

Influence of Science Classroom Climate Among Secondary School Students of Telangana: Special Reference to Academic Achievement

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Abstract — The presented work emphasizes the importance of science classroom climate in fostering basic understanding and improving academic achievement. The study titled "The Influence of Science Classroom Climate on Academic Achievement Among School Students," explores how a positive science classroom climate enhances student efficiency, motivation, and resource utilization. This environment fosters interest in education, leading to improved performance and academic success of students. The study focuses on 250 secondary school students in classes IX and X, limited to 10 English medium secondary schools. These schools are under the CBSE (AISSE) and TS BSE boards, and the research is conducted in Hyderabad, Telangana. This study examines how the science classroom climate affects students' academic achievement. It highlights that proper science classroom equips students with essential problem-solving and decision-making skills, enabling them to tackle global challenges with a scientific perspective while considering social and ethical implications. A sample representing the collected data from 160 students at urban and rural schools in research, outlining variables, sampling, tools and procedures for data collection and analysis. Using specially designed instruments, this study investigates the impact of science classroom environment on learning success amongst school students.

Index Terms — Influence, Science, Classroom, Academic achievement, Climate.

I. INTRODUCTION

The influence of the science classroom climate on academic achievement is significant among students. It captivates and inspires students, fostering curiosity and enabling them to develop a deeper understanding and formulating questions based on their existing knowledge and future aspirations. Students who excel

in education often develop critical thinking skills and a strong determination to seek knowledge. Education provides students with the tools to question the world around them, encouraging them to seek explanations rather by observing, analyzing, experimenting, and concluding, students grasp complex systems and make informed decisions. Science education inspires all age groups, enhancing daily life and encouraging continuous learning.

II. REVIEW OF RELATED LITERATURE

Reviewing related studies is vital for research, offering insights and preventing duplication. It provides valuable hypotheses and statistical insights. The investigator gathered and analysed information from diverse sources to ensure a comprehensive understanding and avoid redundancy. Numerous studies have examined the influence of science classroom climate on students' academic achievement.

2.1. National

Betta Swamy H B and Sharath Kumar C R (2022) explored how scientific attitude impacts the academic achievement of class IX students in Mysore, Karnataka. Their study highlights the pivotal role of science education in fostering positive attitudes, intellectual skills, and academic success. Sree Vrinda Nair (2021) found that graphic organizers improve academic achievement and meta-cognitive awareness in secondary students. The study, with 165 participants from Kerala schools, showed that these tools enhance learning and self-directed learning skills by visually illustrating concept relationships, emphasizing their effectiveness as instructional aids. In their 2019 study, Vineet Gairola and Prabhat Kumar Mishra explored the connection between school climate and student

outcomes in India, emphasizing its complexity and influence on student achievement. Their paper urges additional research on how factors such as leadership, teacher behaviour, academic stress, mental health, and school effectiveness affect school climate and student outcomes, including perception and adjustment dynamics. Harish Mittu and Lino K Zhimomi (April, 2019) examined how school climate influences achievement motivation in higher secondary students. Surveying 250 students from five schools in Dimapur, Nagaland, they found a positive relationship, though not a strong predictor. Nonetheless, a supportive school climate, including safety and academic environment, is crucial for student success. In 2017, K. Tharani and D. Geetha explored the connection between classroom climate and academic achievement in higher secondary students. Surveying 300 students from government and private schools in Coimbatore, Tamil Nadu, they found no significant relationship between the two variables.

2.2. International

Qiumei Wang, Kenny Cheah Soon Lee, and Kazi Enamul Haque (2020) found that classroom climate positively influences academic motivation among Chinese higher education students, as evidenced by their survey of 119 undergraduate medical students. This underscores the importance of a positive classroom environment for enhancing student motivation and learning, providing insights for stakeholders and educators. Riaz Hussain Malik and Asad Abbas Rizvi (2018) explored how classroom environment perceptions impact math achievement in secondary students. Surveying 516 10th-graders from 24 schools in Tehsil Rawalpindi and Islamabad, Pakistan, they found positive impacts of "Involvement" and "Emphasis on understanding" on achievement, while "Investigation" and "Autonomy" had negative effects. They suggest boosting involvement of low achievers to enhance outcomes. Tim Konold, Dewey Cornell, Yuane Jia, and Marisa Malone (December 2018) studied the link between school climate, student engagement, and academic achievement. With a vast sample of over 60,000 students and 11,000 teachers from 298 high schools, their research supported the authoritative school climate theory. They found that schools with strong structure and student support experienced increased student engagement, leading to improved academic

performance. This underscores the vital role of an authoritative school climate in boosting academic success. Sophie Maxwell et al. (2017) analyzed how school climate and identification impact academic achievement using multilevel modeling. They found students' perceptions of school climate influenced writing and numeracy achievement through their identification with the school. Staff perceptions also affected student achievement, but staff's identification did not. These findings hold relevance for organizational, social, and educational research. Mona Faisal Al-Qahtani (2015) examined the relationship between study approaches, learning environments, and academic achievement at Taibah University of Medical Sciences. The study found that students frequently used achievement, versatility, and reproduction approaches and perceived their learning environments positively. It highlighted significant connections between study methods, environments, and academic success, with academic self-perception playing a crucial role.

III. OBJECTIVES OF THE STUDY

- 3.1. To identify the relationship between science classroom climate and academic achievement.
- 3.2. To analyze the difference between rural and urban students with respect to dimensions of science classroom climate.
- 3.3. To compare the academic achievement of rural and urban students.

IV. RESEARCH QUESTIONS

- 4.1 What is the relationship between science classroom climate and academic achievement?
- 4.2 Is there any difference between urban and rural students in respect of science classroom climate?
- 4.3 Is there any difference between urban and rural students in respect of academic achievement?

V. METHODOLOGY

5.1 Population and Sample

The population for this study includes class IX and X students from English medium schools under CBSE and TS BSC in Hyderabad (Range Reddy district) during the academic year 2023-2024. For this study,

data was collected from 160 students attending urban (Sentia The Global School, CBSE) and rural (Devendra Vidyalaya, TS BSE) schools.

5.2 Study Area

This study was conducted with different schools of the CBSE (AISSE) and TS BSE boards in Hyderabad, Telangana.

5.3 Theoretical Framework

The Measured Variables in this study include "The Influence of Science Classroom Climate" as the independent variable and "Academic Achievement Among School Students" as the dependent variable. In this study, Location (divided into Rural and Urban schools) is the categorical variable.

5.4 Tools

This section outlines the development and standardization of the data collection tool used by the investigator, which is a questionnaire consisting of 10 questions with 4 options. Each option is assigned a weightage of marks (a=1, b=2, c=3, d=4). Academic achievement among students was assessed through project work conducted in class, including Subject Enrichment Activities (SEA), Multidisciplinary Activities (MDA), and Art Integration (AI) related to the science topic of "friction and sound," with scores assigned accordingly.

5.5 Design

The research design guides data collection, measurement, and analysis, ensuring coherence across study components. Here, a descriptive survey design is chosen to describe the population, situation, or phenomenon, focusing on how, what, when, and where questions. Utilizing surveys, this approach gathers data to understand the extent of different conditions among subjects.

VI. RESULTS

- Objective 3.1: To identify the relationship between science classroom climate and academic achievement.

6.1 Explanation of science classroom climate.

(Table : 6.1)

Option	Percentage of Students	Total No of Students
Atmosphere	25%	40
Environment	12%	20
Availability of all resources in classroom	50%	80
Smartboard	13%	20

6.2 Science climate in school. (Table : 6.2)

Option	Percentage of Students	Total No of Students
Scientific activities	13%	20
Class tests	12%	20
Scientific activities, concept clarity, hands on experiment	75%	120
Reading and learning	0%	0

- Objective 3.2: To analyze the difference between rural and urban students with respect to dimensions of science classroom climate.

6.3 Facilities are available for rural students.

Option	Percentage of Students	Total No of Students
Proper laboratories	6%	10
Online classes, smartboard	0%	0
Computer facilities	10%	16
Books and teachers demonstration in class	84%	134

(Table : 6.3)

6.4 Facilities are available for urban students.

Option	Percentage of Students	Total No of Students
Proper laboratories	31%	50
Online classes, smartboard	19%	30
Computer facilities	28%	45
Books and teachers demonstration in class	22%	35

(Table : 6.4)

- 6.5 Difference between Urban and Rural students with respect to dimensions of science classroom climate.

Option	Percentage of Score	Total Score
Rural students	32%	200
Urban students	68%	440

(Table : 6.5)

6.6 The child struggles to play in group. The difference between Urban and Rural students with respect to Academic Achievement

Option	Percentage of Score	Total Score
Rural students	39%	1260
Urban students	61%	1986

(Table : 6.6)

VII. DISCUSSION

From the Table 6.1, we find out that 25% of students says atmosphere, 12% of students says environment, 50% students says availability of all resources in classroom, 13% of students says smart board. From Table 6.2, we find out that 75% of students says scientific activities, concept clarity and hands on experiment, 12 % says class tests, 13% says scientific activities. From Table 6.3, we find out that 6% says proper laboratories, 0% says online classes and smartboard, 10% says computer facilities 84% says books and teachers demonstration in class From Table 6.4, we find out that 31% says that proper laboratories, 19% says online class and Smartboard, 28% says computer facilities, books and teachers demonstration in class says 22%. From Table 6.5, we can say that 38% facilities provided to rural students and 68% facilities are provided to urban school. From Table 6.6, we find that 39% is the Academic Achievement among rural students and 61% in urban students.

VIII. CONCLUSION

The researcher began by selecting and verifying the problem statement. Objectives guided research questions, shaping the study's direction. Operational definitions clarified terms, aiding focus. Delimitations ensured adherence to the topic. Significance highlighted the importance of studying in a science classroom climate for students, which helps in problem-solving abilities. Reviewing related literature provided diverse perspectives. Critical observation of ten studies, both Indian and international, informed insights. Methodology detailed variables, population, samples, tools, design, and procedures. Description

and interpretation shaped the study systematically, with findings presented accordingly.

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