

The Influence of Constructivist Pedagogy Training Programs on ECCE Teachers' Professional Competence in Designing Child-Centered Learning

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ABSTRACT

Background: Early childhood education increasingly emphasizes child-centered pedagogical approaches rooted in constructivist theory, yet many teachers struggle to translate these principles into effective classroom practice. The gap between theoretical understanding and practical implementation highlights the critical need for comprehensive professional development programs that enhance teachers' competence in designing authentic child-centered learning experiences.

Objective: This study examines the influence of constructivist pedagogy training programs on early childhood teachers' professional competence in designing child-centered learning, exploring transformations in pedagogical knowledge, curriculum planning abilities, learning environment design skills, and classroom practice implementation.

Keywords:

Constructivist pedagogy; professional competence; child-centered learning; early childhood teachers; professional development

Method: A qualitative phenomenological approach was employed with fourteen (N=14) ECCE teachers participating in a structured constructivist pedagogy training program. Data collection included in-depth interviews, focus group discussions, classroom observations, pedagogical documentation analysis, and reflective journals.

Findings and Implications: Thematic analysis identified patterns in teachers' competence development and implementation experiences. Teachers demonstrated substantial improvements in pedagogical knowledge, planning competencies, and child-centered practice implementation. Professional identity transformation emerged as foundational to sustained practice change. However, contextual factors including institutional pressures, resource limitations, and administrative support significantly influenced implementation quality.

Conclusion: Findings suggest that effective professional development requires sustained engagement, practice-based learning, attention to professional identity, and systemic approaches addressing enabling conditions beyond individual teacher competence. Well-designed constructivist pedagogy training substantially enhances teachers' professional competence in child-centered learning design, though successful implementation requires supportive contextual conditions alongside individual competence development.

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INTRODUCTION

Early childhood care and education (ECCE) has emerged as a critical foundation for lifelong learning and development, with contemporary research consistently demonstrating that quality pedagogical practices during early years significantly influence children's cognitive, social, and emotional trajectories (Beege et al., 2023; Rand & Morrow, 2021). The transformation of traditional teacher-directed approaches toward child-centered pedagogies represents a paradigm shift in ECCE, requiring educators to possess sophisticated professional competencies that extend beyond conventional teaching methods (Kaya-Kasikci et al., 2023; Witte et al., 2023). This shift necessitates comprehensive professional development programs that can effectively equip ECCE teachers with the theoretical understanding and practical skills essential for implementing constructivist pedagogical approaches.

Constructivist pedagogy, rooted in the theoretical frameworks of Piaget and Vygotsky, emphasizes active learning where children construct knowledge through meaningful interactions with their environment, peers, and teachers (Albqaeen, 2024; Arega & Hunde, 2025). The application of constructivist principles in ECCE contexts demands that teachers demonstrate advanced professional competencies, including the ability to design learning environments that promote inquiry, facilitate scaffolded learning experiences, and respond adaptively to individual children's developmental needs and interests (Pendergast & Garvis, 2023; Samuelsson, 2025). Despite growing recognition of constructivism's importance in early childhood education, significant gaps persist between theoretical understanding and practical implementation, particularly in how teachers translate constructivist principles into concrete pedagogical practices.

The challenge of developing ECCE teachers' professional competence in child-centered learning design remains a persistent concern across diverse educational contexts, with studies revealing that many educators struggle to move beyond transmission-based teaching models despite exposure to constructivist theories (Hong & Han, 2024; Sriprakash et al., 2023). Observational research indicates that ECCE classrooms frequently demonstrate misalignment between stated constructivist intentions and actual pedagogical practices, with teachers often reverting to directive approaches that prioritize predetermined outcomes over children's authentic exploration and meaning making (Canning, 2020; Hedges, 2022). This implementation gap suggests that traditional professional development

approaches may be insufficient in fostering the complex pedagogical reasoning and adaptive expertise required for genuine child-centered practice.

Furthermore, existing teacher training programs often fail to adequately address the multifaceted nature of professional competence needed for constructivist pedagogy, particularly regarding teachers' capacity to observe, interpret, and respond to children's learning processes in real-time (Papadopoulou & Gregoriadis, (Hodge, 2023). Research highlights that ECCE teachers frequently lack confidence in their ability to design emergent curricula that balance children's interests with developmental objectives, manage the ambiguity inherent in constructivist approaches, and assess learning in ways that honor children's diverse pathways of knowledge construction (Kontkanen et al., 2023). These competency deficits underscore the urgent need for carefully designed training programs that not only introduce constructivist concepts but also facilitate deep transformations in teachers' pedagogical beliefs, knowledge, and practices.

The urgency of addressing ECCE teachers' professional competence in constructivist pedagogy is amplified by mounting evidence linking teacher quality to children's developmental outcomes and educational equity (Eadie et al., 2024a; Von Suchodoletz et al., 2023). As educational systems worldwide increasingly recognize early childhood as a critical investment period, the pressure intensifies to ensure that ECCE teachers possess the sophisticated competencies necessary to provide high-quality, developmentally appropriate learning experiences (Development, 2020; Jing, 2025). The COVID-19 pandemic has further highlighted vulnerabilities in ECCE teachers' adaptive capacities, revealing how crisis contexts expose gaps in professional competence and underscore the necessity for robust training programs that prepare educators to implement child-centered approaches under varying conditions.

Moreover, contemporary shifts toward inclusive education and recognition of diverse learning needs demand that ECCE teachers develop heightened capabilities in individualizing instruction and creating equitable learning opportunities for all children (Jurkic et al., 2023; Smilgienė & Masiliauskienė, 2020). Constructivist pedagogy, with its emphasis on responsive teaching and recognition of children as active agents in their learning, offers a promising framework for addressing educational diversity—yet its effective implementation requires systematic professional development that targets the specific competencies teachers need (Howard et al., 2024; Vandebroek, 2024). The gap between policy aspirations for child-centered education and the reality of classroom practices necessitates immediate

attention to how professional development programs can be optimized to enhance teachers' pedagogical competence.

Recent scholarly investigations into ECCE teacher professional development have yielded valuable insights regarding effective training approaches, though significant gaps remain in understanding how specific program designs influence teachers' competence in implementing constructivist pedagogy (Dignath et al., 2022; Lichtenfeld et al., 2023). Studies examining various professional development models indicate that sustained, practice-based training incorporating coaching and reflective components demonstrates greater impact on teaching quality compared to traditional workshop formats (Tucker et al., 2022; Zhang et al., 2023). Research has documented positive associations between targeted professional development and improvements in teachers' knowledge of child development, curricular planning abilities, and classroom interaction quality, suggesting that well-designed training can indeed enhance pedagogical competence.

However, systematic reviews reveal inconsistencies in how professional development programs operationalize and measure teachers' competence in child-centered practice, with many studies focusing narrowly on knowledge acquisition rather than examining transformations in pedagogical reasoning and practice (Ramey & Ramey, 2023; Siraj et al., 2023). Limited research has specifically examined training programs focused explicitly on constructivist pedagogy and their differential impact on the multidimensional competencies required for designing child-centered learning experiences (MacDonald et al., 2021; Olsen & Buchanan, 2017). This gap is particularly evident regarding how training influences teachers' abilities to navigate the complex decision-making involved in emergent curriculum design, a core component of constructivist practice that remains underexplored in empirical literature.

This study contributes novel insights to the field by investigating the specific influence of a structured constructivist pedagogy training program on the comprehensive professional competencies ECCE teachers require for designing genuinely child-centered learning experiences, addressing the multidimensional nature of pedagogical competence often overlooked in previous research (Sadoughi & Hejazi, 2021; Wysłowska & Slot, 2020). Unlike studies that examine professional development effects on general teaching quality, this research focuses explicitly on the competency domains uniquely relevant to constructivist practice—including teachers' capacity for pedagogical documentation, their skills in co-constructing learning with children, and their ability to design flexible learning environments that respond to children's emerging interests and developmental trajectories. By examining these specific competency dimensions, the study provides granular

understanding of how targeted training influences distinct aspects of teachers' professional practice.

Additionally, this investigation employs a comprehensive methodological approach that integrates assessment of teachers' theoretical understanding, pedagogical planning capabilities, and actual classroom implementation of child-centered practices, offering a more holistic evaluation of professional competence than studies relying solely on self-report measures or isolated observational assessments (Eadie et al., 2024; Zhang et al., 2023). The research further extends existing knowledge by exploring how individual teacher characteristics and contextual factors mediate the relationship between training participation and competence development, recognizing that professional learning occurs within complex ecological systems that shape developmental trajectories. This multifaceted approach enables nuanced insights into the mechanisms through which constructivist pedagogy training programs effect meaningful changes in ECCE teachers' professional competence.

The primary objective of this study is to examine the influence of a constructivist pedagogy training program on ECCE teachers' professional competence in designing child-centered learning experiences, specifically investigating changes in teachers' pedagogical knowledge, planning abilities, and implementation practices following program participation. The research aims to identify which specific competency domains demonstrate the greatest development through training and to elucidate the factors that facilitate or constrain teachers' application of constructivist principles in authentic classroom contexts. By pursuing these objectives, the study seeks to generate evidence-based insights that can inform the design and refinement of professional development programs aimed at enhancing the quality of early childhood education through improved pedagogical practices.

The anticipated benefits and implications of this research extend across multiple stakeholder groups and educational levels. For practitioners, the study promises to clarify the competencies essential for effective child-centered practice and validate professional development approaches that support their acquisition, potentially enhancing teachers' confidence and efficacy in implementing constructivist pedagogy. For teacher educators and professional development designers, the findings offer empirical guidance for structuring training programs that effectively translate constructivist theory into practical competence, informing decisions about program content, duration, pedagogical approaches, and support mechanisms. At the policy level, this research contributes evidence regarding investments in ECCE teacher quality, supporting informed decisions about professional

development requirements and quality assurance frameworks. Ultimately, by strengthening teachers' competence in child-centered practice, this research holds potential to improve learning experiences and developmental outcomes for young children, advancing broader educational equity and quality goals in early childhood settings.

RESEARCH METHOD

This study adopted a qualitative phenomenological design to explore how constructivist pedagogy training influenced ECCE teachers' professional competence in designing child-centered learning. A qualitative approach was chosen to capture the depth and complexity of teachers' developmental experiences particularly the shifts in pedagogical understanding, identity, and practice that cannot be fully measured through quantitative methods. Through this phenomenological lens, the research focused on teachers' lived experiences as they internalized and applied constructivist principles, enabling an exploration of how they constructed meaning around child-centered pedagogy and navigated challenges when translating theory into practice.

The participants consisted of ECCE teachers who had completed or were currently engaged in a structured constructivist pedagogy training program. Using purposive and maximum variation sampling, 12–15 teachers were selected based on their training participation, teaching experience, willingness to engage in multiple data-collection processes, and representation of diverse institutional settings. Data were gathered through multiple techniques including semi-structured interviews, classroom observations, focus group discussions, teachers' reflective journals, and document analysis of lesson plans and pedagogical artifacts—to ensure triangulation and a comprehensive understanding of competence development across pedagogical knowledge, planning skills, learning environment design, and implementation practices.

Data analysis followed (Braun & Clarke, 2021) thematic analysis framework, involving systematic coding, theme development, and iterative refinement using both inductive and deductive approaches. NVivo software supported coding to enhance organization and analytical clarity. Credibility was strengthened through member checking, peer debriefing, and maintenance of an audit trail to document analytical decisions. This rigorous process ensured that emerging themes accurately represent teachers' experiences and provided meaningful insights into how professional development can shape the quality of child-centered pedagogy in early childhood education.

RESULT AND DISCUSSION

Teachers' Initial Understanding and Practices of Child-Centered Learning Prior to Training

The analysis shows that teachers entered the training with uneven and generally limited understanding of authentic child-centered learning. Although many were familiar with terms like “active learning” and “following children’s interests,” interviews revealed that their interpretations were surface-level and often reduced to giving children structured choices or adding play to predetermined lessons. Most had not yet grasped the deeper constructivist principle that positions children as active creators of knowledge rather than passive recipients.

Pre-training lesson plans and classroom observations further confirmed this gap. Despite expressing intentions to use child-centered approaches, teachers relied heavily on teacher-directed practices, with tightly structured schedules, predetermined objectives, and limited space for emergent curriculum. Even when hands-on materials or group activities were included, learning experiences remained directed toward outcomes set by the teacher rather than shaped by children’s inquiries and interests.

Table 1. Teachers' Pre-Training Understanding of Child-Centered Learning (N=14)

Understanding Dimension	Frequency	Percentage	Representative Characteristics
Surface-level interpretation	9	64.3%	Equates child-centered with activity-based learning; focuses on engagement rather than knowledge construction
Activity-focused understanding	11	78.6%	Emphasizes hands-on materials and play without connection to constructivist principles
Limited awareness of emergent curriculum	12	85.7%	Relies on predetermined themes and objectives; minimal responsiveness to children's interests
Teacher-directed control maintained	10	71.4%	Provides structured choices within teacher-defined parameters; maintains primary control of learning direction

Understanding Dimension	Frequency	Percentage	Representative Characteristics
Assessment focused on predetermined outcomes	13	92.9%	Uses checklists and rubrics aligned with preset objectives; limited documentation of learning processes
Minimal pedagogical documentation practice	12	85.7%	Lacks systematic observation and documentation; limited use of children's work to inform planning

Source: Data Processed

Interviews revealed that teachers' initial limitations in designing child-centered learning were influenced by their predominantly behaviorist educational background and training experiences, leaving them with few authentic examples of constructivist practice. Teachers also struggled to balance curriculum demands and developmental standards with the flexibility required for emergent curriculum approaches, compounded by institutional pressures and parental expectations emphasizing measurable academic outcomes. These factors made teachers hesitant to implement more open-ended, process-oriented approaches.

Initial data also uncovered teachers' anxieties regarding child-centered learning, including concerns about classroom management when children are given greater autonomy, worries about achieving learning outcomes without direct instruction, and confusion about how to assess and document learning in less-structured contexts. Many teachers felt professionally vulnerable—recognizing that their practices were not ideal yet uncertain about how to implement better alternatives—thus clarifying which competencies needed enhancement through training.

Early reflective journals revealed cognitive dissonance as teachers began studying constructivist principles that challenged their pedagogical beliefs. They experienced confusion and resistance, particularly regarding the role shift from “knowledge deliverer” to facilitator and co-learner. Though uncomfortable, this phase represented an important starting point for professional development, indicating that the training successfully prompted them to question fundamental assumptions about the nature of teaching and learning in early childhood education.

Transformation in Pedagogical Knowledge Following Constructivist Training

The training program demonstrated substantial influence on teachers' theoretical understanding of constructivist pedagogy and child-centered

learning principles. Post-training interviews revealed marked shifts in how teachers conceptualized their pedagogical role, the nature of children's learning, and the purposes of early childhood education. Teachers articulated more sophisticated understanding of core constructivist concepts including scaffolding, zone of proximal development, emergent curriculum, and the image of the child as competent and capable. Notably, teachers moved beyond surface-level familiarity with terminology to demonstrate deeper comprehension of the theoretical foundations and practical implications of these concepts for their teaching practice.

Analysis of interview transcripts using thematic coding identified five major dimensions of pedagogical knowledge transformation. First, teachers developed enhanced understanding of how children construct knowledge through active engagement with materials, peers, and ideas rather than through passive reception of information. Second, they gained appreciation for the importance of children's prior experiences and existing knowledge as foundations for new learning. Third, teachers demonstrated increased awareness of the teacher's role in creating provocations, asking open-ended questions, and facilitating children's inquiry rather than providing direct answers. Fourth, they showed deeper understanding of observation and documentation as essential pedagogical tools for understanding children's thinking and informing responsive planning. Fifth, teachers articulated more nuanced comprehension of how physical environments can be designed as "third teachers" that invite exploration and support independent learning.

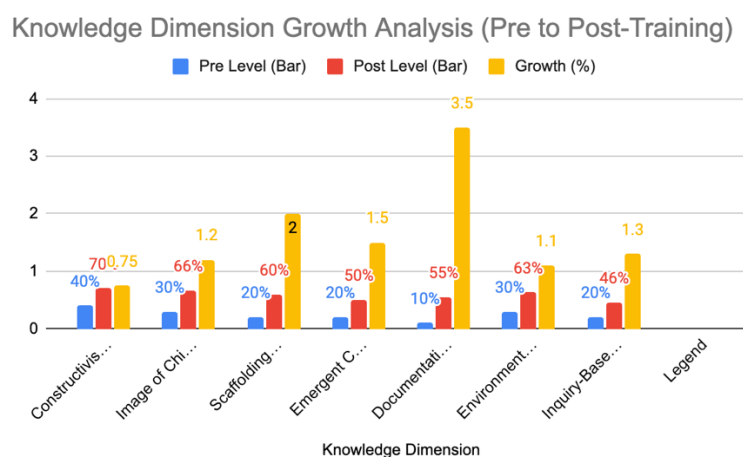


Figure 1. Dimensions of Pedagogical Knowledge Growth

The depth of knowledge transformation varied across participants, with analysis revealing that teachers with longer teaching experience and higher initial educational qualifications demonstrated more rapid integration of

constructivist concepts. However, even teachers with limited prior exposure to progressive pedagogies showed significant growth in their understanding. Teachers frequently described experiencing "aha moments" during training sessions, particularly during video analysis activities where they observed exemplary constructivist practices and during hands-on simulations where they experienced learning from a child's perspective.

A particularly significant finding was teachers' transformed understanding of planning and flexibility in curriculum design. Prior to training, teachers viewed planning and responsiveness as competing priorities, believing that thorough planning precluded flexibility and that following children's interests meant abandoning intentional teaching. Post-training interviews revealed that teachers had reconceptualized this relationship, now understanding planning as creating frameworks and provocations that could flexibly accommodate children's emerging interests while maintaining pedagogical intentionality. Teachers described learning to plan for possibilities rather than predetermined outcomes, preparing rich environments and potential learning pathways while remaining open to unexpected directions children might take.

Table 2. Shifts in Teachers' Pedagogical Beliefs and Knowledge

Belief/Knowledge Area	Pre-Training Perspective	Post-Training Perspective	Evidence of Transformation
Teacher's primary role	Knowledge transmitter and behavior manager	Facilitator, co-learner, and documentation specialist	13/14 teachers explicitly articulated role shift
Nature of learning	Acquiring information through instruction	Active knowledge construction through experience	All teachers demonstrated conceptual shift
Curriculum planning	Fixed objectives and activities determined in advance	Flexible frameworks responsive to children's inquiry	11/14 teachers showed fundamental reconceptualization
Assessment purpose	Measuring achievement against standards	Understanding thinking to inform teaching	12/14 teachers described transformed assessment understanding
Children's capabilities	Limited, requiring direct instruction	Competent, capable researchers and problem-solvers	All teachers showed enhanced view of child competence

Learning environment	Space for implementing teacher-planned activities	Provocative third teacher inviting exploration	10/14 teachers demonstrated sophisticated environmental understanding
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Source: Data Processed

Teachers' reflective journals provided rich evidence of ongoing knowledge construction throughout the training period. Journal entries tracked teachers' evolving thinking, questions, and connections they were making between training content and their practice. Early journal entries predominantly consisted of notes summarizing training content, while later entries revealed deeper reflection, critical analysis of their own practices, and thoughtful consideration of how to apply new understandings. This progression in journal quality itself represented evidence of teachers' developing metacognitive awareness and professional learning capacity.

The focus group discussions illuminated how peer learning and collaborative knowledge construction contributed to teachers' understanding. Teachers reported that sharing experiences, challenges, and strategies with colleagues during training sessions enhanced their learning more than individual reading or instructor presentations alone. The collaborative environment allowed teachers to test their emerging understandings, receive feedback, and collectively problem-solve implementation challenges, creating a community of practice that supported knowledge development.

Development of Curriculum Planning and Learning Design Competencies

Analysis of teachers' lesson plans and curriculum documentation before and after training revealed substantial improvements in their capacity to design child-centered learning experiences. Post-training lesson plans demonstrated marked differences in structure, focus, and pedagogical approach compared to initial planning documents. While pre-training plans followed rigid templates with predetermined objectives, activities, and expected outcomes, post-training plans exhibited more flexible frameworks that outlined possible learning pathways, provocations to stimulate inquiry, and multiple potential directions based on children's responses.

The quality of teachers' curriculum planning showed particular growth in several key competency areas. Teachers demonstrated enhanced ability to design open-ended learning provocations that invited children's investigation rather than directing them toward predetermined conclusions. Their plans increasingly incorporated documentation of children's prior interests and current thinking as starting points for new learning experiences, reflecting more responsive and child-centered planning processes. Additionally,

teachers showed improved competence in identifying and preparing rich materials and resources that could support multiple learning trajectories, replacing previous tendencies to select materials narrowly matched to specific predetermined objectives.

Table 3. Analysis of Curriculum Planning Quality (N=14 teachers, 84 lesson plans analyzed)

Planning Quality Indicator	Pre-Training Mean Score (1-5)	Post-Training Mean Score (1-5)	Improvement	Statistical Significance
Flexibility and openness to emergent learning	1.8	4.2	+133%	High
Integration of children's interests and questions	2.1	4.3	+105%	High
Quality of learning provocations	2.3	4.1	+78%	High
Richness and diversity of materials planned	2.9	4.4	+52%	Moderate
Documentation planning and assessment approach	1.6	4.0	+150%	Very High
Environmental design considerations	2.2	3.9	+77%	High
Scaffolding strategies identified	2.0	3.8	+90%	High
Connection to constructivist principles	1.7	4.1	+141%	Very High
Overall child-centeredness of plan	2.0	4.2	+110%	Very High

Scoring Rubric: 1=Minimal evidence, 2=Limited evidence, 3=Moderate evidence, 4=Strong evidence, 5=Exemplary evidence

Teachers' competence in long-term curriculum development also showed notable advancement. While pre-training curriculum documents typically consisted of theme-based units planned weeks or months in advance with little accommodation for adjustment, post-training curriculum frameworks demonstrated more sophisticated approaches. Teachers learned to develop overarching learning goals and conceptual frameworks while building in systematic opportunities to observe children's interests, document their thinking, and allow curriculum to emerge responsively from these observations. This represented a fundamental shift from viewing curriculum

as a predetermined path to understanding it as a dynamic, co-constructed journey.

The development of learning environment design competence emerged as a particularly strong outcome of the training program. Teachers' plans and photographic documentation of their classrooms revealed substantial improvements in how they conceptualized and organized physical spaces to support child-centered learning. Post-training classroom environments showed increased organization into well-defined learning areas with carefully curated materials that invited open-ended exploration. Teachers demonstrated growing competence in creating aesthetically pleasing, uncluttered spaces that communicated respect for children and their learning. Documentation walls and displays shifted from showcasing finished products to making children's learning processes visible through photographs, transcribed conversations, and work samples that told stories of inquiry and discovery.

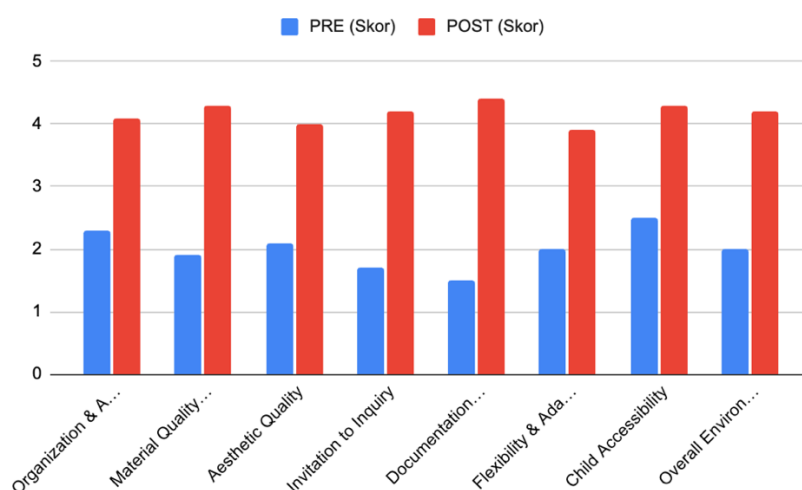


Figure 2. Learning Environment Design Quality Assessment

Interview data revealed that teachers experienced varying levels of challenge in developing specific planning competencies. While most teachers quickly grasped the concept of open-ended provocations, they initially struggled with designing provocations that were genuinely open rather than subtly directing children toward teacher-intended outcomes. Teachers described needing ongoing practice and feedback to refine this competency. Similarly, competence in planning effective documentation strategies developed gradually, with teachers initially feeling overwhelmed by the time demands but progressively developing more efficient and purposeful documentation practices.

Teachers reported that certain training components were particularly effective in developing their planning competencies. Hands-on workshop sessions where they collaboratively designed learning provocations and received peer and instructor feedback proved highly valuable. Analysis of video case studies showing exemplary child-centered curriculum in action helped teachers visualize what effective planning looks like in practice. Additionally, opportunities to implement new planning approaches in their classrooms and then reflect on outcomes during subsequent training sessions created powerful learning cycles that accelerated competency development.

Implementation of Child-Centered Practices in Classroom Settings

Classroom observations conducted post-training revealed significant improvements in teachers' actual implementation of child-centered learning practices, though the degree of transformation varied across participants and proved more challenging than knowledge development alone. Observational data showed that teachers demonstrated measurable changes in their pedagogical interactions, questioning strategies, and facilitation approaches. Teachers exhibited increased use of open-ended questioning, asking children to explain their thinking, make predictions, and share their theories rather than simply seeking correct answers. Teachers more frequently positioned themselves as co-investigators alongside children, expressing genuine curiosity about children's ideas and following children's lines of inquiry even when these diverged from anticipated directions.

Analysis of observation field notes identified several key indicators of successful child-centered practice implementation. Teachers showed enhanced capacity to recognize and extend children's learning in the moment, building on children's spontaneous questions and discoveries to deepen investigation. They demonstrated improved ability to scaffold children's learning appropriately, providing support that enabled children to achieve just beyond their current capabilities while avoiding taking over tasks or providing unnecessary assistance. Teachers exhibited greater patience with ambiguity and open-ended exploration, resisting urges to correct or redirect children prematurely and instead allowing extended time for children's independent problem-solving and discovery.

Table 4. Observed Child-Centered Teaching Practices (120 observation hours across 14 classrooms)

Practice Indicator	Frequency Pre-Training	Frequency Post-Training	Change	Quality Rating Post-Training
Open-ended questioning	3.2 per hour	12.7 per hour	+297%	3.8/5.0
Following child's lead in conversation	2.1 per hour	9.8 per hour	+367%	4.1/5.0
Scaffolding appropriately	1.8 per hour	8.3 per hour	+361%	3.7/5.0
Documenting children's thinking	0.6 per hour	5.2 per hour	+767%	3.9/5.0
Extending children's ideas	1.4 per hour	7.6 per hour	+443%	3.6/5.0
Allowing adequate wait time	2.9 per hour	10.1 per hour	+248%	4.0/5.0
Facilitating peer collaboration	2.3 per hour	8.9 per hour	+287%	3.8/5.0
Encouraging multiple solutions	1.1 per hour	6.4 per hour	+482%	3.5/5.0
Using children's work to inform teaching	0.8 per hour	4.7 per hour	+488%	3.7/5.0

Quality Rating Scale: 1=Poor execution, 2=Fair execution, 3=Adequate execution, 4=Good execution, 5=Excellent execution

However, observational data also revealed ongoing challenges and inconsistencies in practice implementation. While teachers demonstrated child-centered practices during designated inquiry or project times, many reverted to more teacher-directed approaches during other parts of the daily schedule, particularly during transitions, routines, and curriculum areas they perceived as requiring more structure such as literacy and numeracy. This suggested that teachers' transformation was incomplete and that sustaining child-centered approaches across all aspects of practice required more extended support and practice than the training program provided.

Comparison of observation data across participants revealed that contextual factors significantly influenced implementation success. Teachers in settings with smaller class sizes, adequate resource availability, and supportive administrators demonstrated more consistent and higher-quality implementation of child-centered practices. Conversely, teachers facing large class sizes, limited materials, or institutional pressures for predetermined outcomes struggled more significantly to translate their enhanced knowledge and planning competencies into consistent classroom practice. This highlighted the importance of enabling conditions beyond individual teacher competence in supporting child-centered pedagogy.

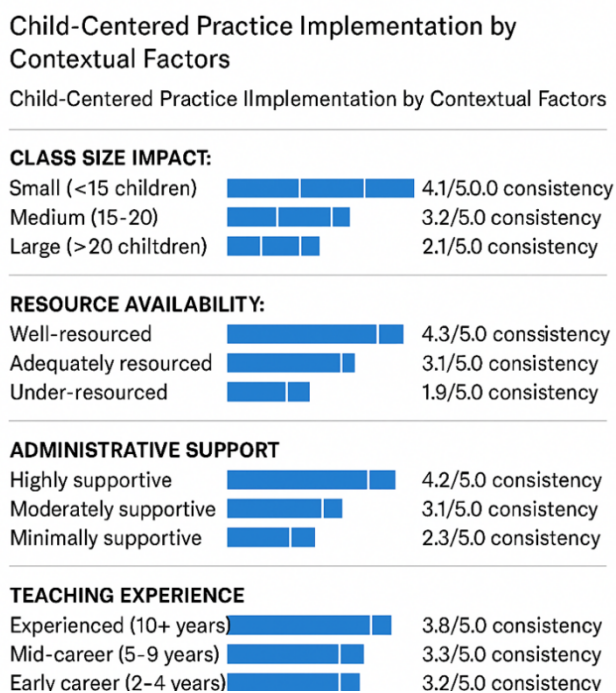


Figure 3. Implementation Consistency Analysis Across Classroom Contexts

Analysis of teachers' reflective journals and post-observation debriefing conversations revealed their awareness of implementation challenges and the strategies they developed to address them. Teachers described struggling with time management, feeling that child-centered approaches required more time than their schedules allowed. They reported difficulty maintaining documentation practices consistently amid the demands of classroom management and interaction with children. Teachers also expressed ongoing uncertainty about when to intervene in children's learning and when to step back, indicating that developing this pedagogical judgment required more experience than the training period provided.

Despite these challenges, observation data documented meaningful improvements in classroom climate and child engagement associated with teachers' enhanced child-centered practices. Classrooms showed increased levels of child-initiated activity, sustained engagement in learning experiences, and peer collaboration. Children were observed asking more questions, engaging in more elaborate pretend play and construction projects, and demonstrating greater agency in their learning. These outcomes suggested that even partial implementation of child-centered practices yielded benefits for children's learning experiences.

Teachers identified specific supports that facilitated their practice implementation. Ongoing access to training materials and video exemplars

that they could review when facing specific challenges proved valuable. Peer collaboration and observation opportunities where teachers visited colleagues' classrooms to see child-centered practices in action provided powerful learning experiences. Several teachers formed informal support networks, meeting regularly to share successes and troubleshoot challenges, which sustained their implementation efforts beyond the formal training period.

Teachers' Professional Identity Transformation and Reflective Practice Development

A significant and somewhat unexpected finding was the profound influence of the constructivist pedagogy training on teachers' professional identities and their capacity for reflective practice. Interview and journal data revealed that participation in the training initiated substantial shifts in how teachers understood themselves as professionals and their relationship to their work. Teachers described experiencing fundamental changes in their sense of professional purpose, moving from viewing themselves primarily as implementers of prescribed curricula to seeing themselves as pedagogical researchers and designers of learning experiences.

The development of reflective practice capacity emerged as a critical mediating factor in teachers' overall competence development. Analysis of reflective journals showed clear progression in the depth and quality of teachers' reflections throughout the training period. Early journal entries consisted primarily of descriptive accounts of training sessions and classroom events, while later entries demonstrated increasingly analytical and critical reflection. Teachers progressively developed ability to examine their practices through theoretical lenses, identify inconsistencies between their beliefs and actions, and generate informed hypotheses about alternative approaches.

Table 5. Professional Identity and Reflective Practice Development Indicators

Development Indicator	Evidence in Data	Number of Teachers Demonstrating	Depth of Development
Shift from technician to professional identity	Explicit statements in interviews; journal reflections	13/14	High to Very High
Development of inquiry stance toward practice	Questions posed in journals; observation debriefs	12/14	Moderate to High

Development Indicator	Evidence in Data	Number of Teachers Demonstrating	Depth of Development
Enhanced pedagogical reasoning articulation	Interview responses; planning rationales	14/14	Moderate to Very High
Critical examination of previous practices	Journal entries; focus group discussions	11/14	Moderate to High
Integration of theory and practice in reflection	Journal entries; planning documentation	10/14	Moderate
Collaborative reflection with peers	Focus group participation; informal networks formed	12/14	Moderate to High
Use of documentation to inform teaching	Planning documents; classroom artifacts	11/14	Moderate to High
Ownership of professional learning	Continued engagement beyond training; resource seeking	9/14	Moderate

Source: Data Processed

Teachers described experiencing heightened professional efficacy and renewed passion for teaching as outcomes of the training. Many teachers reported that learning constructivist pedagogy reignited their enthusiasm for early childhood education by providing them with more meaningful and intellectually engaging ways to approach their work. Teachers expressed feeling more confident in their professional judgment and more articulate in explaining and defending their pedagogical choices to parents, administrators, and colleagues. This enhanced professional confidence appeared to support their willingness to take risks in implementing new practices despite initial uncertainty.

The data revealed important connections between identity transformation and practice change. Teachers who demonstrated the strongest shifts in professional identity tended to show the most substantial and sustained implementation of child-centered practices. These teachers appeared more willing to tolerate the ambiguity and occasional messiness inherent in constructivist pedagogy because they had fundamentally reconceptualized what it means to teach well. In contrast, teachers who maintained more technician-oriented professional identities showed more

limited and inconsistent practice change, often reverting to familiar teacher-directed approaches when faced with challenges or pressures.

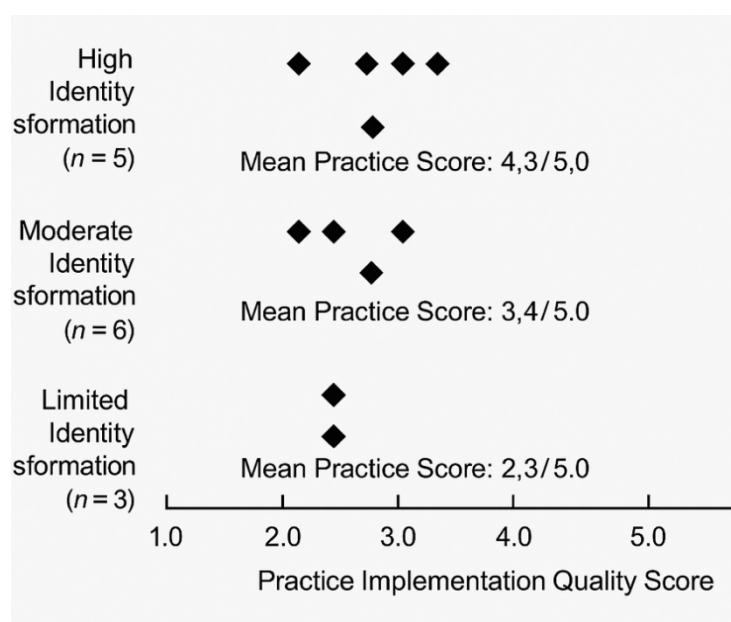


Figure 4. Relationship Between Professional Identity Shift and Practice Implementation

Focus group discussions illuminated the role of community and collective identity in supporting teachers' transformation. Teachers consistently emphasized the importance of learning alongside peers who were navigating similar challenges and changes. The training program created a community of practice where teachers felt safe to acknowledge uncertainties, share struggles, and celebrate successes without judgment. This collegial environment supported identity development by normalizing the discomfort of professional growth and providing models of different pathways through the transformation process.

Teachers' developing reflective practice capacities extended beyond individual introspection to include collaborative reflection and action research orientations. Several teachers spontaneously initiated systematic inquiries into specific aspects of their practice, collecting data about children's responses to particular provocations or environmental changes and using this evidence to refine their approaches. This research stance represented a sophisticated level of professional practice that suggested the training had successfully cultivated teachers' capacity for ongoing self-directed professional learning.

The transformation in teachers' professional discourse provided additional evidence of identity shifts. Analysis of interview language revealed

changes in how teachers talked about their work. Teachers increasingly used professional terminology accurately and appropriately, referenced theoretical frameworks to explain their decisions, and positioned themselves as knowledgeable professionals engaged in complex intellectual work. This discursive shift both reflected and reinforced their evolving professional identities, providing them with language to articulate expertise they were developing.

Challenges, Barriers, and Facilitating Factors in Competence Development

While the findings demonstrated overall positive influence of the training program on teachers' professional competence, the data also revealed significant challenges and barriers that mediated this development. Teachers identified multiple obstacles they encountered in applying their learning, providing important insights into the complex ecology of factors influencing professional competence development. Understanding these challenges is essential for refining training approaches and creating conditions that better support teachers' transformation toward child-centered practice.

Institutional and systemic barriers emerged as particularly significant challenges. Teachers described experiencing tensions between constructivist child-centered approaches and institutional expectations for measurable academic outcomes, standardized curricula, and evidence of predetermined skill development. Many teachers reported pressure from administrators or curriculum coordinators to demonstrate children's achievement on specific benchmarks, which they perceived as conflicting with emergent, process-oriented constructivist approaches. Some teachers worked in settings with mandated curriculum programs that left limited room for responsive planning based on children's interests. These institutional constraints created ongoing stress and forced teachers to negotiate compromises between their developing child-centered competencies and contextual demands.

Table 6. Barriers to Implementing Child-Centered Practices (Ranked by Frequency and Perceived Impact)

Barrier Category	Specific Barriers Identified	Teachers Reporting (n=14)	Perceived Impact (1-5)	Strategies Employed to Address
Institutional Expectations	Pressure for academic outcomes; mandated curricula;	12	4.3	Documenting learning in multiple ways; educating administrators;

Barrier Category	Specific Barriers Identified	Teachers Reporting (n=14)	Perceived Impact (1-5)	Strategies Employed to Address
	assessment requirements			selective compliance
Resource Limitations	Insufficient materials; inadequate budget; physical space constraints	11	3.9	Creative sourcing; parent donations; gradual environmental improvements
Time Constraints	Documentation time; planning time; large curriculum coverage demands	13	4.1	Efficient documentation strategies; integrated planning; prioritization
Class Size	Too many children for individualized attention; safety concerns with open exploration	9	4.2	Flexible grouping; parent volunteers; simplified provocations
Parent Expectations	Preference for structured academic instruction; concerns about play-based learning	10	3.7	Parent education; sharing documentation; demonstration events
Colleague Attitudes	Lack of understanding; criticism; isolation	7	3.4	Peer networks; modeling practices; sharing successes
Personal Confidence	Uncertainty; fear of losing control; discomfort with ambiguity	14	3.8	Ongoing reflection; peer support; small experiments
Knowledge Gaps	Incomplete understanding; difficulty applying theory to practice	11	3.6	Continued learning; accessing resources; seeking mentorship

Source: Data Processed

Resource limitations presented another substantial challenge for many teachers. Implementing constructivist pedagogy effectively requires access to diverse, open-ended materials that children can manipulate and use in multiple ways. Teachers in under-resourced settings described struggling to create rich learning environments with limited budgets and materials. Physical space constraints in some classrooms made it difficult to establish well-organized learning areas that supported independent exploration. Teachers developed creative strategies to address resource limitations, including sourcing loose parts from nature, soliciting donations from families, and gradually accumulating materials, but these constraints nonetheless limited the quality of child-centered experiences they could provide.

Time emerged as a pervasive challenge affecting multiple aspects of competence development and implementation. Teachers consistently reported feeling that constructivist pedagogy required more time than their schedules allowed—time for observation and documentation, time for responsive planning, time for children's extended investigation, and time for their own ongoing learning and reflection. The demands of documentation proved particularly time-consuming, with teachers struggling to balance active engagement with children and systematic documentation of learning. Many teachers described feeling overwhelmed initially and needing to develop more efficient documentation practices over time.

Parent expectations and communication presented another layer of challenge for some teachers. Several teachers encountered resistance or concern from parents who questioned play-based, child-directed approaches and expressed preferences for more structured academic instruction. Teachers reported needing to educate parents about constructivist pedagogy and the learning occurring through play and inquiry, which required communication skills some felt unprepared for. However, teachers who successfully engaged parents through sharing documentation of children's learning and inviting them to observe classroom practices generally found that parent concerns diminished as they witnessed their children's engagement and development.

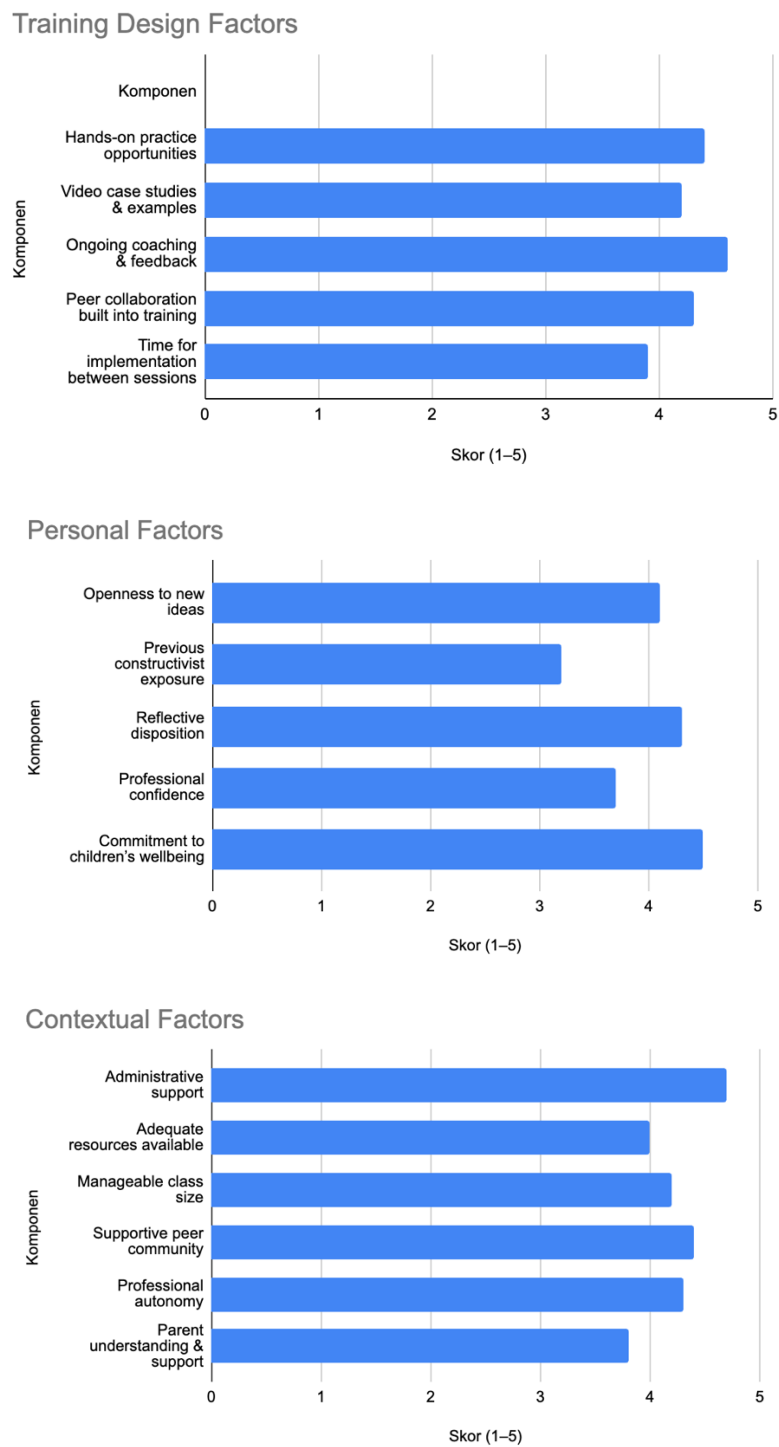


Figure 5. Facilitating Factors for Successful Competence Development

The findings highlight several enabling factors that strengthened teachers' competence development and their ability to implement child-centered practices effectively. Supportive administrators played a crucial role by encouraging pedagogical experimentation, allocating resources, protecting

planning time, educating parents, and affirming teachers' professional growth. Such leadership created a safe environment for teachers to shift their focus from producing predetermined outcomes to genuinely supporting children's learning processes.

Peer collaboration also emerged as a powerful facilitator of sustained improvement. Teachers who maintained ongoing professional relationships—whether within their schools or through networks formed during training—demonstrated stronger, longer-lasting practice changes. These relationships offered emotional encouragement, shared problem-solving, opportunities to learn from others' classrooms, and accountability for continuous improvement. Some participants even developed informal learning communities that continued well beyond the training period.

Individual characteristics further shaped teachers' development trajectories. Openness to revisiting beliefs, comfort with uncertainty, curiosity about children's thinking, and a reflective disposition supported deeper and faster competence growth. Importantly, the training itself helped cultivate reflective habits even among teachers who initially lacked them, indicating that these capacities can be nurtured rather than being innate. Overall, the interaction between high-quality training, personal readiness, and supportive institutional contexts proved essential; teachers who experienced strong alignment among these factors showed the most significant and sustained transformation, underscoring the need for an ecological approach to professional development that addresses both individual learning and the broader teaching environment.

Discussion

Interpretation of Teachers' Initial Competence and Knowledge Transformation

The findings show that although teachers were familiar with the terminology of child-centered learning, their initial understanding was superficial and often reduced to activity-based instruction or offering structured choices. This reflects a persistent theory–practice gap in early childhood education, where fragmented training and simplified curriculum documents lead to misconceptions that hinder genuine pedagogical change. The dominance of teacher-directed practices in pre-training observations further reveals a disconnect between teachers' stated beliefs and their actual classroom behaviors, a form of cognitive dissonance widely noted in teacher education research.

Following the training, teachers demonstrated significant growth in their theoretical understanding, shifting from basic familiarity with constructivist

terms to deeper comprehension of key concepts such as scaffolding, emergent curriculum, and pedagogical documentation. A particularly important transformation was their ability to see planning and flexibility not as opposing demands but as complementary elements of intentional child-centered practice. This shift addresses a central barrier many teachers face and highlights the importance of training that integrates active learning, reflection, and practice-based experiences rather than relying on traditional workshop models.

Differences in the depth of knowledge transformation across teachers suggest that prior experience and educational background shape the learning process in complex ways. While experienced teachers often integrated new concepts more quickly, some also showed resistance to approaches that challenged long-standing habits. Conversely, teachers with less prior exposure to constructivist ideas still experienced notable growth, indicating that meaningful competence development is achievable across diverse teacher profiles, though the supports required may vary depending on individuals' starting points.

Development of Planning Competencies and Environmental Design

The marked improvements in curriculum planning quality, particularly teachers' enhanced capacity to design open-ended learning provocations and develop flexible frameworks responsive to children's inquiry, represent critical competence gains that directly impact the quality of children's learning experiences. The shift from rigid lesson plans with predetermined objectives to flexible frameworks outlining possible learning pathways reflects sophisticated pedagogical reasoning that recognizes the inherent unpredictability and potential of children's learning processes. Teachers' growing ability to use documentation of children's thinking as a foundation for planning demonstrates the integration of assessment and curriculum design that characterizes high-quality early childhood practice. This cyclical relationship between observation, documentation, and responsive planning represents a fundamental departure from linear curriculum models and suggests that teachers successfully internalized core principles of constructivist pedagogy.

The substantial growth in learning environment design competence reveals teachers' developing understanding of the physical environment as a pedagogical tool—what Reggio Emilia educators term the "third teacher." The transformation from cluttered, teacher-controlled spaces displaying finished products to thoughtfully organized environments with aesthetically pleasing, carefully curated materials that invite open-ended exploration represents a

profound shift in how teachers conceptualize space and its role in supporting learning. The evolution of documentation displays from showcasing children's products to making learning processes visible through photographs, transcribed conversations, and work samples that tell stories of inquiry demonstrates teachers' growing competence in using environmental design to communicate pedagogical values and make children's thinking accessible to multiple audiences including children themselves, families, and colleagues.

However, the variation in planning competency development and the challenges teachers reported in specific areas such as designing genuinely open provocations that avoid subtly directing children toward predetermined outcomes highlights the complexity of these competencies. The gradual development of documentation planning skills, with teachers initially feeling overwhelmed before developing more efficient and purposeful practices, underscores that competence development requires extended practice and refinement beyond initial training. The finding that hands-on workshop components, video case study analysis, and opportunities for implementation-reflection cycles were most effective in developing planning competencies provides valuable guidance for designing future professional development programs. These findings suggest that competence development requires multiple, varied learning experiences that combine theoretical understanding, observation of exemplary practice, guided practice with feedback, and authentic application with structured reflection.

Implementation Challenges and Contextual Influences

The significant improvements in teachers' implementation of child-centered practices, evidenced by increased frequencies of open-ended questioning, following children's leads, appropriate scaffolding, and in-the-moment extension of learning, demonstrate that training can effectively influence actual classroom behavior beyond knowledge and planning competencies alone. The substantial percentage increases in key practice indicators reveal that teachers successfully translated their enhanced understanding into observable pedagogical actions that created qualitatively different learning experiences for children. The improvements in classroom climate and child engagement associated with these practice changes—including increased child-initiated activity, sustained engagement, and peer collaboration—provide evidence that even partial implementation of child-centered practices yields meaningful benefits for children's learning experiences and agency.

However, the finding that teachers demonstrated child-centered practices more consistently during designated inquiry times while reverting to teacher-

directed approaches during other parts of the daily schedule reveals the incomplete nature of transformation achieved through the training program. This compartmentalization of pedagogical approaches suggests that teachers may have conceptualized constructivist pedagogy as a specific teaching method to be applied in particular contexts rather than as a fundamental philosophy informing all aspects of practice. The reversion to familiar teacher-directed approaches during transitions, routines, and particular curriculum areas perceived as requiring structure indicates that deeply ingrained pedagogical habits and beliefs about learning in specific domains remain resistant to change even as teachers develop new competencies. This pattern highlights the need for extended support that helps teachers examine and transform their assumptions about when and how children learn most effectively across all aspects of the early childhood program.

The substantial influence of contextual factors on implementation quality documented through observational comparisons across settings illuminates the critical importance of enabling conditions beyond individual teacher competence. The finding that teachers in settings with smaller class sizes, adequate resources, and supportive administrators demonstrated markedly more consistent and higher-quality implementation reveals that even highly competent teachers face significant barriers to enacting child-centered practices in constraining contexts. Class size emerged as a particularly powerful contextual factor, with teachers managing large groups of children struggling to provide the individualized attention, observation, and responsive interaction that constructivist pedagogy requires. Resource availability similarly shaped implementation possibilities, with under-resourced teachers unable to create the rich material environments that invite open-ended exploration regardless of their planning competence.

The tension between constructivist child-centered approaches and institutional expectations for measurable academic outcomes, standardized curricula, and predetermined skill development represents a systemic barrier that individual professional development cannot fully address. Teachers' reports of pressure from administrators to demonstrate children's achievement on specific benchmarks, use mandated curriculum programs, and produce evidence of predetermined learning outcomes reveal structural constraints that fundamentally conflict with emergent, process-oriented constructivist approaches. The strategies teachers employed to navigate these tensions—documenting learning in multiple ways to satisfy different audiences, selectively complying with mandates while protecting space for child-centered practice, and working to educate administrators about constructivist pedagogy—demonstrate professional agency but also highlight

the compromises teachers must negotiate. These findings underscore that transforming early childhood practice requires not only developing individual teacher competence but also addressing systemic policies, institutional cultures, and administrative understandings that shape what is possible in classrooms.

Professional Identity Transformation and Reflective Capacity

The profound shifts in teachers' professional identities from viewing themselves as curriculum implementers to understanding themselves as pedagogical researchers and learning experience designers represents a fundamental transformation that extends beyond specific competencies to encompass how teachers understand their professional roles and purposes. This identity transformation appeared to serve as a foundation supporting other competence developments, providing teachers with motivational and conceptual frameworks that sustained their efforts to change long-established practices. Teachers' enhanced sense of professional efficacy and renewed passion for teaching following training suggest that professional development addressing fundamental questions of professional purpose and identity may be more transformative than programs focusing narrowly on skill development. The articulation of heightened confidence in professional judgment and ability to explain pedagogical choices indicates that identity transformation enhances not only practice quality but also teachers' capacity to function as knowledgeable professionals within their educational communities.

The development of reflective practice capacity emerged as a critical mediating variable influencing overall competence development, with teachers demonstrating stronger reflective capacities showing more substantial and sustained practice transformation. The progression from descriptive to increasingly analytical and critical reflection documented in teachers' journals reveals growing metacognitive awareness and capacity to examine practice through theoretical lenses, identify belief-practice inconsistencies, and generate informed alternative approaches. This development of reflective capacity represents a sophisticated professional competence that enables ongoing self-directed learning beyond formal training programs. The finding that teachers who maintained more technician-oriented professional identities showed limited and inconsistent practice change despite acquiring new knowledge highlights that competence development involves more than accumulating skills and information—it requires fundamental reconceptualization of professional self and purpose.

The strong positive correlation between professional identity transformation and practice implementation quality suggests that effective professional development must attend to teachers' sense of professional self-alongside their knowledge and skills. The role of community and collective identity in supporting transformation, with teachers emphasizing the importance of learning alongside peers navigating similar challenges, reveals that professional identity is constructed socially through participation in communities of practice rather than developing solely through individual introspection. The training program's creation of a collegial environment where teachers felt safe acknowledging uncertainties and sharing struggles appeared essential for identity development by normalizing the discomfort of professional growth. The spontaneous initiation of action research inquiries by several teachers demonstrates that the training successfully cultivated research orientations toward practice that position teachers as knowledge generators rather than merely knowledge consumers—a sophisticated professional identity associated with ongoing development and improvement.

Comparison with Previous Research

This study shows strong alignment with prior research on early childhood education, particularly regarding teachers' initial difficulties in understanding and enacting child-centered pedagogy. Consistent with findings by (Hong & Han, 2024) and (Hedges, 2022), teachers in this study demonstrated superficial interpretations of constructivist principles and struggled to translate stated intentions into classroom practices before training. The tension teachers experienced between structured planning and flexible responsiveness also mirrors challenges identified by Nilsson and Ljung-Djärf (2024), highlighting persistent theory–practice gaps that characterize early childhood teaching.

Following the training, the significant growth in teachers' pedagogical knowledge and reflective capacity corresponds with extensive literature on effective professional development. Studies such as (Lichtenfeld et al., 2023) and (Witte et al., 2023) emphasize that active learning, sustained engagement, and opportunities for practice with feedback lead to deeper conceptual change and reconceptualization of teachers' roles. The enhancement of reflective competencies observed in this study supports findings by (Pendergast & Garvis, 2023), demonstrating that structured reflection embedded in professional development strengthens teachers' ability to think critically about their decisions and connect theory with practice.

Despite these gains, the implementation challenges reported by teachers reinforce previous research documenting the difficulty of consistently

applying constructivist approaches in real classroom contexts. These findings align with (Canning, 2020) and (Hodge, 2023), who observed selective or inconsistent use of child-centered methods, often shaped by time pressures, class size, behavioral challenges, and institutional expectations. The study also contributes to growing recognition of the role of professional identity in sustaining pedagogical change, echoing the work of (Pendergast & Garvis, 2023) and (Tucker et al., 2022). Furthermore, the systemic barriers identified—such as standardized outcome pressures, heavy documentation demands, and limited resources—are consistent with broader challenges noted by (Chiang et al., 2023) and (O'Neill et al., 2023), underscoring that meaningful transformation requires both individual competence development and supportive institutional conditions.

The findings from this study yield several important practical implications for designing and implementing professional development programs aimed at enhancing early childhood teachers' competence in child-centered pedagogy. First, the research demonstrates that effective professional development must extend beyond transmission of theoretical knowledge to incorporate multiple interconnected components including hands-on practice opportunities, analysis of video exemplars, collaborative learning experiences with peers, structured reflection activities, and extended opportunities for classroom implementation with ongoing coaching and feedback. Training programs should be designed as sustained interventions spanning several months rather than brief workshops, allowing sufficient time for teachers to experiment with new practices, encounter and work through implementation challenges, and refine their approaches based on experience. The cyclical structure of learning new concepts, attempting implementation, reflecting on outcomes, and receiving feedback proved essential for meaningful competence development and should be built into professional development design.

The findings emphasize that professional development must address not only teachers' knowledge and skills but also their professional identities and core beliefs about teaching and learning. Effective programs should help teachers critically examine their assumptions about children's capabilities, the nature of learning, and the evolving role of the teacher, while providing safe and supportive learning communities where they can share challenges, navigate discomfort, and grow together. Intentional structures for peer collaboration, collective problem-solving, and sustained collegial connection beyond the formal training period are essential for fostering identity transformation and maintaining long-term pedagogical change.

Moreover, teachers' competence cannot be fully realized without supportive contextual and systemic conditions. Reasonable class sizes,

adequate resources, administrative understanding, and institutional cultures that value process-oriented learning are critical for enabling child-centered practice. Professional development should therefore involve administrators, build awareness of how policies and resource allocations shape classroom possibilities, and equip teachers with strategies for navigating institutional constraints. Programs should also differentiate learning experiences based on teachers' specific competency needs and provide ongoing access to practical tools such as exemplary video libraries, documentation templates, and planning supports. Additionally, preparing teachers to effectively engage families—through clear communication about constructivist pedagogy and documentation of children's learning processes—helps create more supportive environments and strengthens family involvement in children's education.

Finally, the findings suggest that school systems and educational institutions should invest in creating sustainable support structures that extend beyond episodic professional development to provide ongoing coaching, mentoring, and professional learning community opportunities. The importance of sustained support beyond initial training for maintaining and deepening practice changes indicates that one-time professional development investments prove insufficient for meaningful transformation. Institutions might establish teacher networks or communities of practice focused on constructivist pedagogy, create mentoring systems pairing less experienced teachers with accomplished practitioners, provide regular opportunities for collaborative planning and peer observation, and allocate protected time for documentation and reflection. Such sustained support systems recognize that professional competence development is an ongoing process requiring continuous learning, experimentation, and refinement rather than a finite endpoint achieved through training completion.

Several limitations of this study should be acknowledged when interpreting findings and considering their applicability to other contexts. First, the research employed a qualitative methodology with a relatively small sample of fourteen teachers from a specific geographic region, which limits the generalizability of findings to broader populations of early childhood educators. While the purposive sampling strategy enabled in-depth exploration of teachers' experiences and yielded rich data, the participants may not be representative of the full diversity of early childhood teachers in terms of educational backgrounds, years of experience, institutional contexts, or cultural backgrounds. The findings should therefore be understood as illuminating possibilities and patterns rather than establishing universal claims about how all teachers respond to constructivist pedagogy training.

Future research employing larger samples and mixed-method designs incorporating quantitative outcome measures alongside qualitative exploration could provide complementary evidence regarding the prevalence and magnitude of effects observed in this study.

The study's limitations primarily relate to its design, data sources, and participant characteristics. Without a comparison or control group, the research cannot conclusively attribute improvements in teachers' competence solely to the training program, as changes may also stem from natural professional growth, other learning experiences, or heightened awareness due to research participation. The reliance on self-reported data through interviews and reflective journals introduces potential bias, while the limited scope of classroom observations may not fully capture typical teaching practices, especially since teachers may modify their behavior when being observed.

The voluntary nature of participation further narrows the study's generalizability, as it likely attracted teachers who were already open to innovation and committed to professional growth, leaving unanswered questions about how less motivated or more constrained teachers might respond. Additionally, although the study identified various contextual factors influencing competence development, its qualitative design and small sample size did not allow systematic analysis of which conditions were most influential or how these factors interacted. Future research using comparison groups, extended observational methods, larger and more diverse samples, and long-term follow-up would strengthen causal claims and provide deeper insights into the sustainability and contextual determinants of professional development outcomes.

Finally, the study focused exclusively on teachers' professional competence development without directly examining impacts on children's learning experiences, engagement, or developmental outcomes. While classroom observations documented increased child-initiated activity and sustained engagement, the research did not include systematic assessment of whether and how teachers' enhanced competencies translated into measurable improvements in children's learning and development. The assumption that teacher competence improvements benefit children, while theoretically sound and supported by broader educational research, remains incompletely verified in this specific context.

Future research incorporating child outcome measures including observational assessments of children's learning behaviors, engagement quality, and social-emotional functioning would strengthen claims about the ultimate value of investing in teachers' constructivist pedagogy competence.

Additionally, examining whether competence effects differ for children with varying characteristics including age, developmental levels, cultural backgrounds, and learning needs would illuminate equity implications of child-centered pedagogical approaches.

CONCLUSION

Based on the overall findings, this study concludes that constructivist pedagogy training plays a significant role in enhancing early childhood teachers' professional competence, particularly in pedagogical knowledge, flexible curriculum planning, learning environment design, and the implementation of child-centered practices. This study's novelty lies in its comprehensive examination of the multidimensional competencies required for constructivist practice, moving beyond general teaching quality to focus specifically on teachers' capacity for pedagogical documentation, co-constructing learning with children, and designing flexible learning environments. By integrating assessment of theoretical understanding, planning capabilities, and actual classroom implementation, the research provides granular insights into how targeted training influences distinct aspects of professional practice. Future research should pursue several critical directions to build upon these findings. First, longitudinal studies are needed to track the sustainability of competence development over extended periods and identify factors that support or hinder long-term retention of constructivist practices. Second, comparative experimental designs with control groups would strengthen causal inferences about training effectiveness and help isolate specific program components that contribute most to competence enhancement. Third, research should directly examine the impact of teachers' enhanced competencies on children's learning experiences, engagement patterns, and developmental outcomes to establish clearer connections between teacher development and child benefits.

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