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Re-conceptualising Teacher Professional Learning for Play-Based Pedagogy: Insights from Rwandan Preschools

Christine Osae

Unicaf University Zambia Plot 20842, Off Alick Nkhata Road (Opposite United Nations Headquarters), Longacres, Lusaka, Zambia

Abstract

Despite Rwanda's national emphasis on play-based learning, classroom enactment remains uneven, with many preschool teachers relying on traditional, teacher-directed routines. This study examines how professional learning interactions and social participation shape teachers' implementation of play-based pedagogy in Rwandan preschools. Using a convergent mixed-methods design, data were collected from 1,876 classroom observation points across 54 teachers and in-depth interviews with 10 purposively selected teachers. Quantitative analysis showed that 39% of all observed classroom actions reflected play-based principles, with the pedagogical domain scoring lowest (28.4%). Schools characterised by more robust collaborative routines: peer planning, feedback cycles, and leadership-supported reflection, demonstrated higher levels of child-centred practice. Qualitative findings revealed three distinct modes of professional participation: isolated enactment, where teachers work individually with minimal peer interaction; adaptive experimentation, where teachers attempt play-based strategies but without structured collegial support; and collaborative reflection, where collective inquiry consistently shapes classroom practice. Integrating Communities of Practice (CoP) theory, the study argues that sustained pedagogical change depends less on workshop-based training and more on the social infrastructures that enable teachers to learn with and from one another. The findings reconceptualise play-based implementation as a socially mediated process and offer practical implications for strengthening school-level professional learning systems in low-resource early childhood settings.

Keywords: play-based pedagogy; professional learning; Communities of Practice; early childhood education; Rwanda; teacher development; mixed methods



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Introduction

Despite significant international investments in early childhood education (ECE), substantial learning gaps persist in low-income contexts, with fewer than half of primary-level pupils attaining grade-level literacy and numeracy skills (Flink et al., 2024; Nkundabakura et al., 2024). The quality of early learning represents a critical intervention point in addressing these disparities, yet its effectiveness depends fundamentally on educators' preparedness and continuous professional learning. The integration of play-based pedagogy into early childhood curricula has gained international recognition as a powerful means of promoting holistic child development and learning readiness (Pyle & Daniells, 2017; Zosh et al., 2018). However, realising the transformative potential of play-based approaches requires a profound shift in how teachers are trained, supported, and professionally engaged across their careers (Flink et al., 2024).

Rwanda, like many sub-Saharan African nations, has achieved commendable progress in expanding access to preschool education. Yet, persistent challenges, high pupil-teacher ratios, limited teaching experience, and inadequate institutional support continue to constrain the quality of early learning (Flink et al., 2024; REB, 2015; Murungi, 2021). Although the national Competency-Based Curriculum (CBC) positions play as the cornerstone of early childhood instruction, classroom realities often diverge from policy aspirations (Nsengimana & Mugiraneza, 2020; Rwanda Education Board, 2020). Teachers tend to interpret play as unstructured recreation rather than an intentional learning process, reverting to teacher-directed routines that prioritise content coverage and compliance over inquiry and creativity (Tuyizere et al., 2020; Muriisa & Bukenya, 2022). Studies in Rwanda and Mozambique have shown that gender-responsive, play-based interventions can improve child outcomes and classroom environments, but their success depends heavily on the quality and contextual fit of teacher professional development (Flink et al., 2024).

Traditional teacher development approaches in ECE, typically characterised by short, workshop-style trainings, have demonstrated limited capacity to sustain meaningful pedagogical change (Machado & Oliveira-Formosinho, 2024). By contrast, Continuous Professional Development (CPD) models that are practice-embedded, reflective, and contextually grounded show greater promise in strengthening teachers' confidence, engagement, and self-efficacy (Kurniawati et al., 2024). Evidence increasingly suggests that professional learning that addresses teachers' pedagogical knowledge needs, emotional well-being, and institutional contexts is more likely to yield durable improvements in teaching quality and child outcomes (Flink et al., 2024). Yet, in Rwanda, opportunities for sustained professional collaboration remain fragmented and largely externally driven.

The imperative to reconceptualise professional learning for play-based pedagogy in Rwanda is therefore both timely and necessary. National policy frameworks emphasise quality ECE as foundational for long-term educational success (RTB, 2015; REB, 2015), but the professional learning infrastructure has not evolved at the same pace. Many teachers enter the workforce with limited exposure to developmentally appropriate practices, relying on procedural compliance rather than adaptive pedagogical reasoning (Rashid et al., 2025). Moreover, successful pedagogical reform depends not only on curriculum design but on teachers' ability to negotiate innovations within their lived institutional and cultural contexts.

To address these challenges, this study advances a Communities of Practice (CoP) perspective (Lave & Wenger, 1991; Wenger, 1998), situating teacher professional learning as a social and participatory process

rather than a top-down transfer of knowledge. From this perspective, teacher growth occurs through sustained engagement in shared inquiry, reflection, and meaning-making about what constitutes effective pedagogy (Wenger-Trayner & Wenger-Trayner, 2015). Applying the CoP framework allows for an examination of how teachers construct, adapt, and sustain play-based practices collectively within their school communities. This approach moves beyond deficit-oriented narratives to view teachers as reflective practitioners capable of theorising their practice, shaping local interpretations of curriculum, and contributing to a culture of professional learning (Lieberman & Mace, 2010; Opfer & Pedder, 2011).

Although play-based pedagogy is central to Rwanda's early childhood curriculum, a persistent implementation gap remains. National reviews show that many classrooms continue to rely on directive, whole-class instruction despite policy emphasis on exploratory and child-led learning. This discrepancy suggests that the challenge is not solely conceptual understanding of play-based methods but the limited professional learning environments in which teachers collectively interpret and refine new practices.

Against this backdrop, the present study is guided by the question: How do professional learning interactions and social participation influence teachers' enactment of play-based pedagogy in Rwandan preschools? This central question is further supported by two analytic strands consistent with the mixed-methods design: understanding observable patterns of play-based practice across different school contexts, and examining the social processes: collaboration, feedback, shared experimentation, through which teachers negotiate new pedagogical expectations.

The study makes several contributions to the literature on early childhood pedagogy and teacher learning. It demonstrates empirically how variations in the strength of school-based professional learning communities correspond with differing levels of play-based enactment. It further refines theoretical understanding by identifying three modes of professional participation: isolated enactment, adaptive experimentation, and collaborative reflection that explain how teachers respond to pedagogical reform within their social contexts. In doing so, the study introduces the concept of micro-communities of practice to describe the small, school-embedded structures that support or constrain teacher learning in low-resource settings.

The remainder of this article is structured as follows. The next section reviews literature on play-based pedagogy and teacher professional learning, followed by the conceptual framework grounded in Communities of Practice. The methodology section details the mixed-methods design, sampling, and analytical procedures. Findings are then presented and subsequently interpreted through the CoP lens. The article concludes with implications for strengthening school-based professional learning systems to support sustainable play-based pedagogical reform in Rwanda.

Literature Review

The discourse on play-based learning has evolved from viewing play as a developmental activity to conceiving it as a complex pedagogical practice requiring deliberate professional engagement and reflective teacher learning (Danniels & Pyle, 2023; Kangas et al., 2023; Veraksa et al., 2022). Contemporary scholarship recognises play as an epistemic mode of inquiry: an experiential space in which children construct meaning through exploration, dialogue, and social interaction (Zosh et al., 2017; Papadopoulos, 2020). Within this paradigm, teachers are not passive facilitators but active co-participants who design and mediate learning ecologies that integrate play with curricular intent (Li, 2023). Yet despite global advocacy, the implementation of play-based pedagogy remains inconsistent, particularly across low-resource contexts where professional learning deficits, structural constraints, and policy–practice misalignments persist (Burson, 2021; Lohmander & Samuelsson, 2022; UNICEF, 2018; Lungu & Matafwali, 2020). Scholars increasingly argue that the quality of play-based practice depends less on prescriptive frameworks and more on the professional communities that support teachers in interpreting, experimenting with, and sustaining pedagogical innovation (Keung & Cheung, 2019; Pyle et al., 2021).

Historically, teacher professional development (PD) in early childhood education has been conceptualised as an individual endeavour centred on the acquisition of technical knowledge or pedagogical content expertise. However, growing evidence highlights that meaningful and sustainable pedagogical change emerges from teachers' participation in social learning systems rather than through isolated training (Opfer & Pedder, 2011; Asterhan & Lefstein, 2023). The Communities of Practice (CoP) framework (Lave & Wenger, 1991; Wenger, 1998) offers a generative theoretical lens for reinterpreting teacher learning as social participation in shared practice. Within this perspective, professional knowledge is co-constructed through mutual engagement, joint enterprise, and the progressive negotiation of meaning, identity, and competence (Wenger-Trayner & Wenger-Trayner, 2015). Applied to early childhood settings, these mechanisms illuminate how teachers refine and sustain play-based practices through shared inquiry, observation, and collective problem-solving (Pyle & Danniels, 2017; Weisberg et al., 2013; Zosh et al., 2018).

Recent research in early childhood education and care (ECEC) indicates a shift from fragmented, workshop-style PD toward Continuous Professional Development (CPD) that is situated in practice, sustained over time, and organised around collaborative inquiry (Machado & Oliveira-Formosinho, 2024). Empirical evidence shows that the effectiveness of PD depends less on exposure to standardised "features" and more on how teachers participate together in collective problem-solving within their institutional ecologies (Lieberman & Mace, 2010; Asterhan & Lefstein, 2023). Within this frame, three interrelated mechanisms underpin teacher learning: collective professional learning, reflective dialogue, and situated practice (Wenger, 1998). These mechanisms provide the conceptual scaffolding for interpreting the data in this study.

Evidence from diverse contexts underscores that collective professional learning thrives where institutional structures deliberately allocate time, space, and routines for teachers to collaborate on authentic problems of practice (Ajibade & Bertram, 2020). In Rwanda and similar systems, mid-level education officers often function as critical brokers of such collaboration, yet their potential is underutilised (Stutchbury et al., 2024). Participation in collaborative learning is strongly shaped by leadership commitment, workplace support, and enabling conditions such as protected release time or professional recognition (Cadima et al., 2024; Kurniawati et al., 2024). These findings are mirrored in Rwandan preschools, where teachers' professional isolation and lack of institutional support have been observed as recurring barriers to innovation. Interpreted through a CoP lens, such constraints signify not a deficiency in individual competence but a systemic absence of sustained communities of practice.

Reflective dialogue is another defining feature of professional learning communities. Through cycles of joint planning, peer observation, and feedback, teachers render tacit knowledge visible and collectively reconstruct pedagogical norms (Biccard, 2020). Lesson study, mentoring, and video-supported reflection have all been shown to foster inquiry-oriented professional cultures in which teachers learn by analysing evidence from their own classrooms (Sins et al., 2023). Digital modalities such as webinars and Virtual Professional Learning Communities (VPLCs) further extend these opportunities across distance, sustaining collegial exchange and reducing professional isolation (Rolandson & Ross-Hekkel, 2022; Shal et al., 2024). The interview data in this study revealed that such dialogic opportunities among Rwandan preschool teachers were rare and externally dependent, reinforcing the need for deliberate structures that nurture reflective conversation as a means of deepening professional agency.

Equally important is the notion of situated practice: the idea that teacher learning is embedded in, and inseparable from, the daily realities of classroom work (Lave & Wenger, 1991). Studies of gender-responsive play-based learning interventions in Rwanda and Mozambique demonstrate that sustained collegial support and contextual adaptation are critical for success, while short-term training without embedded learning structures yields limited results (Flink et al., 2024). Similar findings from Rwandan CPD programmes in science and mathematics indicate that extended, system-embedded professional learning enhances teachers' pedagogical knowledge, confidence, and self-efficacy, conditions essential

for disciplined experimentation with play-based methods (Nkundabakura et al., 2024). These insights resonate strongly with classroom observations from this study, where isolated experimentation and lack of feedback loops curtailed the sustainability of play-based approaches.

Implementing play-based pedagogy also demands social coordination among teachers, administrators, and families. Studies in diverse ECEC systems show that successful enactment is shaped by teachers' beliefs, collaboration routines, and institutional supports (Yin et al., 2023; Yang et al., 2024; McInnes et al., 2024). In Rwanda, while teachers exhibit conceptual awareness of play-based learning, practice often remains constrained by workload pressures, compliance demands, and limited opportunities for shared reflection. From a CoP standpoint, these constraints highlight that the play-based implementation gap reflects fragmented collective learning rather than mere deficits in knowledge or skill.

Overall, the literature converges on a clear conclusion: teacher professional learning that is collective, reflective, and situated produces deeper and more enduring pedagogical change than episodic, transmission-based training. The CoP framework provides an explanatory structure for interpreting how Rwandan preschool teachers' participation, or lack thereof, in professional learning communities shapes their ability to enact play-based pedagogy. Re-conceptualising professional learning as social participation thus offers a robust pathway for understanding both the limitations and the transformative potential of Rwanda's early childhood education system in translating curriculum intent into sustainable classroom practice.

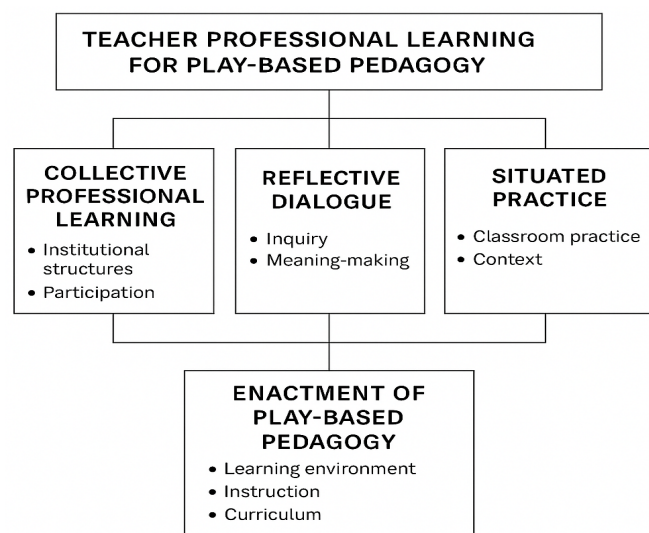


Figure 1 *Conceptual Framework*

The conceptual model depicts a dynamic relationship between teachers' participation in CoP mechanisms and observable indicators of play-based enactment. CoP processes (left side of the figure) feed into the three domains of practice (centre): the pedagogical domain (e.g., scaffolding, open-ended questioning), the learning environment (e.g., accessibility of materials, child choice), and curriculum integration (e.g., thematic connections and experiential tasks). The arrows indicate that stronger CoP participation is hypothesised to lead to richer enactment within each domain. The framework also acknowledges feedback loops: as teachers refine practices collectively, the evolving shared repertoire strengthens the CoP, generating iterative cycles of improvement. This model guides both the quantitative measurement of classroom practices and the qualitative exploration of teachers' experiences.

Despite the growing evidence on collaborative and situated forms of teacher learning, limited empirical research has examined how CoP mechanisms operate in early childhood classrooms in low-resource African contexts. Even less is known about how these social learning processes influence the translation

of play-based policy into day-to-day classroom routines in Rwanda. This study addresses this gap by investigating how teachers' participation in school-based professional learning relationships shapes their enactment of play-based pedagogy and by analysing the patterns of practice that emerge across different professional learning environments.

Methodology

This study adopted a convergent parallel mixed-methods design (Creswell & Plano Clark, 2018) to investigate how teacher professional learning processes shape the implementation of play-based pedagogy in Rwandan preschools. Grounded in the Communities of Practice (CoP) framework (Lave & Wenger, 1991; Wenger, 1998; Wenger-Trayner & Wenger-Trayner, 2015), the research reconceptualised teacher professional learning as social participation—a process through which educators co-construct meaning, negotiate pedagogical identities, and develop shared repertoires of practice within their institutional contexts.

The mixed-methods approach integrated systematic classroom observations and semi-structured interviews to capture both the visible enactment of pedagogy and the underlying social and cognitive processes informing those practices. Quantitative observation data were used to describe the extent to which play-based pedagogical principles were enacted, while qualitative data illuminated how teachers interpreted, adapted, and reflected on those practices within their professional communities. Triangulation across the two strands enhanced the study's credibility, complementarity, and interpretive depth, allowing the CoP framework to guide integration and interpretation.

Setting and Participants

The research was conducted in sixteen preschools located in Gasabo District, Rwanda, selected for their diversity in ownership (public and private), resource availability, and engagement in national early childhood education (ECE) reforms. This district represents a microcosm of Rwanda's broader ECE landscape, where efforts to expand access are accompanied by challenges in pedagogical quality and teacher preparedness (Flink et al., 2024).

A total of fifty-four teachers were observed during live classroom sessions, with an additional ten teachers (approximately 20% of the sample) selected purposively for semi-structured interviews. Sampling sought maximum variation across levels of pedagogical experience, qualifications, and institutional type (public/private). This approach ensured representation of diverse professional learning ecologies, consistent with qualitative protocols recommending 20–30% of observed participants for follow-up interviews (Creswell & Poth, 2018).

Data Collection

Structured classroom observations were conducted using an instrument developed from the literature on play-based pedagogy (Pyle & Danniels, 2017; Weisberg et al., 2013) and aligned with the Communities of Practice (CoP) constructs of shared practice and participatory engagement. The tool focused on three domains: Learning Environment—organisation of materials, child participation, and physical layout; Instructional Practice—teacher–child interaction, scaffolding, and inquiry facilitation; and Curriculum Implementation—integration of play within competency-based objectives. Across fifty-four classroom sessions, a total of 1,876 pedagogical actions were recorded. Observers documented both quantitative indicators and qualitative field notes capturing instances of collaboration, reflective dialogue, and situational adaptation, which are central elements of CoP. To ensure inter-rater reliability, four trained raters independently coded 20 per cent of the sessions, yielding an average Cohen's Kappa (κ) of 0.82,

indicating substantial agreement (Landis & Koch, 1977). This process reinforced the consistency and trustworthiness of the observational data.

Semi-structured interviews with ten teachers complemented the observations, providing deeper insights into teachers' professional learning experiences, perceptions of play-based pedagogy, and participation in collaborative activities. Guided by CoP principles, the interviews explored three dimensions of teacher learning: collective professional learning, how teachers co-plan, share resources, and discuss pedagogical challenges; reflective dialogue, how teachers seek and provide feedback within and beyond their schools; and situated practice, how teachers adapt play-based pedagogy to their specific classroom realities. All interviews were audio-recorded, transcribed verbatim, and supplemented with contextual memos capturing non-verbal cues and environmental factors, thereby ensuring analytic depth and contextual fidelity.

Data Analysis

A parallel mixed-methods analysis was employed, allowing the quantitative and qualitative strands to be analysed independently before being merged for joint interpretation (Creswell & Plano Clark, 2018). Observation data were analysed descriptively to determine the prevalence and distribution of play-based pedagogical actions across the domains of learning environment, instruction, and curriculum. The findings indicated that only 28.4 per cent of observed practices reflected core play-based principles such as scaffolding, inquiry, and formative feedback. These data were further examined across teacher experience and institutional context to identify systemic or structural factors influencing practice.

Interview transcripts were analysed thematically following Braun and Clarke's (2006) six-step framework. Although the coding process was inductive, interpretation was guided by the CoP constructs of mutual engagement, joint enterprise, and shared repertoire. Three dominant modes of participation emerged: isolated enactment, where teachers implemented play superficially or individually; adaptive experimentation, where teachers modified approaches without sustained peer feedback; and collaborative reflection, where teachers co-developed strategies through dialogue and shared inquiry.

These modes corresponded with differences observed in classroom implementation, demonstrating how patterns of social learning shaped pedagogical outcomes. Integration of the two data strands occurred at the interpretive stage through a joint display matrix that aligned quantitative indicators with qualitative insights. Observation trends provided empirical grounding for the CoP mechanisms of collective learning, reflection, and situated practice, while interview data contextualised how institutional support and collegial interaction either facilitated or constrained these mechanisms. Together, these analyses illuminated how professional learning communities, or their absence, mediate the translation of curriculum policy into sustainable play-based classroom practice.

To strengthen the credibility of qualitative interpretations, member-checking was conducted with five of the ten interviewed teachers following preliminary thematic analysis. Participants reviewed condensed thematic summaries and representative quotations to confirm the accuracy and resonance of interpretations. Their feedback, mainly clarifying contextual nuances and terminology, was incorporated into the final coding schema, ensuring analytic authenticity and participant validation.

For data integration, a joint display matrix was employed to align and interpret quantitative and qualitative results. The matrix was structured with columns representing pedagogical domains (pedagogy, learning environment, curriculum) and rows representing Communities of Practice (CoP) mechanisms (collective learning, reflective dialogue, and situated practice). Within each cell, exemplar quotations and observation indicators were juxtaposed to reveal convergence, divergence, or complementarity between reported experiences and observed practices. This systematic alignment enhanced interpretive transparency and coherence across data strands.

Ethical Procedures

Ethical approval for the study was obtained from the Rwandan Ministry of Education, as well as from the respective school administrations where the research was conducted. Informed consent was obtained from all participating teachers after they were fully briefed on the purpose, procedures, and voluntary nature of the study. To ensure participant confidentiality, pseudonyms were assigned, and all data, both digital and physical, were securely stored in password-protected files and locked cabinets accessible only to the researcher. These measures were taken to uphold the principles of autonomy, confidentiality, and responsible data management in accordance with established ethical research standards.

Limitations of the Study

Although the study's design enabled a nuanced examination of teacher learning in context, its single-district focus may limit transferability to other regions with differing sociocultural or institutional conditions. Additionally, observer presence may have introduced minor Hawthorne effects, influencing teachers' behaviour during observed sessions. However, methodological triangulation, member checking, and data integration reduced these risks and enhanced interpretive credibility. Future studies could extend this framework longitudinally or across multiple districts to explore how evolving professional communities influence sustained pedagogical change.

Findings

Part I: Patterns of Practice and Professional Participation

Across the 41 indicators observed in the 16 preschools, the data yielded a total of 1,876 observations. Of these, 731 (39%) indicated that the intended practice was present, and 1,145 (61%) indicated that it was absent (see Table 1). Consistent with the national concern over uneven play-based implementation, less than half of the observed practices demonstrated fidelity to play-based principles. However, when interpreted through a Communities of Practice (CoP) lens, these disparities suggest differences in how teachers participate, interact, and learn within their professional contexts, rather than in individual competence alone.

Table 1 Observed Frequencies across Domains

Domain	Yes (n)	No (n)	Total	% Yes	% No
Pedagogy	176	444	620	28.4%	71.6%
Learning Environment & Engagement	280	398	678	41.3%	58.7%
Curriculum Implementation & Planning	275	303	578	47.6%	52.4%
Overall	731	1145	1876	39.0%	61.0%

Overall, the quantitative results point to fragmented enactment of play-based pedagogy. Yet, qualitative field notes taken during observations revealed that teachers who belonged to more collaborative school environments, where peer discussions, co-planning, or feedback sessions occurred at least weekly, demonstrated comparatively stronger performance in all domains (average 51% "Yes" scores versus 32% in isolated schools). This variation provides preliminary evidence that social participation within school-based communities influences how effectively teachers implement play-based practices.

Domain-Specific Findings

Pedagogical Domain

The pedagogical patterns observed in this study varied not only in absolute prevalence but also in clear relation to the strength of professional learning interactions within each school, indicating that teachers' enactment of play-based techniques is fundamentally shaped by the maturity of the Communities of Practice to which they belong.

A comprehensive observation was conducted in pedagogy, focusing on fourteen key aspects of teaching practice, designated A1 to A14. This study investigates how teachers scaffold children's experiences to facilitate learning (A1) and their active participation in play to model language, problem-solving, and social skills (A2). Observations evaluated the extent to which teachers employ open-ended questions or prompts to enhance children's cognitive engagement during play (A3), as well as the alignment of selected materials and planned activities with learning objectives and developmental goals (A4). The observations also examined whether teachers permit learners to assume responsibility in the learning process (A5) and utilise supportive language to offer guidance when necessary (A6). The evaluation included inclusivity and cultural representation in play materials and activities (A7), along with equitable opportunities for all children to engage in play (A8). The examination focused on teachers' capacity to engage learners in activities fostering critical thinking and their approaches to documenting children's play experiences.

Additionally, strategies such as observations, photographs, and other artefacts were analysed for their effectiveness in tracking learning and development over time. The analysis focused on the provision of encouraging and constructive feedback (A12), the extent to which assessments address the holistic development of children, including cognitive aspects (A13), and the application of formative assessment techniques grounded in close observation of children's play to inform instructional decisions (A14). Figure 2 below shows the findings.

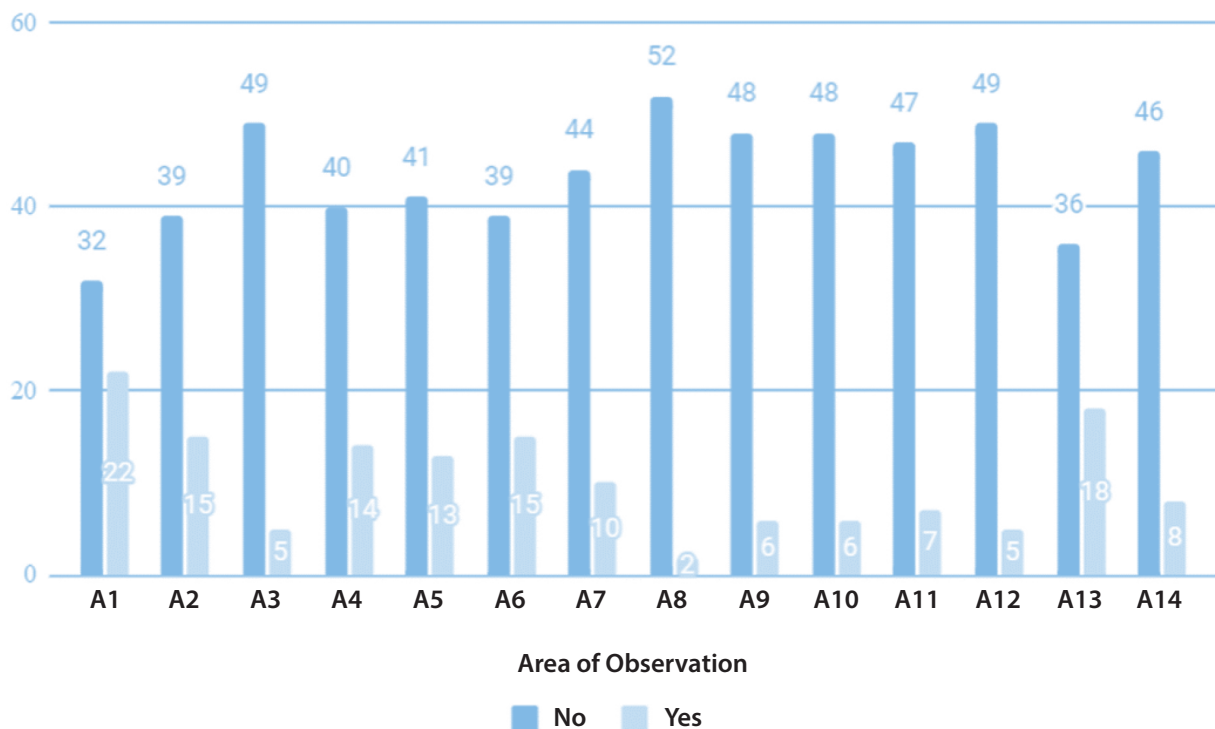


Figure 2 Observed Scores on the Pedagogy Domain

Observed pedagogical indicators across 54 preschool classrooms (n = 620). The data show low overall implementation of play-based teaching practices (28.4 % Yes) and notable variation across schools, with higher frequencies in institutions where teachers participated in collaborative or reflective professional activities.

As illustrated in Figure 2, pedagogical practices registered the weakest performance overall, with only 176 of 620 observations (28.4%) demonstrating the desired play-based behaviour and 444 (71.6%) showing its absence. However, a closer school-level analysis revealed variation that corresponded to the strength of professional learning communities within each institution.

In schools where teachers regularly engaged in peer dialogue or joint lesson reflection, scaffolding children's learning experiences was observed in 22 of 54 classrooms (41%), compared to 15% in schools without such collaboration. Similarly, teacher participation in children's play, for example, modelling vocabulary or supporting problem-solving, was recorded in 28% of classrooms overall but rose to 46% in schools reporting active peer observation routines. The use of open-ended questions during play remained low at 9% overall (5 of 54 classrooms) but doubled in settings with structured mentoring programmes. Likewise, formative feedback during play was present in 9% of total cases, climbing to nearly 20% in schools where teachers held regular post-lesson discussions.

Other pedagogical indicators followed the same trend. Encouraging language use was documented in 28% of classrooms (15 out of 54) but reached 39% in those where colleagues shared and discussed children's work. Culturally inclusive play materials appeared in 19% of classes (10 of 54), and equitable participation in only 4% (2 of 54); yet both increased slightly in schools where teachers co-planned learning activities. Critical thinking opportunities through play occurred in 11% of classrooms (6 of 54), while documentation of children's play (11%) and formative assessment (15%) were infrequent overall, but more common where leadership encouraged collaborative review of learner portfolios.

These variations are summarised in Table 2, which compares pedagogical indicators across schools with high and low CoP maturity.

Table 2 Pedagogical Indicators by CoP Maturity Across Schools

Pedagogical Indicator	Strong CoP Schools (% "Yes")	Weak CoP Schools (% "Yes")
Scaffolding children's learning (A1)	41%	15%
Teacher participation in children's play (A2)	46%	21%
Use of open-ended questions (A3)	18%	9%
Formative feedback during play (A12 / A14)	20%	9%
Encouraging language use (A6)	39%	28%
Culturally inclusive materials (A7)	26%	12%
Equitable participation (A8)	7%	3%
Critical thinking opportunities (A9)	17%	11%
Documentation of play (A10–A11)	16%	11%

The table demonstrates a consistent pattern: schools with more mature CoPs outperform those with weaker collaborative structures across nearly every pedagogical indicator. For example, scaffolding children's learning (A1) was observed in 41% of classrooms in strong CoP schools but only 15% in weak CoPs. Similarly, teacher participation in children's play (A2) rose from 21% in weak CoPs to 46% in strong CoPs. Even low-frequency indicators such as open-ended questioning (A3) and formative feedback (A12/A14) were nearly doubled in settings where reflective dialogue was institutionalised.

Other indicators exhibited the same pattern of variation: encouraging language use increased from 28% to 39% between weaker and stronger CoPs; culturally inclusive materials rose from 12% to 26%; and opportunities for equitable participation, though low across the board, were more common in strong CoP schools. These differences strongly suggest that the enactment of play-based pedagogy cannot be understood solely as an individual attribute but rather as a socially mediated process shaped by teachers' participation in collaborative meaning-making, joint problem-solving, and shared repertoires of practice.

Learning Environment and Student Engagement Domain

Variation in the organisation, accessibility, and interactive quality of learning environments corresponded closely with the presence or absence of collaborative professional routines, suggesting that classroom ecology is a direct expression of how teachers collectively negotiate and sustain play-based practice within their school-based Communities of Practice.

The learning environment was examined across fourteen specific aspects, designated B1 to B14, in addition to pedagogical practices. The aspects emphasised the accessibility and organisation of materials and spaces to facilitate both independent and group play (B1, B2), along with the degree to which the indoor and outdoor environments promote learning (B3). The examination focused on the safety, warmth, and welcoming characteristics of the indoor environment (B4), the safety of the atmosphere (B5), and the suitability of classroom furnishings for the learners' age and developmental stages (B6). The existence of improvised learning resources (B7) and the teacher's initiatives to actively engage all students, including methods to involve initially disengaged children (B8), were also observed. The assessment focused on cultural relevance in the learning environment, aligning with students' backgrounds and experiences (B9), as well as the accessibility of language utilised in the classroom (B10).

Furthermore, consideration was given to the display height of children's work for visibility and recognition (B11), the extent of active participation in play activities (B12), and the level of interaction among children, their peers, and the learning materials (B13). Opportunities for children to express themselves freely within the learning environment were evaluated (B14). Figure 3 below presents the findings:

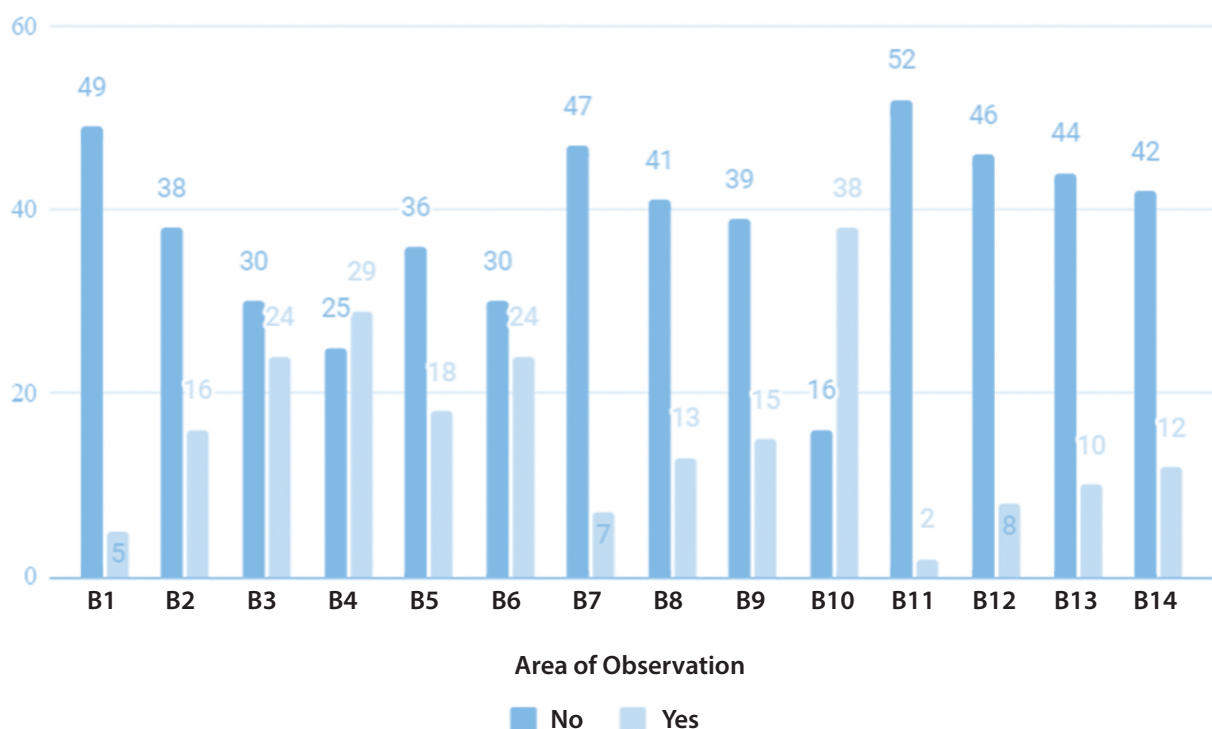


Figure 3 Learning Environment and Student Engagement Domain

Observed indicators of Learning Environment and Learner Engagement across 54 classrooms. Although overall performance remained below desired levels, schools demonstrating active professional collaboration (CoP maturity) showed notably stronger results in classroom organisation, material accessibility, and child participation.

As presented in Figure 3, the quality of learning environments varied considerably across classrooms, revealing not only material disparities but also differences in how teachers collectively organised and sustained spaces for playful inquiry. Out of 54 observed classrooms, safe and inviting indoor conditions were present in 54% (29/54), age-appropriate furnishings in 44% (24/54), and environments enabling both indoor and outdoor learning in 44% (24/54). Classrooms designed to support independent and group play were less frequent, observed in 30% (16/54). Accessibility of classroom language emerged as a relative strength, with 70% (38/54) of classrooms using language comprehensible to learners. However, materials supporting independent exploration were found in only 9% (5/54), improvised learning tools in 13% (7/54), and culturally relevant displays or materials in just 28% (15/54). The absence of children's work displayed at accessible heights (4%, 2/54) and the low visibility of learner contributions underscore a persistent hierarchical design of classroom space.

Interactional dimensions of the learning environment similarly reflected a limited culture of participatory engagement. Active efforts to involve disengaged learners were recorded in 24% (13/54) of classrooms, active child engagement in play in 15% (8/54), peer and material interaction in 19% (10/54), and opportunities for self-expression in 22% (12/54). Collectively, these figures point to classrooms that, while safe and linguistically accessible, remain socially constrained, structured more for order and transmission than for exploration, expression, or collaboration.

To further illustrate how these patterns aligned with differences in teachers' professional participation, Table 3 compares environmental indicators across strong and weak CoP schools.

Table 3 Learning Environment and Engagement Indicators by CoP Maturity

Learning Environment Indicator	Strong CoP Schools (% "Yes")	Weak CoP Schools (% "Yes")
Safe and inviting indoor environment (B4)	64%	48%
Age-appropriate furnishings (B6)	52%	38%
Independent + group play spaces (B1–B2)	41%	21%
Indoor–outdoor learning provision (B3)	52%	38%
Improvised or low-cost materials (B7)	19%	9%
Cultural relevance of materials (B9)	37%	22%
Accessible classroom language (B10)	76%	64%
Engagement of disengaged learners (B8)	31%	18%
Child participation in play (B12)	22%	11%
Peer and object interaction (B13)	27%	15%
Opportunities for self-expression (B14)	29%	18%
Child's work displayed at a visible height (B11)	9%	2%

The contrasts are striking. Classrooms in strong CoP schools demonstrated consistently higher scores across nearly all indicators, with pronounced differences in independent/group play spaces (41% vs. 21%), improvised materials (19% vs. 9%), cultural relevance of materials (37% vs. 22%), active engagement of disengaged learners (31% vs. 18%), and peer/material interaction (27% vs. 15%). These differenc-

es indicate that, even under resource constraints, collaborative professional cultures tend to yield more participatory, responsive, and child-centred learning environments.

Thus, the learning environment emerges as a material manifestation of a school's professional learning culture. Where teachers engaged in shared routines, co-created materials, reflected together on classroom design, or jointly problem-solved environmental challenges, classrooms tended to be more dynamic and exploration-oriented. Where such collaborative practices were absent, teachers defaulted to static and custodial environmental arrangements. In this way, the CoP lens helps to explain why environmental quality varied so widely across the sample, and why these variations map onto teachers' collective, rather than individual, practices.

Curriculum Planning and Implementation

Patterns in curriculum planning and thematic integration similarly reflected teachers' differential participation in school-based professional communities, with stronger curriculum enactment emerging in settings where joint planning, shared repertoires, and collective interpretation of the CBC were institutionalised features of daily practice.

Fifteen specific aspects, designated C1 to C15, were examined to evaluate the effectiveness of thematic planning and curriculum implementation in relation to learning themes and instructional design. The observation examined the presence of theme-related materials, props, and visuals aimed at engaging children and promoting exploration (C1), the incorporation of key words associated with the theme, including action verbs and nouns (C2), and the utilisation of multiple languages for key words to enhance language diversity (C3). The integration of various learning areas within the theme (C4) and the degree of children's engagement with the theme displays (C5) were thoroughly analysed. The evaluation focused on the theme's adherence to the criteria of a well-structured design (C6), its compatibility with age-appropriate curriculum frameworks as per national standards (C7), and its capacity to incorporate multiple learning domains (C8). The teacher's preparation of a comprehensive learning plan, which includes objectives, activities, and assessment strategies pertinent to the current theme (C9), was assessed.

Additionally, the plan incorporated diverse play-based activities that cater to various learning styles and developmental needs (C10). The learning plan considered opportunities for both child-directed and teacher-guided activities (C11) as well as the developmental appropriateness of the planned activities (C12). The observation also examined the extent to which planned activities foster higher-order thinking skills (C13), the implementation of KWLS (Know, Want to know, Learned, Still want to learn) activities to assess children's prior knowledge and interests (C14), and the visibility of student names as part of the learning environment (C15). Figure 4 below shows the observation results on curriculum planning and implementation.

Curriculum implementation and planning displayed the strongest results among the three domains, though overall levels of enactment still fell short of national expectations. As shown in Figure 4, developmentally appropriate activities were present in 28% of classrooms (15 of 54), and child-directed and teacher-guided activities appeared in 15% (8 of 54). Diversified play-based learning activities—integrating multiple learning styles—were recorded in 13% (7 of 54) of classrooms. However, the presence of theme-related materials that stimulate inquiry was also limited to 13% (7 of 54), and integration of key thematic vocabulary was absent (0%). Multilingual vocabulary support appeared in only 2% (1 of 54) of classrooms, and cross-domain thematic integration was observed in 7% (4 of 54). Curriculum webs aligned with national standards were present in 6% (3 of 54), while those linking multiple learning areas were observed in just 4% (2 of 54). Engagement with thematic displays was virtually nonexistent (2%, 1 of 54), and activities that developed higher-order thinking occurred in 9% (5 of 54). Reflective KWLS activities (“Know, Want to know, Learned, Still need to learn”) were noted in 4% (2 of 54) of classes, while displays of student names—an indicator of identity recognition—were likewise present in 4% (2 of 54).

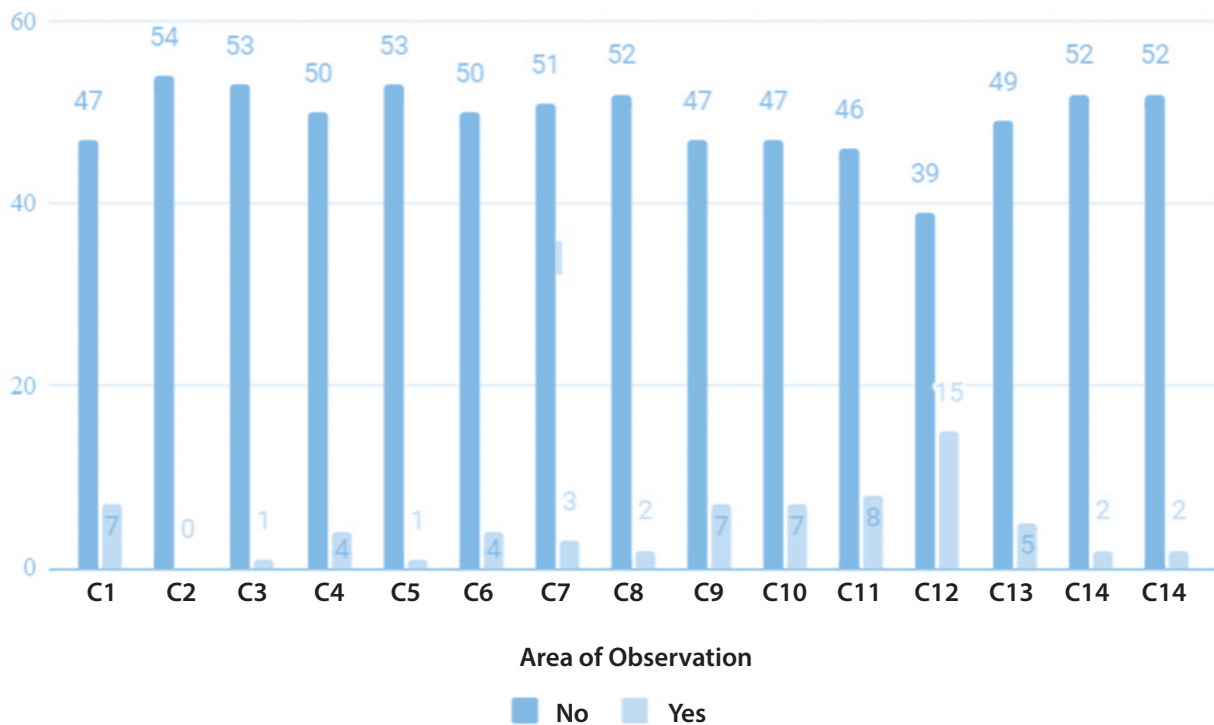


Figure 4 Curriculum Planning and Implementation

Observed indicators of Curriculum Implementation and Planning across 54 classrooms. The data show modest overall implementation but reveal that schools with active professional learning communities exhibited higher rates of thematic integration, diversified play-based activities, and curriculum alignment to national standards.

Yet, as with pedagogy and environment, CoP-based differences were substantial. Table 4 presents these contrasts.

Table 4 Curriculum Planning and Implementation by CoP Maturity

Curriculum Indicator	Strong CoP Schools (% "Yes")	Weak CoP Schools (% "Yes")
Developmentally appropriate activities (C12)	38%	22%
Child-directed + teacher-guided balance (C11)	24%	11%
Diversified play-based activities (C10)	21%	9%
Theme-related materials (C1)	19%	9%
Thematic vocabulary integration (C2–C3)	4%	0%
Cross-domain thematic integration (C4)	12%	5%
Curriculum webs aligned with national standards (C7)	11%	4%
Curriculum webs showing domain linkages (C8)	7%	2%
Engagement with thematic displays (C5)	6%	1%
Higher-order thinking activities (C13)	14%	6%
KWLS or reflective activities (C14)	7%	3%
Student name visibility (C15)	7%	3%

The table reveals that schools with strong CoPs consistently outperformed weak CoPs across curriculum indicators. Developmentally appropriate activities increased from 22% in weak CoPs to 38% in strong CoPs; diversified play-based activities rose from 9% to 21%; child-directed and teacher-guided activity balance improved from 11% to 24%; theme-related materials increased from 9% to 19%; and higher-order thinking activities doubled (6% to 14%). Even indicators with low base rates—such as thematic vocabulary or curriculum webs, were more frequently present where collaborative interpretation of the CBC occurred.

These differences confirm that curriculum planning is fundamentally a collective interpretive process rather than an individual technical exercise. Schools with active CoPs engaged in shared lesson planning, exchanged thematic resources, and collectively adapted national guidelines to classroom realities, resulting in deeper and more coherent curriculum enactment. Conversely, in schools where teachers worked in isolation, curriculum planning tended to be perfunctory and compliance-driven, producing superficial or fragmented implementation.

Together, these CoP-based contrasts across the three domains demonstrate that the uneven implementation of play-based pedagogy in Rwandan preschools is not merely the result of teacher-level deficits but reflects differences in the collective learning ecologies within which teachers operate.

Part II: Insights from Teacher Interviews

The interview data revealed how teachers' engagement with play-based pedagogy was mediated not only by individual competence but also by the nature and quality of their professional learning relationships. Three interrelated themes emerged: (1) uneven access to professional learning and collaborative support; (2) curriculum interpretation and enactment as a collective, negotiated process; and (3) institutional and structural constraints that weaken sustained communities of practice.

Professional Learning, Collaboration, and Teacher Identity

While 58% of the teachers were formally certified, only 35.7% had received specific training in play-based pedagogy, a gap that shaped both their confidence and practice. However, the interviews revealed that training alone was not the decisive factor; rather, what differentiated teachers was the degree of participation in collegial learning. In schools where teachers reported joint planning, peer feedback, or mentoring arrangements, confidence and experimentation with play-based methods were notably higher. As one teacher observed, *"When we meet every Friday to share what worked in the week, I learn from my friend how to make children explore by themselves. Alone, I can't think of such ideas."* (T5).

Conversely, teachers who worked in isolation described a sense of professional stagnation: *"I just do my lessons as I know them. There is no one to ask or show me what to change."* (T3) This variation in social participation aligns with the CoP principle that learning is not merely individual acquisition but a process of belonging and meaning-making within shared practice. Teachers embedded in collaborative structures were more likely to conceptualise play as a pedagogical tool, while isolated practitioners tended to view it as recreational or peripheral.

Some teachers explicitly described how belonging to informal networks shaped their evolving identities as early childhood educators. One explained: *"We are only two trained in nursery here, so we plan together. When she shows me how she uses songs to teach counting, I feel like I am also growing as a teacher."* (T7) Such accounts illustrate how even limited collegial exchanges can function as micro-communities of practice, enabling shared reflection and incremental change.

Curriculum Interpretation as a Social Process

Curriculum planning emerged as another site where professional learning was both enacted and constrained. Teachers reported that formal lesson planning was often driven by accountability requirements rather than by collaborative inquiry or pedagogical reflection. One teacher admitted:

"I prepare lessons so that when NESAs come, they can see I have a plan. But we don't plan together as teachers; everyone does for themselves." (T2)

Yet in schools where collaborative planning routines existed, whether organised by the headteacher or initiated informally by peers, teachers described deeper engagement with curriculum integration. As one participant explained, *"We sit together and see how to combine the week's theme with songs, art, and counting. When we plan together, it becomes easy to connect everything." (T9)*

These experiences confirm that curriculum enactment is not a fixed technical act but a socially negotiated practice. Teachers' capacity to translate national play-based frameworks into daily lessons depended heavily on the presence of shared repertoires: lesson templates, activity banks, and peer models, created and sustained through CoP interactions. Where such repertoires were missing, planning became perfunctory and decontextualised, reinforcing the compliance-oriented culture already reflected in the observation data.

Constraints on Sustaining Communities of Practice

The majority of teachers identified structural barriers that limited their engagement in professional learning communities. Double-shift schedules, large class sizes, and lack of release time were commonly cited. One teacher lamented: *"I start in the morning, then after lunch another group comes. There is no time even to talk with other teachers about what happened in class." (T10)*

Resource shortages further undermined collaborative experimentation. Teachers often relied on makeshift materials and lacked institutional support to co-create or share teaching aids. As one teacher described: *"We make toys from bottles and boxes, but sometimes they are taken or spoiled. If we had a place to keep them and share ideas on how to use them, we could improve." (T4)*

A smaller subset of teachers, mostly in schools with active headteachers or NGO-supported projects, reported more consistent engagement in school-based professional learning sessions. These schools functioned as emergent communities of practice, where shared reflection was institutionalised: *"Every Wednesday we meet to watch each other's lessons and talk about how we can add play. Even the headteacher joins. It helps us a lot." (T1)*

This cross-case contrast demonstrates that CoP mechanisms: mutual engagement, joint enterprise, and shared repertoire, are contingent upon leadership support, time allocation, and institutional norms that value collaboration. Where these were absent, professional learning remained individualised and reactive.

Training Deficits and Social Learning Gaps

Overall, the interviews reveal that the central challenge in advancing play-based pedagogy is not simply a matter of inadequate training, but of fragmented professional participation. Teachers' narratives portray schools as uneven ecosystems of learning: some operating as vibrant micro-communities where play is co-constructed through peer dialogue and reflection, and others as isolated workspaces constrained by time, resources, and accountability pressures.

This reconceptualises the problem from one of teacher deficit to one of institutional design. In the Rwandan preschool context, sustaining play-based pedagogy depends less on one-off capacity-building and more on cultivating durable communities of practice that support reflection, collaboration, and adaptive experimentation. When teachers engage collectively in sense-making around play, curriculum,

and pedagogy, they move closer to the national aspiration of transforming early childhood classrooms into spaces of joyful, inquiry-driven learning.

Discussion

The study's findings confirm that the implementation gap in Rwanda's play-based pedagogy cannot be reduced to a technical or individual deficit. Instead, it reflects a systemic failure of professional learning as a collective enterprise. This aligns with international evidence that teacher change is primarily sustained through collaborative and situated engagement rather than through episodic workshops (Opfer & Pedder, 2011; Lieberman & Mace, 2010; Asterhan & Lefstein, 2023).

The observed low levels of play-based enactment, only 28.4% of pedagogical actions demonstrating core principles, mirror what prior studies in Sub-Saharan Africa have reported about the disjuncture between early childhood policy and classroom reality (Burson, 2021; Lohmander & Samuelsson, 2022). Yet the present study advances the literature by showing that this inconsistency is not merely structural or resource-driven, but deeply social: teachers' participation in school-based communities of practice predicted measurable differences in implementation quality. This reinforces Lave and Wenger's (1991) conception of learning as legitimate peripheral participation—teachers acquire professional competence through belonging, observation, and contribution within a social practice rather than through isolated skill accumulation.

In contrast to studies that locate reform failure in inadequate teacher qualification (Murungi, 2021; Rashid et al., 2025), these findings highlight that qualified teachers working in isolation performed no better than unqualified peers embedded in collaborative settings. This divergence nuances previous Rwandan evidence (Nsengimana & Mugiraneza, 2020; Tuyizere et al., 2020) by illustrating that policy fidelity depends less on credentials than on participation architectures that sustain mutual engagement and shared meaning-making around pedagogy.

Pedagogical Practice and Collective Professional Learning

The findings revealed that only 28.4 per cent of observed pedagogical actions reflected play-based principles such as scaffolding, open-ended questioning, and formative feedback. This limited enactment aligns with prior evidence from sub-Saharan Africa showing that teachers often struggle to translate play-based policy rhetoric into classroom reality (Burson, 2021; Lohmander & Samuelsson, 2022; Tuyizere et al., 2020). However, unlike earlier studies that attribute these challenges primarily to inadequate training or resources (Murungi, 2021; Rashid et al., 2025), the present research demonstrates that variation in pedagogical practice corresponded directly to the presence or absence of collective professional learning structures within schools.

Teachers embedded in collaborative environments, where peer discussions, co-planning, or mentoring occurred regularly, exhibited stronger enactment of play-based strategies. This finding confirms Lave and Wenger's (1991) assertion that learning is not merely the accumulation of skills but a process of legitimate participation in shared practice. It also reinforces international evidence that teacher learning is socially mediated: sustained engagement in professional communities fosters pedagogical confidence and experimentation (Lieberman & Mace, 2010; Opfer & Pedder, 2011; Kurniawati et al., 2024). Conversely, teachers working in isolation demonstrated static, compliance-driven routines, reflecting what Wenger (1998) describes as the absence of *mutual engagement*—a breakdown in the social fabric necessary for collective learning.

In comparison to Pyle and Danniels (2017) and Weisberg et al. (2013), who emphasise teachers' co-construction of knowledge as central to authentic play facilitation, this study extends their work by quantifying the pedagogical effects of collaboration. Schools functioning as emergent Communities of

Practice (CoPs) recorded nearly double the rates of scaffolding and inquiry-based interaction compared with those where teachers worked alone. This suggests that the development of play-based pedagogy in low-resource contexts is contingent not only on individual competence but on the institutionalisation of collective professional learning routines that enable teachers to reflect, adapt, and co-create new repertoires of practice.

Learning Environment and Situated Practice

The study also revealed stark disparities in the quality of learning environments across the observed preschools. While over half of classrooms demonstrated safety and linguistic accessibility, fewer than one-third were designed to support independent or group play, and only 19 per cent evidenced active child–material interaction. These results corroborate research by Lungu and Matafwali (2020) and UNICEF (2018), which similarly found that African ECE classrooms often prioritise order, compliance, and teacher control over learner autonomy and exploratory engagement.

However, through the lens of the CoP framework, these data take on new significance. Classrooms belonging to schools with active professional collaboration displayed richer environmental organisation and more participatory layouts, even under identical material constraints. This finding supports Lave and Wenger's (1991) conception of learning as situated practice, with teachers collectively recontextualising play principles within the specific affordances of their work environment. It also aligns with Ajibade and Bertram's (2020) and Biccard's (2020) findings that the physical learning space is often a reflection of professional interaction: where teachers plan and reflect together, the environment evolves as a shared artefact of practice.

Additionally, the results also highlight a departure from studies in high-income contexts, such as Zosh et al. (2018) and Kangas et al. (2023), where environmental transformation often precedes pedagogical change. In the Rwandan case, transformation emerged only when collective reflection preceded material innovation—teachers co-created solutions (e.g., improvised play materials, flexible seating) through social interaction, not resource injection. This nuance extends CoP theory by demonstrating that *situated improvisation* within constrained environments can act as a form of professional learning when mediated by collaboration.

Curriculum Implementation and Shared Repertoires

Findings from the curriculum domain revealed that only 15–28 per cent of classrooms exhibited evidence of developmentally appropriate, integrated, or child-directed planning. Thematic webs and activity diversification remained minimal, with some teachers openly admitting to borrowing lesson plans from peers or external curricula. These results echo prior studies documenting superficial curriculum compliance in Rwanda's Competency-Based Curriculum (CBC) implementation (Nsengimana & Mugiraneza, 2020; Niyibizi, 2024), but this study deepens that understanding by illustrating how curriculum enactment is a socially negotiated process shaped by shared repertoires (Wenger, 1998).

In schools where teachers co-planned lessons and reflected collectively, curriculum coherence improved markedly. Teachers not only integrated play across themes but also began developing locally contextualised materials and documentation systems. This pattern affirms the findings of Pyle et al. (2021) and Cadima et al. (2024), who argue that collective inquiry is the cornerstone of curriculum translation, and it parallels Nkundabakura et al.'s (2024) work showing that embedded professional learning leads to stronger curriculum alignment in Rwandan primary schools.

However, the data also diverge from the literature, suggesting that once teachers receive curriculum training, implementation naturally follows (Flink et al., 2024). Despite awareness of play-based approaches, many teachers in this study viewed planning as an accountability exercise, not a reflective act. This

tension underscores Wenger-Trayner and Wenger-Trayner's (2015) observation that CoPs cannot be externally imposed; they must emerge from an authentic, shared enterprise. In the absence of such a joint enterprise, curriculum design remains fragmented and ritualistic. Thus, the findings confirm that sustainable play-based curriculum implementation depends on teachers' participation in CoPs that generate and sustain shared pedagogical repertoires.

Professional Learning Communities, Teacher Identity, and Institutional Mediation

Interviews revealed that fewer than 36 per cent of teachers had received training in play-based pedagogy, and yet training alone did not predict effective practice. Rather, professional growth was mediated by the quality of collegial participation; teachers who met regularly for dialogue or peer feedback expressed greater confidence, adaptability, and ownership of the play-based philosophy. This finding resonates with Opfer and Pedder's (2011) argument that teacher learning is recursive and socially emergent, as well as with Lieberman and Mace's (2010) assertion that professional identity evolves through membership in communities of shared inquiry.

These patterns also align with Ajibade and Bertram's (2020) study in South Africa, which found that teacher collaboration fosters pedagogical resilience even in under-resourced contexts. The presence of leadership support further amplified CoP functionality: headteachers who facilitated reflective sessions acted as brokers—a term used by Wenger (1998) to describe individuals who sustain boundary-crossing dialogue within and across professional communities. This leadership-as-brokerage dynamic mirrors evidence from Rolandson and Ross-Hekkel (2022) and Shal et al. (2024), who observed similar effects in virtual learning communities.

Conversely, in schools without such structures, teachers reported professional isolation, heavy workloads, and limited time for reflection. These experiences parallel the constraints documented by Machado and Oliveira-Formosinho (2024) in Lusophone Africa and reaffirm that without institutional mediation—protected time, recognition, and leadership commitment—communities of practice cannot mature. In Rwanda, as in many low-resource systems, the sustainability of pedagogical reform thus depends not only on individual motivation but on systemic design for collaboration.

Theoretical and Policy Implications

This study affirms and extends the CoP framework by empirically linking participation structures to pedagogical outcomes in early childhood education. It confirms that teacher learning unfolds through mutual engagement (collaboration and reflection), joint enterprise (shared commitment to play-based pedagogy), and shared repertoires (locally generated tools and routines). These findings align with Wenger-Trayner and Wenger-Trayner's (2015) conceptualisation of CoPs as engines of social learning and extend it to low-resource African ECE contexts where such mechanisms have been under-theorised.

At a policy level, the evidence underscores the inadequacy of episodic, cascade-style training as a model for teacher development. Instead, it advocates for school-embedded, relational professional learning architectures that enable iterative, collaborative inquiry. Practices such as protected collaboration time, peer observation, and cluster-based CoPs should be institutionalised as part of Rwanda's ECE reform strategy. Furthermore, leadership training should emphasise the brokerage role—helping headteachers and sector education officers facilitate reflective dialogue and cross-school learning networks.

In theoretical terms, the study contributes a contextualised understanding of how CoP mechanisms operate under constraint, showing that even minimal collaborative engagement can produce measurable pedagogical gains. In doing so, it advances the notion of "micro-communities of practice"—adaptive, small-scale formations that sustain professional learning in resource-poor environments.

Recommendations

The findings of this study underscore the need to reconceptualise teacher professional learning as a sustained, dialogic, and situated process embedded within the daily life of schools. At the policy level, Rwanda's early childhood education framework should transition from sporadic, workshop-based professional development to a system that institutionalises continuous collective learning. The integration of structured Communities of Practice (CoPs) into the national professional development architecture would provide teachers with regular opportunities for shared reflection, peer observation, and collaborative lesson design. Such an approach requires that the Rwanda Basic Education Board (REB) and district education offices allocate protected time within school schedules for professional interaction and recognise participation in CoPs as a legitimate dimension of teachers' workload and evaluation. Moreover, school leadership preparation programmes should explicitly incorporate the concept of brokering—the facilitation of cross-boundary dialogue and professional exchange—as a central competency for headteachers and inspectors, ensuring that leadership becomes an enabler rather than an inhibitor of collaborative learning.

At the institutional level, schools must cultivate professional cultures grounded in trust, reciprocity, and shared purpose. Rather than perceiving lesson planning or classroom observation as acts of compliance, teachers should be encouraged to engage in cycles of collective inquiry that transform practice into a shared enterprise. This requires that schools invest in mechanisms for peer reflection, joint resource development, and the documentation of practice as a collective artefact. The emergence of these micro-communities of practice—where teachers interpret, test, and adapt pedagogical ideas together—represents the most sustainable route to embedding play-based pedagogy in low-resource settings. Partnerships between schools, teacher training colleges, and local education authorities should be deepened to facilitate the exchange of expertise, co-design of learning materials, and mentorship structures that bridge preservice and in-service teacher learning.

From a research standpoint, further inquiry should focus on understanding the developmental trajectory of communities of practice in early childhood education and the conditions under which they become self-sustaining. Longitudinal studies tracking changes in teacher participation, identity formation, and classroom practice would illuminate how collaborative professional cultures evolve. Comparative research across districts or between public and private schools would also clarify how institutional ecology, particularly leadership style, resource distribution, and social capital, shapes the success of collective learning models. In addition, mixed-method analyses that map the networks of interaction among teachers could provide empirical insights into how knowledge flows within and between schools, thereby refining the conceptual tools used to study professional learning in African education systems.

Collectively, these recommendations converge on a central proposition: the effectiveness of play-based pedagogy depends not only on teachers' access to knowledge but on their embeddedness within dynamic professional communities that sustain inquiry, creativity, and reflection. A shift toward institutionalised collaboration, both horizontally among teachers and vertically across governance levels, represents the most viable pathway to achieving Rwanda's vision of high-quality, competency-based early childhood education.

Conclusion

This study has demonstrated that the implementation of play-based pedagogy in Rwandan preschools cannot be understood solely as a question of teacher competence or curriculum fidelity but must be situated within the social and institutional dynamics that shape professional learning. The integration of quantitative classroom observation data with qualitative interview insights revealed a consistent pattern: teachers who engaged in collaborative learning relationships displayed higher levels of pedagogical intentionality,

environmental adaptation, and curriculum integration. These results confirm that professional learning is most transformative when it is collective, reflective, and situated in practice principles at the core of the Communities of Practice framework articulated by Lave and Wenger (1991) and Wenger (1998).

In theoretical terms, the study extends CoP scholarship by illustrating how participation structures operate under the material and temporal constraints of a low-resource education system. The emergence of what may be termed micro-communities of practice—small, locally driven networks of teachers engaging in joint reflection and experimentation—highlights the adaptability of the CoP model beyond its traditional corporate or Western educational contexts. In doing so, the research contributes to a growing body of evidence suggesting that teacher learning is not the linear acquisition of discrete skills but the negotiated co-construction of pedagogical meaning within institutional and cultural settings.

Empirically, the study provides one of the first mixed-methods examinations of play-based pedagogy in Rwanda that explicitly links classroom-level practice to the architecture of professional learning. The identification of three modes of participation, isolated enactment, adaptive experimentation, and collaborative reflection, offers a heuristic for understanding how professional learning communities evolve and why pedagogical reforms often stall in their absence. The consistency of these findings with prior international research (Pyle & Danniels, 2017; Lieberman & Mace, 2010; Flink et al., 2024) underscores that sustainable educational change is relational rather than procedural.

From a policy perspective, the implications are clear: capacity-building for early childhood educators must prioritise the cultivation of collective professional agency over the mere dissemination of techniques. When teachers engage in ongoing collegial inquiry, play-based learning shifts from an externally mandated reform to an internally theorised practice that reflects local realities and shared pedagogical purpose. Rwanda's experience thus contributes to the broader continental discourse on educational transformation by demonstrating that innovation in pedagogy flourishes not through policy decree but through the deliberate construction of social infrastructures for professional learning.

In conclusion, the study affirms that the sustainability of play-based pedagogy—and indeed of curriculum reform more broadly—rests upon how teachers learn together. In the rhythm of collaboration, reflection, and situated adaptation lies the essence of professional growth. By nurturing communities of practice within its schools, Rwanda stands to transform early learning from a prescriptive framework into a living, evolving culture of inquiry—one in which play is not merely taught but collectively reimagined as the foundation of learning itself.

References

- Abu-Ghaida, D., & Silva, K. (2021). *Educating the forcibly displaced: Key challenges and opportunities* (pp. 1–34). Reference paper for the 70th Anniversary of the 1951 Refugee Convention.
- Adams, A. K., Asemnor, F., & Nkansah, V. (2024). Play-based pedagogy in Ghanaian basic schools: A review of related literature. *Asian Journal of Advanced Research and Reports*, 18(3), 17–28. <https://doi.org/10.9734/ajarr/2024/v18i3611>
- Ajibade, B. A., & Bertram, C. (2020). How district teacher development centres support teachers' learning: Case studies in KwaZulu-Natal, South Africa. *Journal of Education*, 38(2), 1–18. <https://doi.org/10.18820/2519593x/pie.v38.i2.07>
- Alam, A., & Mohanty, A. (2023). Cultural beliefs and equity in educational institutions: Exploring the social and philosophical notions of ability groupings in the teaching and learning of mathematics. *International Journal of Adolescence and Youth*, 28(1), 2270662. <https://doi.org/10.1080/02673843.2023.2270662>
- Alonzo, A. C., Berry, A., & Nilsson, P. (2019). Unpacking the complexity of science teachers' PCK in action: Enacted and personal PCK. In A. Hume, R. Cooper, & A. Borowski (Eds.), *Repositioning pedagogical content knowledge in teachers' knowledge for teaching science* (pp. 273–288). Springer. https://doi.org/10.1007/978-981-13-5898-2_12

- Asterhan, C., & Lefstein, A. (2023). The search for evidence-based features of effective teacher professional development: A critical analysis of the literature. *Journal of Teacher Education*, 74(6), 1–15. <https://doi.org/10.1080/19415257.2023.2283437>
- Blundell, C. N. (2022). A scoping review of design thinking in school-based teacher professional learning and development. *Journal of Education for Teaching*, 48(4), 1–18. <https://doi.org/10.1080/19415257.2022.2132269>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Burson, S. L. (2021). *In-school play opportunities, academic achievement, and social-emotional well-being* (Publication No. 30559) [Doctoral dissertation, University of Texas at Austin]. Texas ScholarWorks. <http://dx.doi.org/10.26153/tsw/30559>
- Cadima, J., Ferreira, T., Guedes, C., Alves, D., Grande, C., Leal, T., ... Grammatikopoulos, V. (2024). Does support for professional development in early childhood and care settings matter? A study in four countries. *Early Childhood Education Journal*, 52, 1–12. <https://doi.org/10.1007/s10643-024-01669-x>
- Cappiali, T. M. (2023). A paradigm shift for a more inclusive, equal, and just academia? Towards a transformative emancipatory pedagogy. *Education Sciences*, 13(9), 876. <https://doi.org/10.3390/educsci13090876>
- Carlson, J., Daehler, K. R., Alonzo, A., Barendsen, E., Berry, A., Borowski, A., ... Wilson, C. D. (2019). The refined consensus model of pedagogical content knowledge in science education. In A. Hume, R. Cooper, & A. Borowski (Eds.), *Repositioning pedagogical content knowledge in teachers' knowledge for teaching science* (pp. 77–92). Springer. https://doi.org/10.1007/978-981-13-5898-2_2
- Chudzik, M., Corr, C., & Fisher, K. W. (2023). Trauma-informed care: The professional development needs of early childhood special education teachers. *Journal of Early Intervention*, 45(2), 1–18. <https://doi.org/10.1177/10538151231164898>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Danniels, E., & Pyle, A. (2023). Inclusive play-based learning: Approaches from enacting kindergarten teachers. *Early Childhood Education Journal*, 51(7), 1169–1179. <https://doi.org/10.1007/s10643-022-01369-4>
- Developing early graders' collaborative skills through group-work, play-based pedagogy. (2023). *International Journal of Learning, Teaching and Educational Research*, 22(4), 1–20. <https://doi.org/10.26803/ijlter.22.4.10>
- Dowd, A., & Thomsen, B. (2021). *Learning through play: Increasing impact, reducing inequality* (White Paper). Teacher Task Force.
- Ehrenfeld, N., & Stengel, B. (2025). The temporal dimension of teacher learning in a video-based professional development program: An ecological perspective. *Teaching and Teacher Education*, 139, 1–12. <https://doi.org/10.1080/10508406.2025.2468205>
- Ekeh, M. C., & Hadebe-Ndlovu, B. (2025). Tech-enhanced teacher training: Evaluating pre-service early childhood teachers' experiences and perceptions. *International Journal of Learning, Teaching and Educational Research*, 24(4), 1–18. <https://doi.org/10.26803/ijlter.24.4.4>
- Farisia, H., & Syafi'i, I. (2024). Professional development on digital literacy for teachers in early childhood education in the digital era. *Turkish Journal of Islamic Education*, 5(3), 1–15. <https://doi.org/10.31538/tjje.v5i3.820>
- Flink, I., Avildsen, C., Mabunda, M., Yisa, C., Teh, H., & Perez, R. (2024). Mixed methods study supporting the piloting and scaling of a gender-responsive play-based learning training package for pre-primary teachers in Rwanda and Mozambique. *SSM – Qualitative Research in Health*, 5, 1–12. <https://doi.org/10.1016/j.ssaho.2024.101151>

- Geletu, G. M. (2023). Conceptualisation and implementation of play-based curriculum and pedagogy in preschools in Oromia Regional State, Ethiopia. *Education*, 1–14. <https://doi.org/10.1080/03004279.2023.2169050>
- Grossman, P. L. (1990). *The making of a teacher: Teacher knowledge and teacher education*. Teachers College Press.
- Gunawan, I., Sopandi, W., Handayani, H., Fatonah, N., Suhendra, I., & Maulana, Y. (2023). Repackaging character literacy and numeracy-oriented RADEC learning model through a teacher professional development program. *Syntax Literate: Jurnal Ilmiah Indonesia*, 4(3), 1–15. <https://doi.org/10.46627/silet.v4i3.342>
- Hadara, Y. (2025). The role of teacher training in effective EFL instruction in Mali and sub-Saharan Africa: A systematic literature review. *Journal of Kharizmi Business and Education*, 1–18. <https://doi.org/10.24042/jkbxe624>
- Johnstone, A. (2022). An inquiry into teachers' implementation of play-based learning aligned approaches within senior primary classes. *Kairaranga*, 23(1), 17–34.
- Kangas, J., Lastikka, A.-L., & Arvola, O. (2023). Inclusive play: Defining elements of playful teaching and learning in culturally and linguistically diverse ECEC. *Education Sciences*, 13(9), 956. <https://doi.org/10.3390/educsci13090956>
- Khalil, N., Aljanazrah, A., Hamed, G., & Murtagh, E. (2022). Exploring teacher educators' perspectives of play-based learning: A mixed method approach. *Education Sciences*, 12(2), 95. <https://doi.org/10.3390/educsci12020095>
- Keung, C. P. C., & Cheung, A. C. K. (2019). Towards holistic supporting of play-based learning implementation in kindergartens: A mixed-method study. *Early Childhood Education Journal*, 47, 627–640. <https://doi.org/10.1007/s10643-019-00956-2>
- Kurniawati, A., Nurhayati, S., & Rukanda, N. (2024). Enhancing early childhood education teachers' creativity through professional development training program. *Aulad: Journal on Early Childhood*, 7(1), 1–15. <https://doi.org/10.31004/aulad.v7i1.537>
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159–174. <https://doi.org/10.2307/2529310>
- Li, J. (2023). *A research on the relationship between student-centred approach and student competence development in higher education: Case studies in China and Italy* [Doctoral dissertation, Università Ca' Foscari Venezia]. <https://hdl.handle.net/11577/3484866>
- Lohmander, M., & Samuelsson, I. (2022). Challenges and dilemmas with play-based pedagogy in Swedish early childhood education. In *Play and learning in early childhood education* (Chap. 11). Routledge. <https://doi.org/10.4324/9781003149668-11>
- Long, R., & Graven, M. (2023). Grade R teacher expressions of themselves as teachers of early numeracy participating in an intervention programme. *African Journal of Research in Mathematics, Science and Technology Education*, 27(3), 1–15. <https://doi.org/10.1080/18117295.2023.2224138>
- Lungu, S., & Matafwali, B. (2020). Play-based learning in early childhood education (ECE) centres in Zambia: A teacher perspective. *European Journal of Education Studies*, 7(20), 356–369.
- Machado, I., & Oliveira-Formosinho, J. (2024). Professional development for praxis transformation in early childhood education and care: A systematic review. *Early Years*, 44(3), 1–18. <https://doi.org/10.1080/1350293X.2024.2381134>
- Maro, S. H., Kondoro, A., Mtebe, J., Proctor, J., Komba, A., & Haler, B. (2024). Exploring the feasibility of technology-enhanced school-based teacher continuous professional development in internet-limited environments in Tanzania. *International Review of Research in Open and Distributed Learning*, 25(2), 1–20. <https://doi.org/10.19173/irrodl.v25i2.7428>

- McInnes, E., Whittington, V., Neill, B., & Farndale, A. (2024). Professional learning supporting multilingual children's social and emotional development in diverse Australian early childhood education and care settings. *Early Childhood Education Journal*, 52, 1–15. <https://doi.org/10.1007/s10643-023-01620-6>
- MINEDUC. (2018). *Education sector strategic plan 2018/19–2023/24*. Republic of Rwanda Ministry of Education.
- Mostafa, M. (2023). *Teachers' perceptions of play-based pedagogy in developing children's literacy skills at the pre-primary level* [Doctoral dissertation, BRAC University].
- Nilsson, M., & Nilsson, P. (2019). From pedagogical knowledge to pedagogical content knowledge: Development in mentor and student-teacher group conversations. *International Journal of Learning, Teaching and Educational Research*, 18(10), 233–247. <https://doi.org/10.26803/ijlter.18.10.15>
- Niyibizi, O., Kazinyirako, J. P., Gasigwa, J. B., Mukeshimana, A. M., Singirankabo, J. N., Bintunimana, C., & Mutarutinya, V. (2024). Teachers' understanding of play-based learning implementation on students' achievement. *Universal Journal of Educational Research*, 3(4), 374–385.
- Nkundabakura, P., Nsengimana, T., Uwamariya, E., Nyirahabimana, P., Nkurunziza, J. B., Mukamwambali, C., ... Iyamuremye, A. (2024). Effectiveness of continuous professional development training on upper primary mathematics, science, and elementary technology teachers' pedagogical content knowledge in Rwanda. *International Journal for Innovation Education and Research*, 12(2), 1–18. <https://doi.org/10.1007/s44217-024-00091-0>
- Papadopoulos, I. (2020). *From translanguaging pedagogy to classroom pedagogy: Supporting literacy, communication and cooperative creativity*. Disigma Publications.
- Papadopoulos, I., & Bourogianni, M. E. (2024). Delving into word and print awareness in 4-year-old children. *British Journal of Education*, 12(3), 41–54.
- Papadopoulos, I., & Hathaway, T. (2024). *Multilingual early childhood education: Modern approaches and research*. Nova Science Publishers.
- Papadopoulos, I., & Shin, J. K. (2021). Developing young foreign language learners' persuasive strategies through intercultural pedagogy. *Research Papers in Language Teaching and Learning*, 1(1), 185–202.
- Panganiban, J., Shire, S. Y., Williams, J., & Kasari, C. (2022). Supporting peer engagement for low-income preschool students with autism spectrum disorder during academic instruction: A pilot randomized trial. *Autism*, 26(4), 1–15. <https://doi.org/10.1177/13623613221085339>
- Park, S., & Oliver, J. S. (2007). Revisiting the conceptualisation of pedagogical content knowledge (PCK): PCK as a conceptual tool to understand teachers as professionals. *Research in Science Education*, 38(3), 261–284.
- Pyle, A., Pyle, M., Prioletta, J., & Alaca, B. (2021). Portrayals of play-based learning: Misalignments between public discourse, classroom realities, and research. *Frontiers in Education*, 6, 639432. <https://doi.org/10.3389/educ.2021.639432>
- Rivas, A., Mooss, A., Hughes Pontier, C., Romillo, J., & Muñoz, E. (2023). The effect of universal teacher-child interaction training on Hispanic teachers' sense of self-efficacy in early childhood education and care settings. *BMC Psychology*, 11, 115. <https://doi.org/10.1186/s40723-023-00115-6>
- Rolandson, D., & Ross-Hekkel, L. E. (2022). Virtual professional learning communities: A case study in rural music teacher professional development. *Journal of Music Teacher Education*, 31(3), 1–18. <https://doi.org/10.1177/10570837221077430>
- Shal, T., Ghamrawi, N., & Ghamrawi, N. A. R. (2024). Webinars for teacher professional development: Perceptions of members of a virtual professional community of practice. *Journal of Education for Teaching*, 50(1), 1–18. <https://doi.org/10.1080/02680513.2023.2296645>
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–23. <https://doi.org/10.17763/haer.57.1.j463w79r56455411>

- Sins, P. H. M., de Leeuw, R. D., de Brouwer, J., & Vrieling-Teunter, E. (2023). Promoting explicit instruction of strategies for self-regulated learning: Evaluating a teacher professional development program in primary education. *Instructional Science*, *51*, 1–20. <https://doi.org/10.1007/s11409-023-09368-5>
- Smith, P. K., & Pellegrini, A. D. (2013). Learning through play. In R. E. Tremblay, M. Boivin, & R. DeV. Peters (Eds.), *Encyclopedia on early childhood development*. <http://www.child-encyclopedia.com/play/according-experts/learning-through-play>
- Taiwo Ogunyemi, F., & Henning, E. (2020). From traditional learning to modern education: Understanding the value of play in Africa's childhood development. *South African Journal of Education*, *40*(Supplement 2). <https://doi.org/10.15700/saje.v40ns2a1768>
- UNICEF. (2018). *Learning through play: Strengthening learning through play in early childhood education programs*. <https://www.iicba.unesco.org/>
- van Driel, J., & Berry, A. (2019). Pedagogical content knowledge in preservice teacher education. In M. A. Peters (Ed.), *Encyclopedia of teacher education* (pp. 1–6). Springer. https://doi.org/10.1007/978-981-13-1179-6_176-1
- Veraksa, A., Sukhikh, V., Veresov, N., & Almazova, O. (2022). Which play is better? Different play types and the development of executive functions in early childhood. *International Journal of Early Years Education*, *30*(3), 560–576. <https://doi.org/10.1080/09669760.2022.2091979>
- Veraksa, N., Colliver, Y., & Sukhikh, V. (2022). Piaget and Vygotsky's play theories: The profile of twenty-first-century evidence. In *Piaget and Vygotsky in the XXI century: Discourse in early childhood education* (pp. 165–190). Springer. https://doi.org/10.1007/978-3-031-05747-2_10
- Yang, W., Luo, H., & Su, J. (2022). Towards inclusiveness and sustainability of robot programming in early childhood: Child engagement, learning outcomes and teacher perception. *British Journal of Educational Technology*, *53*(4), 1–18. <https://doi.org/10.1111/bjet.13266>
- Yang, Y., Rao, N., & Sun, J. (2024). From pre-service preparation to professional development: Early childhood teachers' learning experiences, ECE quality, and child development in China. *Early Childhood Research Quarterly*, *67*, 1–12. <https://doi.org/10.1080/10409289.2024.2336659>