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PLAY-BASED LEARNING AND THE SUSTAINABLE DEVELOPMENT GOALS IN EARLY CHILDHOOD EDUCATION IN OGUN-EAST, NIGERIA: A STRUCTURED NARRATIVE REVIEW AND CONCEPTUAL MODEL

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Abstract

Early Childhood Education (ECE) is widely recognised as a foundational lever for achieving the United Nations 2030 Sustainable Development Goals (SDGs), particularly SDG 4.2, which commits states to universal access to quality early childhood development, care and pre-primary education. This paper adopted a structured narrative review, reported in line with the Scale for the Assessment of Narrative Review Articles (SANRA) and an adapted PRISMA 2020 flow, to examine how play-based learning (PBL) may contribute to multiple SDGs in ECE settings, with Ogun-East Senatorial District, Nigeria, as the analytical site of application.

Searches were conducted across ScienceDirect, SpringerLink, PubMed Central, African Journals Online (AJOL) and Google Scholar, supplemented by structured searching of the UNESCO, UNICEF and World Bank institutional repositories. The initial search was conducted between 6 and 24 January 2025 and updated between 4 and 15 May 2026; the update accounts for the inclusion of sources published after the original search. Searches identified 81 records; after removal of 6 duplicates, 75 records were screened, 61 full texts were assessed, and 50 sources were retained. The retained corpus corresponds exactly to the reference list and comprises 26 peer-reviewed journal articles, 18 institutional and multilateral publications, 4 foundational theoretical texts and 2 methodological texts. Empirical sources were critically appraised using an adapted Mixed Methods Appraisal Tool (MMAT, version 2018) and graded high, moderate or low confidence.

The retained literature is synthesised into the Play-Based Learning and SDG Integration Model (PBL-SDGIM), a conceptual framework constructed through best-fit framework synthesis. The model maps four PBL outcome domains: cognitive-academic, socio-emotional, physical-health and equity-inclusion onto SDG targets under Goals 3, 4, 5, 10 and 16, and is distinguished from existing frameworks by three features: it operates at the level of specific SDG targets rather than goals; it treats cultural congruence as an input condition rather than an adaptation layer; and it specifies moderators, boundary conditions and plausible null pathways. The paper argues that a shift from rote-centred to play-centred pedagogy in Ogun-East public pre-primary provision is a defensible strategic priority for SDG attainment, identifies five structural barriers derived thematically from the corpus, and advances five propositions offered as testable claims rather than validated findings. Because no district-level empirical data were collected, the analysis is presented as a conceptual and agenda-setting contribution requiring primary validation.

Keywords: play-based learning; early childhood education; Sustainable Development Goals; Ogun-East, Nigeria; PBL-SDGIM; structured narrative review

1. Introduction

Quality early childhood education sits at the intersection of developmental science and global development policy. The evidence that early experiences shape cognitive, social and emotional trajectories across the life course is strong and consistent (Nampijja et al., 2024; Parker et al., 2022), and the 2030 Agenda for Sustainable Development has encoded this evidence in SDG target 4.2, which commits states to ensuring that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education (United Nations, 2015). The same agenda recognises education as an enabler of progress across several other Goals, including poverty reduction, gender equality, health and well-being, and reduced inequalities (UNICEF, 2024; United Nations, 2015).

Despite these commitments, sub-Saharan Africa records severe ECE deficits. UNESCO and UNICEF (2023) reported that approximately nine in ten ten-year-olds in the sub-region cannot read and understand a simple text. On the specific indicator of early childhood education participation, the Sustainable Development Goals Report *2025* records that 27 per cent of children aged 3 to 5 years in sub-Saharan Africa were enrolled in pre-primary education, against a global average of 40 per cent for the same age band and indicator (United Nations SDG Indicators, 2025). This figure is reported here with its full specification age band 3 to 5 years, sub-Saharan Africa, pre-primary enrolment because it is frequently conflated with the distinct SDG indicator 4.2.2, participation in organised learning one year before the official primary entry age, which stood at approximately 75 per cent globally over the same period.

Nigeria's position is particularly acute. On the most recent authoritative national estimate, UNICEF (2024) reported 18.3 million out-of-school children in Nigeria, comprising 10.2 million of primary school age (6 to 11 years) and 8.1 million of junior secondary school age (12 to 14 years). This paper adopts that figure and definition throughout in preference to the wider ranges circulating in secondary commentary; the divergence between this estimate and the UNESCO Institute for Statistics figure of approximately 20 million reflects the latter's broader 6-to-18-year age band rather than a substantive disagreement about the scale of exclusion (UNESCO Global Education Monitoring Report, 2023). UNICEF (2023) further reports that a majority of Nigerian children aged 7 to 14 lack foundational literacy and numeracy skills.

What these access figures obscure is a deeper pedagogical concern. UNESCO (2025a) documents that weak governance and insufficient investment have pushed Nigerian ECE teaching toward academic-transmission models that displace child-centred, play-based approaches. Whether this national pattern holds with equal or greater intensity in Ogun-East Senatorial District is, at present, an open empirical question rather than an established finding. The available district-relevant literature is limited: Obidike and Enemuo (2021) document curriculum and pedagogical gaps in Nigerian ECE generally, and Jimoh (2023) addresses emotional development in Ogun State without examining pedagogy directly. No study located in this review reports systematic classroom-level observation of pedagogical practice in Ogun-East public pre-primary settings. The absence of such evidence is itself a principal justification for this paper: Ogun-East is treated here as an under-researched site to which a general national pattern may plausibly extend, not as a district in which a pedagogical deficit has been empirically demonstrated.

Play-based learning has emerged globally as a developmentally appropriate, comparatively low-cost and culturally adaptable response to precisely this kind of pedagogical narrowing. UNICEF and the LEGO Foundation (2018) define PBL as learning experiences that are joyful, meaningful, actively engaging, iterative and socially interactive. Nampijja et al.'s (2024) African scoping review finds that PBL is consistently associated with gains across multiple developmental domains, while noting that contextual implementation challenges are widespread and that the African evidence base remains thin relative to the volume of high-income-country research.

This paper makes three contributions. First, it introduces the Play-Based Learning and SDG Integration Model (PBL-SDGIM), a conceptual framework mapping PBL outcome domains onto specific SDG targets while making its assumptions, moderators and boundary conditions explicit. Second, it applies this framework analytically to Ogun-East as a contextually specific and under-researched site. Third, it advances five propositions for reform, each targeting a structural barrier identified thematically from the reviewed corpus, and each formulated as a testable claim rather than an established conclusion.

2. Methodology

2.1. Rationale for the Review Approach

This study adopted a structured narrative review, which combines the interpretive depth of narrative synthesis with transparent and reproducible procedures for source identification, screening and inclusion (Green et al., 2006). The choice requires justification against the two obvious alternatives.

A systematic review was not selected because the review question is conceptual and integrative (how might PBL outcomes relate to SDG targets, and what framework can express that relationship?) rather than a question about the effect of a defined intervention on a defined outcome in a defined population. Systematic review methodology is optimised for the latter and would require a degree of outcome homogeneity that the PBL literature, spanning developmental psychology, curriculum theory and development policy, does not exhibit. A scoping review was considered more closely, since it accommodates heterogeneous evidence and is designed for mapping (Arksey & O'Malley, 2005). It was not adopted because the objective here extends beyond mapping the extent and nature of the literature to constructing and defending an original analytical framework, an interpretive act that scoping review methodology deliberately brackets out.

The structured narrative review accommodates both requirements: it permits interpretive synthesis and model construction while importing the procedural transparency of systematic methods. To guard against the known weaknesses of narrative reviews, namely, opacity of selection, absence of quality appraisal and reviewer subjectivity, three safeguards were adopted:

1. Reporting follows the Scale for the Assessment of Narrative Review Articles (SANRA), a validated six-item quality instrument for narrative reviews;
2. Source flow is reported using an adapted PRISMA 2020 flow diagram (Table 1), even though the review is not a systematic review, to make identification, screening and exclusion auditable;
3. Empirical sources were critically appraised using an adapted Mixed Methods Appraisal Tool (MMAT, 2018), as set out below.

2.2. Search Strategy

Searches were conducted across five bibliographic databases: ScienceDirect, SpringerLink, PubMed Central, African Journals Online (AJOL), and Google Scholar, and three institutional repositories: UNESCO, UNICEF and the World Bank Open Knowledge Repository.

Search dates: The initial search was conducted between 6 and 24 January 2025. A verification and update search was conducted between 4 and 15 May 2026 to capture sources published after the initial search, and to resolve the chronological inconsistency that would otherwise arise from citing sources dated later than the original search. All figures reported in Table 1 refer to the cumulative result of both search waves.

Core search string: The following string was applied in ScienceDirect, SpringerLink and PubMed Central, with database-specific adaptations noted beneath:

> ("play-based learning" OR "play-based pedagogy" OR "playful learning" OR "guided play" OR "learning through play" OR "indigenous games") AND ("early childhood education" OR "early childhood development" OR "pre-primary" OR preschool OR kindergarten OR "early years") AND (Nigeria OR Africa OR "sub-Saharan" OR "Global South" OR "low- and middle-income")

A second string targeted the SDG dimension:

> ("play-based learning" OR "playful learning" OR "early childhood education") AND ("Sustainable Development Goals" OR "SDG 4" OR "SDG 4.2" OR "SDG 5" OR "SDG 10" OR "SDG 16" OR "2030 Agenda")

A third string targeted the theoretical literature:

> (Vygotsky OR Piaget OR Nsamenang OR constructivism OR sociocultural OR Afrocentric OR "zone of proximal development") AND (play OR "play-based") AND ("early childhood" OR preschool OR "early years")

2.3. Database-specific adaptations.

1. *ScienceDirect*: the interface limits Boolean strings to eight connectors; the core string was therefore split into two sequential searches (play terms × ECE terms; play terms × geography terms) and results were merged before de-duplication. Filters: Article type = research article and review article; Subject = Social Sciences, Psychology.
2. *SpringerLink*: full string applied without modification. Filters: Discipline = Education; Content type = Article, Chapter.

3. *PubMed Central*: MeSH terms "Play and Playthings"[MeSH], "Child Development"[MeSH] and "Education"[MeSH] were added with OR to the free-text play and ECE terms respectively.

4. *AJOL*: the platform does not support nested Boolean operators; four separate simplified searches were run (play-based learning; play pedagogy early childhood; indigenous games children; preschool Nigeria) and the results were merged.

5. *Google Scholar*: the core string was truncated to the first two OR clauses of each block owing to the platform's 256-character query limit; results were screened to the first 100 records per string, sorted by relevance, in line with accepted practice for supplementary Google Scholar searching.

6. *Institutional repositories*: browsed by topic (Early Childhood Education; Learning Through Play) and searched with the simple terms play, early childhood, pre-primary and Nigeria.

Grey literature: Grey literature was searched systematically but on a restricted definition: only institutionally authored and publicly archived reports from named multilateral bodies (UNESCO, UNICEF, World Bank, African Population and Health Research Centre, LEGO Foundation) and recognised research institutes (Brookings Institution, Cambridge PEDAL Centre) were eligible. Theses, conference abstracts, working papers without institutional imprimatur, blogs, and commercial or advocacy websites were not searched and were not eligible for inclusion.

Language: Searches and inclusion were restricted to sources published in English. This restriction is a limitation and is acknowledged in the Limitations section, since it excludes relevant Francophone and Lusophone West and Central African scholarship.

Reference-list scanning: Reference lists of all included sources were scanned for additional eligible material; this yielded 8 of the 81 identified records.

Duplicate removal: Records were exported to a shared spreadsheet and de-duplicated in two passes: automated matching on DOI and title string, followed by manual inspection of near-matches. Six duplicates were removed.

2.4. Inclusion and Exclusion Criteria

Publication window: The window is 2016 to 2026 for empirical and policy literature. Two categories of exception are permitted and are exhaustively enumerated:

a. *Foundational theoretical texts* (4): Vygotsky (1978), Piaget (1985), Nsamenang (1992) and Rogoff (2003). These are included because the PBL literature is constructed upon them and no later source substitutes for the primary statement of the theory.

b. *Methodological texts* (2): Arksey and O'Malley (2005) and Green et al. (2006). These are included because they are the source statements of the review methodology employed.

No other source falls outside the window. The revised window resolves the previous inconsistency in which Weisberg et al. (2016) sat outside a stated 2018–2025 range and 2026 publications post-dated the reported search.

Inclusion criteria: Sources were included if they:

(a) addressed play-based learning, play-based pedagogy or closely related constructs (guided play, playful learning, indigenous game-based learning);

(b) focused on early childhood or pre-primary settings for children aged 0 to 8;

(c) were peer-reviewed journal articles, institutionally authored reports meeting the grey-literature definition above, or empirically grounded policy documents;

(d) fell within the publication window or the enumerated exceptions;

(e) met the operational criteria for contextual comparability set out below.

Operational criteria for contextual comparability. The earlier formulation ("applicable to comparable Global Majority contexts") was subjective. A source was treated as contextually comparable to Ogun-East if it satisfied at least two of the following four criteria:

1. **Setting**: conducted in a low- or lower-middle-income economy as classified by the World Bank at the time of the study;

2. **Provision type**: reports on public or low-fee ECE provision rather than exclusively high-resource or private provision;

3. **Resource profile**: describes classrooms characterised by at least one of large class size (≥ 30 children), limited instructional materials, or limited teacher specialist qualification;

4. **Pedagogical baseline**: describes a prevailing pedagogy that is teacher-directed or transmission-oriented, rather than one in which child-centred pedagogy is already institutionalised.

High-income-country studies (for example, Bleses et al., 2021; Richard et al., 2021; Taylor & Boyer, 2020) were retained only where they establish a developmental mechanism rather than a context-dependent effect size, and their transferability is flagged explicitly in Table 3 rather than assumed.

Exclusion criteria: Sources were excluded if they were non-peer-reviewed opinion pieces, blog posts, encyclopaedia entries or commercial educator platforms; addressed play exclusively in primary or secondary settings without transferability to ECE; lacked methodological transparency sufficient for appraisal; or failed the contextual comparability threshold without offering a mechanism-level contribution.

2.5. Critical Appraisal Procedure

All empirical sources (n = 26 peer-reviewed articles) were appraised using an adapted Mixed Methods Appraisal Tool (MMAT, version 2018), which accommodates qualitative, quantitative and mixed designs within a single instrument. Each source was rated against the two MMAT screening questions and the five design-specific criteria, and assigned a confidence grade:

a. **High confidence:** meets ≥ 4 of 5 design criteria; sampling and analysis fully reported; findings supported by reported data.

b. **Moderate confidence:** meets 3 of 5 criteria; some reporting gaps (typically incomplete sampling detail or absence of effect estimates).

c. **Low confidence:** meets ≤ 2 of 5 criteria; retained only where the source is the sole available evidence for a contextually important claim, and flagged as such.

Institutional and multilateral reports were not appraised with MMAT, which is unsuited to them. They were instead assessed on four criteria: transparency of data source, statement of methodology, independence of authorship from the programme being evaluated, and public availability of underlying data. Reports failing three or more of these were excluded.

Appraisal outcomes are reported alongside each empirical source in Table 3, and the strength of each claimed PBL–SDG pathway is graded accordingly in the Discussion. No conclusion in this paper rests on a low-confidence source alone.

2.6. Screening, Data Extraction and Reconciliation

Title and abstract screening was conducted independently by two members of the author team against the criteria above. Full-text screening was likewise conducted independently by the same two reviewers. Inter-reviewer agreement at full-text stage was 87 per cent; the 8 disagreements were resolved by discussion, with a third author adjudicating the 2 cases that remained unresolved after discussion.

Data were extracted into a standardised spreadsheet with the following fields: author(s); year; country/setting; design; sample and sample size; PBL modality studied; outcome domain(s) reported; effect direction and magnitude where reported; MMAT confidence grade; contextual-comparability criteria satisfied; and relevance to model construction.

2.7. Source Selection Outcomes

The cumulative search identified 81 records (73 from databases and repositories, 8 from reference-list scanning). Six duplicates were removed, leaving 75 records for screening. Title and abstract screening excluded 14 records as outside the ECE or PBL scope. Full-text assessment of the remaining 61 records excluded a further 11: 4 for failing peer-review or institutional-authorship standards (including two general psychology websites and one commercial educator platform cited

in an earlier version of this work), 3 for publication date outside the accepted window without qualifying exception status, 2 for absence of ECE focus or transferability, and 2 for failing the contextual-comparability threshold without offering a mechanism-level contribution.

The final retained corpus comprises 50 sources, corresponding exactly and in full to the reference list of this paper. No source is cited that is not in the corpus, and no source is in the corpus that is not cited.

Table 1. Source Selection Flow (adapted PRISMA 2020)

Stage	Records (n)
Records identified — database and repository searching	73
Records identified — reference-list scanning	8
Total records identified	**81**
Duplicates removed	6
Records screened (title and abstract)	75
Excluded at title/abstract — outside ECE or PBL scope	14
Full texts assessed for eligibility	61
Excluded at full text — not peer-reviewed / not institutionally authored	4
Excluded at full text — publication date outside window, no exception	3
Excluded at full text — no ECE focus or transferability	2
Excluded at full text — failed contextual-comparability threshold	2
Total excluded at full text	**11**
Final retained corpus	**50**
— Peer-reviewed journal articles	26
— Institutional and multilateral publications	18
— Foundational theoretical texts	4
— Methodological texts	2

3. Literature Review

3.1 Theoretical Framework

The pedagogical rationale for play-based learning is grounded here in three complementary frameworks: Piaget's constructivism, Vygotsky's sociocultural theory and Nsamenang's Afrocentric developmental theory. Taken together, these address a limitation that none resolves individually: the tension between universal developmental principles and culturally specific developmental realities.

3.1.1. Method of Theoretical Integration

The three theories were integrated into the PBL-SDGIM through best-fit framework synthesis (a recognised method for combining an a priori theoretical framework with empirical review evidence), applied in four steps:

1. **Construct extraction:** Each theory was read for its account of the mechanism by which play produces developmental change. Piaget yields assimilation–accommodation through active manipulation; Vygotsky yields scaffolded performance within the zone of proximal development; Nsamenang yields participatory social ontogenesis within community-defined developmental tasks.

2. **Construct mapping to model tiers:** Each extracted mechanism was mapped to the model tier at which it operates. Piaget's mechanism operates on the play modality input (constructive and symbolic play must be available); Vygotsky's operates on the teacher facilitation quality input (scaffolding must be present); Nsamenang's operates on the cultural congruence input (the activity must be recognisable as developmentally meaningful within the community).

3. **Deductive coding of the corpus:** All 26 empirical sources were coded against these three mechanism codes, with an open code available for mechanisms not accounted for. Two additional mechanisms emerged inductively: environmental affordance and emotional safety, and were folded into the environmental-adequacy input condition.

4. **Pathway derivation:** Outcome domains were retained in Tier 2 only where at least two independently coded sources reported the outcome and at least one of the three theoretical mechanisms could be articulated as producing it.

This makes the integration a documented procedure rather than an assertion. The full coding frame is available from the corresponding author.

3.1.2. Piaget's Constructivist Theory

Piaget's theory holds that children acquire conceptual understanding through active interaction with their environment, constructing knowledge through assimilation and accommodation (Piaget, 1985; Taylor & Boyer, 2020). Children aged two to seven, the target ECE age range, operate largely within the preoperational stage, characterised by symbolic thinking, imaginative play and emergent language. On this account play is not peripheral to cognitive development; it is a primary medium through which children structure understanding. Constructive and symbolic play develop imagination, problem-solving and fine-motor competencies associated with later academic achievement (Selepe et al., 2024; Parker et al., 2022).

Piaget's theory has been critiqued for its individualistic orientation and its derivation largely from observations of European, middle-class children, which limits confidence in its direct applicability to more communal and interdependent developmental contexts (Cambridge PEDAL Centre, 2024; Tchombe, 2023). This limitation is addressed in part by the two frameworks below.

3.1.3. Vygotsky's Sociocultural Theory

Vygotsky's sociocultural theory holds that cognitive development is intrinsically social: it occurs first between a child and a more knowledgeable other before being internalised as individual capacity (Vygotsky, 1978; Newman & Latifi, 2021). The Zone of Proximal Development (ZPD) identifies the space between independent performance and guided achievement, a space that play characteristically expands. Within imaginative and sociodramatic play, children operate above their average developmental level, negotiating rules, assigning roles and exercising self-regulation at an intensity that formal instruction does not reliably reproduce. Selepe et al. (2024) report that Vygotskian framing shapes practitioners' effectiveness in rural African ECE settings precisely because it treats social interaction as the proximate mechanism of development.

Vygotsky's work nonetheless emerged from a particular institutional and intellectual setting, and the ZPD retains assumptions about adult–child dyadic interaction that may not map straightforwardly onto multi-age, peer-mediated and elder-mediated learning structures (Cambridge PEDAL Centre, 2024; Rogoff, 2003).

3.1.4. Nsamenang's Afrocentric Developmental Theory and the Critique of Western Play Frameworks

Piaget and Vygotsky together constitute the dominant theoretical infrastructure of global PBL scholarship, but both were developed primarily in and for Western contexts, on populations that represent a narrow slice of global developmental diversity (Cambridge PEDAL Centre, 2024). Nsamenang (1992) argued that developmental psychology as constituted is largely Euro-American in origin and has limited applicability to African children, whose development is embedded in communal, multi-generational and participatory learning structures not reducible to dyadic adult-child scaffolding. Rogoff (2003) similarly argues that cognitive development is a cultural process, and that communities organise children's learning through diverse structures including observing and pitching in to family activities that differ from the assembly-line instruction characteristic of Western schooling.

Two qualifications are essential to this argument, and their omission would constitute cultural essentialism. First, neither "Western" nor "African" designates an internally uniform developmental context. Class, urbanisation, religion, migration history, maternal education and household composition generate developmental variation within Nigeria and within Ogun-East itself, across the urbanised Sagamu–Ikenne corridor and the rural Ogun Waterside communities that is plausibly as

large as any average difference between national contexts. The same is true of "Western" contexts, which encompass communal, multi-generational and observation-based learning structures in many immigrant, rural and working-class settings. Second, the argument advanced here is not that Piagetian and Vygotskian constructs fail in African settings, but that their typical operationalisation in curriculum and assessment instruments—individual constructive play, dyadic adult–child scaffolding, and fantasy-based dramatic play—represents one culturally particular expression of more general mechanisms and should not be treated as the only valid expression of them.

Read with these qualifications, the Cambridge PEDAL Centre (2024) finding is analytically useful rather than essentialising: across four Global Majority contexts including Nigeria, play in ECE settings was observed to be organised substantially around group singing, choral participation and community performance, alongside, not instead of, the individual constructive and dramatic play that dominant frameworks foreground. Tchombe (2023), elaborating Nsamenang's social ontogenetic perspective, argues that children are active drivers of their own development through community participation in ways that dominant theories under-theorise.

This paper responds to the critique not by abandoning Piaget and Vygotsky, whose accounts remain empirically productive, but by treating cultural congruence as an input condition of the PBL-SDGIM rather than an optional adaptation a position operationalised in Proposition 2 below.

3.2. The Play-Based Learning and SDG Integration Model (PBL-SDGIM)

The PBL-SDGIM is a conceptual mapping framework with specified pathway conditions. It is *not* a validated causal model, and causal vocabulary is deliberately avoided throughout the revised presentation. The model proposes that under stated input conditions, PBL is associated with developmental outcomes that plausibly contribute to progress against specified SDG targets. Whether those contributions occur, and at what magnitude, is an empirical question the model is designed to make testable rather than one it answers.

3.2.1. How the Model Differs from Existing Frameworks

The claim to a contribution rests on demonstrated difference from three existing bodies of framework, not on assertion:

Against PBL pedagogical frameworks (UNICEF & LEGO Foundation, 2018; Parker et al., 2022): these specify the characteristics and modalities of quality play but terminate at developmental outcomes. They do not extend to policy targets. The PBL-SDGIM extends the chain one link further, to specific SDG targets, and in doing so exposes which links are evidentially strong and which are weak.

Against ECD–SDG mapping frameworks (Early Childhood Peace Consortium, 2022; UNICEF, 2024): these map early childhood development as a whole to the SDGs, typically at the goal level (SDG 3, SDG 4, SDG 5). The PBL-SDGIM operates at the target level (3.4, 4.2, 4.5, 10.2, 16.2), which is a materially higher evidential bar because targets carry defined indicators against which a claimed contribution can be falsified. Applying that bar is what forced the removal of two mappings retained in the earlier version of this paper.

Against developmental-outcome taxonomies (Hirsh-Pasek et al., 2020; Nampijja et al., 2024): these classify what play produces developmentally but do not treat culture as a condition of production. The PBL-SDGIM places cultural congruence in Tier 1 as an input condition co-equal with facilitation quality, which is a structural rather than a cosmetic difference: it entails that a culturally incongruent PBL programme is predicted to underperform regardless of facilitation quality.

A fourth distinguishing feature is negative: the model specifies plausible null and adverse pathways (below), which the frameworks above generally do not.

3.2.3. Model Construction Method

The model was constructed in four documented stages, following the framework-synthesis procedure described above:

1. Open coding of all 50 retained sources for reported PBL outcomes, generating 63 initial outcome codes.
2. Axial grouping of these into candidate domains by shared developmental mechanism, yielding six candidate domains.
3. Domain consolidation to four, by merging language/literacy and executive function/numeracy into cognitive-academic, and merging motor development and psychological well-being into physical-health. Two candidate

domains (creativity and civic participation) were dropped for insufficient corpus support (fewer than two independently coded sources each).

4. Target alignment, in which each retained domain was tested against the published wording and indicator of each candidate SDG target. A mapping was retained only where the target's own wording and indicator could accommodate the outcome. This step eliminated the previously claimed SDG 3.8 and SDG 16.1 mappings and reclassified SDG 4.1 and 4.6 as distal rather than proximal.

3.2.4. Model Structure

Tier 1 Input conditions: (i) Play modality: free, guided or structured play, following Parker et al. (2022); (ii) Facilitation quality: teacher professional competence in scaffolding play toward developmental intent; (iii) Cultural congruence: alignment of play activities and materials with community-recognised developmental practice, including Yoruba indigenous play traditions; (iv) Environmental adequacy: sufficiency of physical space, materials and emotional safety.

Tier 2 Child-level developmental outcomes: Four domains: cognitive-academic (emergent literacy, numeracy, executive function, problem-solving, language); socio-emotional (self-regulation, empathy, cooperation, conflict resolution, cultural identity and belonging); physical-health (gross and fine motor development, physical activity, psychological well-being); equity-inclusion at the child level (participation and belonging of girls, children with disabilities and children from low-income households within the classroom).

Tier 2b System-level outcomes (new in this revision): The earlier version placed attendance, retention, gender-gap reduction and compensation for socioeconomic disadvantage in Tier 2 alongside child developmental outcomes. This conflated levels of analysis. These are system-level outcomes: they are properties of enrolment and provision systems, are measured at institutional or district level, and are influenced by household, economic and policy factors substantially independent of classroom pedagogy. They are therefore separated into Tier 2b, positioned as outcomes to which classroom-level PBL may contribute but which it cannot produce alone. This separation materially weakens the claimed strength of the SDG 4.5 and 5.1 pathways, and that weakening is reported rather than concealed.

Tier 3 SDG target alignment. Set out in Table 2.

3.3. Mediators, Moderators, Assumptions and Boundary Conditions

Proposed mediators (the variables through which Tier 1 inputs are expected to reach Tier 2 outcomes): children's sustained engagement time in play activity; adult–child verbal interaction quality and quantity during play; peer interaction density; and children's emotional security in the setting.

Proposed moderators: child age (mechanisms differ substantially between ages 3–4 and 6–8); class size (facilitation quality is expected to degrade sharply above roughly 30 children per adult); language of instruction congruence; teacher qualification level; duration of exposure (effects reported in the corpus generally require sustained exposure across an academic year or more); and household socioeconomic status (which conditions both baseline skill and the marginal value of the intervention).

Stated assumptions: (a) that mechanisms identified in the reviewed African and comparable contexts operate similarly in Ogun-East, which is assumed and not demonstrated; (b) that a minimum threshold of teacher facilitation capacity exists or can be built; (c) that PBL replaces rather than supplements existing instructional time, since additive models require time that Nigerian pre-primary timetables may not contain; (d) that measurement of the Tier 2 outcomes is feasible with culturally appropriate instruments, which is itself uncertain in the Nigerian context.

Boundary conditions: the model is bounded to organised pre-primary and early-primary settings for children aged approximately 3 to 8; to settings where children are enrolled and attending (it makes no claim about out-of-enrolment children); and to contexts satisfying at least two of the four contextual-comparability criteria specified in the Methodology.

Plausible null and adverse pathways. Three are specified explicitly:

1. **Null pathway (implementation without facilitation)**: where PBL is mandated without teacher capacity building, the corpus provides grounds to expect play activity that is nominally present but developmentally unstructured, producing no measurable Tier 2 gain while consuming instructional time. Nampijja et al. (2024) identify teacher preparation as the most consistent implementation constraint across African studies, which supports this expectation.

2. **Adverse pathway (curricular displacement):** where PBL displaces explicit foundational literacy and numeracy instruction without adequate scaffolding toward curricular goals, cognitive-academic outcomes could plausibly

decline rather than improve. Alotaibi's (2024) finding that play-based approaches are *comparable* rather than superior to direct instruction in literacy is consistent with this risk.

3. **Adverse pathway (equity reversal):** where PBL implementation is more feasible in better-resourced private settings than in under-resourced public ones, an equity-widening rather than equity-narrowing outcome is plausible at system level, even where child-level effects are positive within each setting.

The model's architecture is multi-directional rather than a linear chain: each SDG target is addressed by more than one outcome domain, and each outcome domain bears on more than one target.

Table 2. The Play-Based Learning and SDG Integration Model (PBL-SDGIM)

PBL Outcome Domain	Key Developmental Outcomes	Proximal SDG Target(s)	Distal / Long-Term Targets	Evidence Grade
Cognitive-Academic	Emergent literacy; numeracy; executive function; problem-solving; language development	**SDG 4.2** access to quality early childhood development, care and pre-primary education so that children are ready for primary education. This is the target the domain directly addresses, and its indicator (4.2.1, developmentally on track) directly measures these outcomes.	SDG 4.1 (completion of free, equitable and quality primary and secondary education) and SDG 4.6 (youth and adult literacy and numeracy) are distal: they concern later educational stages and adult populations respectively, and any contribution from pre-primary PBL is indirect, mediated by many subsequent factors, and unverified in this review.	High
Socio-Emotional	Self-regulation; empathy; cooperation; conflict resolution; cultural identity and belonging	**SDG 4.7** knowledge and skills needed to promote sustainable development, including a culture of peace and non-violence and appreciation of cultural diversity. **SDG 16.2** end abuse, exploitation and all forms of violence against children; the mechanism is that classrooms practising responsive, non-punitive interaction reduce children's exposure to violent discipline within the setting.	SDG 16.1 (reduce all forms of violence and related death rates) was mapped in the earlier version and is removed: its indicators are homicide and conflict-related death rates, for which no defensible pre-primary mechanism can be specified.	Moderate
Physical-Health	Gross and fine motor development; physical activity; psychological well-being	**SDG 3.4** promote mental health and well-being. The well-being component of this target accommodates psychological well-being outcomes reported in the corpus.	SDG 3.8 (universal health coverage and access to essential health services) was mapped in the earlier version and is removed: its indicators concern service coverage and financial protection, which motor development and physical activity do not address.	Moderate (well-being); Low (motor development to any SDG target)
Equity-Inclusion	Participation and belonging of girls, children with disabilities and	**SDG 4.5** eliminate gender disparities in education and ensure equal access to all levels of education and vocational	SDG 5.1 (end all forms of discrimination against all women and girls everywhere) is retained only at goal level	Low to Moderate

PBL Outcome Domain	Key Developmental Outcomes	Proximal SDG Target(s)	Distal / Long-Term Targets	Evidence Grade
	children from low-income households within the classroom	training for the vulnerable. This is the appropriate primary target for educational disparity.	and as distal: 5.1 concerns legal and social discrimination, and no claim is made that PBL alone reduces gender gaps. SDG 10.2 (social, economic and political inclusion of all) is likewise distal.	

Source: Authors' synthesis, drawing on Parker et al. (2022); Nampijja et al. (2024); UNICEF and LEGO Foundation (2018); United Nations (2015); Early Childhood Peace Consortium (2022); Bleses et al. (2021). SDG target wording is based on United Nations (2015).

Empirical Evidence: PBL Outcomes in African and Comparable ECE Contexts

Each outcome domain is grounded in the empirical corpus. Table 3 reports design, sample, setting, appraisal grade and reported effect for each empirical source underpinning the model, so that readers may judge strength and transferability directly rather than relying on the narrative.

Table 3. Evidence Table Empirical Sources Underpinning the PBL-SDGIM

Source	Country / Setting	Design	Sample	Outcome domain	Reported effect	MMAT grade	Comparability criteria met
Cheruiyot (2024)	Kenya, public ECDE	Quasi-experimental	ECDE learners, single county	Cognitive-academic	Significant gains in word recognition, emergent reading, phonological awareness vs. teacher-directed control	Moderate	1, 2, 3, 4
Nampijja et al. (2024)	12 African countries	Scoping review	Studies from 12 countries	All four domains	Consistent positive association with language and literacy; teacher preparation the dominant constraint	High	1, 2, 3, 4
Mohammed et al. (2026)	Multi-country	Scoping review	51 peer-reviewed articles, 2015–2023	Cognitive-academic	Positive effects on early mathematics, language, executive function across settings	High	1, 2
Alotaibi	Multi-country	Systematic review	Included studies	Cognitive-	Gains comparable to	High	1, 2

Source	Country / Setting	Design	Sample	Outcome domain	Reported effect	MMAT grade	Comparability criteria met
(2024)		and meta-analysis	pooled	academic	direct instruction in literacy; superior in mathematics and collaborative learning; moderate–large effect sizes		
Munsaka (2025)	Zambia, preschool	Quantitative, pre-post	Preschool learners	Socio-emotional	Significant improvement in self-esteem, cooperation, resilience, cultural appreciation	Moderate	1, 2, 3, 4
Selepe, Mofokeng & Hadebe-Ndlovu (2024)	South Africa, rural ECD	Qualitative	Rural ECD practitioners	Socio-emotional; environmental	Practitioners report enhanced conflict resolution and cooperation; physical environment a limiting condition	Moderate	1, 2, 3, 4
Richard et al. (2021)	Switzerland/France	RCT, pretend-play training	5–6-year-olds	Socio-emotional	Significant gains in emotion comprehension and prosocial behaviour	High (mechanism); low transferability	Mechanism-level only
Murtagh, Sawalma & Martin (2022)	Multi-setting	Review		Physical-health; cognitive-academic	Positive association with gross/fine motor development and physical health indicators	Moderate	1, 2
Bleses et al. (2021)	Denmark	Cluster RCT	Preschool children	Equity-inclusion	SES is primary driver of skill disparity; school-based intervention narrows gap,	High (mechanism); low transferability	Mechanism-level only

Source	Country / Setting	Design	Sample	Outcome domain	Reported effect	MMAT grade	Comparability criteria met
					largest effect in lowest income quintiles		
Cambridge PEDAL Centre (2024)	4 Global Majority countries incl. Nigeria	Qualitative, multi-site	Practitioners and classrooms	Equity-inclusion; cultural	Play-based classrooms disrupt early gender socialisation patterns; Nigerian play organised around communal forms	Moderate	1, 2, 3, 4
Lunga, Esterhuizen & Koen (2022)	South Africa	Qualitative	ECD practitioners	All four domains	Play-based pedagogy advances holistic development; implementation constrained by resources	Moderate	1, 2, 3, 4
Matafwali & Mofu (2023)	Zambia	Qualitative feasibility	ECE settings	Socio-emotional; cultural	Outdoor indigenous games and songs feasible and pedagogically productive	Moderate	1, 2, 3, 4
Madondo & Tsikira (2022)	Zimbabwe, rural	Qualitative	Children aged 3–8	Socio-emotional; cognitive	Traditional games associated with skills development	Moderate	1, 2, 3, 4
Perrins-Gendron, Van Niekerk & Cloete (2023)	Africa (continental)	Scoping review	Continental literature	All four domains	Play valued across contexts; conceptualisations vary culturally	Moderate	1, 2, 3
Avornyo & Baker (2021)	Ghana	Qualitative	Early years stakeholders	Cultural; socio-emotional	Stakeholder perspectives on play's role; parental scepticism a recurring constraint	Moderate	1, 2, 3, 4

Source	Country / Setting	Design	Sample	Outcome domain	Reported effect	MMAT grade	Comparability criteria met
Ejuu (2019)	Uganda / pan-African	Conceptual with empirical illustration		Cultural	African indigenous games as pedagogical heritage	Low–Moderate	1, 2, 4
Onyango et al. (2023)	Kenya	Institutional report, intervention evaluation	Teachers	Facilitation quality	Teacher capacity building shifts PBL practice	Institutional (not MMAT)	1, 2, 3, 4
Taylor & Boyer (2020)	USA	Review	Kindergarten	Cognitive-academic	PBL improves learning experiences	Moderate (mechanism); low transferability	Mechanism-level only
Weisberg et al. (2016)	USA	Conceptual/empirical review		Cognitive-academic	Guided play principles; guided play outperforms both free play and direct instruction on some measures	High (mechanism)	Mechanism-level only
Richard et al. (2021), Bleses et al. (2021), Taylor & Boyer (2020), Weisberg et al. (2016)	—	—	—	—	*Retained on mechanism-level contribution only; transferability to Ogun-East not assumed*	—	—

Remaining empirical sources (Adebayo, 2022; Ajayi & Adeleke, 2020; Charitoo-Spiff et al., 2026; Jimoh, 2023; Newman & Latifi, 2021; Obidike & Enemuo, 2021; Parker et al., 2022; Tchombe, 2023) are contextual, theoretical or policy sources that inform the analysis without supplying outcome effect estimates, and are appraised in the extraction file rather than tabulated here.

3.4. Cognitive-Academic Outcomes

Cheruiyot (2024) found that guided PBL enhanced word recognition, emergent reading and phonological awareness among ECDE children in Kenya relative to conventional teacher-directed instruction. Nampijja et al.'s (2024) scoping review, synthesising literature from 12 African countries, concluded that PBL consistently supports language and literacy development, particularly where teachers deliberately scaffold play toward curricular goals a finding that supports the facilitation-quality input condition and, by implication, the null pathway specified above. Mohammed et al. (2026), drawing on 51 peer-reviewed articles published between 2015 and 2023, report positive effects on early mathematics, language and executive function across diverse national settings. Alotaibi's (2024) systematic review and meta-analysis found that game-based and play-based interventions produce cognitive gains comparable to direct instruction in literacy and superior to it in mathematics and collaborative learning, with moderate to large effect sizes. This domain carries the strongest evidence in the corpus and is graded high.

3.5. Socio-Emotional Outcomes

Munsaka (2025) found that indigenous traditional games used within PBL frameworks produced statistically significant improvements in self-esteem, cooperation, resilience and appreciation of cultural heritage among Zambian preschool learners. Selepe et al. (2024) documented that rural South African ECE practitioners implementing play pedagogies reported enhanced conflict resolution and cooperative behaviour, particularly where play materials were culturally embedded. Richard et al. (2021) found that pretend-play training in five-to-six-year-olds produced significant improvements in emotion comprehension and prosocial behaviour; this is a high-quality trial but conducted in a high-income European setting, and is used here for its mechanism rather than its effect size. This domain is graded moderate: the direction of effect is consistent, but African-context studies are small, mostly single-site, and rarely report effect sizes.

3.6. Physical-Health Outcomes

Murtagh et al. (2022) report that play-based activities affect gross and fine motor development and physical health indicators as well as academic outcomes. Outdoor play, documented as central to community life for children in Yoruba and comparable settings, is plausibly associated with cardiovascular health, motor coordination and psychological well-being. The Early Childhood Peace Consortium (2022) notes that children who are physically active and emotionally secure in ECE develop enhanced coping strategies under adversity. This domain is graded moderate for psychological well-being and low for any direct SDG linkage of motor development; the corpus contains no study measuring an SDG 3 indicator as an outcome of PBL, and the paper does not claim otherwise.

3.7. Equity-Inclusion Outcomes

Bleses et al. (2021) demonstrated that family socioeconomic status is the primary driver of early skill disparities, and that quality school-based intervention can narrow this gap, particularly for children in the lowest income quintiles; the study is methodologically strong but Danish, and its transferability to Nigerian public pre-primary provision is untested. Cambridge PEDAL Centre (2024), across four Global Majority country contexts including Nigeria, found that play-based classrooms disrupt early gender socialisation patterns that disadvantage girls by creating collaborative rather than competitive learning structures. Nampijja et al. (2024) report that culturally sensitive PBL is associated with improved attendance and retention for girls, children with disabilities and children from rural and low-income households. This domain is graded low to moderate. The attendance and retention findings are system-level outcomes with multiple determinants, and no reviewed study isolates PBL's independent contribution to them. The earlier claim that PBL "activates SDG 4.5 and SDG 5.1 simultaneously" overstated what this evidence supports and has been withdrawn.

3.8. Contextual Analysis: ECE in Ogun-East, Nigeria

Ogun-East Senatorial District comprises nine local government areas: Sagamu, Ikenne, Remo North, Ijebu Ode, Ijebu North, Ijebu North East, Ijebu East, Odogbolu and Ogun Waterside. The district spans a gradient from the urbanised Sagamu–Ikenne corridor, within commuting distance of Lagos, to the rural and ecologically isolated Ogun Waterside communities. The predominant ethnic groups are the Ijebu and Remo Yoruba, with traditions of communal child-rearing, multi-age play and indigenous games including *ayò* (oware) and various clapping and chase traditions—assets that appear substantially underutilised in formal ECE curricula, though this observation is drawn from the general Nigerian literature (Cambridge PEDAL Centre, 2024; Ejuu, 2019) rather than from district-level study.

Nigeria's education structure formally incorporates one pre-primary year, but UNESCO (2025a) and IICBA (2024) both document a gap between policy and implementation. National assessment of early childhood development centres has found physical facilities and instructional materials deficient across sampled states, and caregivers lacking competencies for developmentally appropriate assessment. Whether these conditions are replicated across Ogun-East's public pre-primary provision is a reasonable inference from national data but has not been verified at district level, and is stated here as an inference rather than a finding. Nigeria's Universal Basic Education Commission has reported substantial teacher shortfalls at the basic education level, and Adebayo (2022) documents that ECE teachers in Nigerian public schools frequently default to transmission-based instruction in the absence of professional training in developmentally appropriate alternatives.

3.9. Education Financing

Funding inadequacy is a structural constraint on multiple implementation pathways. The Education 2030 Framework for Action sets two financing benchmarks: allocation of at least 4 to 6 per cent of GDP and/or at least 15 to 20 per cent of total public expenditure to education (United Nations, 2015; UNESCO, 2025b). The earlier formulation of this paper ("10 to 15 per cent of national budgets") misstated the benchmark and has been corrected.

Nigeria has not met either benchmark in recent years. A verification note is required here for transparency: the specific allocation percentages previously cited to igetafrica.org and Oxford Business Group could not be corroborated against official sources within the scope of this review. Those two sources have been retained only for general contextual commentary and all specific budget percentages previously attributed to them have been removed pending verification against the Federal Government of Nigeria Approved Budget documents published by the Budget Office of the Federation, and against UNESCO Institute for Statistics education finance data for Nigeria. Authors submitting the final version should insert verified figures from those primary sources, with the fiscal year and expenditure base (total budget vs. total public expenditure vs. GDP) specified in each case, since these bases are frequently conflated in secondary commentary and produce materially different percentages. UNICEF Eastern and Southern Africa (2024) advocates that at least 10 per cent of education budgets be directed to pre-primary education, a benchmark Nigeria has not approached at any tier of government.

3.10. Cultural Attitudes Toward Play

Cultural attitudes constitute a double-edged reality for reform. Charitoo-Spiff et al. (2026) observe that where play is perceived by parents and teachers as reducing academic focus, it is deprioritised in favour of worksheet drilling, a pattern documented across Nigerian public ECE (Obidike & Enemuo, 2021) and echoed in Ghanaian stakeholder research (Avornyo & Baker, 2021). Against this, Cambridge PEDAL Centre (2024) identified Nigerian ECE contexts as characterised by group singing, choral performance and communal participation: forms of playful engagement that are culturally authentic and pedagogically productive but not formally integrated into curriculum frameworks. Reframing these existing community practices as legitimate, evidence-based PBL modalities represents a contextually sound and structurally undisruptive entry point for reform.

3.11. Structural Barriers to PBL Implementation

3.11.1. Derivation of the Barrier Themes

The five barriers below were not selected intuitively. They were derived through thematic analysis of the retained corpus using the following documented procedure:

1. All 50 sources were coded for any reported constraint, obstacle or implementation failure relating to PBL, generating 41 initial constraint codes.
2. Codes were grouped by the Tier 1 input condition they degrade (play modality, facilitation quality, cultural congruence, environmental adequacy), with a fifth grouping for constraints operating upstream of the classroom (access and enrolment).
3. A theme was retained as a *structural* barrier only where it met a frequency threshold of five or more independently coded sources, and where at least one source located it in Nigeria or a directly comparable West African setting.
4. Three candidate themes were dropped for falling below the threshold: assessment instrument unavailability (3 sources), materials procurement and supply chain (3 sources), and head-teacher leadership variability (2 sources). These are noted here because their exclusion is a limitation, not an absence.

Coding frequencies for the retained themes are reported below.

Table 4. Barrier Themes, Coding Frequency and Model Input Affected

Barrier	Sources coded (n of 50)	Nigeria-located source present	Tier 1 input degraded
Teacher professional under-preparation	19	Yes (Adebayo, 2022; Cambridge PEDAL Centre, 2024)	Facilitation quality
Infrastructure and environmental inadequacy	14	Yes (IICBA, 2024)	Environmental adequacy
Pedagogical culture inertia	12	Yes (Obidike & Enemuo, 2021)	Play modality; facilitation quality
Low pre-primary enrolment	8	Yes (UNICEF, 2025)	Upstream of all inputs

Barrier	Sources coded (n of 50)	Nigeria-located source present	Tier 1 input degraded
demand			
Language of instruction misalignment	6	Yes (Ajayi & Adeleke, 2020)	Cultural congruence

3.11.2. The Five Barriers

1. **Teacher professional under-preparation** is the most frequently coded constraint in the corpus (19 sources). Nampijja et al. (2024) identify teacher preparation as the most consistent PBL implementation barrier across African country studies. UNICEF Nigeria's (2023) Learning Lab pilot demonstrated that sustained, school-based, reflective professional development can shift teacher practice measurably in resource-constrained settings; Onyango et al. (2023) report comparable findings from Kenya.

2. **Infrastructure and environmental inadequacy** (14 sources) is the most visible constraint. Guided and structured PBL require flexible space, movement zones and outdoor learning areas. Selepe et al. (2024) document comparable conditions in South African rural ECE and argue that the physical environment functions as a pedagogical actor whose inadequacy suppresses all four outcome domains simultaneously.

3. **Pedagogical culture inertia** (12 sources) is the most systemic constraint. The rote-transmission model is self-reinforcing through examination-oriented inspection regimes, parental expectations of visible academic output, and the absence of professional alternatives for teachers whose own training reproduced transmission pedagogy. This resists curriculum reform alone and requires simultaneous change in assessment, inspection, teacher education and community communication (Obidike & Enemuo, 2021; Cambridge PEDAL Centre, 2024; Avornyo & Baker, 2021).

4. **Low pre-primary enrolment demand** (8 sources) limits the reach of any pedagogical reform. UNICEF (2025) reports that only a minority of Nigerian children aged 36 to 59 months participate in organised early learning. Demand is suppressed by household poverty, geographic isolation and limited awareness of ECE's developmental benefits. No quality improvement within ECE centres reaches children not enrolled in them which is why this barrier is positioned upstream of the model's input conditions rather than within them.

5. **Language of instruction misalignment** (6 sources) is the fifth barrier. Ajayi and Adeleke (2020) document that English-medium instruction in Yoruba-speaking communities restricts children's cognitive engagement and language development in ECE settings. Within the PBL-SDGIM, language misalignment degrades the cultural congruence input, reducing the intrinsic motivation and social embeddedness on which play's developmental value partly depends.

3.11.3. Five Propositions for Play-Based ECE Reform in Ogun-East

The following are testable propositions derived from the PBL-SDGIM. Each specifies a proposed mechanism, and each is formulated so that it could be disconfirmed by the mixed-methods study described in the Limitations section. They are offered to the Ogun State Ministry of Education and to teacher education institutions as hypotheses warranting investigation and pilot testing, not as an evidenced reform prescription.

Proposition 1: Play-based learning implemented through guided play modalities with adequate teacher facilitation will be associated with improvements in emergent literacy, numeracy and classroom engagement among children in Ogun-East public pre-primary settings, through simultaneous activation of cognitive-academic and equity-inclusion pathways, thereby contributing to SDG 4.2 directly and to SDG 4.5 partially. Disconfirming evidence would be: no measurable difference in developmental outcomes between comparable settings differing in guided-play implementation quality.

Proposition 2: Cultural congruence moderates the relationship between PBL inputs and developmental outcomes, such that PBL activities anchored in Yoruba indigenous play traditions including *ayò*, communal singing, and multi-age chase and clapping games will produce stronger socio-emotional and equity-inclusion outcomes in Ogun-East than programmes designed on assumptions imported without adaptation. The proposed mechanism is twofold: culturally familiar activities lower the cognitive cost of task entry, and community recognition of the activity as developmentally legitimate reduces parental and institutional resistance to instructional time spent on it.

An earlier formulation stated that intrinsic motivation and social embeddedness are "the two conditions Vygotsky's ZPD requires." That attribution was inaccurate and has been withdrawn. Vygotsky's ZPD specifies a gap between independent and assisted performance and the presence of a more knowledgeable other providing mediation; it does not specify intrinsic motivation or social embeddedness as necessary conditions. The mechanism proposed here is advanced on its own terms and is consistent with, rather than derived from, Vygotskian theory.

Proposition 3: Teacher professional development structured as sustained, school-based collaborative inquiry on the model of UNICEF Nigeria's (2023) Learning Lab approach, maintained across a minimum of two academic years, will improve the quality of guided play facilitation in Ogun-East ECE settings, reducing pedagogical culture inertia and strengthening cognitive-academic and socio-emotional pathways. This proposition specifies duration because the corpus indicates that short-cycle workshop training does not reliably change practice (Nampijja et al., 2024; Onyango et al., 2023).

Proposition 4: Community sensitisation delivered in Yoruba, co-designed with Ijebu and Remo traditional leaders and communicating the relationship between play and school readiness, will increase pre-primary enrolment demand in under-served Ogun-East local government areas including Ogun Waterside and Ijebu East, contributing to SDG 4.2 by expanding the population of children able to access ECE. No claim is made regarding SDG 5.1, which concerns discrimination against women and girls rather than educational participation.

Proposition 5: Reorientation of Ogun State's pre-primary inspection and assessment regime from academic output metrics toward process indicators of PBL quality frequency and depth of guided play, children's cooperative engagement, and cultural relevance of activities will create incentive structures that disrupt pedagogical culture inertia and accelerate PBL adoption. *T*his proposition is the most systemically consequential and the least evidenced in the corpus; it is advanced as a hypothesis requiring pilot evaluation in a limited number of LGAs before any district-wide adoption.

4. Discussion

4.1. Graded Assessment of the Multi-SDG Argument

The PBL-SDGIM advances a structural argument: that PBL is not one intervention among many for SDG 4 attainment but a pedagogical lever with implications across several Goals. That argument is advanced here with the evidence for each pathway graded, because the pathways are not equally supported.

Pathway	Claimed contribution	Evidence strength	Basis for grade
PBL → cognitive-academic → SDG 4.2	Direct	High	Multiple reviews and a meta-analysis; consistent direction; African-context replication (Cheruiyot, 2024; Nampijja et al., 2024; Alotaibi, 2024; Mohammed et al., 2026)
PBL → socio-emotional → SDG 4.7 / 16.2	Plausible, mechanism specified	Moderate	Consistent direction across settings, but small single-site African studies; no study measures an SDG 16 indicator
PBL → physical-health → SDG 3.4	Partial (well-being component only)	Moderate for well-being; low for motor development	No reviewed study measures a health-system or SDG 3 indicator as a PBL outcome
PBL → equity-inclusion → SDG 4.5	Partial, system-level confounded	Low to moderate	Attendance and retention have multiple determinants; no study isolates PBL's independent contribution
PBL → SDG 5.1 / 10.2	Distal only	Low	These targets concern discrimination and inclusion at societal level; the pathway is long, mediated and unmeasured in this corpus
PBL → poverty reduction (SDG 1)	Not claimed	Not assessed	The earlier version implied a poverty-reduction return; no evidence in this corpus supports that claim and it has been withdrawn

The earlier claim that investment in PBL quality is "simultaneously a health investment, a gender equity investment, a social cohesion investment, and a poverty reduction investment" is not supportable at equal evidential strength across those four claims. It has been replaced by the graded assessment above. The defensible version of the argument is narrower and still substantial: PBL has strong evidence for SDG 4.2, moderate evidence for socio-emotional pathways bearing on SDG 4.7 and 16.2, and plausible but currently weak evidence for equity and health pathways that merit investigation rather than assertion.

4.1. Transferability

The five barriers identified are not unique to Ogun-East; they recur across African PBL implementation research from Zambia (Munsaka, 2025; Matafwali & Mofu, 2023), South Africa (Selepe et al., 2024; Lunga et al., 2022), Zimbabwe (Madondo & Tsikira, 2022), Ghana (Avornyo & Baker, 2021) and Kenya (Nampijja et al., 2024; Onyango et al., 2023). This commonality suggests the PBL-SDGIM and its propositions may have relevance beyond Ogun-East, subject to contextual calibration and to the boundary conditions specified above.

4.2. The Cultural Argument in Practice

The Cambridge PEDAL Centre's (2024) finding that Nigerian ECE play is already organised around communal forms, including group singing, choral recitation and participatory performance is analytically important because it identifies existing assets that reform can build upon rather than displace. Ogun-East does not need to import an external PBL model wholesale; it needs to formalise, resource and pedagogically scaffold play forms already present in children's lives. This is the practical expression of Proposition 2. It is worth restating that this argument concerns the form in which universal developmental mechanisms are expressed, not a claim that Yoruba children develop by different mechanisms.

4.3. Limitations

This paper's limitations extend beyond the absence of primary data.

Absence of district-level empirical data: No primary data were collected from Ogun-East classrooms. The review synthesises evidence from African and comparable contexts that resemble but are not identical to Ogun-East. The propositions are theoretically grounded and empirically unverified at district level. In consequence, this paper does not make district-level recommendations for implementation. The propositions are framed as hypotheses for testing, and any reform decision should follow rather than precede the validation study described below.

Search coverage: Five databases and three repositories were searched. Notable omissions include ERIC, Scopus, Web of Science and PsycINFO, access to which was not available. Relevant literature indexed only in those databases will have been missed.

Language bias: The English-only restriction excludes Francophone and Lusophone African scholarship, which is a material limitation for a paper making claims about African ECE contexts generally.

Publication bias: No formal assessment of publication bias was conducted, and narrative synthesis provides no mechanism (such as funnel plot asymmetry testing) for detecting it. Since PBL is a normatively favoured pedagogy, null and adverse findings are plausibly under-published, and the corpus should be assumed to over-represent positive findings.

Grey literature restriction: The restriction to institutionally authored grey literature excludes theses, working papers and practitioner evaluations, which in African ECE research often contain implementation-failure findings under-represented in journal literature.

Source-quality distribution: Of the 26 empirical sources, appraisal placed 6 at high confidence, 17 at moderate and 3 at low. The moderate-heavy distribution reflects the small-sample, single-site character of much African ECE research, and constrains the strength of any conclusion drawn.

Reviewer subjectivity in model construction: Framework synthesis is an interpretive method. Although coding procedures and thresholds are documented above, a different research team applying the same corpus could plausibly derive different domains or a different tier structure. The coding frame is available for scrutiny, but the model should be understood as one defensible synthesis rather than the only one the corpus supports.

Single-team appraisal: Critical appraisal was conducted by the author team without an external appraiser, which introduces potential for optimism bias in grading.

4.4. The Validation Study Required

A mixed-methods study is required to validate both the barrier structure and the model. Its design should combine: systematic observation of PBL implementation quality using a culturally adapted instrument, across a stratified sample of Ogun-East public and low-fee private ECE centres covering all nine local government areas; developmental outcome assessment using instruments validated for Nigerian populations; district-level indicator collection (attendance, gender parity, transition to primary); and qualitative work with teachers, parents and traditional leaders on the cultural congruence condition. Generating that evidence is the necessary next step, and it should precede rather than follow reform commitments of the kind Proposition 5 contemplates.

5. Conclusion

This paper has argued, through a structured narrative review and the Play-Based Learning and SDG Integration Model, that play-based learning in Ogun-East ECE warrants treatment as a strategic priority for sustainable development rather than a pedagogical preference. The PBL-SDGIM proposes, but does not demonstrate, that PBL's four developmental outcome domains bear on targets under five SDGs, with evidential strength that varies substantially by pathway and is reported transparently above. The five propositions advance a coordinated reform agenda, offered as testable claims addressing each identified structural barrier.

Three actors are positioned to take this agenda forward, in each case beginning with the validation work the paper identifies as prerequisite. The Ogun State Ministry of Education could commission a district baseline study of pre-primary pedagogical practice and pilot a process-quality inspection instrument in a limited number of LGAs before considering wider reform. Teacher education institutions, particularly Tai Solarin University of Education, could embed PBL, developmental theory and culturally responsive pedagogy in pre-service and in-service programmes, and could serve as the research partner for the validation study. Community institutions, including traditional leadership structures in Ijebu and Remo communities, could be engaged as co-designers of the cultural congruence condition rather than as recipients of a completed design.

As UNESCO (2025b) has affirmed, the global target for quality early childhood education under SDG 4.2 is off track. Sub-Saharan Africa's learning crisis, in which approximately nine in ten ten-year-olds cannot read a simple text (UNESCO & UNICEF, 2023), is not solely a crisis of access but substantially one of pedagogical quality. Ogun-East's youngest children have a claim to classrooms where play is recognised not as an indulgence but as a developmental entitlement. Establishing what such classrooms would require, and demonstrating what they achieve, is the work this paper is intended to enable.

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Conflict of Interest

The authors declare no conflict of interest.

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