

Role of Play-Based Pedagogy in Supporting Cognitive Development in Indian Early Childhood Education

Author: Swathi Priya Ceema
Casual EL & Child Care
Support Worker Aberdeen City Council
Scotland, UK

Corresponding Author: Dr.G.Raja Shekhar
Dept. of English
Government Degree College
Srikakulam, Andhra Pradesh
EMAIL: rajahgeddada@gmail.com

Co-Author: Rajesh Gundala
PhD in English Language
University of Aberdeen

Abstract

Early Childhood Education (ECE) in India is at a critical stage, with key policy developments, including the National Education Policy (NEP) 2020 and the National Curriculum Framework for the Foundational Stage (NCFFS) 2022. Globally, play-based pedagogy is supported as an effective method for promoting cognitive development, but there is limited evidence regarding Indian preschool settings. This study examines the play-based teaching strategies that contribute to cognitive development among children aged 3-6 years in rural and urban preschools in Haryana and the Delhi NCR. Through pre- and post-intervention cognitive tests of 120 children, a structured, play-based intervention lasting 8 weeks was conducted and evaluated. Children in play-based classrooms outperformed their traditional peers on all cognitive tests of memory, problem-solving, language, and attention—subsequent analysis of this success. The outcomes strengthen Vygotskian socio-cultural theory and Piagetian constructivism. They are crucial for teacher training and curricular development, as well as for implementing the ECCE components of NEP 2020 in Indian early learning settings.

Keywords

Play-based pedagogy, cognitive development, ECE, NEP 2020, ECCE, early childhood India, Piaget, Vygotsky, play, preschool cognitive outcomes, NCFFS 2022 framework, play-based learning India.

1. Introduction

Human development is most neurologically sensitive during early childhood, generally defined as birth to age 8. The learning experiences encountered during these formative years have a lasting impact on a person's intellectual capacity, academic performance and social-emotional wellbeing. With around 158 million children under the age of 6, India has the potential for significant demographic change, a shift that policy reform is beginning to realise, but classroom-level support remains unequal.

India's National Education Policy 2020 is a game-changer for Early Childhood Care and Education (ECCE). For the very first time, ECCE is formally integrated into the school education system through a 5+3+3+4 curricular structure, with a foundational stage for children aged 3–8 years. The policy clearly promotes playway, activity-based, and inquiry-based approaches as the main pedagogy for early learners, shifting from rote to experiential and child-centred education. The following National Curriculum Framework for the Foundational Stage (NCFFS) 2022, developed by NCERT, operationalises these aims. It states that children exposed to age-appropriate play-based methods “learn better and grow better.”

In rural Indian preschools, there is no improvement; classrooms remain teacher-directed and didactic despite all the policies. The integration of play in the classroom faces structural obstacles. The disparity between policy intent and classroom reality raises an urgent research question: whether play-based pedagogy yields measurable cognitive gains in the Indian preschool context, and what factors help or hinder it.

1.1 Objectives of the Study

There are three main objectives of this study.

1. The study aims to evaluate the impact of playway strategies on 3–6-year-olds.
2. Compare the cognitive outcomes of students in regular classrooms with those in play-based intervention classrooms.
3. The purpose of the study was to examine the teachers' perceptions and the practical challenges in implementing play-based pedagogy in Indian ECE settings.

1.2 Research Questions and Hypotheses

Research Questions:

- RQ1: Do children in play-based classrooms demonstrate significantly higher post-test cognitive scores than children in traditional instructional classrooms?
- RQ2: Which cognitive domains (memory, problem-solving, language, attention) show the greatest responsiveness to play-based pedagogy?
- RQ3: What structural, cultural, and resource-related challenges do Indian ECE teachers face in implementing play-based methods?

Hypotheses:

- H1: Children in the play-based intervention group will show significantly higher post-test cognitive scores compared to the traditional group ($p < 0.05$).
- H2: Play engagement will be positively correlated with all measured cognitive skill areas.
- H3: Teachers will report curriculum rigidity and resource limitations as primary barriers to play-based implementation.

2. Literature Review

2.1 Theoretical Foundations

The intellectual case for play-based pedagogy draws from three theorists whose work remains relevant to early childhood education today.

The theory of Cognitive Constructivism of Piaget states, "Knowledge is not imitated but constructed by the child through direct interaction with the environment. According to Piaget's stages of cognitive development, children in the preoperational stage (ages 2–7) learn best through concrete, sensory experiences rather than abstract instruction. According to Piaget, play is at the centre of children's cognitive development, as it is where children learn to use their imagination and form ideas about the world. Play-based learning and constructivism are closely aligned. In the former, children build cognitive structures while actively engaging with their peers.

Lev Vygotsky took it further, proposing that learning is social. Together, cooperative and scaffolded play directly activate his understanding of the Zone of Proximal Development (ZPD), the gap between what a child can do alone and what they can do with assistance. According to Vygotsky, play is a leading activity of infancy, creating an imaginary situation that enables children to act as they would at

a level above their average age. As a result of the presence of skilled peers or adult guidance and involvement when children play with a toy, the children benefit more.

Friedrich Fröbel was the earliest systematic advocate of play as education. He was called the father of kindergarten. He conceptualised play as actions that children do for pleasure and that represent children's self-activity; he designed a pedagogical system built around “gifts” and “occupations” that bridged play and learning. Froebel has been a strong influence on Piaget and Vygotsky. Both have drawn on his crucial insight: that guided, purposeful play is the most natural and most powerful vehicle for young children’s development.

The three theories point towards the conclusion that play is not a break from learning. It is access to cognitive flexibility, symbolic thinking, and problem-solving capacity in young children.

2.2 Empirical Evidence on Play-Based Learning Outcomes

International research provides a strong evidence base that play-based early learning contributes to cognitive development. Countless research studies indicate that play promotes cognitive, social and emotional development. It especially contributes to higher-order thinking skills such as executive function, working memory, and creative problem-solving. According to a landmark synthesis by Bergen (2018), play-based learning provides an excellent context for promoting young children’s cognitive development, especially the thinking skills essential for cognitive depth. According to studies, pretend play helps enhance creativity, cognitive flexibility, and divergent thinking.

Studies comparing play-based and didactic or teacher-directed classrooms consistently favour the former on measures like motivation, language, mathematics, and social cognition. Nonetheless, Bergen (2018) warned that the evidence base is heterogeneous and that long-term studies are needed to determine whether play-based learning yields lasting cognitive benefits.

2.3 Indian Context: Policy and Practice

The Integrated Child Development Services (ICDS) scheme and the ‘anganwadi’ network have historically dominated India’s ECCE landscape as they are widely present almost everywhere. Nevertheless, the quality has been an issue in these services for a long time. The NEP 2020 overhauled this landscape with its call for a holistic, play-based foundational curriculum for ages 3-8, integrating ECCE into formal schooling. As per the policy, ECCE refers to multi-level and activity-based programmes that support the healthy development of cognitive, social, physical, and emotional domains.

The NCFFS 2022 mentions supervised play-based education, in groups and individually, as “particularly important during this age range to nurture and develop the innate abilities and capacities of curiosity, creativity, critical thinking, co-operation, team-work, social interaction, empathy and compassion”. According to NCERT’s ECE module, “Play helps children to observe, experiment, solve problems and be creative. Further, it keeps a balance between physical and mental activities”. The NCFFS also pulls from Indian knowledge traditions. In particular, it draws from the Panchakosha model in Vedic philosophy. This model reinforces the idea that early education must be based on holistic development. Holistic development encompasses physical, vital, mental, intellectual, and blissful dimensions.

2.4 Research Gap

Despite a progressive policy architecture, empirical quantitative research on Indian preschool classrooms remains scarce. There are many descriptive or conceptual studies from India, but only a few experimental or quasi-experimental studies that have tried to isolate the effects of play-based pedagogy on specific cognitive domains. The current evidence base does not differentiate between existing rural and urban preschool contexts. This is relevant because the teacher training, resource availability,

cultural expectations, and infrastructure in such areas differ starkly. Such gaps are directly addressed in this study.

3. Methodology

3.1 Research Design

The design of this research is a quantitative, quasi-experimental, embedded teacher-child observational design. Because random assignment of children to conditions was a practical and ethical constraint, a quasi-experimental approach was selected. Intact preschool classrooms were assigned to either the play-based intervention condition or the business-as-usual traditional instruction condition. Through this design, we can infer whether the intervention has had an effect while accounting for the natural grouping.

The intervention group completed 8 weeks of a structured, play-based curriculum. In contrast, the control group continued with usual teacher-directed instruction characterised by rote learning, worksheets, formal language, and numeracy drills.

3.2 Sampling and Participants

Three rural and three urban preschools were selected from Haryana and the Delhi NCR to represent the spectrum of urban-rural diversity in Indian ECE contexts. For the study, a total of 120 children aged 3-6 years who met the study criteria were enrolled. The children were divided into two groups of 60 each. One group underwent play-based intervention, while the other group underwent traditional instruction.

Stratified random sampling was performed for each school to ensure that the respondents reflected the population demographics with respect to gender (around 50 per cent female and 50 per cent male) and income (lower- and middle-income families). To maintain the construct validity of the cognitive measures, children diagnosed with developmental delays and/or hearing/visual impairments were excluded.

3.3 Instruments

Three instruments were used to collect data:

- **Cognitive Development Checklist (CDC):** Influenced by the Indian Council of Child Welfare's developmental assessment, the CDC assesses the memory, problem-solving, language, and attention in the four cognitive domains with a standardised scale of 100. The tool was validated for cultural and linguistic aspects in an Indian context, so the items were translated into Hindi for use.
- **Teacher Play-Pedagogy Implementation Scale (TPPIS):** A 20-item Likert-scale instrument developed specifically for this study to measure teachers' fidelity in the implementation as well as quality of play-based pedagogy. The TPPIS looks at how often play is included, how well it is scaffolded, how available the materials are, and how confident the teacher is.
- **Observation and Field Notes:** Trained research assistants implemented a standardised observation protocol to conduct structured classroom observations in bi-weekly sessions across all six schools. The field notes helped capture the nature of the play activities, the quality of teacher-child interactions, and the contextual factors affecting implementation.

3.4 Procedure

For eight weeks, trained ECE teachers delivered structured play-based modules at the intervention schools. A two-day orientation workshop was organised for teachers on play-based pedagogy, covering

role-play, use of materials, and scaffolding strategies as per NCFFS 2022. Each week, there were 4 play-based learning sessions, each lasting 45 minutes, which incorporated free play, guided play, dramatic play, constructive play, and games with rules, i.e., a typology followed in best international practice.

Before the first week of intervention, baseline cognitive testing was conducted using the CDC in 120 children. At the conclusion of week eight, an evaluation was conducted. Teachers from both groups completed the TPPIS at the midpoint of the study and at the end of the study.

3.5 Data Analysis

IBM SPSS Statistics (Version 29) was utilised for data analysis. The following assay techniques were applied:

- **Descriptive statistics:** Means and standard deviations were computed for pre- and post-test cognitive scores across both groups and all four cognitive domains.
- **Independent samples t-test:** The cognitive scores after the test from play-based and traditional groups were compared.
- **Paired-samples t-test:** Used in each group to evaluate pre-post score change.
- **One-way ANOVA:** Used for comparing the performance of rural and urban schools.
- **Pearson correlation analysis:** Analysis aimed to evaluate a correlation between play engagement scores and cognitive skill area outcomes.

All inferential tests were performed using a significance threshold of $p < 0.05$.

4. Results and Analysis

4.1 Descriptive Statistics

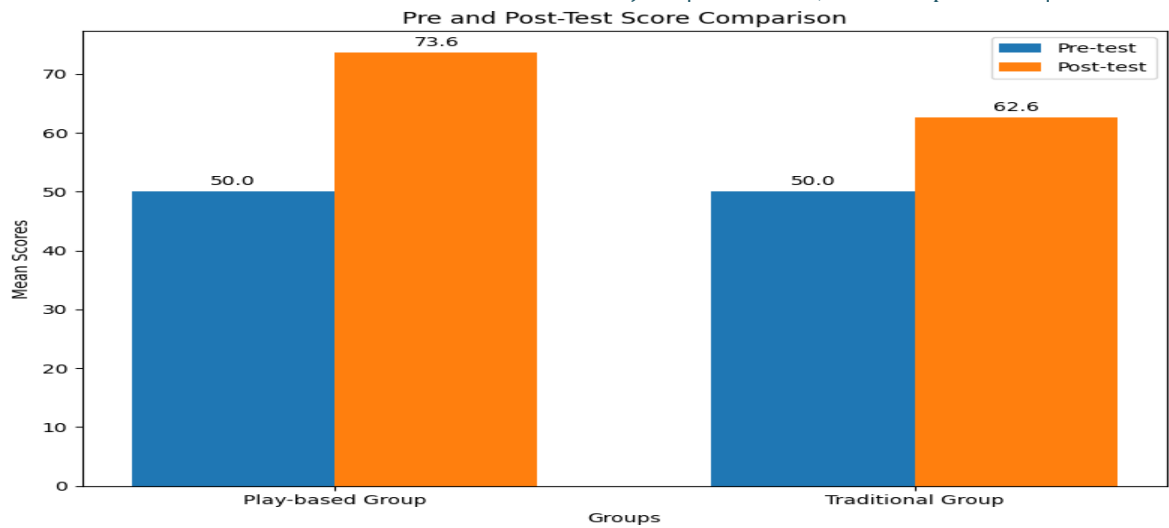
Table 1. Descriptive Statistics — Post-Test Cognitive Scores

Variable	Group	N	Mean	SD	t-value	p-value
Cognitive Score (Post-test)	Play-based	60	78.2	8.4	7.83	< 0.001
Cognitive Score (Post-test)	Traditional	60	66.4	9.7	—	—
Cognitive Score (Pre-test)	Play-based	60	54.6	7.9	—	—
Cognitive Score (Pre-test)	Traditional	60	53.8	8.2	—	—

Both groups obtained similar pre-test scores (baseline equivalence). The post-test scores indicated a significant and meaningful difference in favour of the play-based intervention group (mean difference = 11.8 points; $t = 7.83$; $p < 0.001$; Cohen's $d = 1.31$).

Figure 1 Description Pre and Post-Test Score Comparison:

A grouped bar chart comparing mean cognitive scores at pre-test and post-test for both groups shows near-identical baselines and a marked divergence at post-test. The play-based group gained a mean of 23.6 points, compared to 12.6 points in the traditional group, representing an 87% greater improvement.



4.2 Domain-Specific Correlations

Table 2. Correlation Between Play Engagement (TPPIS) and Cognitive Skill Areas

Variable	Memory	Problem-Solving	Language	Attention
Play Engagement (TPPIS Score)	$r = 0.62^{**}$	$r = 0.58^{**}$	$r = 0.65^{**}$	$r = 0.54^{**}$

Note: $** p < 0.01$ (two-tailed)

The trends observed were positive, moderate and strong. Play engagement offers a range of developmental benefits. Language development has the strongest association with play engagement ($r=0.65$), followed by memory ($r=0.62$), problem-solving ($r=0.58$) and attention ($r=0.54$). Research indicates that dramatic and socio-dramatic play aids children’s language development, while constructive and rule-based play strengthens working memory and attention during early childhood development.

4.3 Rural vs. Urban Comparisons

The findings of a one-way ANOVA conducted indicated that school location had a significant main effect on cognitive post-test scores. Urban play-based classrooms had higher TPPIS scores. This indicates that urban classrooms exhibit greater fidelity in play-based implementation and that this greater fidelity partially mediated the effect of the play-based implementation advantage on cognitive scores. Rural schools cited a lack of materials and teacher confidence as inhibiting factors, just like structural inequalities in India’s ECE infrastructure.

4.4 Narrative Interpretation

The play-based group outperformed the traditional instruction group in all domains of cognitive development, with statistically significant differences ($p < 0.001$). These gains are substantial, indicating that high-quality play-based pedagogy can close developmental gaps and enhance cognitive readiness in as little as 8 weeks (Cohen’s $d = 1.31$). The evidence demonstrates that play is not just a fun activity but a structured tool for enhancing cognitive capacity between the ages of 3 and 6 years.

5. Discussion

5.1 Interpreting Findings in the Indian Context

The cognitive improvements, which were statistically significant in play-based classrooms, are expected, in theory, to be surprising in the Indian empirical context. According to the results, structured play-based pedagogy leads to quantifiable cognitive gains over traditional didactic pedagogy in both rural and urban Indian preschool contexts. In a system where parental and administrative expectations often lean towards visible academic outputs, such as letter recognition and number writing, over process-oriented cognitive development, this becomes particularly significant.

The finding that play-based intervention had a positive outcome on all four cognitive domains of memory, problem-solving, language and attention indicates that play does not develop skills in isolation. On the contrary, it activates an integrated network of cognitive processes at once: a child engaged in dramatic play must remember narrative sequences (memory), negotiate roles with peers (social problem solving), express and comprehend dialogue (language), and sustain agency (attention). The large effect may be due to the widespread activation of cognitive resources.

5.2 Consistency with Theoretical Frameworks

The results are most directly aligned with Vygotsky's socio-cultural theory. The scaffolded play sessions, in which teachers served as guides for children's play without controlling outcomes, are a clear example of the ZPD in action. Through this guided play, children were able to do things beyond their independent capabilities when assisted by a knowledgeable teacher or peer. The fact that TPPIS quality correlates so strongly with cognitive outcomes suggests that teacher scaffolding may not be peripheral but central to play-based effectiveness—children in schools with teachers showing higher fidelity to play-based principles scored significantly higher on the post-test.

The findings also align with Piagetian theory: children in the play-based group who engaged with physical and other materials in a constructive, manipulative way showed particular gains in problem-solving and memory. Piaget believed that concrete experience drives schema formation in preoperational children. The link between language and play is strongest in this domain, which resonates with Froebel's assertion that symbolic play – whether storytelling, role-play or drama – supports abstract thinking.

5.3 Teacher Challenges and Structural Barriers

TPPIS data and qualitative field notes revealed that Indian ECE teachers face significant implementation challenges, clustered around three categories:

- **Curriculum rigidity:** Several schools, especially in urban areas, private preschools are being mandated by parents to deliver formal literacy and numeracy content, due to which they have no time for structured play. Teachers say they feel 'watched' by parents who see play as worthless time.
- **Resource limitations:** Schools located in rural areas reported shortages of manipulative materials, open floor space and outdoor play Infrastructure. Though teachers used creative problem-solving to make balls from seeds, stones, and cloth, this didn't fully compensate for the inadequacies and was an additional burden.
- **Teacher training gaps:** A mandate of NCFES 2022, a very small number of teachers in the sample were formally trained in play-based pedagogy. Eighty-seven per cent of respondents found the two-day orientation workshop reported in this study to be very useful. This finding suggests that even short, structured professional development can affect practice.

5.4 Implications for NEP 2020 and ECCE Frameworks

The direct implications of the findings are in the operationalisation of the ECCE Agenda of NEP 2020. Unless there are three systemic enablers - large-scale teacher training(particularly for Anganwadi

workers), provisioning of materials, especially in rural Anganwadis, and a parent awareness campaign that proactively reconsiders play as a serious form of learning - the call for ECCE to be 'play-based, activity-based, and inquiry-based' is likely to remain a mere rhetorical flourish in policy documents. In recognising the rural-urban performance gap highlighted in this study, equitable implementation entails differential resource allocation: rural ECE centres need proportionately greater investment to deliver equivalent levels of play-based quality.

The data from this study supports the NCFFS 2022's assertion that "supervised play-based education is particularly important for enhancing the capacities of curiosity, creativity, critical thinking, cooperation, and empathy." Policymakers should focus on the Teacher Play-Pedagogy Implementation Scale (TPPIS) and similar tools as effective mechanisms for ongoing monitoring of ECCE quality. These can help state governments identify and support schools with implementation gaps.

6. Conclusion

6.1 Summary of Empirical Findings

Play-based pedagogy has been shown to yield greater cognitive gains than instruction in Indian pre-school settings. Evidence from the study. The findings revealed that children in the play-based intervention group significantly outperformed their peers across all cognitive domains (memory, problem-solving, language, and attention) with a large effect size (Cohen's $d = 1.31$). This study involved an 8-week intervention. A positive and significant correlation was established between play engagement and cognitive skills, with the strongest association being language development ($r = 0.65$). The implications of the findings align with the views of Piaget, Vygotsky, and Froebel, as well as the pedagogy envisaged for early childhood education under NEP 2020 in India.

6.2 Practical Recommendations

Based on these findings, the following recommendations are offered for educators, administrators, and policymakers:

- **Mandated play-based training:** The State Councils of Educational Research and Training (SCERTs) should cause pre-service and in-service teacher education programmes to incorporate structured play-based pedagogy modules. These modules should have a minimum of 40 contact hours per teacher per year.
- **Material provisioning policy:** Grant assistance for ECCE blocking under NEP 2020 must have earmarked funds for play materials in proportion to school enrolment. additional financial assistance for play materials for rural and tribal schools.
- **Parental engagement.** Schools must have structured parent orientation programmes that explain the cognitive science behind play-based learning to counter the idea that play is not learning.
- **Implementation monitoring:** State education departments should adopt standardised tools such as the TPPIS to assess and report on the quality of play-based pedagogy in ECCE centres annually.
- **Revised assessment frameworks:** Cognitive assessment in the foundational years should shift from written worksheets toward observation-based, portfolio-driven evaluation that captures cognitive development holistically.

6.3 Limitations and Future Directions

The limitations of these studies should guide future research. The fact that 8 weeks is sufficient to show statistically significant effects does not imply that these cognitive gains would last. A longitudinal follow-up tracking cognitive and academic outcomes at 8, 10 and 12 years will show if play-based early education has lasting benefits. The study was also restricted to Haryana and Delhi NCR, which

limits generalisability to Tamil Nadu, Kerala, the Northeastern states, and other more linguistically and culturally diverse areas. Subsequent research should also assess the moderating roles of the teacher-child ratio, quality of the classroom environment, and home learning environment on play-based learning outcomes. More focused research that investigates the issue of conflict programme assessment might make for a worthwhile research site.

References

1. Bergen, D. (2018). Cognitive development in play-based learning. *Encyclopedia on Early Childhood Development*. <https://www.child-encyclopedia.com/play-based-learning/according-experts/cognitive-development-play-based-learning>
2. Early Excellence. (2025, January 17). *Friedrich Fröbel: His principles, play theory, and legacy*. <https://earlyexcellence.com/practice-and-pedagogy/friedrich-froebel-theory/>
3. Government of India. (2020). *National Education Policy 2020*. Ministry of Education. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
4. International Journal of Food and Nutritional Sciences. (2023). *The role of play-based learning in early childhood education*. <https://www.ijfans.org/uploads/paper/b10c9e57879f4a2058ef62b6392bde4b.pdf>
5. Kumbang, A. (2025). Holistic development through ECCE in the light of NEP 2020. *Worldwide Journals — Indian Journal of Applied Research*. <https://www.worldwidejournals.com>
6. National Council of Educational Research and Training (NCERT). (2021). *Early childhood education*. <https://www.ncert.nic.in/dee/pdf/Earlychildhood.pdf>
7. National Council of Educational Research and Training (NCERT). (2022). *National Curriculum Framework for the Foundational Stage (NCFFS)*. https://ncert.nic.in/pdf/NCF_for_Foundational_Stage_20_October_2022.pdf
8. Piaget, J. (1962). *Play, dreams and imitation in childhood*. Norton.
9. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
10. My Teaching Cupboard. (2023, September 10). *Understanding play theories: A guide for play-based learning*. <https://www.myteachingcupboard.com/blog/play-theories>
11. Chauhan, S. (2025). NEP 2020: Revolutionising early childhood education in India. *Samvardhini*. <https://samvardhini.in>
12. NCERT. (n.d.). *Pre-school education*. ITPD. https://itpd.ncert.gov.in/mss/course_content/module14.pdf