

RELATIONSHIP BETWEEN SCIENTIFIC APTITUDE AND ACADEMIC ACHIEVEMENT OF COLLEGE STUDENTS

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ABSTRACT

The present study was undertaken to investigate the relationship between scientific aptitude and academic achievement among college students. The sample comprised 100 students selected from five colleges in the Pathankot district of Punjab. From each college, 20 students (10 males and 10 females) were selected through a random sampling technique to ensure representativeness. Scientific aptitude was assessed using the Scientific Aptitude Test Inventory for College Students developed by A.K.P. Sinha and L.N.K. Sinha (2012). Academic achievement was measured based on students' performance records. Pearson's product-moment correlation coefficient was employed to determine the relationship between scientific aptitude and academic achievement. Furthermore, t-test was utilized to examine gender differences in both scientific aptitude and academic achievement. The findings of the study revealed a positive and statistically significant relationship between scientific aptitude and academic achievement among college students. A significant difference was observed in the mean scores of scientific aptitude between male and female students, with male students demonstrating higher levels of scientific aptitude. In contrast, a significant difference was also found in academic achievement, with female students outperforming their male counterparts.

Keywords: Scientific Aptitude, Academic Achievement

INTRODUCTION

Education serves not only as a means of imparting knowledge and skills but also as a process of instilling values, shaping attitudes, refining instincts, cultivating appropriate aptitudes and habits.

Its broader objective lies in the holistic development and enrichment of an individual's personality. By organizing knowledge and facilitating the realization of life's values, education contributes meaningfully to societal progress. Moreover, it plays a critical role in nurturing individuals who can make significant contributions to fields such as science and technology. Scientific aptitude, in particular, emerges from a complex interplay of genetic and environmental factors that shape an individual's predispositions and abilities (Mishra, 2020). Individuals often possess unique characteristics or capabilities that enable them to excel in scientific domains (Manickavasagan, 2019). As a construct, scientific aptitude refers to the assessment of an individual's innate potential for scientific thinking and problem-solving. It also reflects the impact of educational experiences on the development of higher-order cognitive abilities (Vadivu, Sridhar, & Kumar, 2016).

SCIENTIFIC APTITUDE

Scientific aptitude constitutes a transferable asset within the domain of science, encompassing a range of essential competencies such as critical observation, open-mindedness, suspension of judgment, and freedom from superstition and erroneous beliefs. The development of these skills in students proves beneficial not only in academic contexts but also in their future personal and professional lives. Individuals possessing a positive scientific aptitude are generally more effective learners compared to those with a less developed or negative aptitude.

In the contemporary era, characterized by rapid scientific and technological advancement, the importance of scientific aptitude has gained increasing recognition. A well-developed scientific aptitude is vital not only for individual growth but also for enabling learners to contribute meaningfully to national development. It serves as an indicator of a learner's ability to engage constructively with their environment, including school, home, and society. Consequently, students aspiring to achieve academic success must cultivate strong scientific aptitude, as it significantly enhances their potential for attaining desired educational outcomes. Learners who combine a high level of scientific aptitude with a strong motivation to learn are more likely to achieve their goals effectively.

ACADEMIC ACHIEVEMENT

Academic accomplishment is regarded as a fundamental factor for assessing an individual's overall potential and capabilities. Consequently, academic accomplishment holds significant importance in both education and the learning process. According to Crow and Crow (1969), academic performance is characterized by the degree to which a student benefits from instruction in a certain subject, indicating the level to which skills and information have been conveyed to them.

Academic achievement is regarded as a crucial feature in life and the primary objective of school. Notwithstanding numerous diverse assertions on the objectives of education, the academic advancement of a student remains the central focus and the paramount target of education. Academic accomplishment is seen as the exclusive duty of educational institutions. Understanding the association between various elements and academic accomplishment is essential for a teacher to determine the contributors to high and low student performance. The global landscape is increasingly competitive. The caliber of performance has emerged as the crucial element for individual advancement. In this increasingly competitive society, everyone aspires to attain a high level of achievement. The entire educational system is focused on students' academic success, creating an advantageous environment for research endeavors. The quality of student performance remains a primary objective for educators. It aims to effect change at local, regional, national, and global levels. Educators, trainers, and researchers have sought to investigate the characteristics that significantly influence the quality of learner performance.

FACTORS AFFECTING ACADEMIC ACHIEVEMENT

Academic achievement may be influenced by several elements, including IQ, emotional intelligence, study habits, attitudes towards school, and different facets of personality. The elements influencing academic achievement are categorized as follows:

(1) Individual Factors

Cognitive factors: They include factors like intelligence creativity.

Non-cognitive factors: They include study habits, learning styles and self concept of the learner.

- (2) **Psychological Factors:-** The psychological factors are related to influencing individual achievement that are intelligence, learning ability, self efficiency, stress, personality
- (3) **Family Factors:-** Family factors include low socio-economic status, single parent and step parent families, low parental aspirations and expectations, strict learning style, low parental involvement with school or college etc.
- (4) **Work Factors:-** Work factors include the students early involvement in work level, long work hours etc.

Consequently, despite a steady increase in enrolment across various courses, students' levels of achievement do not align with expected standards. This persistent underachievement raises concerns regarding the potential wastage of human resources, thereby becoming a significant issue for educators, administrators, and researchers alike. In this context, students' scientific aptitude has emerged as an important area of concern. These circumstances have, therefore, necessitated the selection of the present topic for investigation.

REVIEW OF LITERATURE

A review of related literature assists the researcher in circumventing numerous pitfalls and broadens their perspective on the study challenges.

Balasundaram and Muthuchamy (2022) identified a substantial positive link between scientific aptitude and study methods among Higher Secondary pupils. There is no substantial difference between higher secondary boys and girls regarding their scientific aptitude and study practices in various learning environments.

Patel (2019) did a study on the scientific aptitude of secondary school students in connection to several variables. The research indicated that gender, locality, and standards were important, revealing that boys possess greater scientific aptitude than girls.

Roy and Goel (2018) investigated the scientific ability and attitudes of secondary school pupils, concluding that the demonstration of scientific abilities is essential for improved living standards. **Kalaivani (2018)** investigated the disparities in gender achievement in chemistry and scientific ability among eleventh-grade students in upper secondary school. Male and female students exhibited differences in scientific aptitude.

Manichander and Brindhamani (2014) examined the Academic Achievement and Scientific Aptitude in Science among Standard X students in the Perambalur district of Tamil Nadu. Students in urban schools possess superior Scientific Aptitude compared to their rural counterparts. Female students exhibit superior scientific aptitude compared to male learners.

SIGNIFICANCE OF THE STUDY

The educational instruction process in the institution is assessed by several periodic evaluations, including weekly, monthly, semiannual, and annual tests. The student's efficiency in acquiring the imparted knowledge is evidenced by the test results, which are significantly influenced by the students' scientific ability. Science is an essential and dynamic influence in the daily lives of all individuals. It encompasses all aspects of human endeavor. The remarkable advancement in science has surpassed the boundaries of the world. A journey to the Moon or Mars is no longer an unprecedented aspiration. Living in this world without scientific understanding has nearly become unfeasible. A scientific aptitude is the capacity to acquire specific skills or knowledge. Consequently, it is employed in a far more precise manner than intelligence. The educational program for learners must include not only their general learning capacity but also any specific abilities or scientific aptitudes they may have, for which specialized instruction should be offered. This study aims to investigate the correlation between scientific aptitude and academic performance among college students, acknowledging the significance of scientific aptitude across numerous domains, including education.

OBJECTIVES OF THE STUDY

The main objectives of the study are:

1. To study the relationship between scientific aptitude and academic achievement of college students.
2. To study the difference in scientific aptitude of college students with respect to gender.
3. To study the difference in academic achievement of college students with respect to gender.

HYPOTHESES OF THE STUDY

The study has been designed to test the following null hypotheses:

1. There exists no significant relationship between scientific aptitude and academic achievement of college students.
2. There exists no significant difference in scientific aptitude of college students with respect to gender.
3. There exists no significant difference in academic achievement of college students with respect to gender.

METHODOLOGY

The researcher employed the Descriptive Survey Method to carry out the current investigation.

SAMPLE OF THE STUDY

The investigator utilized a random sampling procedure to choose the sample. The sample consisted of 100 college students picked from five colleges of Pathankot district of Punjab state. Subsequently, 20 students (10 males and 10 females) were chosen from each selected college. In this way a total number of 100 college students, comprising 50 males and 50 females, constituted the sample for this study.

TOOL USED

The present study utilized the Scientific Aptitude Test Inventory for College Students developed by A.K.P. Sinha and L.N.K. Sinha (2012).

ANALYSIS AND INTERPRETATION OF THE DATA

The data collected was analyzed by employing descriptive statistics and the results were interpreted.

Hypothesis: 1 “There exists no significant relationship between Scientific Aptitude and Academic Achievement of college students”

In order to test this hypothesis, coefficient of correlation (r) was computed. The results so obtained have been entered in table 1

Table 1 Relationship between Scientific Aptitude and Academic Achievement of college students.

Variables	N	Mean	S.D	Correlation	Inference
Scientific Aptitude	100	57.35	8.96	0.64	Positive Correlation
Academic Achievement	100	367.01	19.4		

The findings presented in Table 1 reveal a correlation coefficient (r) of 0.64, indicating a substantial positive relationship between scientific aptitude and academic achievement among college students. This result clearly suggests that students who possess higher levels of scientific aptitude tend to perform better academically. The observed relationship may be attributed to the fact that scientific aptitude encompasses essential cognitive and attitudinal qualities such as critical thinking, logical reasoning, curiosity, and systematic problem-solving. These attributes enable students to understand scientific concepts more effectively and apply them in academic contexts, thereby enhancing their overall performance.

Hence, first hypothesis, **“There exists no significant relationship between Scientific Aptitude and Academic Achievement of college students”** stands rejected.

Hypothesis: 2

“There exists no significant difference in scientific aptitude of college students with respect to gender”

In order to test this hypothesis ‘t’-value was computed and the results have been entered in table 2

Table 2 Difference in Scientific Aptitude of college students with respect to gender

Gender	N	Mean	S.D	t-ratio	Inference
Male	50	56.8	18.16	2.65	Significant
Female	50	46.0	22.36		

Table 2 shows the mean scientific aptitude scores for male and female college students as 56.8 and 46.0, with standard deviations of 18.16 and 22.36, respectively. The t-ratio for the mean scores of scientific aptitude between male and female college students is 2.65, which is significant at the 0.01 level. It suggests that the scientific competence of male and female college students varies considerably. Here male students have higher scientific aptitude than female students. The finding of present study is in consonance with the previous studies like Patel (2019) who also did a study on the scientific aptitude of secondary school students in connection to several variables revealing that boys possess greater scientific aptitude than girls. It may be due to different treatment by parents towards male and female children. From early childhood, boys and girls are often treated differently. Boys may be encouraged to tinker, explore, and take risks, while girls may receive less encouragement in those areas. Over time, this shapes interest and confidence.

Hence the second hypothesis **“There exists no significant difference in Scientific Aptitude of college students with respect to gender”** stands rejected.

Hypothesis: 3 “There exists no significant difference in Academic Achievement of college students with respect to gender”

Table 3 Difference in the Academic Achievement of college students with respect to gender

Gender	N	Mean	S.D	t-ratio	Inference
Male	50	331	47.58	2.51	Significant
Female	50	355	47.96		

Table 3 presents the mean scores of Academic Achievement for male and female college students as 331 and 355, with standard deviations of 47.58 and 47.96, respectively. The t-ratio for the mean scores of male and female college students' Academic Achievement is 2.51, which is significant at the 0.05 level of significance. The Academic Achievement of male and female college students differs substantially. Here the academic achievement of female students is higher than that of male students. It may be due to the stronger self-regulation skills among the female students.

Hence second hypothesis “**There exist no significant difference in Academic Achievement of male and female college students.**” stands rejected.

MAIN FINDINGS

1. Findings indicate that scientific aptitude has a strong positive relationship with academic achievement. Scientific aptitude influences the academic performance of college students.
2. The disparity between the mean scores of scientific aptitude among male and female college students was determined to be considerable. The disparity favored male students. Consequently, it was determined that gender influenced variations in scientific aptitude.
3. The disparity in mean scores of Academic Achievement between male and female college students was determined to be considerable. The disparity favored female students.

Consequently, it was determined that gender contributed to disparities in academic achievement as well.

CONCLUSION

The findings indicate that scientific learning plays a pivotal role not only in individual's intellectual development but also in enabling learners to contribute meaningfully to national progress. Academic achievement in science is strongly influenced by the effective identification and nurturing of scientific talent. In this context, assessing scientific aptitude becomes essential, as it helps in enhancing students' understanding of scientific concepts and processes. Furthermore, such assessment provides valuable insights for educators to design and implement strategies that can strengthen students' learning potential and foster deeper engagement with science.

EDUCATIONAL IMPLICATONS

Education is gaining increasing global recognition, as the advancement of science is regarded as a fundamental prerequisite for the holistic development of a nation's economy. A higher standard of science education within a country yields extensive benefits across all sectors through the promotion of technological advancement and innovation.

Nevertheless, a significant proportion of students demonstrate a lack of scientific aptitude toward science, resulting in diminished interest in science education. This deficiency may perpetuate ignorance and contribute to the reinforcement of superstitious beliefs and misconceptions. In the absence of adequate education and a sound understanding of scientific principles, the development of a positive scientific aptitude characterized by objective thinking, logical reasoning, open-mindedness, curiosity, skepticism toward unfounded beliefs, and impartial judgment becomes constrained.

In this regard, it may be asserted that the enhancement of science education, and consequently scientific aptitude, is a gradual process that unfolds over generations rather than occurring immediately. Therefore, the cultivation of scientific aptitude should be accorded high priority

within the educational framework. Its systematic development can enable learners to think, act, and make decisions in accordance with scientific principles, thereby preparing them to function effectively as responsible citizens in a contemporary scientific society. Furthermore, it contributes to individuals' personal well-being and the realization of their aspirations.

REFERENCES

- Balasundaram, A., & Muthuchamy, I. (2022). Scientific aptitude among higher secondary students in relation to their study practices. *International Journal of Health Sciences*, 6(10), 463–471.
- Kalaivani, S. (2018). Gender difference in achievement in chemistry and scientific aptitude of higher secondary school students. *Paripex – Indian Journal of Research*, 7(12), 49–50.
- Manickavasagan, T. (2019). Correlation among higher secondary students' achievement in chemistry, scientific aptitude, and chemistry learning environment. *Journal of Xi'an University of Architecture & Technology*, 11(8), 50–54.
- Mishra, S. (2020). Scientific aptitude and academic achievement of students in mathematics. *International Refereed/Peer Reviewed Journal of Education*, 6, 13–20.
- Patel, A. P. (2019). A study of scientific aptitude of secondary school students in context of certain variables. *Gap Interdisciplinarity*, 2(3), 420–424.
- Pandiavadivu, P., Sridhar, R., & Kumar, B. M. (2016). Construction and standardization of scientific aptitude test (SAT) for secondary school students: A pilot study. *International Journal of Social Sciences and Management*, 3(1), 17–21.
- Roy, D., & Goel, N. (2018). A study of scientific aptitude and attitude in the secondary students. *International Journal of Advanced Research and Development*, 3(2), 338–341.
- Sivapathis, M. R., & Manickavasagan, T. (2019). Correlation between achievement in chemistry in relation to notational ability of senior secondary school students. *Alochana Journal*, 5(1), 17-21.