29	72.5
Average	20	50	2	5
Below Average	1	2.5	0	0
Poor	0	0	0	0
TOTAL	40	100.0	40	100.0

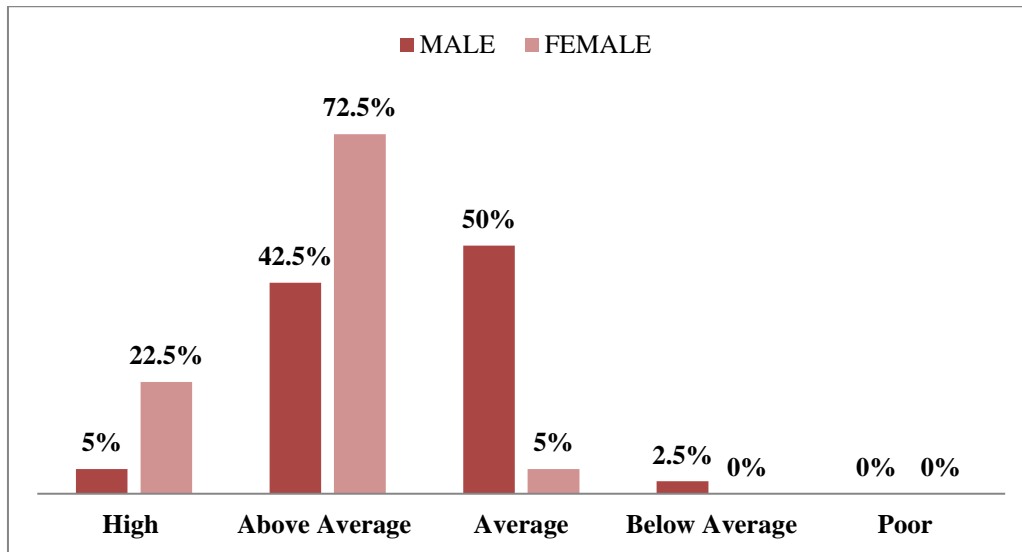


Fig. 2: Percentage of male and female secondary school students on various levels of scientific temper.

Table 1 indicates that out of the sample group of 80 secondary school students, 13.75% have a high level of scientific temper, 57.5% have an above-average level, 27.5% have an average level, 1.25% have a below-average level, and none have a poor level of scientific temper. Table 2 shows that out of the sample group of 40 male secondary school students, 5% have a high level of scientific temper, 42.5% have an above-average level, 50% have an average level, and 2.5% have a below-average level of scientific temper. None of the male students were found to have a poor level of scientific temper. For the sample group of 40 female secondary school students, 22.5% have a high level, 72.5% have an above-average level, and 5% have an average level of scientific temper. None of the female students were found to have a below-average or poor level of scientific temper.

Comparative Analysis

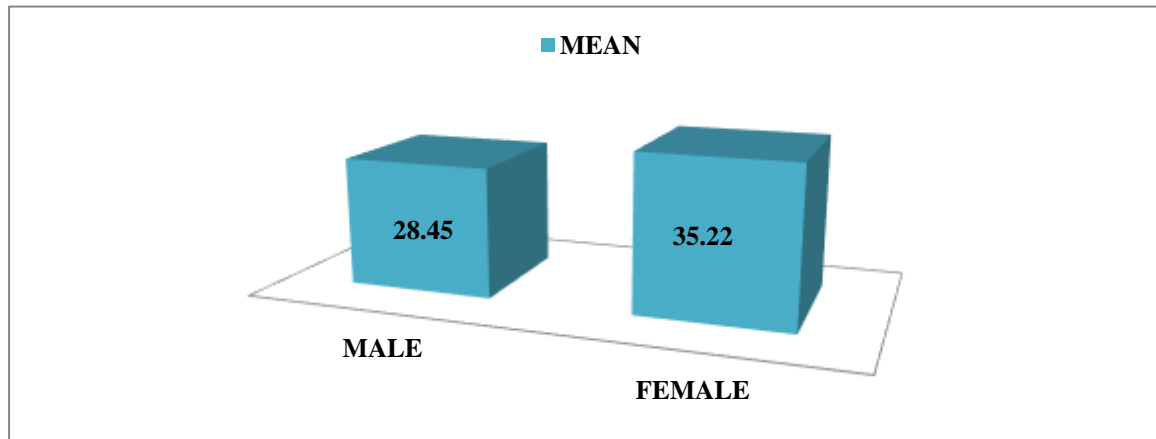
Table 3: Mean difference between Male and Female Secondary School students on Scientific Temper.

Group	N	Mean	Standard Deviation	t-value	Level of Significance
Male	40	28.45	5.71	6.02	Significant at 0.01 level
Female	40	35.22	4.24		

The above table reveals that there is a significant difference in scientific temper between male and female secondary school students. The calculated t-value of 6.02 exceeds the tabulated value at the 0.01 level of significance, indicating that the difference is statistically

significant. Additionally, the mean score of female students (35.22) is higher than that of male students (28.45). Therefore, hypothesis number one, which states that "there is no significant difference between male and female secondary school students on scientific temper," is rejected.

Fig. 3: Mean difference between Male and Female Secondary School students on Scientific Temper.



Discussion of Results

The aim of this study was to investigate the level of scientific temper among secondary school students and to compare the differences in scientific temper between male and female students. The findings of the study revealed that a significant proportion of the sample group of 80 secondary school students had an above-average to high level of scientific temper. Specifically, 13.75% of the students had a high level, 57.5% had an above-average level, 27.5% had an average level, and only 1.25% had a below-average level of scientific temper. Notably, none of the students were found to have a poor level of scientific temper.

The results of the study also indicated that there were significant differences in scientific temper between male and female secondary school students. The mean score of female students (35.22) was significantly higher than that of male students (28.45), indicating that female students had a higher level of scientific temper than male students. Furthermore, the proportion of male students with above-average to high levels of scientific temper (47.5%) was lower than that of female students (95%), while the proportion of male students with average to below-average levels of scientific temper (52.5%) was higher than that of female students (5%). These findings suggest that gender may play a significant role in determining scientific temper among secondary school students.

The finding that a significant proportion of the sample group had an above-average to high level of scientific temper is encouraging, as it indicates that many secondary school students are interested in and engaged with science. This finding is consistent with previous research that has shown that students tend to be interested in science and technology, and that interest in these subjects tends to be higher among younger students (Morrone & Reiff, 2019). Moreover, the finding that none of the students had a poor level of scientific temper suggests that science education in secondary schools may be effective in fostering interest and engagement in science among students.

The finding that there were significant differences in scientific temper between male and female students is an important result of this study. The finding that female students had a higher level of scientific temper than male students is consistent with previous research that has shown that females tend to be more interested in science and math than males (Ertl et al., 2019). This may be due to a number of factors, including differences in socialization, exposure to role models, and attitudes towards science and math. The finding that a larger proportion of male students had average to below-average levels of scientific temper than female students is also noteworthy, as it suggests that science education programs may need to be tailored to better engage male students.

There are various studies which suggest that gender differences in scientific temper exist, and that girls may have higher levels of curiosity, self-efficacy, engagement, and higher-order thinking skills in science than boys. However, it's important to note that individual differences exist within any given group and those other factors, such as cultural and societal factors may also play a role in shaping gender differences in scientific temper. A study published in the journal "PLOS ONE" found that female high school students in India had higher levels of scientific temper than their male counterparts. The study surveyed over 1,200 students and found that girls were more likely to express interest in scientific concepts and report positive attitudes toward science. A study published in the "Journal of Research in Science Teaching" found that female students in the United States were more likely to report interest and confidence in science, and were more likely to engage in science-related extracurricular activities than their male counterparts. The study surveyed over 1,000 high school students and found that girls were more likely to view science as relevant to their future careers and express interest in pursuing science-related fields.

This study provides valuable insights into the level of scientific temper among secondary school students and highlights the need to address gender differences in scientific temper. The

findings suggest that science education programs may need to be tailored to better engage male students and to promote interest and engagement in science among all students. Further research is needed to explore the factors that contribute to gender differences in scientific temper and to develop effective strategies for addressing these differences.

Conclusion

In conclusion, the present study aimed to explore the scientific temper of secondary school students and to investigate if there are any significant differences between male and female students. The findings of the study indicate that a majority of the students have an above-average level of scientific temper. However, only a small percentage of students have a high level of scientific temper. None of the students were found to have a poor level of scientific temper. Furthermore, the results of the study revealed a significant difference in the scientific temper of male and female secondary school students. Female students had a significantly higher mean score than male students, indicating that they possess a higher level of scientific temper. This suggests that there might be some gender-based differences in the development of scientific temper, which needs to be further explored.

The present study has some limitations that need to be acknowledged. Firstly, the study was conducted in only one district, which may limit the generalizability of the findings to other districts. Secondly, the sample size was relatively small, which may limit the power of the study to detect significant differences. Finally, the study did not examine the factors that might contribute to the development of scientific temper in students, such as teaching methods, curriculum, and parental involvement. Despite these limitations, the present study provides some useful insights into the scientific temper of secondary school students. The findings suggest that there is a need to develop strategies to enhance the scientific temper of students, especially male students. The results also highlight the need for further research to explore the factors that might contribute to the development of scientific temper in students. Finally, this study adds to the growing body of research on science education and provides useful information that can be used to improve science education practices.

References

- Adeniyi, O. A., & Oyewunmi, O. O. (2021). *Scientific temper and academic achievement of secondary school students in Nigeria. International Journal of Instruction, 14(1), 223-238.*
- Aezum A. and Wani, N. (2013). *Comparative evaluation of scientific temper and academic achievement among adolescent students. International Journal of Innovative Research and Development, 2 (8), 174-177.*
- Akın, S., & Arslan, H. (2021). *Scientific temper and academic achievement among high school students in Turkey. International Journal of Instruction, 14(1), 125-140.*
- Bhatnagar, R.D, (2014). *An investigation into the scientific temper in relation to scientific creativity of senior Secondary science students, Institute of Advanced Studies in Education (IASE).*
- Ertl, B., Luttenberger, S., Paechter, M., & Schreiner, C. (2019). *Gender differences in mathematics and science: What really matters? Educational Research Review, 27, 238-253.*
- Ishfaq and Ridwana (2016) *Scientific temper and creativity among higher secondary school students, An International Journal of Multidisciplinary Research, vol:2,issue1.*
- Jahanger J. and Dar G. N. (2019). *Scientific Temper of Rural and Urban Senior Secondary School Students, International Journal of Advanced Multidisciplinary Scientific Research, 2(1).*
- Maqbool, A. & Sofi, A. (2013). *Scientific temper and academic achievement of science and social science stream adolescents, Elite Research Journal of Education and Review, vol. 1(5).*
- Morrone, A. S., & Reiff, R. R. (2019). *Engagement in science, technology, engineering, and math (STEM) across the lifespan: An analysis of survey data from youth, young adults, and adults. PloS one, 14(4), e0215267.*
- Nadeem N.A. & Ridwana (2012). *Scientific temper and Creativity among Higher secondary school students, Department of Education, Kashmir University, Hazratbal (Unpublished Dissertation).*
- Nadeem N.A. & Sabahat (2015). *Scientific temper, Career preferences and Academic achievement of rural and urban secondary school students, Department of Education, University of Kashmir, (Unpublished).*
- National Education Policy (2020). *New Delhi, Ministry of Education, Government of India.*
- Thirunarayanan, R., & Gayathri, S. (2020). *Impact of scientific temper on scholastic achievement of students. International Journal of Indian Psychology, 8(2), 543-550.*