

Scientific Aptitude in Relation to Science Achievement among Secondary School Students: A Correlational Study

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Abstract

The present study finds the link between scientific aptitude and science achievement through investigation. Scientific aptitude is a potent tool dealing with scientific enquiry and the ability to apply science for academic pursuits and real-life activities. Secondary school students need support, motivation, and direction for the development of interest in science and for preparing themselves for skill advancement through science in the future. The study adopted a descriptive survey research design with a correlational approach. The sample consisted of 200 secondary school students from Prayagraj district, selected through purposive sampling from various secondary schools. The Adolescents' Scientific Aptitude Test (ASAT-KSDS), standardized by Kusum, Satish and Sumitra Devi, and the Science Achievement Test (SAT-YMRA), constructed by Moni Yadav and Ananthula Raghu, were used to collect the data. Pearson's product-moment correlation coefficient was used to examine the relationship between scientific aptitude and science achievement. A significant positive correlation was found between scientific aptitude and science achievement ($r = .403$, $p < .01$). On the basis of findings of the study, it can be concluded from the study that scientific aptitude is positively associated with science achievement among students of secondary school.

Keywords: Scientific aptitude, Science achievement, secondary school students

Introduction

Science achievement is a broad and important concept that has become central to the Indian education system, as envisaged through NEP 2020. Scientific aptitude can be understood as an individual's ability to learn scientific methods, engage in scientific enquiry, and apply science in academic pursuits as well as in real-life activities. Secondary school students are the focal point of this study, as their science achievement opens the door to their future depending upon its quality, interest, and scope. The contribution of science in shaping students' academic future and career path is well determined by its foundation at the secondary school level (NCERT, 2005). The relationship between scientific aptitude and science achievement has implications for the future planning of students as individuals and, collectively, for the path and pace of scientific development and overall growth of the nation. Students'

involvement in learning also leads to improvement in their academic achievement and increases their satisfaction.

According to Shabir Dar and Majid's (2022) study in Jammu and Kashmir's Anantnag area, students from economically deprived backgrounds also exhibit varying degrees of scientific aptitude development. According to the study, boys and girls with varying degrees of scientific ability achieved varied levels of academic success. awareness variations in scientific aptitude also requires an awareness of the relationship between gender and science accomplishment. Pal and Dey (2024) used a cross-sectional survey of tenth-grade secondary school students from six West Bengali areas to look at this. The findings demonstrated gender-based disparities in science accomplishment as assessed by behavioural, emotional, and cognitive engagement. Students' interest fosters scientific aptitude, which is a questioning style associated with objectivity and logic. Suneela, M. E., and Viveki, D. (2026) examined secondary school pupils in Andhra Pradesh's Guntur area and found that learner-centred approaches and inquiry-based learning are critical for fostering students' scientific aptitude and accomplishment. Reasoning and problem-solving abilities are developed by regular use of scientific procedures. Students, teachers, and other stakeholders all have a cumulative impact on science accomplishment, which is also resource-dependent. The research done by Singh, H., and Gautam, A. According to a study by et al. (2026) on science accomplishment among secondary school students in Uttar Pradesh in connection to scientific aptitude, instructional methods and infrastructure have a significant impact in encouraging students' scientific aptitude. Students are motivated and produce scientific thinking in a setting that encourages observation, reasoning, and application. Due to improved classroom and lab facilities, teacher-student contact, and encouraging parental support, private school students outperformed government school pupils. The development of scientific aptitude can be facilitated by consistent familiarity with science and contact at various levels and in various ways; this has to be further investigated in various geographic locations.

Review of Literature

Considering foreign and Indian literature, scientific aptitude has been found to be positively associated with science achievement. Studies by Ahmed (2007), Nataraj and Manjula (2012), Manjula (2013), Gao and Hansing (2019), Synrema and Syiem (2018), and Shabir Ahmad Dar and Ishfaq Majid (2022) have examined scientific aptitude in relation to achievement in science among secondary or high school students. Similarly, studies such as Akram et al. (2024) and Pal et al. (2024) have examined factors related to science achievement among secondary school students. These studies highlight the importance of scientific aptitude and other student-related factors in science achievement.

Research examining science achievement specifically in relation to scientific aptitude appears to be limited among secondary school students in Uttar Pradesh. The present study therefore seeks to throw light on this relationship among secondary school students in Prayagraj district and contributes to understanding the association between scientific aptitude and science achievement in the local context.

Purpose of the study

The study aims to investigate the relationship between scientific aptitude and science achievement among secondary school students. Secondary school students are central to this study as they represent a vital link between adolescence and adulthood. Their development of scientific aptitude is important for their academic achievement and for developing an interest in science and science-related learning.

Science-based achievement also contributes to the development of competence and may influence future academic and career choices. The study seeks to examine the relationship between science achievement and scientific aptitude among secondary school students. Scientific aptitude as an important aspect of science learning needs to be studied to understand its association with science achievement in the present academic context. The study involves secondary school students from different socio-economic settings and demographic backgrounds.

Objective of the Study

To investigate the relationship between scientific aptitude of secondary school students with academic achievement.

Hypothesis of the study

H₀: There is no significant relationship between scientific aptitude and science achievement among secondary school students.

Research Methodology

The study aimed to investigate the relationship between scientific aptitude and science achievement among secondary school students in Prayagraj. A descriptive survey research design with a correlational approach was adopted. The correlational approach was used to determine whether scientific aptitude and science achievement were significantly related. Numerical data were collected, the variables were identified, and the hypothesis was tested using an appropriate statistical technique.

Sample and Sampling Technique

The sample comprised of secondary schools' students studying in Prayagraj. Purposive sampling was used to select the participants. The sample consisted of 200 secondary school students. Data were collected from the selected students using the specified research instruments.

Tools for Gathering Data

Two tools were used by the researcher to collect data:

Adolescents' scientific aptitude test ASAT-KSDS: standardized by Kusum, Satish, and Sumitra Devi, consists of 66 items distributed across four dimensions: Numerical Ability, Logical Reasoning, Scientific Knowledge, and Scientific Reasoning.

Science achievement test (SAT-YMRA): Moni Yadav and Ananthula Raghu

Questionnaire with its originality was designed to undergo rigorous item analysis sorted to 60 items divided into three objectives- (i) chemistry (ii) physics (iii) Biology. which would used in assessment methods.

Data Analysis: After the data collection and in order to produce significant results, the data were analysed using the proper statistical techniques. Pearson's product-moment correlation coefficient was employed to examine the relationship between scientific aptitude and science achievement among secondary school students. The correlation between scientific aptitude and science achievement is presented in Table 1.

Result and Discussion

Table-1 shows the correlation between scientific aptitude and Science achievement of secondary school students.

Variables	N	Mean	S.D.	r
Scientific Aptitude	200	28.4500	9.33236	.403**
Science achievement		25.5700	10.12411	

**Significant at 0.01 level*

The Pearson product-moment correlation coefficient was used in this investigation. Table 1 shows a positive correlation between scientific aptitude and science achievement among secondary school students. The correlation coefficient ($r = .403$) indicates a moderate positive relationship between scientific aptitude and science achievement. The relationship between scientific aptitude and science achievement is further illustrated through the scatter plot presented in Figure 1.

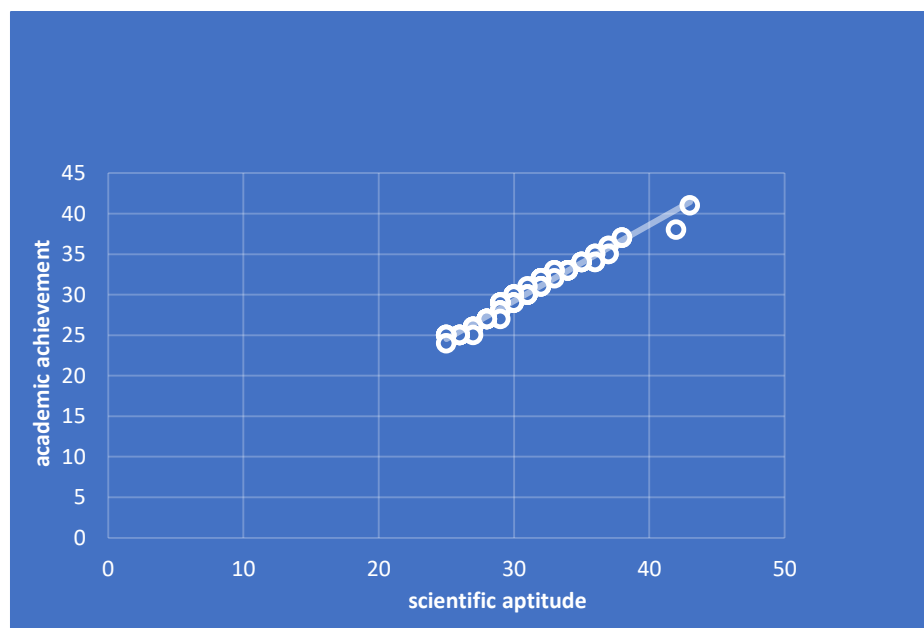


Figure-1 The Scatter Plot showing Correlation between Scientific Aptitude and Science Achievement of secondary school students.

Null Hypothesis (H_0): There is no significant relationship between scientific aptitude and science achievement among secondary school students.

Alternative Hypothesis (H_1): There is a significant relationship between scientific aptitude and science achievement among secondary school students.

Justification: The correlation coefficient ($r = .403$) is positive and statistically significant at the 0.01 level. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. This indicates that there is a significant positive relationship between scientific aptitude and science achievement among secondary school students.

Limitations of the study

In spite of the present study having certain limitations, the study area was limited to a single district; therefore, the findings may not be generalized to a much larger area with confidence. The use of purposive sampling may also limit the sample's representativeness. Further studies may include more diverse samples and employ additional research methods to obtain deeper insights into the relationship between scientific aptitude and science achievement. Future research may also be conducted across different geographical areas and with larger samples to strengthen the generalizability of the findings.

Conclusion

The significance of scientific aptitude in relation to science accomplishment among secondary school students is shown by this investigative investigation. As newer courses and disciplines demand skill development and mastery in areas like robotics, AI-based courses, and sophisticated medical domains, scientific aptitude may broaden the breadth of study and future academic chances. There are several opportunities for specialisation and diversification of skills due to the connections between STEM and humanities topics. The current study sheds light on the connection between secondary school students' scientific achievement and aptitude. The results demonstrated a strong positive correlation ($r = .403$, $p < .01$) between scientific accomplishment and scientific aptitude. Thus, among secondary school pupils, scientific aptitude is positively correlated with science achievement. The results emphasize how crucial it is for students to develop scientific thinking, problem-solving skills, and scientific reasoning.

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