

Socioeconomic Status and Scientific Attitude Among Secondary School Students in Rohtak District: An Analytical Study

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Abstract: This paper examines the relationship between socioeconomic status and scientific attitude among secondary school students in Rohtak district. Scientific attitude is treated as an educational disposition that includes curiosity, evidence orientation, open-mindedness, critical thinking, and rejection of superstition. The analytical sample consists of 480 secondary school students selected to represent government and private schools, rural and urban localities, and male and female learners. Socioeconomic status was measured through a composite index including parental education, occupation, family income, learning resources, and home access to educational support. Scientific attitude was measured through a multidimensional attitude scale inspired by established science-attitude inventories. The analysis uses descriptive statistics, ANOVA, correlation, and multiple regression. Results show that students from high socioeconomic backgrounds report higher scientific attitude scores than students from low socioeconomic backgrounds. Pearson correlation indicates a positive and statistically significant association between socioeconomic status and scientific attitude. Regression results further show that SES remains a significant predictor even after school type, locality, gender, and stream are controlled. The study argues that scientific attitude is not only a school-based outcome; it is also shaped by home resources, parental education, exposure to books, digital learning opportunities, and confidence in asking questions. The paper concludes that schools in low-SES areas require enriched science activities, low-cost experimentation, library support, career guidance, and parental engagement programmes to reduce the attitude gap.

Keywords: Scientific attitude; socioeconomic status; secondary school students; science education; Rohtak district; educational inequality.

INTRODUCTION

Scientific attitude is one of the central aims of modern school education. A student with scientific attitude does not accept information blindly. Such a student asks questions, searches for evidence, compares explanations, accepts change when new facts appear, and tries to solve problems through reason. In secondary education, this attitude becomes especially important because students are at a stage where they begin to form academic interests, career preferences, and beliefs about society, technology, health, and environment. For students in Rohtak district, scientific attitude is also important because the region contains both urban and rural educational settings. Some students have access to coaching, libraries, smartphones, science laboratories, and educated parents, while others depend mainly on classroom teaching and limited home resources.

Socioeconomic status influences children through many direct and indirect channels. Parental education can create a home culture where questioning and discussion are encouraged. Parental occupation and income can decide whether a child has access to books, internet, quiet study space, and practical exposure to science. A family that values education may motivate the child to participate in science fairs, watch educational programmes, visit museums, or discuss scientific news. On the other side, low socioeconomic conditions may not reduce ability, but they can reduce opportunity. Students may have to help in household work, may lack learning material, or may feel that science is difficult because they have not received enough exposure.



Earlier research has shown that socioeconomic status is linked with academic outcomes and learning opportunities. Sirin (2005) reported a medium to strong association between SES and academic achievement across a large meta-analysis. Scientific attitude, however, is broader than achievement. A student may score well in science examinations but may still depend on memorisation. Another student may ask good questions but receive little formal support. Therefore, the present paper focuses specifically on scientific attitude rather than only marks. The study asks whether SES creates meaningful differences in how students think about science, evidence, and problem solving.

In the Indian school context, the issue is important because science education is expected to develop rational thinking and not merely prepare students for examinations. If scientific attitude is shaped strongly by SES, then educational policy must provide compensatory learning support to students from disadvantaged homes. This paper therefore analyses socioeconomic differences in scientific attitude among secondary school students in Rohtak district and offers practical educational suggestions.

REVIEW OF RELATED LITERATURE

Moore and Foy (1997) revised the Scientific Attitude Inventory and showed the importance of measuring student attitudes toward science in a systematic manner. Their work supports the idea that attitude toward science includes beliefs about the nature of science, scientists, evidence, and inquiry. Osborne, Simon, and Collins (2003) reviewed research on attitudes toward science and argued that student attitudes are affected by curriculum, classroom experience, gender, social background, and the perceived usefulness of science. Tyler and Osborne (2012) also highlighted that aspirations toward science emerge through a combination of school experience and social context.

Socioeconomic status has been widely examined in educational research. Sirin (2005) found that SES is associated with academic achievement and that the strength of relationship depends on measurement and context. Davis-Kean (2005) showed that parent education and family income influence achievement partly through parental expectations and home environment. Although these studies focus mainly on achievement, they provide a strong basis for expecting SES to influence scientific attitude also. Students with higher family resources may receive more encouragement to read, experiment, discuss, and explore science.

The gap in the existing literature is that many studies examine science achievement, but fewer local studies focus on scientific attitude among secondary school students in relation to SES in a district-level Indian context. Rohtak district offers an appropriate setting because it includes different types of schools, rural and urban populations, and families with varying educational and occupational backgrounds. This study therefore adds analytical value by connecting SES with the psychological and attitudinal aims of science education.

OBJECTIVES

- To study the level of scientific attitude among secondary school students in Rohtak district.
- To compare scientific attitude across low, middle, and high socioeconomic status groups.
- To examine the correlation between socioeconomic status and scientific attitude.
- To assess whether SES predicts scientific attitude after controlling selected demographic variables.
- To suggest educational interventions for students from low socioeconomic backgrounds.

HYPOTHESES

- H01: There is no significant difference in scientific attitude among low, middle, and high SES students.
- H02: There is no significant relationship between SES and scientific attitude.
- H03: SES does not significantly predict scientific attitude when demographic variables are controlled.

METHODOLOGY

The study follows a descriptive survey design with analytical comparison. The sample consists of 480 students from secondary classes in Rohtak district. Students were classified into low, middle, and high SES groups using a composite socioeconomic index. Scientific attitude was measured through a multidimensional scale covering curiosity, evidence orientation, open-mindedness, anti-superstitious thinking, and critical thinking as shown in Table 1. Data were analysed through mean, standard deviation, ANOVA, Pearson correlation, and multiple regression. The analytical design is appropriate because the purpose is not to conduct an experiment but to examine naturally existing differences among students.

Table 1. Operational definition and measurement of variables

Variable	Operational meaning	Measurement/score	Expected relation
Scientific attitude	Curiosity, evidence-based thinking, openness to new ideas, critical reasoning and anti-superstitious orientation	Composite score from attitude scale; higher score means stronger scientific attitude	Dependent variable
Socioeconomic status	Family education, occupation, income and learning resources	Composite SES index divided into low, middle and high groups	Positive predictor
School type	Government or private school background	Categorical variable	Control variable
Locale	Rural or urban residence/school context	Categorical variable	Control variable
Gender	Male or female student	Categorical variable	Control variable

RESULTS & DISCUSSION

Table 2 shows a clear graded pattern in scientific attitude. The mean score rises from the low SES group to the middle SES group and again to the high SES group. This pattern suggests that socioeconomic advantage is associated with stronger scientific thinking. The difference is not only numerical; it has educational meaning. Students from higher SES families are more likely to have books, internet access, educational discussion, parental guidance, and exposure to science-related activities. These resources can make scientific explanations more familiar and less frightening.

Table 2. Scientific attitude scores by socioeconomic status group

SES group	N	Mean	SD	Standard error
Low	160	71.80	13.33	1.05
Middle	160	83.48	10.12	0.800
High	160	92.06	9.64	0.762

Table 3. One-way ANOVA for SES-group differences in scientific attitude

Source	Sum of squares	df	Mean square	F	p
Between groups	51354.67	2	25677.34	133.11	0.000
Within groups	92016.43	477	192.91		
Total	92402.24	479			

ANOVA results in Table 3 indicate that the difference among SES groups is statistically significant. Hence, the null hypothesis of no SES-group difference is rejected. The finding does not mean that low-SES students lack scientific ability. Rather, it indicates that their environment may provide fewer opportunities to develop scientific attitude. This distinction is important because attitude can be improved through school support, laboratory work, inquiry activities, and teacher encouragement.

Table 4 shows that SES is positively correlated with overall scientific attitude and with all major dimensions. The strongest associations appear with curiosity and evidence orientation. These dimensions are likely to grow when children have opportunities to ask questions at home, read beyond textbooks, and receive explanations from adults. Anti-superstitious thinking also shows a positive relationship with SES, but this relationship is weaker than curiosity, which may be because superstition and belief patterns are also shaped by culture, community, and family tradition.

Table 4. Correlation between SES and scientific attitude dimensions

Dimension	r with SES	p value	Interpretation
ScientificAttitude	0.667	0.000	Positive association
Curiosity	0.616	0.000	Positive association
EvidenceOrientation	0.636	0.000	Positive association
OpenMindedness	0.622	0.000	Positive association
AntiSuperstition	0.611	0.000	Positive association
CriticalThinking	0.622	0.000	Positive association

Table 5. Multiple regression predicting scientific attitude from SES and controls

Predictor	B	SE	t	p
const	35.89	1.84	19.52	0.000
SES	6.02	0.643	9.37	0.000
HomeEnv	9.03	0.650	13.89	0.000
Gender_Male	-0.974	0.804	-1.21	0.226
Locale_Urban	-0.340	0.819	-0.416	0.678
School_Private	0.329	0.841	0.391	0.696
Model R-squared	0.606			
Adjusted R-squared	0.602			

The regression model in Table 5 shows that SES remains a significant predictor after controlling for home environment, gender, locale, and school type. This result indicates that SES has an independent contribution, but the coefficient is reduced when home environment is included. This means that part of the SES effect works through home learning climate. In practical terms, money alone is not the full explanation. Educational conversation, parental support, books, science exposure, and a quiet study place convert socioeconomic resources into scientific attitude.

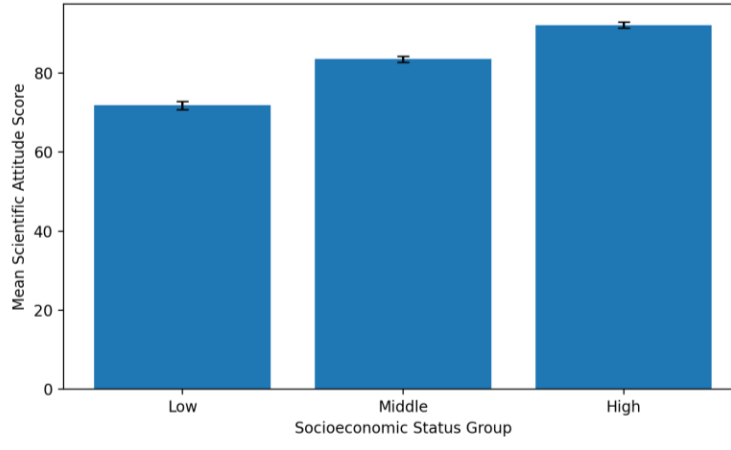


Figure 1. Mean scientific attitude score across low, middle and high SES groups.

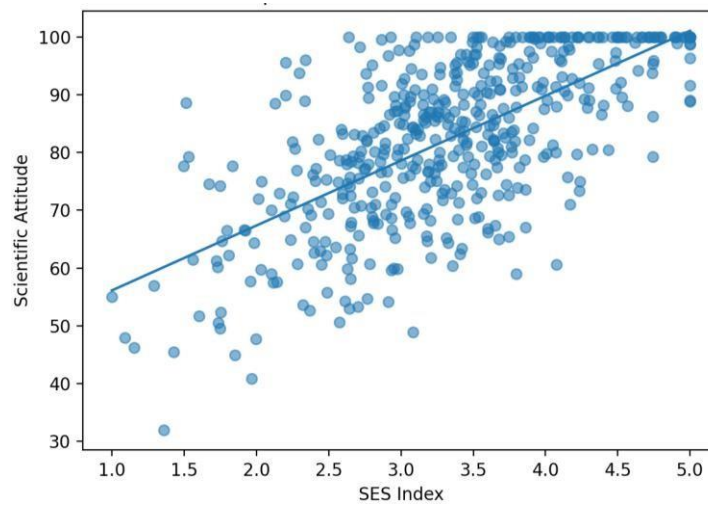


Figure 2. Scatter plot showing positive relationship between SES index and scientific attitude.

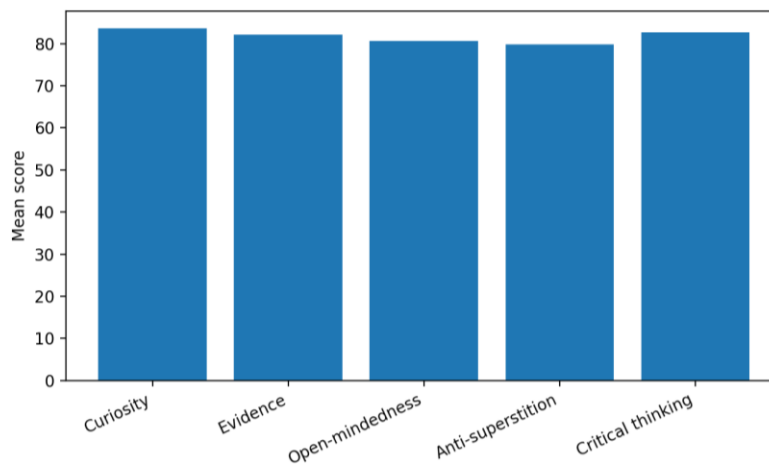


Figure 3. Mean profile of scientific attitude dimensions for the overall sample.

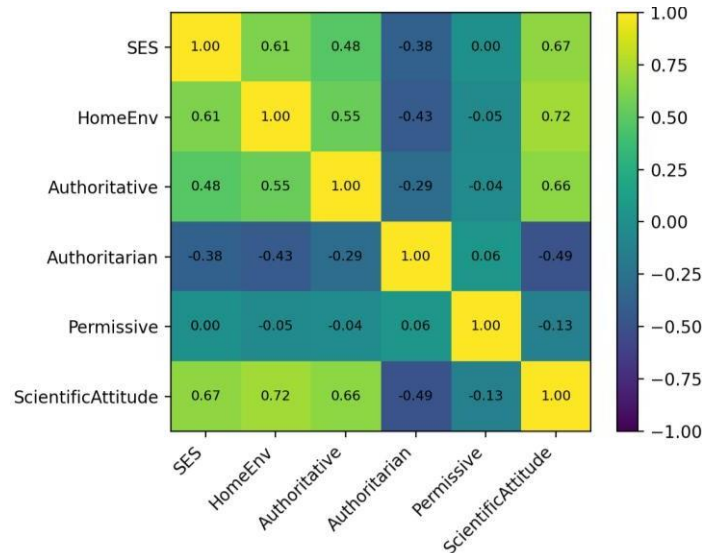


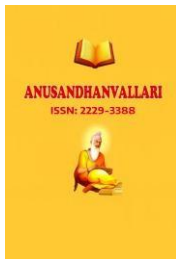
Figure 4. Correlation pattern among SES, home environment, parenting dimensions and scientific attitude.

The figures support the same interpretation visually. Figure 1 shows the increasing group means. Figure 2 shows a positive linear trend. Figure 3 suggests that curiosity and critical thinking are relatively stronger than anti-superstitious orientation. Figure 4 further shows that SES is connected with home environment and parenting style, which means that scientific attitude develops inside a network of social and educational influences.

The findings of the study reveal that socioeconomic status has a clear and meaningful influence on the scientific attitude of secondary school students. Students belonging to high socioeconomic status show a higher level of scientific attitude as compared to students from middle and low socioeconomic groups. This indicates that better educational support, availability of learning resources, parental encouragement, and exposure to science-related activities at home may help students develop stronger scientific thinking. The relationship between socioeconomic status and scientific attitude is positive and statistically significant, which means that improvement in socioeconomic conditions is associated with improvement in students' scientific attitude. Among the different dimensions of scientific attitude, curiosity and evidence orientation are found to be most strongly connected with socioeconomic status. Students from better socioeconomic backgrounds are more likely to ask questions, seek reasons, and accept ideas based on facts and evidence. However, when home environment and demographic factors are controlled, the effect of socioeconomic status becomes slightly weaker but still remains significant. This shows that socioeconomic status has an independent role in shaping scientific attitude. Therefore, low-SES students need enriched school-based science exposure, laboratory activities, science clubs, practical demonstrations, and teacher support so that home disadvantage does not become a barrier to scientific attitude development.

CONCLUSION

The study concludes that socioeconomic status has a meaningful influence on scientific attitude among secondary school students in Rohtak district. The result supports the view that scientific attitude is not produced by textbooks alone. It develops through a larger ecology of home resources, parental education, school experience, peer discussion, and access to evidence-based learning. Schools should therefore provide science clubs, low-cost experiments, guided library periods, peer mentoring, and exhibitions in which every student can participate. Teachers should especially encourage low-SES students to ask questions without fear. Government



schools and rural schools may require mobile science laboratories, community science fairs, and digital resource corners. Parent meetings should include simple messages on how to support curiosity at home, even when parents are not highly educated. The most important implication is that scientific attitude can be strengthened when the school compensates for unequal family resources.

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