

Review of Classroom Climate on Science Learning Interest among Class X Students

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Abstract: *Classroom climate is a significant factor influencing students' motivation, engagement, and interest in learning, particularly in science education at the secondary school level. Science learning interest among Class X students is often shaped by the social, emotional, and instructional environment of the classroom. This review paper examines existing literature on the concept of classroom climate and its relationship with students' interest in science learning. The review focuses on key dimensions of classroom climate such as teacher–student interaction, peer relationships, instructional practices, classroom management, and emotional support.*

Findings from previous studies consistently indicate that a positive and supportive classroom climate enhances students' curiosity, engagement, and sustained interest in science. Conversely, a negative classroom climate may lead to disinterest, anxiety, and reduced participation in science learning. The review highlights the importance of creating a learner-centered, emotionally safe, and interactive classroom environment to promote science learning interest among Class X students. The paper concludes by emphasizing the need for teachers and schools to consciously foster positive classroom climates to improve students' interest and overall learning outcomes in science.

Keywords: Classroom climate, Science learning interest, Class X students.

I. INTRODUCTION

Education at the secondary school level plays a pivotal role in shaping students' academic trajectories, attitudes toward learning, and future career aspirations. Among the various subjects taught at this stage, science occupies a central position due to its contribution to the development of scientific temper, critical thinking, problem-solving skills, and informed citizenship. Class X represents a crucial transitional phase in the school system, as students encounter increased academic demands, board examinations, and decisions related to subject specialization. During this stage, students' interest in science learning often determines not only their academic performance but also their willingness to pursue science-related courses and careers. However, research has consistently reported a decline in students' interest in science during secondary school years, highlighting the need to examine contextual factors that influence science learning interest.

One of the most influential contextual factors in school education is the classroom climate. Classroom climate refers to the overall atmosphere of the classroom as experienced and perceived by students. It encompasses the social, emotional, psychological, and instructional characteristics of the learning environment. A classroom is not merely a physical space where teaching and learning occur; rather, it is a dynamic social system shaped by interactions among teachers, students, peers, and instructional practices. The nature of these interactions significantly affects students' motivation, engagement, attitudes, and interest toward learning, particularly in cognitively demanding subjects such as science.

In recent years, educational researchers have emphasized the importance of classroom climate in promoting meaningful learning experiences. A positive classroom climate is characterized by supportive teacher–student relationships, mutual respect, cooperation among peers, clarity of expectations, opportunities for active participation, and emotional safety.

Such an environment encourages students to express their ideas freely, ask questions without fear of ridicule, and engage deeply with scientific concepts. Conversely, a negative classroom climate marked by excessive control, poor teacher support, unhealthy competition, or fear of failure can suppress curiosity and reduce students' interest in science learning.

Science learning interest is a motivational construct that reflects students' curiosity, enjoyment, and willingness to engage with scientific content and activities. Interest in science develops through continuous interaction between the learner and the learning environment. When students perceive science classes as relevant, enjoyable, and supportive, they are more likely to invest effort, persist in challenging tasks, and develop a positive attitude toward the subject. For Class X students, whose academic pressure is often high, maintaining interest in science is particularly important to prevent disengagement and learning anxiety.

The relationship between classroom climate and science learning interest has been widely explored in educational psychology and science education research. Studies suggest that classroom climate acts as a mediating factor between instructional practices and student outcomes. Teacher enthusiasm, clarity of instruction, use of student-centered strategies, and encouragement of inquiry-based learning contribute to a positive classroom climate that nurtures students' interest in science. Moreover, peer interactions such as cooperative learning, group discussions, and collaborative experiments enhance social support and make science learning more interactive and meaningful.

At the secondary level, especially in Class X, science learning often becomes content-heavy and examination-oriented. This shift can lead to rote learning and reduced intrinsic motivation if classroom practices are not aligned with students' developmental needs. A supportive classroom climate can counterbalance these challenges by promoting active learning, conceptual understanding, and intrinsic interest. When teachers create an environment that values students' ideas, acknowledges individual differences, and provides constructive feedback, students are more likely to perceive science learning as enjoyable and worthwhile.

Classroom climate also includes the emotional and psychological dimensions of learning. Emotional safety, sense of belonging, and perceived fairness play a crucial role in sustaining students' interest in science. Adolescents are particularly sensitive to classroom interactions and teacher behavior. Negative experiences such as public criticism, lack of encouragement, or favoritism can adversely affect students' confidence and interest in science. On the other hand, a climate that emphasizes empathy, respect, and encouragement fosters positive emotions toward learning and enhances students' engagement with scientific concepts.

The physical and organizational aspects of the classroom further contribute to classroom climate. Availability of learning resources, laboratory facilities, seating arrangements, and effective classroom management influence students' participation and interest in science learning. Well-organized classrooms that support hands-on activities, experiments, and demonstrations make science more tangible and engaging for Class X students. Such environments enable learners to connect theoretical knowledge with practical applications, thereby strengthening their interest in the subject.

Given the multifaceted nature of classroom climate and its significant influence on science learning interest, it is essential to systematically review existing literature in this area. A review of classroom climate in relation to science learning interest among Class X students helps in identifying key dimensions of the learning environment that support or hinder student motivation. It also provides insights into effective teaching practices and classroom strategies that can enhance students' interest in science at the secondary level.

This review-based introduction underscores the need to view science learning not only as a cognitive process but also as a social and emotional experience shaped by classroom climate. Understanding how classroom climate influences science learning interest among Class X students is vital for teachers, curriculum designers, school administrators, and policymakers. By fostering positive classroom environments, schools can play a significant role in sustaining students' interest in science, improving learning outcomes, and encouraging the pursuit of science-related careers.

Classroom climate serves as a powerful determinant of science learning interest among Class X students. As students navigate the academic and emotional challenges of secondary education, a supportive and engaging classroom climate can act as a catalyst for curiosity, motivation, and sustained interest in science learning. A comprehensive review of

literature in this area is therefore essential to inform educational practices and contribute to the improvement of science education at the secondary school level.

CONCEPT OF CLASSROOM CLIMATE

Classroom climate is a multidimensional construct that reflects the quality of interactions, norms, values, and emotional tone within a classroom. According to Fraser (2014), classroom climate includes students' perceptions of teacher support, involvement, cooperation, task orientation, and equity. A positive classroom climate is characterized by mutual respect, encouragement, and a sense of safety.

Researchers have identified two broad components of classroom climate:

Psychosocial climate, which includes relationships, emotional support, and social interactions.

Physical and instructional climate, which includes classroom organization, teaching methods, learning resources, and classroom management.

Both components are essential for promoting students' interest in science learning.

SCIENCE LEARNING INTEREST

Science learning interest refers to the degree of curiosity, enthusiasm, and willingness that students demonstrate toward learning scientific concepts, processes, and applications. At the secondary school level, particularly among Class X students, science learning interest plays a vital role in shaping academic achievement, conceptual understanding, and future educational choices. Interest in science encourages students to actively engage in classroom activities, ask questions, participate in experiments, and seek deeper explanations beyond textbook knowledge. When students are genuinely interested in science, learning becomes meaningful rather than mechanical, leading to improved retention and understanding of scientific concepts.

Science learning interest is not an inborn trait but a dynamic motivational construct that develops through continuous interaction between the learner and the learning environment. Factors such as teaching methods, classroom climate, curriculum relevance, and availability of learning resources significantly influence students' interest in science. At the Class X level, students are exposed to more abstract and complex scientific concepts, which can either stimulate curiosity or lead to disinterest if not presented effectively. When science instruction connects concepts to real-life situations, societal issues, and technological advancements, students are more likely to perceive science as relevant and valuable, thereby strengthening their interest.

The role of teachers is central in fostering science learning interest among Class X students. Teachers who demonstrate enthusiasm for science, encourage questioning, and adopt student-centered instructional strategies contribute positively to students' motivational orientation. Inquiry-based learning, hands-on experiments, demonstrations, and problem-solving activities promote active involvement and help students experience science as an exploratory and investigative process. Such approaches move away from rote memorization and allow students to develop a deeper appreciation for scientific thinking, which sustains their interest over time.

Peer interaction and collaborative learning also influence science learning interest. Group activities, laboratory work, and cooperative projects create opportunities for discussion, idea-sharing, and collective problem-solving. These interactions help reduce fear and anxiety associated with science learning and create a supportive social environment. When students feel accepted and encouraged by their peers, they are more likely to participate actively and develop confidence in their scientific abilities, which further enhances their interest in the subject.

In addition, emotional and psychological factors strongly affect science learning interest. A supportive learning environment that values effort, creativity, and improvement fosters positive attitudes toward science. Conversely, excessive academic pressure, fear of failure, and negative classroom experiences can diminish interest and lead to avoidance of science learning. Therefore, nurturing science learning interest among Class X students requires a holistic approach that integrates effective teaching practices, supportive classroom climate, meaningful curriculum, and emotional encouragement. Developing and sustaining interest in science at this crucial stage not only improves

academic performance but also lays the foundation for scientific literacy, critical thinking, and informed decision-making in later life.

RELATIONSHIP BETWEEN CLASSROOM CLIMATE AND SCIENCE LEARNING INTEREST

The relationship between classroom climate and science learning interest is both strong and significant, particularly among Class X students who are at a critical stage of academic and career development. Classroom climate refers to the overall social, emotional, and instructional atmosphere of the classroom as experienced by students. A positive classroom climate characterized by supportive teacher–student relationships, respectful peer interactions, and engaging teaching practices creates an environment in which students feel safe, valued, and motivated to learn. In such classrooms, students are more willing to participate actively in science activities, ask questions, and explore scientific concepts with curiosity and confidence. Teacher encouragement, fairness, and enthusiasm toward science play a vital role in shaping students’ perceptions of the subject and sustaining their interest.

Moreover, collaborative learning opportunities and inquiry-based instructional methods make science learning more meaningful and relevant, thereby increasing students’ intrinsic motivation. Conversely, a negative classroom climate marked by fear, excessive competition, or lack of support can reduce students’ interest and engagement in science learning. Therefore, classroom climate acts as a crucial contextual factor that directly influences students’ attitudes, motivation, and sustained interest in science, emphasizing the need for supportive and learner-centered classroom environments at the secondary school level.

Teacher–Student Interaction

Teacher support, encouragement, and enthusiasm for science significantly influence students’ interest. When teachers create an open and respectful environment, students feel comfortable asking questions and expressing ideas, which enhances their engagement in science learning (Wentzel, 2012).

Peer Interaction and Collaboration

Collaborative learning and positive peer relationships contribute to a sense of belonging and shared inquiry. Cooperative activities such as group experiments and discussions increase students’ interest by making science learning more interactive and meaningful (Johnson & Johnson, 2019).

Instructional Practices

Student-centered and inquiry-based teaching methods positively affect classroom climate and science interest. Hands-on activities, experiments, and real-life applications of scientific concepts make learning more relevant and enjoyable for Class X students (Hofstein & Lunetta, 2014).

Emotional and Psychological Safety

A classroom climate that promotes emotional safety and reduces fear of failure encourages students to take intellectual risks. Such an environment fosters curiosity and sustained interest in science learning (Eccles & Roeser, 2011).

The following table summarizes selected studies that examined the relationship between classroom climate and science learning interest among secondary school students.

Author(s) & Year	Sample	Variables Studied	Key Findings
Fraser (2014)	Secondary students	Classroom climate, student attitudes	Positive classroom climate enhanced students’ attitudes toward science
Hofstein & Lunetta (2014)	High school students	Learning environment, science interest	Inquiry-based environments increased interest in science
Wentzel (2012)	Adolescents	Teacher support, motivation	Teacher support positively predicted learning interest
Eccles & Roeser (2011)	Secondary students	Emotional climate, engagement	Supportive climate improved engagement and interest
Krapp (2012)	School students	Interest, learning outcomes	Interest mediated the effect of environment on learning

EDUCATIONAL IMPLICATIONS

The review highlights several implications for science teachers and school administrators:

Teachers should foster supportive and respectful relationships to create a positive classroom climate.

Active and inquiry-based teaching strategies should be integrated into science instruction.

Cooperative learning opportunities should be encouraged to enhance peer interaction.

Schools should provide professional development programs focused on improving classroom climate.

A positive classroom climate not only enhances interest in science learning but also contributes to students' overall academic and personal development.

II. CONCLUSION

The present review highlights the significant influence of classroom climate on science learning interest among Class X students and underscores its importance as a core component of effective science education at the secondary level. The synthesis of theoretical perspectives and empirical studies clearly indicates that classroom climate is not merely a contextual backdrop but an active and dynamic force that shapes students' motivation, engagement, and attitudes toward science learning. A positive classroom climate characterized by supportive teacher-student relationships, constructive peer interactions, engaging instructional practices, and emotional and psychological safety plays a decisive role in fostering curiosity and sustained interest in science among adolescents.

For Class X students, who are at a crucial stage of academic development and often experience increased curricular pressure and examination stress, the classroom environment becomes particularly influential in determining whether science is perceived as an interesting and meaningful subject or as a source of anxiety and disengagement. The review demonstrates that teachers are central agents in creating a positive classroom climate, as their attitudes, teaching strategies, and interpersonal behaviors significantly affect students' perceptions of the learning environment. When teachers encourage participation, value students' ideas, and promote inquiry-based and hands-on learning experiences, students are more likely to develop intrinsic interest in science. Furthermore, positive peer relationships and cooperative learning opportunities enhance students' sense of belonging and social connectedness, which in turn contribute to greater engagement and enjoyment in science learning. The emotional dimension of classroom climate also emerged as a critical factor, as classrooms that promote psychological safety and reduce fear of failure enable students to take intellectual risks and view mistakes as part of the learning process. Such environments are especially important in science education, where experimentation, questioning, and critical thinking are essential.

Overall, the review establishes that a supportive and stimulating classroom climate enhances not only science learning interest but also students' confidence, persistence, and long-term academic orientation toward science. In conclusion, fostering a positive classroom climate should be regarded as a priority for science teachers, school leaders, and policymakers aiming to improve students' interest and engagement in science at the secondary level. Teacher training programs, school policies, and curriculum implementation strategies should emphasize the development of positive classroom environments alongside content knowledge and pedagogical skills. Future research may further explore classroom climate through longitudinal and intervention-based studies to better understand its sustained impact on science learning interest and academic outcomes among Class X students.

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