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THE SOCIO-ECONOMIC GRADIENT IN SCIENCE PERFORMANCE: CORRELATING PARENTAL SES WITH ACADEMIC PERFORMANCE AMONG HIGH SCHOOL STUDENTS IN ASSAM

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ABSTRACT

Socio-economic gradient is one of the potent factors, which determines one's future perspective. This study investigates the association between parental socio-economic status (SES) and academic performance in science among high school (HS) students in Assam, India. The study focuses to establish the exact relation that exists between the socio-economic status (SES) and the academic performance, which portrays the unequal distribution that hinders the learning outcomes. A quantitative research design is considered appropriate as it helps to measure the exact relation between SES and academic performance. The sample was taken from 6 different government schools residing in Kamrup Metro and Kamrup, of 150 HS students. The employed a simple, context-appropriate SES measurement tool adapted from the Kuppuswamy scale. The findings revealed a sturdy relation between composite SES and academic performance ($r=0.911$, $p<0.001$), indicating an existing Socio-economic gradient. Students from high SES background have better facilities such as quality education, better resources in contrast to students with lower SES. The study depicts a scenario of unequal distribution of resources , which call for targeted intervention the bridge the performance gap in Assam, and set equity in educational sector as far as possible.

KEYWORDS: *Socio-Economic Gradient, Academic Performance, High School, High School students, Assam*

INTRODUCTION

Education is substantial instrument leading to social makeover, man power development and economic progress. Education is the vital process of life that transformed an entity and makes one able to survive (Ahmar &Anwar, 2013). So, education is a transformative process in the context of social science (Mondal, 2018). Academic performance is very crucial at the secondary level, as it predicts the future endeavor of the students. There are multifaceted variants which act as a divergent in the path of achieving better academic performance, one of the most influential is the socio-economic gradient. The socio-economic gradient refers to the systematic relationship between an individual's social and economic standing and their educational outcomes. Families with enhanced economic-status offers better educational facilities and learning opportunities. The socio-economic status is based on the parameters of parental education, parental occupation and parental income (Rajendra & Selvaganapathy, 2024). In contrast, students from lower socio-economic backgrounds often face multiple challenges like lack of adequate resources, lack of parental involvement due to low educational attainment and limited educational support, which hinders the academic performance (Veen, 2025).

Science education at HS level is crucial as it is the most demanding subject in terms of career opportunities. It offers a wide range of careers in medicine, engineering, biotechnology and a variety of STEM courses, which adds to the national development and personal upliftment. Hence, a weak performance in science limits their access to STEM careers. Thus, the present study holds a significant social and educational implication in the sector of higher secondary science education.

The study seeks to explore how social disparities prevailed in the northeastern state of India, Assam had an influential effect on the HS students learning outcomes, In the existing context of Kamrup Metro and its adjoining district Kamrup seems to have a diversified socio-cultural aspect, which reflects an unequal distribution of academic resources, private guidance and home based educational guidance from the parents. Understanding the socio-economic gradient in science performance within this context is essential for introducing practical strategies for improving science education and promoting educational equity at HS level. Therefore, the present study titled *"**The Socio-economic Gradient in Science Performance: Correlating Parental SES with Academic Performance among High School Students in Assam**"*. It explores the connection between parental SES and academic accomplishment in science among HS students. The results will provide evidence based recommendation to policymakers and educational bodies.

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RESEARCH QUESTION

i. What is the rank of academic performance of H.S students in science subjects in government schools of Kamrup Metro and Kamrup?
ii. Is there a substantial relationship between parental literacy and science performance of HS students?
iii. Is there a substantial relationship between parental occupation and science performance of HS students?
iv. Is there a substantial relationship between family income and science performance of H.S students?
v. Is there a substantial relationship between composite socio-economic status (SES) scores and science performance of H.S students?
vi. Which SES component (parental education, parental occupation, or family income) shows the strongest relationship with science performance?

OBJECTIVES

i. To find the academic performance of higher secondary students in science subjects.
ii. To evaluate the relationship between individual SES components (parental education, occupation, and family income) and composite SES scores and science performance.
iii. To compare science performance across different SES categories (low, middle, and high).

Research Methodology: A descriptive co-relational research design is considered most appropriate for the present study as it helps to predict the exact relation that exist between the SES and academic performance. For the present study sample are taken from 6 government schools residing in the district of Kamrup Metropolitan and Kamrup, Assam. A sample size of 150 HS science stream students are considered appropriate to conduct the research and provide an insightful inference. for the research. A stratified random sampling technique is conventionally used to draw the sample, with the help of structured tool prepared by researcher in reference to Kuppuswamy scale (Mandal & Hossain, 2025). . The tool includes the variables like parental education, parental occupation and parental income; the academic performance was retrieve with the help of school academic records. Finally, the data is systematically arranged and analyzed using SPSS (version 26) and Jamovi 2.7.14 to fulfill the purpose of the study

ANALYSIS

i. To find the level of academic performance of higher secondary students in science subjects.

Table 1.0: ***Descriptive Statistics of Academic performance of H.S students in Science***

Variables	N	Minimum	Maximum	Mean	SD
Academic Performance	150	33.00	95.00	57.73	15.85

Table 1.0 presents the descriptive statistics of the academic performance of the HS students in science. The data shows the minimum score as 33.00 and the maximum score is 95.00,a variation of 62 reflecting difference in academic performance. The mean of 57.73 clearly indicates a moderate rank of academic performance in HS students.

Table 2.0: ***Level of Academic Performance of HS students***

Performance Level	Scores	Frequency	Percentage
Low Performer	33 to 53.99	69	46.0
Moderate Performer	54 to 74.99	61	40.7
High Performer	75 to 95	20	13.3
TOTAL		150	100

Table 2.0 present the rank of academic performance of H.S students in science, it is observed that 69 students (46.0%) were low performer, 61 students (40.7%) were moderate performer and 20 students (13.33%) were high performer. The majority of the students falls under low and moderate performance level, which predicts that a number of students fall under low to moderate performance. The high performer is smaller in portion in comparison to both the categories

ii. To analyze the relationship between individual SES components (parental education, occupation, and family income) and composite SES scores and science performance.

Table 2.0: ***Spearman's Correlation of SES components with Science Performance***

Variables	Mean	SD	Co-relation with Science Performance
Parental Education	6.28	1.48	.666**
Parental Occupation	4.16	1.10	.295**
Family Income	1.56	.670	.495**
Composite SES	12.01	1.835	.911**
Science Performance	57.73	15.85	-

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Table 2.0 presents the composite SES score investigated using non parametric correlation revealed a strong, positive, and statistically substantial correlation with science performance ($r = 0.911$, $p < 0.001$). Among individual SES components, parental education demonstrated the strongest correlation ($r = 0.666$), followed by family income ($r = 0.495$) and parental occupation ($r = 0.295$). All correlations were substantial at the $p < 0.001$ level.

Parents are the harbinger in the child life; they shape the career perspective of their children. Faiza & Daud, 2023 research is an eye opener which evidently depicted that parental literacy especially mother plays an prominent role in shaping child future and perform better Parental literacy plays a prominent role in shaping child future and performs better (Parental involvement is positively correlated with the student's score which nurturing their children's educational process. Students are seen to exhibit higher level of academic scores, when the parents support their study. Likewise, when parents are involved in education, students exhibit a positive outlook and outperformed (Peng *et al.*, 2024).

Objective iii: To compare science performance across different SES categories (low, middle, and high).

Table 3.0: ***Kruskal-Wallis H test of Science Performance Scores across combined SES categories***

Socio-Economic Status	n	Mean Rank	Kruskal-Wallis H test	Chi-Square	Asymp. Sig.
Low SES	4	4.00	67.392	67.3	.000
Moderate SES	115	63.46			
High SES	31	129.40			

Table 3.0 analysis suggested that the Kruskal-Wallis H test confirmed substantial variation across SES group. Introspection of mean ranks reveal that students from high SES families reveals highest performance, mean rank (129.40), followed by moderate SES (mean rank= 63.46) and low SES students (mean rank=4.00).As the overall test was substantial; therefore Dunn's pairwise post-hoc test with Bonferroni correction was conducted to identify specific group differences. See Table 4.0.

Table 4.0: ***Dunn's Pairwise Comparison for Academic Performance across SES composite***

Comparison	*z*-value	p_{Unadj}	$p_{Bonferroni}$
Low SES vs. Moderate SES	-2.69	.007	.021
Low SES vs. High SES	-5.43	<.001	<.001
Moderate vs. High SES	-7.50	<.001	<.001

Table 4.0 presents a Dunn's test to study the difference in science performance across low, moderate and high SES groups. The test confirms that a substantial difference in performance rank across SES categories. High SES students had outperformed than Moderate SES students, z= -7.50, *p* bonf<.001 and Low SES students, _z= -5.43, p_bonf<.001. Similarly, Moderate SES students outperform Low SES students, _z=-2.69, p_bonf=0.021. The patterns reflects that parent with higher SES are reluctant to provide better facilities and resources, which aid to the better academic scores.

FINDINGS

This study examined the socio-economic gradient in science performance among 150 H S students in Assam. The key findings are:

i. The academic performance of HS students in science was low to moderate, where low performer followed by moderate and high performer in Kamrup Metropolitan and Kamrup .
ii. Parental literacy is the strongest predictor of student science performance followed by family income and parental occupation.
iii. A strong, positive, and substantial correlation exists between composite socio-economic status and science performance.
iv. A sturdy substantial socio-economic gradient which reflects that high SES students outperform middle and low SES in terms of science performance.

Limitations of the Study

i. The study lack generalization as it is limited to specific district of Assam and fails to represent the whole population.
ii. The academic record is used to measure the academic performance rather than a standardized achievement and longitudinal assessment.
iii. The SES tool, while simple and context-appropriate, may not capture nuanced aspects of socio-economic status such as household assets, social capital, or intergenerational wealth transfer.

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