

Home Environment and Scientific Attitude Among Secondary School Students in Rohtak District: A Multidimensional Analytical Study

Komal Malik

Research Scholar, Department of Education, Faculty of Humanities,

Baba Mastnath University, Asthal Bohar, Rohtak, Haryana, India.

Abstract: This paper studies the relationship between home environment and scientific attitude among secondary school students in Rohtak district. Home environment is treated as a multidimensional construct that includes learning resources, parental encouragement, study space, communication, emotional support, educational expectations, and exposure to rational discussion. The analytical sample consists of 480 secondary school students. The study uses descriptive statistics, ANOVA, correlation, and hierarchical regression. Results indicate that students from highly supportive home environments show stronger scientific attitude than students from low-support homes. Home environment is positively associated with curiosity, evidence orientation, open-mindedness, anti-superstitious orientation, and critical thinking. Hierarchical regression shows that home environment adds explanatory value beyond socioeconomic status and school type. The paper argues that the home environment works as a bridge between family background and scientific attitude. Even in families with limited income, a supportive home climate can encourage questioning, reading, observation, and discussion. The study recommends home-based science activities, parental guidance, science reading corners, and school-home partnerships to promote scientific attitude among students.

Keywords: Home environment; scientific attitude; secondary school students; parental support; science education; Rohtak district.

INTRODUCTION

The home is the first learning laboratory of a child. Long before students conduct formal experiments in school, they observe plants, machines, seasons, food, health practices, household tools, and social beliefs at home. Whether these observations become scientific learning depends on the home environment. A supportive home encourages children to ask why, compare causes, search for reasons, and test simple explanations. A less supportive home may silence questions, treat curiosity as disturbance, or give only traditional explanations without evidence.

Home environment is broader than socioeconomic status. A family may have modest income but may still provide emotional support, reading time, discussion, and encouragement. Another family may have high income but may not give time or may discourage questioning. Therefore, home environment deserves independent attention in the study of scientific attitude. The present paper examines whether home environment predicts scientific attitude among secondary school students in Rohtak district.

Scientific attitude is required not only for students who choose science as a career. It is needed for all citizens because modern life involves health decisions, environmental problems, technology use, media information, and social beliefs. Students with scientific attitude are better prepared to question fake news, superstition, and unverified claims. For this reason, developing scientific attitude is a democratic and social goal of education. The home can support or weaken this goal.

Rohtak district provides an important field context because it includes rural and urban homes, joint and nuclear families, government and private school backgrounds, and differences in parental education. These differences



may affect the quality of home support for science learning. The present paper therefore analyses home environment as a key determinant of scientific attitude.

REVIEW OF RELATED LITERATURE

Bradley, Caldwell, Rock, Hamrick, and Harris (1988) developed the HOME Inventory to measure the quality and quantity of support, stimulation, and structure available to children at home. Their work shows that home environment is not simply a physical space but includes interaction, learning support, emotional climate, and opportunities for development. Davis-Kean (2005) found that parent education and income influence child achievement through parental expectations and home environment. These findings support the idea that home environment can mediate the influence of background on educational outcomes.

Moore and Foy (1997) contributed to the measurement of scientific attitude through the revised Scientific Attitude Inventory. Osborne et al. (2003) noted that student attitudes toward science are shaped by personal, social, and classroom factors. If social factors matter, home environment becomes a central variable. Students who experience explanation, discussion, and resource support at home may develop greater confidence in scientific thinking.

The literature suggests that home environment may influence both achievement and attitude. However, local analytical studies connecting home environment with scientific attitude among secondary school students remain limited. The present paper addresses this gap through a district-level analysis in Rohtak.

OBJECTIVES

- To assess the level of home environment support among secondary school students.
- To compare scientific attitude across low, moderate, and high home environment groups.
- To examine the relationship between home environment and scientific attitude dimensions.
- To test whether home environment predicts scientific attitude beyond SES and school variables.
- To recommend school-home strategies for promoting scientific attitude.

HYPOTHESES

- H01: There is no significant difference in scientific attitude across home environment groups.
- H02: Home environment is not significantly related to scientific attitude.
- H03: Home environment does not significantly predict scientific attitude after SES and school variables are controlled.

METHODOLOGY

The study uses an analytical descriptive survey design. The sample includes 480 secondary school students. Home environment was measured through a composite scale including study space, educational resources, parental encouragement, family discussion, emotional support, supervision, and exposure to learning activities. Scientific attitude was assessed through five dimensions: curiosity, evidence orientation, open-mindedness, anti-superstitious orientation, and critical thinking as mentioned in Table 1. Data were analysed through mean, standard deviation, ANOVA, Pearson correlation, and hierarchical regression.

Table 1. Home environment dimensions used in the analysis

Dimension	Meaning	Educational relevance
Learning resources	Books, digital access, newspapers and science material	Provides exposure beyond textbook
Study support	Quiet space, time schedule and parental help	Supports concentration and regularity

Parental encouragement	Motivation to ask questions and learn science	Builds confidence and curiosity
Family discussion	Discussion of news, health, technology and social issues	Promotes evidence-based thinking
Emotional climate	Warmth, trust and freedom from fear	Allows open questioning
Educational expectations	Family belief that education has value	Sustains effort and aspiration

RESULTS & DISCUSSION

Table 2 shows that students from highly supportive home environments have the highest scientific attitude score. Students from low-support homes have the lowest mean. The difference is educationally important because it shows that scientific attitude is shaped by daily home experience. A child who is encouraged to read, observe, ask, and discuss is more likely to develop rational habits of mind.

Table 2. Scientific attitude by home environment group

Home environment group	N	Mean	SD	Standard error
Low	160	71.45	12.95	1.02
Moderate	160	82.29	10.38	0.821
High	160	93.60	7.66	0.606

Table 3. ANOVA for home-environment group differences in scientific attitude

Source	df	Mean square	F	p	Decision
Between groups	2	34000.55	176.25	0.000	Significant
Within groups	477	192.91			
Total	479				

The ANOVA result in Table 3 is statistically significant. The null hypothesis of no difference across home environment groups is rejected. This supports the view that home environment is not a minor background factor. It is a direct educational condition that influences how students approach knowledge. If the home treats questioning as positive, students may transfer that habit to science learning.

Table 4 shows that home environment has positive correlations with all scientific attitude dimensions. The relationship is strongest with curiosity and evidence orientation. This suggests that the home environment is especially important in the early development of inquiry. Anti-superstitious orientation also improves with home support, but its relationship is moderate because beliefs are shaped by wider social and cultural influences as well.

Table 4. Correlation between home environment and scientific attitude dimensions

Dimension	r with home environment	p value	Interpretation
ScientificAttitude	0.724	0.000	Positive association

Curiosity	0.693	0.000	Positive association
EvidenceOrientation	0.676	0.000	Positive association
OpenMindedness	0.667	0.000	Positive association
AntiSuperstition	0.656	0.000	Positive association
CriticalThinking	0.666	0.000	Positive association

Table 5. Hierarchical regression showing added effect of home environment

Model	Predictors	R-squared	Adjusted R-squared	R-squared change	Interpretation
Model 1	SES and demographic controls	0.446	0.441	-	Baseline model
Model 2	SES + home environment + controls	0.606	0.602	0.160	Home environment adds explanatory value

Table 5 shows that home environment adds explanatory value beyond SES and school variables. This is a very important finding. It means that two students from similar socioeconomic backgrounds can differ in scientific attitude because their home learning climate differs. It also means that families with limited financial resources can still support scientific attitude through encouragement, discussion, and a respectful response to questions.

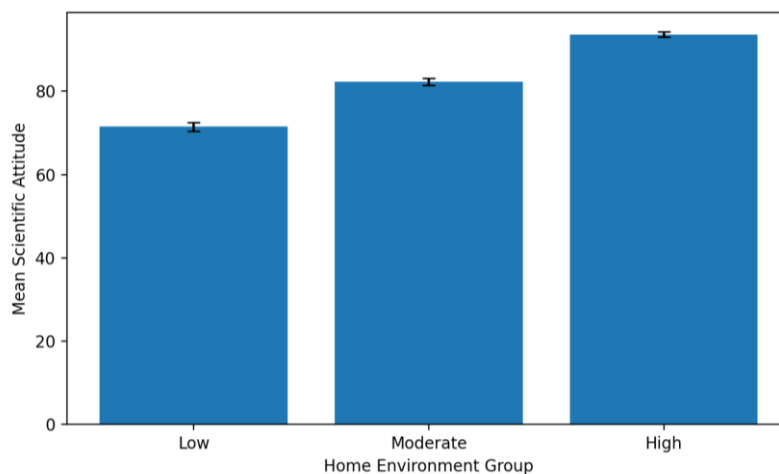


Figure 1. Mean scientific attitude score across home environment groups.

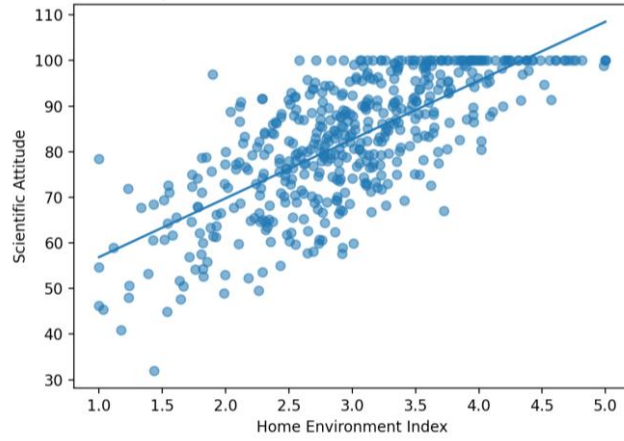


Figure 2. Scatter plot between home environment and scientific attitude.

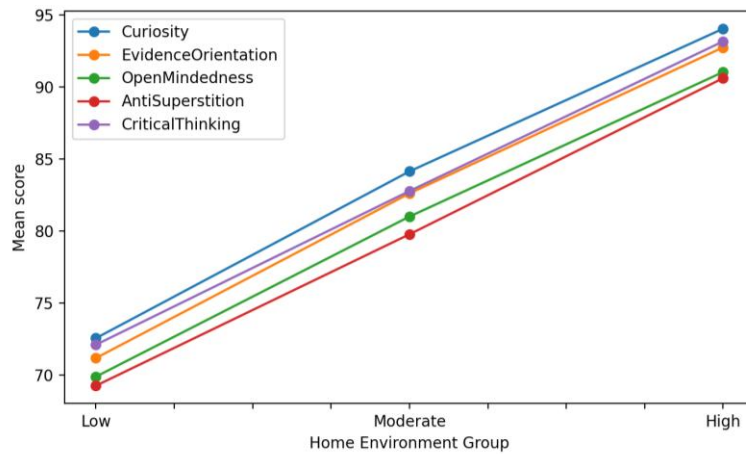


Figure 3. Scientific attitude domain profile across home environment groups.

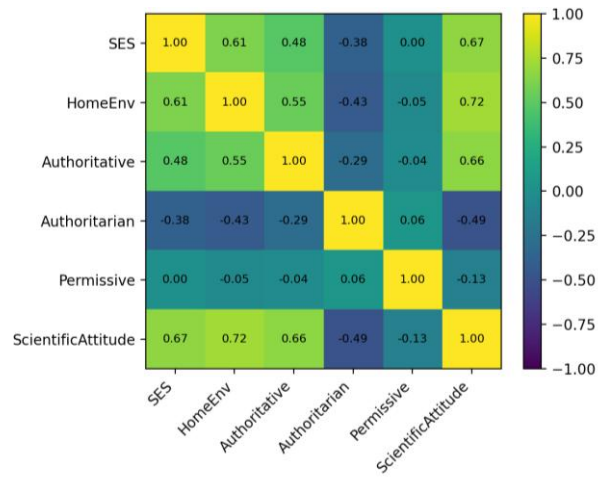
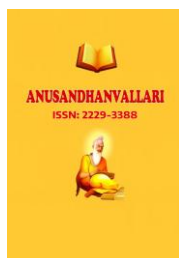


Figure 4. Correlation matrix showing home environment in relation to SES, parenting style and scientific attitude.



The figures strengthen the interpretation. Figure 1 displays the increasing trend across home environment groups. Figure 2 shows a clear positive relationship. Figure 3 demonstrates that high-support homes improve all scientific attitude domains. Figure 4 shows that home environment is related to SES and parenting style, but it also has its own independent role.

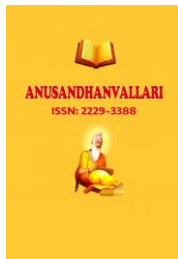
The findings of the study show that home environment plays an important role in developing scientific attitude among secondary school students. It is found that scientific attitude increases as the level of support in the home environment increases. Students who receive encouragement, guidance, learning facilities, emotional support, and freedom to ask questions at home show better scientific thinking than those who do not receive such support. Home environment has a positive relationship with major dimensions of scientific attitude, such as curiosity, evidence orientation, open-mindedness, anti-superstitious thinking, and critical thinking. This means that a supportive family atmosphere helps students ask questions, search for facts, respect different ideas, reject blind beliefs, and think logically. The analysis also shows that home environment adds explanatory value beyond socioeconomic status and school-related variables. Even when SES and school factors are considered, home environment continues to influence students' scientific attitude. A positive and supportive home can also partly reduce the disadvantage faced by students from lower socioeconomic backgrounds. If parents provide motivation, discipline, discussion, and interest in learning, students may develop scientific habits despite limited resources. Therefore, school-home partnership is necessary for strengthening scientific attitude. Teachers and parents should work together through meetings, science activities, guidance sessions, and home-based learning support.

CONCLUSION

The study concludes that home environment is a strong and meaningful predictor of scientific attitude among secondary school students in Rohtak district. A scientifically supportive home does not require expensive equipment. It requires time, encouragement, discussion, reading material, and respect for questions. Parents can develop scientific attitude by asking children to observe daily events, compare explanations, read simple science articles, discuss health and environment issues, and verify information before believing it. Schools should design home-based science assignments that can be completed with low-cost materials. Teachers should guide parents on how to support curiosity without pressuring children. Libraries, science clubs, and community science activities should be connected with family participation. The larger implication is that scientific attitude becomes stronger when school and home work together.

REFERENCES

1. Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *Journal of Early Adolescence*, 11(1), 56-95. <https://doi.org/10.1177/02724316911111004>
2. Bradley, R. H., Caldwell, B. M., Rock, S. L., Hamrick, H. M., & Harris, P. (1988). Home Observation for Measurement of the Environment: Development of a home inventory for use with families having children 6 to 10 years old. *Contemporary Educational Psychology*, 13(1), 58-71.
3. Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology*, 19(2), 294-304. <https://doi.org/10.1037/0893-3200.19.2.294>
4. Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P. H. Mussen & E. M. Hetherington (Eds.), *Handbook of child psychology: Vol. 4. Socialization, personality, and social development* (pp. 1-101). Wiley.
5. Moore, R. W., & Foy, R. L. H. (1997). The scientific attitude inventory: A revision (SAI II). *Journal of Research in Science Teaching*, 34(4), 327-336. [https://doi.org/10.1002/\(SICI\)1098-2736\(199704\)34:4<327::AID-TEA3>3.0.CO;2-T](https://doi.org/10.1002/(SICI)1098-2736(199704)34:4<327::AID-TEA3>3.0.CO;2-T)



6. Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079. <https://doi.org/10.1080/0950069032000032199>
7. Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75(3), 417-453. <https://doi.org/10.3102/00346543075003417>
8. Tytler, R., & Osborne, J. (2012). Student attitudes and aspirations towards science. In B. J. Fraser, K. Tobin, & C. J. McRobbie (Eds.), *Second international handbook of science education* (pp. 597-625). Springer. https://doi.org/10.1007/978-1-4020-9041-7_41