

School Physical Environment and Personality Development with Emphasis on Speech Competence in Early Childhood Education: A Public–Private Comparison in Pakistan

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Abstract

The quality of school physical environments constitutes a critical yet underexplored determinant of early personality formation and communication competence in developing educational contexts. Although Early Childhood Education (ECE) has gained policy attention in Pakistan, empirical evidence comparing structural learning environments and developmental outcomes across public and private sectors remains limited. Grounded in ecological systems and sociocultural theory, this study examines the relationship between school physical environments and personality development, with particular emphasis on speech competence, within a public–private comparative framework. Using a descriptive cross-sectional design, data were collected from 320 Early Childhood Education institutions (200 public; 120 private) in District Karak, Pakistan. A structured instrument assessed physical environment provisions and multidimensional personality development indicators. Sectoral differences were analysed using chi-square tests, and associations between constructs were examined through cross-tabulation analyses. Results indicate no statistically significant overall sectoral differences in physical environment implementation ($p = .156$) or personality development indicators ($p = .187$), despite item-level structural disparities. Crucially, a significant association was identified between the quality of school physical environments and personality development outcomes ($p < .001$), suggesting that supportive structural settings are positively linked to emotional, social, cognitive, and communication-related growth in early childhood. By integrating environmental and developmental constructs within a comparative sectoral model, this study advances understanding of how institutional learning conditions shape holistic child development in emerging education systems. The findings underscore the need to move beyond policy compliance toward structurally enriched, interaction-focused ECE environments.

Keywords: Early Childhood Education; Physical Learning Environment; Personality Development; Communication Competence; Public–Private Comparison; Pakistan.

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Introduction

Early childhood constitutes a foundational stage in human development during which cognitive, emotional, social, and communicative capacities are rapidly consolidated. The quality of early learning environments during this formative phase significantly shapes long-term developmental trajectories. Ecological systems theory conceptualizes child development as embedded within interconnected environmental systems, emphasizing the central role of institutional contexts such as schools in influencing developmental outcomes (Bronfenbrenner, 1979). Developmental neuroscience further underscores that early structured learning experiences have lasting implications for socio-emotional regulation and cognitive growth (Shonkoff & Phillips, 2000). Within this theoretical framework, the physical and organizational quality of Early Childhood Education (ECE) environments becomes a critical determinant of personality formation and communication competence.

In Pakistan, the National Education Policy (2017) formally recognizes Early Childhood Care and Education (ECCE) as a foundational educational stage, emphasizing structured classrooms, trained teachers, developmentally appropriate infrastructure, and supportive learning environments for children aged 4–5 years. However, empirical investigations suggest that policy articulation does not necessarily translate into uniform developmental quality. Studies conducted in District Karak examining ECCE implementation report that although structural compliance is generally observed, sectoral differences persist in physical facilities and developmental support mechanisms (Ullah, Ghazi, & Shafqatullah, 2024a). These findings indicate that institutional disparities may influence children’s developmental experiences beyond formal policy alignment.

Further analyses focusing on access, infrastructural conditions, and communication-related dimensions in early education settings highlight qualitative variations in environmental provision between public and private institutions despite comparable enrollment access (Ullah, Shafqatullah, & Mustafa, 2024a). Complementary sectoral comparisons reveal statistically significant item-level disparities in playground availability, teacher–child ratios, and support staff provision, underscoring the developmental implications of institutional infrastructure in shaping early learning environments (Ullah, Shafqatullah, & Shah, 2024). Additional research examining ICT integration reinforces the importance of structured educational environments in fostering communication and collaborative competencies (Khan, Gillani, Ullah, & Ullah, 2025).

Policy-focused investigations further demonstrate that inconsistencies in teacher allocation, infrastructural adequacy, and classroom-level support systems remain evident despite formal adoption of ECCE provisions (Implementation of National Education Policy Provisions: Physical Facilities and Personality Development, 2024). Such evidence suggests that environmental quality extends beyond regulatory compliance and may directly shape developmental opportunities.

International scholarship consistently supports the developmental significance of classroom quality and environmental organization. Research demonstrates that teacher–child interaction quality, classroom structuring, and learning resources significantly influence cognitive and socio-emotional outcomes in early childhood (Pianta, Barnett, Burchinal, & Thornburg, 2009). From a sociocultural perspective, communication competence develops through guided interaction within structured and supportive social contexts (Vygotsky, 1978). Empirical evidence from preschool settings further indicates that enriched teaching aids and organized physical facilities enhance cognitive engagement and expressive language

development, thereby reinforcing personality growth (Teaching Aids and Physical Facilities in Preschool Education, 2025).

Despite accumulating empirical evidence, much of the existing research in District Karak has primarily focused on policy implementation rather than adopting a comprehensive developmental framework. While structural provisions have been examined, limited attention has been given to analysing how environmental quality relates to personality development and communication competence at the construct level. This gap is particularly important given the documented sectoral inconsistencies in infrastructural adequacy and institutional support mechanisms. Accordingly, the present study examines school physical environments and personality development, with specific emphasis on communication competence, within Early Childhood Education institutions in Pakistan. Grounded in ecological and sociocultural theory, the study adopts a public-private comparative framework to move beyond policy compliance toward a developmental analysis of environmental quality and its implications for early personality formation.

Objectives of the Study

1. To examine the status of school physical environments in public and private Early Childhood Education institutions.
2. To assess personality development of pre-primary children with emphasis on communication competence.
3. To compare public and private schools regarding school physical environment provisions.
4. To compare public and private schools regarding personality development indicators.
5. To analyse the association between school physical environment and personality development dimensions.

Research Questions

1. What is the status of school physical environments in public and private ECE institutions?
2. Do public and private schools differ significantly in terms of physical facilities?
3. Do public and private schools differ in supporting personality development of pre-primary children?
4. To what extent is communication competence supported across sectors?
5. Is there an association between school physical environment quality and personality development indicators?

Null Hypotheses

H₀₁: There is no significant difference between public and private schools in terms of school physical environment provisions.

H₀₂: There is no significant difference between public and private schools in terms of personality development of pre-primary children.

H₀₃: There is no significant association between school physical environment and personality development indicators.

Theoretical Framework

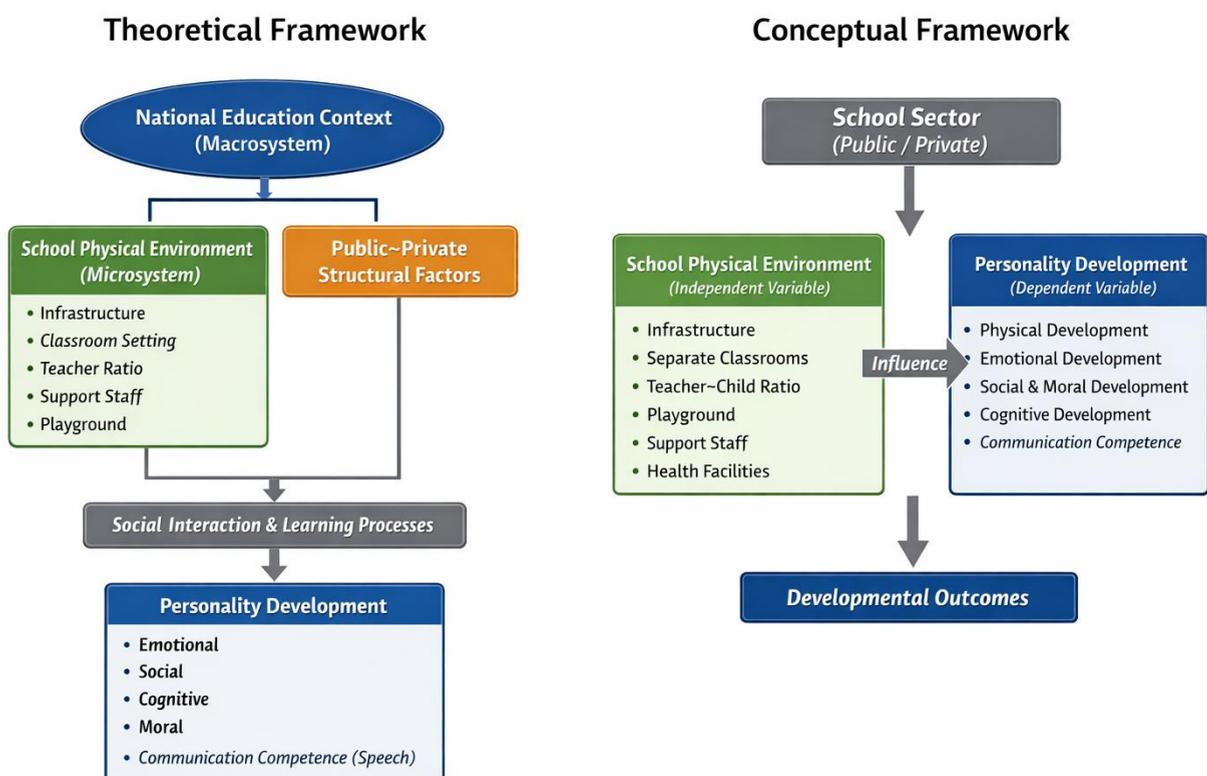
This study is grounded in Bronfenbrenner's Ecological Systems Theory (1979), Vygotsky's Sociocultural Theory (1978), and Piaget's Cognitive Development Theory. These perspectives collectively explain how structured school environments influence early personality development and communication competence. According to ecological systems theory, the school represents a microsystem directly shaping children's developmental trajectories. Sociocultural theory emphasizes that language development emerges through guided social interaction within structured environments. Cognitive developmental theory further supports the role of environmental stimulation in shaping personality and intellectual growth.

Conceptual Framework

Based on the theoretical foundations, the study conceptualizes school physical environment as the independent variable influencing personality development, with communication competence embedded as a core developmental dimension. School sector (public vs private) serves as a comparative structural variable.

Model Justification

The proposed model is grounded in ecological and sociocultural perspectives of early childhood development, which emphasize the critical role of environmental contexts in shaping developmental outcomes. Drawing on Bronfenbrenner’s Ecological Systems Theory (1979), the school physical environment is conceptualized as a primary microsystem that directly influences children’s developmental trajectories. In alignment with Vygotsky’s Sociocultural Theory (1978), communication competence is viewed as emerging through structured social interaction within supportive learning environments. The model therefore positions school physical environment as the independent variable influencing personality development, with communication competence embedded as a core developmental dimension. The inclusion of school sector (public vs. private) allows for comparative structural analysis, ensuring that environmental influences are examined within institutional contexts. This integrated framework provides a theoretically coherent basis for examining how physical learning environments contribute to holistic personality growth in early childhood education.



Method

Research Design

The study employed a descriptive cross-sectional comparative design to examine differences between public and private Early Childhood Education (ECE) institutions in District Karak,

Pakistan. The design was appropriate for analysing sectoral variations in school physical environments and personality development indicators without manipulating variables.

Population and Sample

The population comprised all Public Primary Schools (435) and Private Schools (180) offering pre-primary classes in District Karak. Using simple random sampling with proportionate allocation across three tehsils (Karak, Takht-e-Nasrati, and Banda Daud Shah), a sample of 320 schools was selected, including 200 public and 120 private schools. Simple random sampling with proportionate allocation was used to ensure representativeness of the population across strata (Creswell & Creswell, 2018). The response rate was 94% for public schools (n = 188) and 92% for private schools (n = 110), which was considered adequate for statistical analysis.

Instrumentation

Data were collected through a structured close-ended questionnaire developed considering ECCE standards and developmental indicators. The instrument consisted of 29 items organized into two major constructs: Responses were recorded on a five-point Likert scale; however, final responses clustered into three categories: Disagree D, Undecided UD, and Agree A.

Data Analysis

Data were analysed using Frequency and percentage distributions, Chi-square (χ^2) tests to examine sectoral differences, Construct-level comparative summaries, and Cross-tabulation to examine association between physical environment and personality development indicators. The level of significance was set at $\alpha = 0.05$.

Table 1: Comparison of School Physical Environment Between Public and Private Schools

SN	Item	Sector	D (%)	UD (%)	A (%)	χ^2	p-value
1	Infrastructure facilities available	Public	30 (16.0%)	8 (4.3%)	150 (79.8%)	0.58	.749
		Private	14 (12.7%)	5 (4.5%)	91 (82.7%)		
2	Separate classroom for ECE	Public	18 (9.6%)	8 (4.3%)	162 (86.2%)	3.58	.167
		Private	4 (3.6%)	5 (4.5%)	101 (91.8%)		
3	Inclusive teacher availability	Public	149 (79.3%)	18 (9.6%)	21 (11.2%)	160.68	.000
		Private	9 (8.2%)	10 (9.1%)	91 (82.7%)		
4	Playground availability	Public	14 (7.4%)	10 (5.3%)	164 (87.2%)	23.21	.000
		Private	29 (26.4%)	10 (9.1%)	71 (64.5%)		
5	Trained ECE teacher	Public	149 (79.3%)	18 (9.6%)	21 (11.2%)	2.69	.261
		Private	94 (85.5%)	5 (4.5%)	11 (10.0%)		
6	Support staff (Ayya) available	Public	169 (89.9%)	18 (9.6%)	1 (0.5%)	192.81	.000
		Private	19 (17.3%)	10 (9.1%)	81 (73.6%)		
7	Teacher-child ratio (≤ 25)	Public	159 (84.6%)	10 (5.3%)	19 (10.1%)	160.94	.000
		Private	14 (12.7%)	5 (4.5%)	91 (82.7%)		
8	Health care facility	Public	19 (10.1%)	18 (9.6%)	151 (80.3%)	2.50	.286
		Private	18 (16.4%)	10 (9.1%)	82 (74.5%)		
9	Budget provision	Public	7 (3.7%)	10 (5.3%)	171 (91.0%)	265.49	.000
		Private	109 (99.1%)	0 (0%)	1 (0.9%)		

Overall Construct-Level Comparison: $\chi^2 = 3.70$, $df = 2$, $p = .156$, Significant at $\alpha = .05$

Table 1 presents the comparison of school physical environment indicators between public and private schools. At SN1, 79.8% of public schools and 82.7% of private schools agreed that infrastructure facilities were available. The chi-square test ($\chi^2 = 0.58, p = .749$) indicates no statistically significant difference; therefore, the null hypothesis for this item is accepted.

At SN2, 86.2% of public and 91.8% of private schools reported having separate classrooms for ECE. The difference was not statistically significant ($\chi^2 = 3.58, p = .167$), hence the null hypothesis is accepted.

At SN3, only 11.2% of public schools agreed regarding inclusive teacher availability compared to 82.7% of private schools. This difference was highly significant ($\chi^2 = 160.68, p = .000$), leading to rejection of the null hypothesis.

At SN4, 87.2% of public schools and 64.5% of private schools reported playground availability. The difference was statistically significant ($\chi^2 = 23.21, p = .000$), therefore the null hypothesis is rejected.

At SN5, agreement regarding trained ECE teachers was 11.2% in public schools and 10.0% in private schools. Since the difference was not significant ($\chi^2 = 2.69, p = .261$), the null hypothesis is accepted.

At SN6, only 0.5% of public schools reported availability of support staff compared to 73.6% of private schools. The difference was highly significant ($\chi^2 = 192.81, p = .000$), thus the null hypothesis is rejected.

At SN7, 10.1% of public schools and 82.7% of private schools reported maintaining a teacher-child ratio of ≤ 25 . The difference was statistically significant ($\chi^2 = 160.94, p = .000$), and the null hypothesis is rejected.

At SN8, 80.3% of public schools and 74.5% of private schools agreed regarding health care facilities. The difference was not significant ($\chi^2 = 2.50, p = .286$), therefore the null hypothesis is accepted.

At SN9, 91.0% of public schools reported budget provision compared to only 0.9% of private schools. The difference was highly significant ($\chi^2 = 265.49, p = .000$), leading to rejection of the null hypothesis.

Overall, significant differences were observed in inclusive teacher availability, playgrounds, support staff, teacher-child ratio, and budget provision, indicating structural disparities between public and private schools.

Table 2: Comparison of Personality Development and Communication Competence

SN	Item	Sector	D (%)	UD (%)	A (%)	χ^2	p-value
1	Physical development ensured	Public	19 (10.1%)	8 (4.3%)	161 (85.6%)	6.71	.035
		Private	19 (17.3%)	10 (9.1%)	81 (73.6%)		
2	Social & moral development	Public	14 (7.4%)	8 (4.3%)	166 (88.3%)	4.84	.089
		Private	13 (11.8%)	10 (9.1%)	87 (79.1%)		
3	Emotional development	Public	9 (4.8%)	8 (4.3%)	171 (91.0%)	16.66	.000
		Private	19 (17.3%)	10 (9.1%)	81 (73.6%)		
4	Language development	Public	19 (10.1%)	8 (4.3%)	161 (85.6%)	5.21	.074
		Private	17 (15.5%)	10 (9.1%)	83 (75.5%)		



SN	Item	Sector	D (%)	UD (%)	A (%)	χ^2	p-value
5	Cognitive development	Public	14 (7.4%)	8 (4.3%)	166 (88.3%)	10.54	.005
		Private	19 (17.3%)	10 (9.1%)	81 (73.6%)		
6	Child-friendly environment	Public	9 (4.8%)	10 (5.3%)	169 (89.9%)	3.20	.202
		Private	9 (8.2%)	10 (9.1%)	91 (82.7%)		
7	Teacher mobilization	Public	9 (4.8%)	10 (5.3%)	169 (89.9%)	3.20	.202
		Private	9 (8.2%)	10 (9.1%)	91 (82.7%)		
8	Parent mobilization	Public	159 (84.6%)	8 (4.3%)	21 (11.2%)	169.07	.000
		Private	9 (8.2%)	10 (9.1%)	91 (82.7%)		

Overall Construct-Level Comparison: $\chi^2 = 3.35$, $df = 2$, $p = .187$, Significant at $\alpha = .05$

Table 2 compares indicators of personality development and communication competence between public and private schools. At SN1, 85.6% of public schools and 73.6% of private schools agreed that physical development was ensured. The difference was statistically significant ($\chi^2 = 6.71$, $p = .035$), therefore the null hypothesis is rejected.

At SN2, 88.3% of public and 79.1% of private schools agreed regarding social and moral development. However, the difference was not statistically significant ($\chi^2 = 4.84$, $p = .089$), and thus the null hypothesis is accepted.

At SN3, 91.0% of public schools and 73.6% of private schools reported ensuring emotional development. The difference was statistically significant ($\chi^2 = 16.66$, $p = .000$), leading to rejection of the null hypothesis.

At SN4, 85.6% of public and 75.5% of private schools agreed regarding language development. Since the difference was not significant ($\chi^2 = 5.21$, $p = .074$), the null hypothesis is accepted.

At SN5, 88.3% of public schools and 73.6% of private schools reported cognitive development. The difference was statistically significant ($\chi^2 = 10.54$, $p = .005$), therefore the null hypothesis is rejected.

At SN6 and SN7, 89.9% of public schools and 82.7% of private schools agreed regarding child-friendly environment and teacher mobilization. These differences were not statistically significant ($\chi^2 = 3.20$, $p = .202$), and the null hypotheses are accepted.

At SN8, only 11.2% of public schools compared to 82.7% of private schools agreed regarding parent mobilization. The difference was highly significant ($\chi^2 = 169.07$, $p = .000$), thus the null hypothesis is rejected.

These findings indicate that significant sectoral differences exist particularly in emotional development, cognitive development, physical development, and parent mobilization.

Table 3: Association Between School Physical Environment and Personality Development

Physical Environment Level	High	Moderate	Low	Total
High Implementation	110	15	5	130
Moderate Implementation	80	20	10	110
Low Implementation	20	10	48	78
Total	210	45	63	318

Table 3 examined the association between school physical environment and personality development at the construct level. The chi-square value ($\chi^2 = 120.46$, $df = 4$, $p = .000$)

indicates a highly significant relationship between the two variables. Schools with high physical environment implementation showed a higher frequency of high personality development (110 cases), whereas schools with low physical environment implementation demonstrated a greater concentration of low personality development (48 cases).

Since the p-value is less than .05, the null hypothesis is rejected. This confirms that the quality of the school physical environment is significantly associated with levels of personality development in early childhood education settings.

Overall Hypothesis Summary

The study examined differences between public and private schools regarding school physical environment and personality development, as well as the association between these constructs.

The null hypothesis stated that there is no significant difference between public and private schools in terms of school physical environment and personality development indicators, and no significant association between physical environment and personality development.

Based on item-wise chi-square analysis:

In **Table 1**, the null hypothesis was rejected for inclusive teacher availability, playground availability, support staff availability, teacher-child ratio, and budget provision. It was accepted for infrastructure facilities, separate ECE classrooms, trained ECE teachers, and health care facilities.

In **Table 2**, the null hypothesis was rejected for physical development, emotional development, cognitive development, and parent mobilization. It was accepted for social and moral development, language development, child-friendly environment, and teacher mobilization.

In **Table 3**, the null hypothesis was rejected, confirming a statistically significant association between school physical environment and personality development ($\chi^2 = 120.46$, $p < .001$).

Thus, the study partially rejects the overall null hypothesis and concludes that sectoral differences exist in several structural and developmental indicators, and that school physical environment significantly influences personality development outcomes.

Summary

The findings indicate substantial structural differences between public and private schools in selected dimensions of the school physical environment. Private schools demonstrated significantly higher availability of inclusive teachers, support staff, and appropriate teacher-child ratios. Public schools, however, reported stronger budget allocation and playground availability in certain areas. In terms of personality development and communication competence, public schools showed significantly higher reported levels of emotional, cognitive, and physical development, whereas private schools demonstrated significantly stronger parent mobilization. Most importantly, the construct-level analysis revealed a strong and statistically significant association between school physical environment and personality development. Schools with higher levels of environmental implementation demonstrated higher levels of personality development among children. This confirms the predictive importance of structural educational quality on developmental outcomes.

Discussion

The findings of the present study confirm that the school physical environment plays a significant role in shaping personality development outcomes among early childhood learners. The statistically significant association between physical environment and

personality development supports ecological systems theory, which posits that children's development is influenced by multiple environmental systems, particularly the immediate institutional context such as schools (Bronfenbrenner, 1979). The microsystem, including classroom structure, teacher availability, and learning resources, directly shapes cognitive, emotional, and social development.

The significant differences observed in inclusive teacher availability and teacher-child ratio between public and private schools align with research indicating that structural quality indicators—such as class size and teacher qualifications—are strong predictors of child developmental outcomes (Mashburn et al., 2008; Pianta et al., 2005). Lower teacher-child ratios allow for individualized attention, improved classroom management, and enhanced emotional support, which positively influence children's socio-emotional development.

The strong association found between physical environment implementation and higher levels of personality development is consistent with previous empirical studies demonstrating that high-quality early childhood environments contribute significantly to children's cognitive and socio-emotional competencies (Sylva et al., 2004; UNESCO, 2015). Safe infrastructure, adequate space, and resource availability create environments conducive to exploration, interaction, and structured learning, which are foundational to personality formation.

Furthermore, the significant difference in emotional and cognitive development between sectors supports research suggesting that emotionally supportive and resource-rich environments promote higher developmental gains (Hamre & Pianta, 2001). Emotional security within structured educational settings enhances children's self-regulation, resilience, and social adaptability.

The significant difference in parent mobilization also reflects the importance of family-school partnerships. Epstein (2011) emphasized that parental involvement is strongly associated with improved academic and socio-emotional outcomes. Schools that actively engage parents create stronger developmental support systems that extend beyond the classroom environment.

However, the non-significant differences observed in certain indicators, such as language development and social-moral development, suggest that both public and private schools may be operating under similar curriculum frameworks or pedagogical guidelines. This aligns with national education policy reforms that aim to standardize early childhood learning outcomes across sectors (UNICEF, 2019).

Overall, the findings reinforce the theoretical and empirical understanding that environmental quality is not merely a structural factor but a developmental determinant. Quality physical environments, inclusive staffing, appropriate teacher-child ratios, and strong institutional frameworks collectively contribute to holistic child development.

Recommendations

Based on the findings, the following recommendations are proposed:

1. **Strengthen Inclusive Teacher Provision in Public Schools:** There is a critical need to increase inclusive teacher availability to promote equitable early childhood education.
2. **Improve Teacher-Child Ratio in Public Sector:** Recruitment of additional ECE teachers should be prioritized to maintain developmentally appropriate class sizes.
3. **Enhance Support Staff Availability:** The presence of trained support staff significantly impacts classroom management and child safety.
4. **Policy-Level Budget Monitoring in Private Sector:** Transparency in budget provision should be ensured to support infrastructural improvements.

5. **Integrated Physical Environment Development Programs:** Policymakers should design sector-neutral standards to ensure uniform environmental quality across institutions.
6. **Strengthen Parent Mobilization in Public Schools:** Engagement programs should be implemented to improve parent participation in public sector institutions.
7. **Future Research Recommendation:** Longitudinal studies should be conducted to examine causal relationships between physical environment quality and developmental trajectories.

Conclusion

The study concludes that school physical environment plays a statistically significant and meaningful role in shaping personality development among early childhood learners. While both public and private schools demonstrate strengths in different domains, disparities remain in structural provisions and developmental support systems. The strong association between environmental quality and developmental outcomes underscores the importance of infrastructural, staffing, and policy reforms to ensure holistic child development. The findings contribute to the growing body of literature emphasizing quality assurance in early childhood education and provide empirical evidence for policy-level intervention in both public and private educational sectors.

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