Abstract

The current study aims at finding out the school climate, scientific reasoning, procrastination tendency and parent autonomy support of senior secondary school students in relation to their academic achievement levels in physics. The current study explores the interplay between school climate, scientific reasoning, procrastination tendencies, and parent autonomy support among senior secondary school students, examining how these factors relate to their academic achievement in physics. It further investigates whether these variables, along with academic achievement levels, are influenced by demographic factors such as gender, locality, and type of school. Additionally, the study seeks to identify significant differences among various academic achievement levels in physics concerning these factors. Finally, it delves into whether school climate, scientific reasoning, procrastination tendencies, and parent autonomy support significantly correlate with academic achievement and whether these factors serve as predictors of students' performance in physics.

To address these objectives, a descriptive survey employing a correlational design was conducted in Kangra district, Himachal Pradesh. A total of 560 Class 12 physics students were selected through multistage sampling. The study utilized a range of instruments: a self-developed School Climate Questionnaire, the Lawson Classroom Test of Scientific Reasoning (adapted from Lawson, A.E., 2000), the Procrastination Scale (adapted from Lay, 1986), the Perceived Parental Autonomy Support Scale (P-PASS, adapted from Mageau et al., 2015), and a self-developed Achievement Test in Physics. The data were analyzed using relevant statistical techniques and the results were interpreted to draw conclusions.

The findings of the study highlight several factors influencing students' academic performance in physics, with findings across demographics. According to a study, these are the reasons contributing to the performance of students in physics and it is indeed preventable. Key determinants of the components of this construct were school climate, scientific reasoning, parent autonomy support, and procrastination tendency, with the most ratings being average. Male students were better at scientific reasoning, while female students perceived their school climate more positively but they were more prone to procrastination. Females were found to be higher in procrastination than males. Government programs designed to equalize education resources had a positive effect, as rural and urban students showing similar academic performance. But private school students surpassed those in government schools, a result of

better infrastructure and higher quality teachers. Poor academic performance was weakly associated with the dimensions of school climate, scientific reasoning and procrastination, reaffirming the importance of family support systems and intrinsic motivation. The analysis revealed that scientific reasoning and procrastination were the strongest predictors of academic success, while school climate and parent autonomy support were less impactful, emphasizing the role of cognitive and behavioral factors.

39.28% of students perceived their climate as "average" with only a few of the factors above. 40.89% of students scored themselves average rated their ability to do scientific reasoning, while 33.75% rated themselves below average, likely due to the complexity of the subject and challenges it poses to the science educator. Strategies tailored to these individuals specifically are thus needed in order to nurture critical thinking. On procrastination, 33.93% of the students were average, while 26.61% were below average, largely due to stress and problems in their time management and self-regulation. Parental autonomy support was given an average rating by 41.79% of students, and there were no extreme scores reported, signaling both socio-economic and cultural gaps. Academically, 32.32% of students had an average performance, while 29.29% performed below average due to lack of infrastructure, material shortage, poor teacher-students interaction, and parental support.

Overall, girls scored significantly higher (mean: 218.20) than boys (mean: 211.46) (G = 6.735). The male students did better in the area of scientific reasoning (mean: 7.60 vs. 6.72), possibly due to access to resources and societal norms. As for the different dimensions of procrastination, females tend to procrastinate on time management tasks. Urban students exhibited more procrastination behaviour than rural students, due perhaps to fast-paced lifestyles and media exposure. Rural students performed better on planning and time management. The school crime climate mean revealed that private school students (mean: 223.19) had a better school climate than the government school students (mean: 210.10), which was based on better facilities and individualized attention. But procrastination rates were higher among students in private schools, due to academic pressure and competitiveness. The study found that academic achievement scores were similar for private and government school students, with similar teaching techniques and curriculum implementation. In terms of socio-economic influences, parental involvement (defined by both autonomy support and psychological control) appeared unaffected by gender or type of schooling.

While school climate and scientific reasoning explained a significant amount of variance in predictions related to academic achievement, the associations were statistically weak, indicating that socio-economic status and personal goals are more important. It was found through regression analysis that scientific reasoning ($\beta = 0.162$, $p < 0.001$) and procrastination tendency ($\beta = 0.101$, $p < 0.019$) were the strongest predictor variables of academic success, exceeding school climate and parental support variables. This highlights the role of cognitive and behavioral characteristics including abilities to reason and manage time, more than environmental or socio-emotional factors, to academic achievement.

This study holds diverse educational implications, which go beyond roles related to either the teacher, the student, the administrators, the policymakers, or the parents, but rather plays a critical role in creating the ideal learning environment promoting academic performance, specifically in physics. For teachers, the study which is based on the results of the survey also highlights the importance of developing a positive climate in the school, nurturing scientific reasoning using inquiry-based learning process, mitigating procrastination using time management techniques, and gender-sensitive pedagogies towards a perception gap. Focused interventions enhance students' critical thinking skills and minimize tendencies to procrastinate longer, while collaborative and inquiry-based learning approaches across courses significantly bolster academic performance. It is urged by the administration that allocation of resources, infrastructure development and innovative pedagogical approaches be made while also working to reduce these disparities between the private and government school teachers. The priority for policymakers is to design and implement inclusive, equity-driven reforms that bridge rural-urban and gender gaps, harnessing initiatives such as RMSA and Digital India to contribute to intergroup uniformity in educational outcomes. To address these obstacles, parents are encouraged to create a supportive home environment, complement engagement with the schools, model time management skills, and to combat socio-economic challenges through pressuring educators for more equitable sharing of resources. In summary, these measurements highlight the need for a comprehensive strategy that considers cognitive, behavioral, and contextual elements to improve educational outcomes among different student populations.

Key Terms: *School Climate, Scientific Reasoning, Procrastination Tendency, Parent Autonomy Support, Academic Achievement in Physics, Senior Secondary School Students.*