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School environment as a determinant of intellectual performance of rural pre adolescents of Ludhiana district

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Abstract

This research investigates the impact of school environment on the verbal and non-verbal intellectual performance of rural pre-adolescents in Ludhiana, Punjab, India. The study categorizes children as intellectually superior, average, or below average, analyzing how their intellectual performance evolves with age and how it is influenced by school infrastructure, teacher-student relationships, administrative support, and extracurricular activities. Hypothesis testing reveals that while no significant differences exist between verbally superior and average students in their perception of school environment, significant differences are observed between superior and below average students. For non-verbal intelligence, a positive correlation (0.49) is found between school environment and intellectual performance, with the chi-square value (48.60) confirming the school's influence on cognitive development. Intellectually superior students report greater satisfaction with their school environment, particularly in teacher-student and extracurricular interactions, compared to their below average peers. The findings suggest that a supportive school environment is crucial for fostering intellectual growth, and the study proposes intervention strategies to enhance educational outcomes and reduce intellectual wastage among rural pre-adolescents.

Keywords: School environment, verbal intelligence, non-verbal intelligence, intellectual performance, rural pre-adolescents

Introduction

The intellectual development of children is profoundly shaped by their environment, particularly during the pre-adolescent phase, which is a crucial period for cognitive growth. Among the various environmental influences, the school environment plays a central role in shaping intellectual performance. The school setting not only serves as a space for academic learning but also provides critical social, emotional, and psychological support. A well-functioning school environment can stimulate intellectual curiosity, enhance cognitive abilities, and improve academic outcomes. In contrast, a poorly structured school environment can limit these developmental opportunities.

In rural settings, particularly in developing regions, the school environment becomes even more significant. Rural children often face a distinct set of challenges, including inadequate educational resources, poor infrastructure, and limited access to trained teachers. These challenges can negatively affect the intellectual performance of children, as they are deprived of the stimulating educational experiences that are more readily available in urban schools. The Ludhiana district in Punjab, India, presents a case study of these issues, with a predominantly rural population and a reliance on agriculture as the primary economic activity. In this context, schools serve as vital institutions for intellectual development, especially for pre-adolescent children who are at a critical juncture in their educational journey.

The pre-adolescent phase, typically ranging from 10 to 12 years, is marked by rapid cognitive development. At this stage, children begin to engage in more complex forms of thinking, problem-solving, and reasoning. The intellectual growth that occurs during this period lays the foundation for future academic success and personal development. In rural Ludhiana, where educational disparities are often stark, it is imperative to understand how the school environment influences the intellectual performance of pre-adolescents.

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The Importance of the School Environment

The school environment encompasses a variety of factors that directly and indirectly affect intellectual performance. These factors include:

- 1. Physical Infrastructure:** The availability of basic infrastructure such as classrooms, libraries, laboratories, and playgrounds is essential for creating a conducive learning environment. In many rural areas, schools may lack these facilities, which can hinder the learning process. A well-equipped school provides students with the resources necessary for academic success, allowing them to explore, experiment, and engage actively in learning activities.
- 2. Teaching Quality:** Teachers are the most critical component of any educational system. In rural schools, however, there is often a shortage of qualified and trained teachers, which can impact the quality of education provided. Effective teaching not only involves the delivery of content but also fostering critical thinking, creativity, and problem-solving skills among students. The presence of motivated, well-trained teachers who use innovative pedagogical techniques can significantly enhance intellectual performance.
- 3. Classroom Environment:** The dynamics within the classroom, including the teacher-student relationship, peer interactions, and the overall learning atmosphere, play a key role in intellectual development. A positive classroom environment where students feel supported and encouraged to participate can boost their confidence and intellectual engagement. Conversely, overcrowded classrooms, lack of attention from teachers, and disruptive behaviors can impede cognitive development.
- 4. Curriculum and Learning Materials:** The curriculum followed in schools and the availability of learning materials such as textbooks, supplementary reading materials, and technological aids are crucial for intellectual growth. A curriculum that encourages critical thinking, creativity, and analytical skills helps in the overall intellectual development of students. In rural areas, outdated curricula, insufficient learning materials, and lack of exposure to modern educational tools can limit intellectual stimulation.
- 5. Extracurricular Activities:** Participation in extracurricular activities such as sports, arts, and cultural programs also contributes to intellectual performance. These activities help in developing cognitive abilities, teamwork, problem-solving, and leadership skills. In rural schools, there may be limited opportunities for students to engage in such activities due to lack of infrastructure or resources, which can restrict their intellectual growth.

Socio-Economic and Cultural Context in Rural Ludhiana

In addition to the immediate school environment, broader socio-economic and cultural factors also influence intellectual performance. In rural Ludhiana, children often come from families engaged in agricultural labor, with limited financial resources and lower levels of parental education. These factors can affect a child's academic performance and intellectual development in various ways:

- 1. Parental Involvement:** Parents in rural areas may have lower levels of formal education and may not be able to actively support their children's learning. Research has shown that parental involvement in education is a key determinant of a child's intellectual performance, as it provides emotional support and reinforces the importance

of education. In Ludhiana's rural communities, limited parental involvement due to economic constraints or lack of awareness may hinder children's intellectual development.

- 2. Access to Educational Resources:** The rural-urban divide in terms of access to quality educational resources is stark. Rural schools in Ludhiana may lack modern technology, access to digital learning platforms, and even basic learning materials. This lack of resources can create significant barriers to intellectual development, as students are deprived of the tools that facilitate deeper learning and exploration.
 - 3. Cultural Attitudes toward Education:** Cultural perceptions about the value of education, particularly for girls, can also affect intellectual performance. In some rural areas, there may be a tendency to prioritize labor over education, particularly in agrarian societies where children are expected to contribute to household work. This can limit the time and attention that children devote to their studies, thereby affecting their intellectual development.
- The Need for Focused Research

Understanding the role of the school environment in shaping the intellectual performance of rural pre-adolescents in Ludhiana is vital for creating targeted interventions. By identifying the specific factors within the school environment that influence cognitive development, stakeholders such as educators, policymakers, and non-governmental organizations can work towards improving the quality of education in rural schools. This can be achieved through investments in infrastructure, teacher training, curriculum development, and the provision of extracurricular opportunities.

This study aims to examine the relationship between the school environment and intellectual performance among rural pre-adolescents in the Ludhiana district. By analyzing the key determinants within the school environment, the research will provide valuable insights that can inform educational policies and strategies aimed at improving intellectual outcomes for rural students. The ultimate goal is to ensure that all children, regardless of their geographical location or socio-economic background, have access to a school environment that fosters intellectual growth and prepares them for future academic and personal success. The following objectives have been set forth for the present study:

1. To identify rural children (9-12 years) of different grades of intellectual performance.
2. To compare the school environment of children belonging to different grades of intellectual performance.

Methodology

The research methodology followed for conducting the study has been described under the following subheadings:

Locale of the study A list of the villages of Ludhiana I block which are within 25km radius from PAU was prepared and two villages namely Pamal and Pamali were selected purposively for drawl of sample for the present study.

Selection of sample

The sample for the present study consisted of a total of 200 children (100 males and 100 females), their parents and teachers. Stratified Random sampling technique was used for selecting the respondent for the study. The subjects for the sample were drawn from primary and middle schools located in the villages of Pamal and Pamali. The investigator, with a letter from the advisor, contacted the principals of the school

and explained to them the purpose of the study and solicited involvement of the students in their school.

On the basis of date of birth records available in the schools, a list of all (male and female) students falling within the age range of 8.5 to 12.5 years was prepared for the two schools separately. From the lists, equal member of males and females i.e. 50 each were drawn randomly from the two schools. The selection of the subjects was random and evenly distributed over age levels, sex groups and the two villages.

Selection of subject was done on the basis of following criteria:

1. Only those children were selected who were presently attending the primary / middle schools
2. Only two-parent homes were selected.

Research Instrument

The following standardized tools were used for various assessments observations on the selected sample subjects, their parents and schools.

The standard progressive matrices test

The standard progressive matrices prepared by Raven (1960), is a test of person's capacity at the time of the test to apprehend meaningless figure presented for his observation, see the relation between them, conceive th nature of the figure completing each system of relations presented and, by doing develop a systematic method of reasoning. The scale consists of problems divided into five sets of 12. In each set, the problem is as nearly as possible self-evident. The problems which follow become progressively more difficult. The 5 set provide 5 opportunities for grasping the method five progressive assessments of a person's capacity for intellectual activity The scale is intended to cover the whole range of intellectual development from the time a child is able to grasp the idea of finding a missing piece complete a pattern, and to be sufficiently long to assess a person's maximum capacity to form comparisons and reasons by analogy, without being un exhausting or unwieldy. A person's total score provides an index of intellectual capacity. It is a performance test.

Mohsin's general intelligence test

General intelligence test is given by Professor S.M. Mohsin in 1990. General intelligence test measures the verbal intelligence of a person. Test consists of 6 subtests. Subtest 1 carries 20 items, subtest 2 has 30 items, subtest 3 has 40 items, subtest 4 has 22 items, subtest 5 has 26 and subtest 6 has 18 items.

Socio-emotional school climate inventory given by Sinha and Bhargava (1994)

The socio-emotional climate of educational institutions is a bridging concept between pupils and the school in which they study and is the perception of the structure, processes and values by the student and faculty members. It is related to their test, achievement, satisfaction and behaviour in a particular schooling system to which they belong.

The scale consists of 70 items divided into 2 sets of 35 items each. operative academic programmes, extra curricular activities, socio-academic interaction between students and teacher, students and students,

Pre- Testing of Research Instrument

Pre- testing was done to find out the nature of responses and clarity of statements the test was administered to 10 children. It was found that children had difficulty in understanding the

English language therefore the test was translated into Hindi.

Administration of tests

The tests were initially administered to 10 children, but some faced difficulties understanding Hindi. To address this, the test was translated into Punjabi and re-administered to an additional 5 children (not included in the final sample). This ensured all subjects could answer independently.

Data Collection

The investigator collected data from village school respondents with the principal's permission. The process involved:

1. Administering the general intelligence test to batches of 10-15 pre-adolescents.
2. Reading instructions aloud and ensuring confidentiality.
3. Providing sufficient time for completion.
4. After a 15-minute gap, distributing Raven's Standard Progressive Matrices with necessary instructions.
5. Using the Socio-Emotional School Climate Inventory to gather data on school climate perceptions. Dimensional parenting scale along with the letter of request clarified the purpose of the study and the need for honest responses. Parents were asked to fill the questionnaires jointly after discussing with each other. one questionnaire was collected after 3 - 4 days.

Modified Grades

For evaluating the data given in the guide were grouped for getting liable statistical results into three grades only such as intellectually superior Intellectually average and intellectually below average.

Verbal intelligence was classified as mentioned below

Intellectually superior included index of brightness (I.B.) 113 and above.

Intellectually average included I.B. 69 112

Intellectually below average included I.B. 68 or under.

Whereas, non-verbal intelligence was classified as follows:

Intellectually superior: Grade (I) grade (II) and II in the R.P.M. gu were classified under this grade.

Intellectually average: This grade included grade III, III and III of the R P M guide

Intellectually below average Grade IV, IV and grade V were included under this grade.

Statistical Analysis

The data was scored and tabulated. The following tests were applied

Chi-Square Test, t test, Correlation Coefficient and percentage for analysis of data

Results and Discussion

Table 1: Verbal Intellectual Performance of Rural Pre- adolescents (9-12 Years) Across Different Age Groups

Intellectual Performance / Age	Intellectually Superior(1) n=45	Intellectually Average (2) n=105	Intellectually Below Average (3) n=50
9 Years	13(26)*	25(50)	12(24)
10 Years	19(38)*	18(36)	13(26)
11 Years	9(18)	26(52)	15(30)
12 Years	4(8)	36(72)	10(20)

Value in parentheses indicates the percentage

Classification of Subjects Into Superior, Average And Below Average Non-Verbal Intelligence Level

It is evident from Table.1 that the percentage of intellectually superior (verbal) children depleting as age increased i.e. from being 26 percent at 9 years to 8 percent at the age of 12 years. Whereas the percentage of intellectually (verbal) average children increased from 50 percent to 72 percent from the age of 9 years through to 12 years. The percentage of children classified as intellectually below average increased from 9 to 11 years (24 to 30 percent) but at the age of 12 years it decreased from 30 to 20 percent.

It can be concluded from Table.1 that the depletion of intellectually superior children with increase in age could be attributed to various environmental factors which appear to influence a child's intellectual performance directly or indirectly. It may be mentioned that all of these factors such as socio-economic status, home environment, school environment and parent-child relationship could be investigated to observe how these factors influence intellectual performance.

Table 2: Classification of subjects into different grades of non-verbal intelligence

Intellectual Performance	Subject number	percentage
Intellectually Superior	21	10.5
Intellectually Average	54	27
Intellectually below Average	125	62.5

The data given in Table.2 shows that only a small proportion of rural pre-adolescents (10.5 percent) were superior in non-verbal intelligence whereas others could be classified either into average or below average (62.5 percent) intelligence

Table 4: School environment of verbally intellectually superior, average and below average pre adolescents

SI No.	Intellectual performance	N	School Environment Mean Score	S. D.	Pair	t-Value
1	Superior	45	47.36	9.22	1&2	1.28 NS
2	Average	105	45.49	8.26	1&3	2.16* S
3	Below Average	50	43.58	5.76	2&3	0.0078 NS

Significant at 0.05 level of confidence

Table 4. indicates that school environments of intellectually superior were found to be significantly different from the intellectually below average, but there were no significant differences being observed in school environments of verbal intellectual average and intellectually below average and intellectually average.

Hence, on the light of above, it can be inferred that intellectually superior and intellectually average respondents were equally satisfied with their school administration and general environmental facilities. Referring to Table 4., the 't' value for intellectually superior and intellectually average was found to be 1.28, which was non-significant at 5 percent level. This showed that both the groups were satisfied with school facilities, administration and general environmental facilities. On the other hand, the t- value for intellectually superior and intellectually below average was found to be 2.16, which was significant at 5 percent level. This showed that intellectually superior respondents were more satisfied with school facilities, administration and experienced more attachment with the school.

The overall picture depicted that intellectually superior and average respondents viewed the school environment as facilitating and were satisfied with it whereas intellectually below average respondents viewed school environment as non-facilitating and were not satisfied with it.

grades.

Table 3: Non Verbal Intellectual Performance Of Rural Pre-adolescents (9-12 Years) Across Different Age Groups

Age group	Intellectually Superior n=21	Intellectually Average	Intellectually Below Average
9 years	3(1)	6(3)	43(21.5)
10 years	3(1.5)	16(8)	32(16)
11 years	5(2.5)	16 (8)	29(14.5)
12 years	11(5.5)	17(8.5)	21(10.5)

The percentage of children classified as being intellectually superior increased with increase in age i.e. from 1 percent (at 9 years) to 5.5 percent (at 12 years). Similar trend was observed for children categorized as intellectually average from 3 percent (at 9 years) to 8.5 percent (at 12 years of age). On the other hand, the percentage of children categorized as intellectually below average decreased with increase in age i.e. from 21.5 percent (at 9 years) to 10.5 percent (at 12 years). The above observations appeared to indicate that with increase in age the children who were categorised as Intellectually below average might have shifted to average intellectual category and children who were categorised as intellectually average might have shifted to Intellectually superior category. (table 3)

Testing of Hypothesis

Hypothesis number 1: There is no significant difference of school environment on verbal intelligence of rural pre adolescents

Hence, we can partially reject the null hypothesis and can conclude that the school environment affects verbal intelligence. The finding of the present study supported the findings of Dalal (1991) [5], he focused that children who are satisfied with their school facilities have higher I.Q. than those who view it impoverished.

Hypothesis number 2: There is no significant difference of school environment on non verbal intelligence of rural pre adolescents

Table 5: Contingency table showing the relationship between non-verbal intelligence and school environment

Intellectual Performance	School environment Average	School Environment Low
Superior	17 (36.9)	4 (2.5)
Average	14 (30.4)	40 (25.9)
Below Average	15(32.6)	110 (71.4)

Values in parentheses indicate percentage

When low school environment and average school environment rural children were compared for their intellectual performance, the results depicted that low school environment children were found intellectually below average (71.4 percent), followed by intellectually average (25.9 percent) and very negligible proportion (2.51 percent) were found to be intellectually superior. The percentage of intellectually

superior was found to be more (36.9 percent) in the case of an average school environment followed by intellectually below average (32.6 percent) and intellectually average (30.4 percent). (Table5)

Table 6: Details of Correlation Coefficient and Chi-Square

Variables	Correlation Coefficient	Chi-Square Value
Intellectual Performance Non Verbal and School Environment	0.49	48.60

The obtained correlation coefficient between attributes (0.49) shows that there is a positive relationship between the variables under study *viz.*, non- verbal intelligence and school environment.

It is clear from Table 6, that the chi-square value exceeds the table value of 0.05 level (Table value of X^2 at 0.05 level is 5.99), hence we reject the null hypothesis that there is no effect of school environment on non-verbal intelligence of rural pre-

adolescents.

The above results depicted that the school environment affects the non- verbal intellectual performance of rural pre-adolescents. This may be due to the fact that school caters to the educational needs of the student. The learning processes involved in school, syllabus, teachers and their teaching methods, extra-curricular activities, etc. affect the cognitive strategies needed for successful performance on general ability tests. These findings are in concordance with Gakhar (1991). He revealed that children from private schools have higher I.Q as compared to Government schools because private schools employ strict supervision by the pupil-teacher interaction, good educational management, have better environment, etc.

It can be inferred that schools are vital forces in children's development, affecting their modes of remembering, reasoning, problem solving and understanding, hence, it is imperative to look into detail the aspects of the school environment which strongly influences the intellectual performance. Hence, the qualitative analysis of the school environment was done.

Table 7: Frequency distribution showing response in Intellectual performance in context of the School Environment

Sl. No	Variables	Intellectually Superior	Intellectually Average	Intellectually Below Average
1	Teacher-Student	210 (83.4)	150 (59.5)	95 (37.6)
	Student -Student	160 (76.1)	345(63.8)	800 (64.0)
2	Student-Administrator	90 (71.4)	214 (66)	458 (61.0)
	Teacher-Administrator	85 (67.4)	198 (61.4)	430 (57.3)
	Academic	200 (79.3)	398 (61.4)	625 (41.6)
3	Extra -Curricular	270 (80.3)	540 (62.5)	1000 (50.0)
	Group interaction	147 (87.5)	324 (75.0)	600 (60.0)

1. Warmth and Support
2. Structure
3. Autonomy

Table 7 revealed that 83.4 percent of intellectually superior pre-adolescents were satisfied with socio-academic interaction between students and teachers followed by 59.5 percent of average respondents. Whereas intellectually below average pre-adolescents perceived very low (37.6 percent) socio-academic interaction between student and teachers. When student-student interactions were compared 76.1 percent intellectually superior pre-adolescents were found to be satisfactory. Only 63.8 and 64 percent respondents belonging to intellectually average and below average grade, respectively perceived it satisfactory.

Regarding student-administrator interactions, it was observed that intellectually superior viewed it appropriate, 66 percent average and 61 percent below average respondents viewed it as appropriate and were satisfied with socio-academic interactions. When teacher-administrator interactions were analyzed, it was rated low by all the three grades *i.e.* 67.4 percent by intellectually superior followed by 61.1 percent by intellectually superior and only 57.3 percent by intellectually below average.

As far as academics are concerned, the intellectually below average perceived it very low (41.6 percent) and were not satisfied with it. Intellectually average academics was found to be satisfactory for 61.4 percent respondents whereas intellectually superior (79.3 percent of respondents) perceived it appropriate.

Regarding extra-curricular activities, majority of intellectually superior respondents (80.3 percent) found to be satisfied with extra-curricular opportunities provided to them, whereas only 62.5 percent and 50 percent respondents belonging to intellectually average and below average grades were found to be unsatisfied with extra-curricular opportunities, hence, there

is a different perception of respondents belonging to three grades of intellectual performance.

Regarding group interactions, the majority of respondents (87.5 percent) belonging to superior intellectual performance perceived to be good, followed by intellectually average respondents (75 percent). Intellectually below average respondents were not satisfied with group interactions at their school and they perceived it inappropriate (40 percent).

It could be concluded that perception of social and emotional aspects of the organisational climate are considered of great significance for the betterment of educational institutions. The socio-economic climate of educational institutions is a bridging concept between pupils and the school in which they study and is the perception of the structure, process and values which directly influences the interest in learning experiences available at school. It is therefore imperative to fully understand their concepts, perceptions of the climate and in order to make them active learners at school, it is very important to rectify the problems which they come across in the organisational climate.

Results of detailed analysis will be used for preparing intervention strategies for teachers to improve the intellect of rural pre-adolescents and to minimize the 'intellect wasting'. Keeping this in view. An intervention strategy was planned out for parents and teachers in order to enhance the intelligence ability of Children and to lower the intellectual wastage.

1. Collaboration between Teachers and Parents

- **Regular Communication:** Establish clear, ongoing communication between teachers and parents through scheduled meetings, progress reports, and digital tools. Both parties should share insights about the student's

strengths, weaknesses, and overall learning habits.

- **Goal Setting:** Collaboratively set realistic and specific academic and personal growth goals for each student. These should be measurable, such as improving reading comprehension or mastering a particular math skill.
- **Parental Involvement in Learning:** Encourage parents to engage in their child's education by assisting with homework, encouraging reading at home, and participating in school-related activities like science fairs or literary events.

2. Differentiated Instruction for Teachers

- **Personalized Learning Plans:** Create individual learning plans tailored to each student's abilities, learning styles, and pace. Use assessments to determine where students need more support or enrichment.
- **Interactive and Engaging Teaching Methods:** Employ project-based learning, interactive lessons, and real-world problem-solving tasks to engage students more deeply. Use technology where possible, such as educational apps or online learning platforms.
- **Fostering Critical Thinking:** Implement activities that promote analytical and critical thinking, such as debates, group discussions, and case studies. Encourage students to ask questions and think creatively.

3. Cognitive Skill Development for Students

- **Encouraging Reading:** Foster a culture of reading both in school and at home. Provide access to books of various genres and topics, and encourage regular reading routines.
- **Study Skills and Time Management:** Teach students how to effectively manage their time and develop good study habits. Parents and teachers should work together to help students organize their schedules and prioritize tasks.
- **Active Learning Techniques:** Use hands-on activities, experiments, and real-world applications of classroom knowledge to make learning more meaningful. Encourage students to reflect on what they learn and apply it in various contexts.

4. Emotional and Psychological Support

- **Positive Reinforcement:** Both teachers and parents should provide positive reinforcement and encouragement. Acknowledge achievements, however small, and provide constructive feedback when needed.
- **Stress Management and Mindfulness:** Teach students coping mechanisms for stress and anxiety related to academic performance. Teachers can incorporate mindfulness activities in the classroom, while parents can help students relax and balance academics with leisure activities.

5. Continuous Monitoring and Feedback

- **Frequent Assessments:** Regularly assess student progress through tests, quizzes, and projects. Parents should also monitor progress at home through discussions about schoolwork and involvement in study routines.
- **Data-Driven Adjustments:** Use assessment data to adjust teaching methods and strategies. Identify areas where students are excelling or struggling and adapt lessons accordingly.
- **Collaborative Problem-Solving:** When challenges arise, teachers and parents should work together to identify solutions. This might involve changing study routines, providing extra tutoring, or seeking outside resources such

as educational counselors.

6. Creating a Positive Learning Environment

- **Classroom Environment:** Teachers should create a stimulating and supportive classroom atmosphere where students feel safe to express themselves and take intellectual risks.
- **Home Environment:** Parents can establish a quiet, organized space at home dedicated to studying. Limiting distractions and promoting a structured routine will help students focus and perform better academically.
- By implementing these strategies, teachers and parents can work together to create a supportive environment that enhances intellectual performance and fosters a love of learning in students.

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