

Designing Preschool Project-Based Learning for Teacher Pedagogical Change: A Design-Based Case Study in China

Dongjin Sun

Shandong Vocational and Technical University of International Studies, Rizhao, Shandong, China

DOI: <https://doi.org/10.47772/IJRISS.2026.100800117>

Received: 14 August 2026; Accepted: 20 August 2026; Published: 27 August 2026

ABSTRACT

Project-based learning (PjBL) can connect inquiry, collaboration, and authentic problem solving, but preschool enactment depends on developmentally appropriate tasks and on how teachers organize classroom inquiry. This design-informed case study examined a five-phase PjBL curriculum framework in one kindergarten in Shandong Province, China. The primary unit of analysis was one intervention teacher's pedagogical practice; one comparison teacher provided contextual contrast. Each class included 10 children aged 5-6 years. The framework was refined through three separate reviews by preschool-education specialists and enacted across three project cycles over approximately eight weeks. The evidence corpus comprised three cycle-level planning sets, 18 complete focal-activity observations (nine per class), four Chinese interview transcripts containing 39 question-response units, child artefacts and project-wall records, and 18 observation-linked researcher memos. Reflexive thematic analysis integrated these sources. Across the intervention-class observations, the teacher increasingly connected activities through task chains and project-wall evidence, used more open and evidence-oriented prompts, supported peer comparison and role negotiation, and used documentation to plan subsequent activity. The comparison teacher more often followed discrete theme activities, procedural questioning, product checking, and display-oriented documentation. Child-level records provided contextual evidence of follow-up questioning, material comparison, group-role negotiation, and return to earlier drawings or plans, but no child learning outcomes were measured. Interview evidence indicated that the five-phase structure worked together with orientation, examples, an open-question bank, collaborative review, and simplified documentation. The study therefore identifies a practice-oriented configuration rather than an independently validated intervention. It contributes a mechanism-based account of how task-chain planning, open prompts, project walls, and documentation can redirect teacher attention toward inquiry continuity and children's thinking.

Keywords: project-based learning; preschool education; curriculum design; teacher pedagogical change

INTRODUCTION

Early childhood education in China increasingly expects teachers to create learning environments in which children explore, communicate, cooperate, and connect classroom experience with everyday life. National guidance for children aged 3 to 6 emphasizes holistic development, play-based experience, and respect for developmental differences ^[1]. International research likewise highlights responsive adult-child interaction and learning environments that integrate cognitive, social, emotional, and communicative development ^[2, 3].

Project-based learning offers a possible way to connect these expectations. It engages learners in sustained inquiry around meaningful problems and supports the development of representations, explanations, or products through collaboration ^[4, 5]. Preschool implementation, however, requires careful adaptation. Young children need concrete materials, short cycles of action and reflection, and teacher scaffolding that sustains rather than replaces their inquiry ^[6, 23].

Existing research describes the features and potential outcomes of PjBL, but less is known about how a curriculum framework changes teachers' day-to-day organization, questioning, interaction, and documentation in preschool classrooms. This gap matters because implementation quality depends on what

teachers attend to and how they translate project principles into classroom routines. The present study therefore examines curriculum design as a mediating tool for teacher pedagogical change.

The study addressed three research questions:

- How can a preschool PjBL curriculum framework be designed in a developmentally appropriate and practically usable way?
- What changes in teacher pedagogical behaviour are visible during implementation?
- What support conditions appear to sustain these changes?

The empirical focus is the pedagogical practice of one intervention teacher; the comparison teacher is used only for contextual contrast.

Figure 1 summarizes the conceptual argument: the curriculum framework is translated through classroom tools, these tools shape teacher practice, and support conditions influence whether the changes can be sustained.

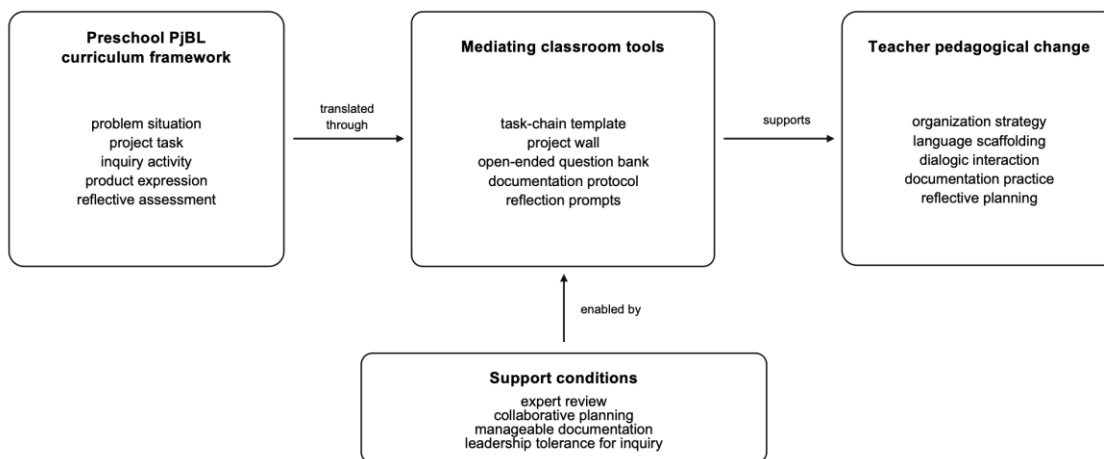


Figure 1 Conceptual model of curriculum-mediated teacher pedagogical change

LITERATURE REVIEW

Project-based learning in preschool curriculum

The project approach in early childhood education emphasizes sustained investigation, children's questions, representation, field experience, and teacher documentation ^[7, 8]. Project work can turn a broad theme into a sequence of experiences that children revisit through talk, drawing, construction, and shared reflection. Reggio-inspired practice similarly uses long-term projects, environmental design, and documentation to make children's thinking visible ^[20].

Recent preschool inquiry studies show that young children can participate in structured investigation when problems are concrete, materials are accessible, and teachers use productive questions and representations ^[23]. The curriculum challenge is to maintain continuity across activities. Without a clear inquiry sequence, project work may become a collection of attractive but disconnected events. A usable framework therefore needs to translate broad PjBL principles into concrete planning tools that connect a problem situation, a shared task, investigation, expression, and reflection.

Curriculum design and teacher pedagogical change

Introducing PjBL changes the demands placed on teachers. Teachers need to design problem situations, manage materials, listen to emerging questions, guide collaboration, and assess learning processes.

Professional learning is more likely to influence classroom practice when it is sustained, practice-focused, collaborative, and supported by feedback^[9, 10, 16–18]. Research with early childhood teachers also shows that collaborative learning is strengthened by structural support, shared motivation, and routines that can be maintained over time^[26].

This study treats curriculum framework development and teacher learning as connected processes. The framework functions as a professional tool that can redirect attention from activity completion to inquiry sequencing, from judging final products to observing children's thinking, and from teacher explanation to dialogic scaffolding.

Conceptual and methodological framing

The study was informed by educational design research because it sought to develop a usable intervention and produce explanatory knowledge about its implementation^[11]. Sociocultural theory highlights the role of language, tools, and guided participation in learning^[12], while experiential traditions emphasize inquiry through meaningful activity^[13]. In this study, the PjBL framework is treated as a mediating classroom tool that helps teachers translate abstract project principles into situated practice.

Pedagogical documentation is relevant to this process because it can make children's thinking visible and support curriculum planning when teachers use records as interpretive resources rather than as proof of activity completion^[24, 25]. This perspective informed the analysis of changes in teachers' documentation practices.

METHODOLOGY

Research design

The study used a design-informed case-study approach. Educational design research informed the development and formative refinement of the preschool PjBL curriculum framework, while its classroom enactment was examined as a bounded case in one kindergarten^[11, 15]. The study comprised one formative development-enactment-analysis cycle, including framework development, expert-informed revision, classroom implementation, and cross-source analysis. This design enabled the study to examine how the framework was translated into classroom practice and how the intervention teacher's pedagogical behaviour changed during implementation. The study did not use random assignment; therefore, the comparison class was used for contextual contrast rather than for estimating causal effects.

Context and participants

The research was conducted in one ordinary kindergarten in Shandong Province, China. Two senior preschool classes were included, each comprising 10 children aged 5-6 years. The intervention teacher (IT) and the comparison teacher (CT) both held bachelor's degrees and had approximately four to five years of teaching experience. The intervention class enacted the PjBL framework, whereas the comparison class continued its regular theme-based curriculum.

The kindergarten and classes were selected purposively because they represented an ordinary preschool setting, were at the same grade level, had comparable class sizes, and could support an eight-week implementation. The primary unit of analysis was IT's pedagogical practice. CT's practice was analysed as a contrastive case, and the two teachers were not treated as a sample from which general statements about teachers could be inferred.

Framework development and review

The five-phase framework was developed through literature review, policy analysis, practical activity design, and formative expert feedback. The phases were problem situation, project task, inquiry activity,

product expression, and reflective assessment. Table 1 describes the function of each phase, the teacher's role, and the evidence expected during implementation.

Table 1 Five-phase preschool PjBL curriculum framework

Phase	Curriculum function	Main teacher role	Visible evidence
Problem situation	Connects the project with children's everyday experience	Identifies meaningful situations and listens for children's questions	Children's initial talk, drawings, and questions
Project task	Turns the situation into a shared challenge	Clarifies task boundaries without closing inquiry	Task board, project wall, and group plan
Inquiry activity	Allows children to investigate through materials and collaboration	Provides materials, asks open questions, and supports peer roles	Observation notes, photographs, and artefacts
Product expression	Makes children's ideas visible through multiple representations	Encourages explanation, comparison, and revision	Models, drawings, displays, and oral explanations
Reflective assessment	Connects evidence with next-step planning	Uses documentation to guide reflection and future activities	Reflection prompts, teacher notes, and follow-up plans

Three reviewers with professional backgrounds in preschool education completed separate written reviews of the draft framework. They were selected for subject-matter expertise relevant to child development, preschool pedagogy, teacher support, and classroom feasibility. Reviewer E01 focused on developmental appropriateness, child participation, and continuity across the five phases; Reviewer E02 focused on teacher roles, questioning, peer interaction, and evidence-based reflection; Reviewer E03 focused on classroom feasibility, documentation burden, project-wall use, and implementation support. The review generated 15 item-level comments. Table 2 summarises the substantive focus, principal recommendations, and changes incorporated before classroom implementation. The review was used for formative refinement.

Table 2 Expert-review focus, recommendations, and framework revisions

Reviewer	Primary review focus	Principal recommendations	Revision incorporated before enactment
E01	Developmental appropriateness; child participation; continuity across phases	Shorten long inquiry sequences; use concrete problem situations; link later phases to earlier child questions and artefacts	Inquiry sequences were divided into shorter action-discussion cycles; abstract tasks were rewritten as observable problems; task-chain planning retained prior evidence
E02	Teacher roles; open questioning; peer comparison; reflective assessment	Specify the teacher role in each phase; provide adaptable open-question prompts; include peer comparison and role negotiation; assess process	Phase-specific teacher roles were clarified; an open-question bank was added; peer comparison and evidence-based reflection were

Reviewer	Primary review focus	Principal recommendations	Revision incorporated before enactment
		evidence	embedded
E03	Classroom feasibility; documentation burden; project-wall use; implementation support	Simplify documentation; link records to next-step planning; use project walls as process evidence; provide orientation, a worked example, and collaborative review	Documentation forms were shortened; next-step planning fields were added; project walls were used as ongoing evidence; implementation support was organised

Implementation and data sources

Figure 2 summarises the design-informed case-study procedure and evidence corpus. Data collection took place from November 2025 to January 2026 over an approximately eight-week implementation comprising three project cycles. Each cycle followed the five-phase sequence of problem situation, project task, inquiry activity, product expression, and reflective assessment. Before implementation, IT received orientation on developmentally appropriate project tasks, open-ended questioning, child participation, and pedagogical documentation, while CT continued regular theme-based activities during the same period.

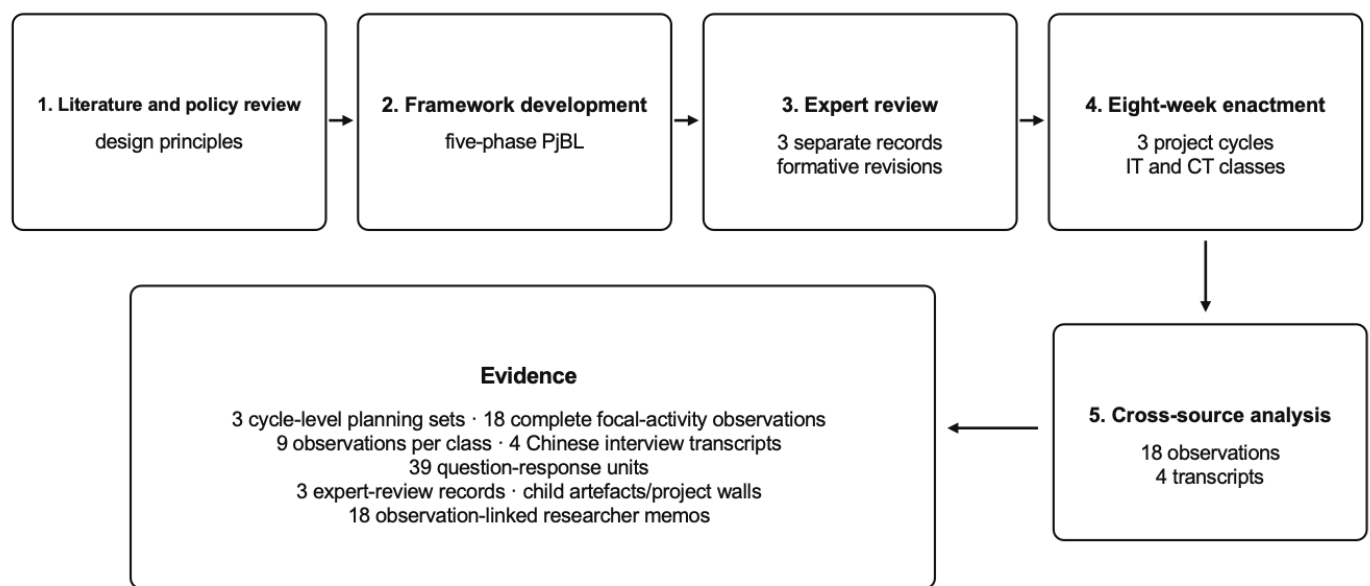


Figure 2 Design-informed case-study procedure and evidence corpus

The comparison class provided contextual contrast and was not used for statistical testing or causal estimation. Each of the three project cycles was observed at the launch, development, and closing stages in both classes, yielding 18 complete focal-activity observations: nine in the intervention class and nine in the comparison class. Each observation covered one complete classroom activity and generated a structured observation record, accompanying field notes, and an observation-linked researcher memo. The three cycle-level planning sets included task-chain plans, group plans or child-question records, and follow-up planning notes. Both focal teachers completed one semi-structured interview before implementation and one after implementation, producing four Chinese transcripts. The transcripts contained 39 question-response units. Interview transcripts were anonymised and analysed alongside the framework documents, three expert-review records, planning materials, classroom observations, child artefacts, project-wall records, and researcher memos.

Table 3 Evidence corpus and analytic use

Data source	Corpus	Analytic use
Framework and revision records	Five-phase framework and pre-enactment revision set	Established the intended design logic and teacher-support tools
Expert-review records	3 separate records; 15 item-level comments	Refined developmental appropriateness, phase continuity, teacher roles, feasibility, and documentation
Teacher planning materials	3 cycle-level planning sets	Traced translation of the framework into task chains, group plans, and follow-up planning
Classroom observations	18 complete focal-activity observations; 9 per class; matched at launch, development, and closing stages	Compared curriculum organisation, questioning, interaction, documentation, and child-participation indicators
Teacher interviews	4 Chinese transcripts; 39 question-response units	Examined pedagogical understanding, perceived change, constraints, and support needs
Child artefacts and project-wall records	Records spanning all 3 project cycles	Provided contextual evidence of question generation, comparison, revision, and return to prior ideas
Researcher memos	18 observation-linked memos plus analytic notes	Documented contextual interpretation, disconfirming evidence, and theme development

Worked enactment example from Project Cycle 2

Project Cycle 2 illustrates how the five-phase framework was enacted in practice. IT began by returning to unresolved child questions and project-wall records from the previous cycle, organised a shared investigation around a core question, supported small groups to compare materials or conditions, and used drawings, artefacts, and observation records to guide explanation and subsequent planning. Table 4 maps this enactment to the five phases.

Table 4 Five-phase enactment in Project Cycle 2

Phase	Enactment in Project Cycle 2	Teacher support	Evidence generated
Problem situation	Children revisited unresolved questions and earlier project-wall entries	Prompted recall and helped the group identify a question that could be investigated	Earlier drawings, questions, and project-wall entries
Project task	The class agreed on a core question and small groups developed investigation plans	Converted child questions into actionable tasks without prescribing one solution	Question list, task-chain plan, and group plans

Phase	Enactment in Project Cycle 2	Teacher support	Evidence generated
Inquiry activity	Groups compared contrasting materials or conditions, recorded differences, and revised methods	Used evidence-oriented prompts, delayed direct explanation, and supported peer comparison	Observation sheets, child records, photographs, and revised plans
Product expression	Groups used drawings, artefacts, records, and oral explanation to present their findings	Invited groups to explain decisions and compare different approaches	Drawings, artefacts, project-wall updates, and group explanations
Reflective assessment	Children compared findings with earlier ideas and identified unresolved questions	Used records to select subsequent materials and questions rather than judging only the final product	Reflection records and revised follow-up plans

Data analysis and trustworthiness

Reflexive thematic analysis was used to examine changes in teacher pedagogical behaviour and the conditions that supported or constrained implementation ^[14, 21]. The analysis involved repeated reading of the 18 observation records, four interview transcripts, three cycle-level planning sets, framework and revision documents, child artefacts and project-wall records, three expert-review records, and researcher memos. Initial codes were generated within each source and then compared across sources, project cycles, and the intervention and comparison classes. Related codes were developed into themes concerning curriculum organisation, teacher questioning, teacher-child interaction, documentation practice, child participation, and professional support. Interview transcripts were coded thematically and integrated with observation, planning, and documentary evidence. All interview quotations reported below are English translations of anonymised Chinese transcript excerpts.

Trustworthiness was strengthened through source triangulation, reflexive memo writing, attention to disconfirming evidence, and contextual comparison between IT and CT ^[22]. The structured observation records separated descriptive classroom events from the researcher's interpretive memo, reducing the risk that initial interpretation replaced description.

Each major theme was checked against classroom observations and at least one additional source, such as an interview transcript, planning material, child artefact, expert comment, or researcher memo. Evidence that qualified an emerging interpretation was retained, including IT's continuing concern about uncertainty and documentation workload and CT's occasional use of open discussion. Comparison-class evidence was used to challenge and refine the intervention-class themes rather than merely confirm them. Because the researcher contributed to framework design, implementation support, observation, and analysis, reflexive memos documented role-related assumptions and alternative explanations throughout coding.

RESULTS

The results focus on the pedagogical practice of IT, with CT providing contextual contrast. Findings are organised around themes developed through the integration of classroom observations, teacher interviews, planning materials, child artefacts, project-wall records, and researcher memos. Child-level evidence is used to contextualise participation and inquiry rather than as a measure of learning outcomes.

Curriculum organisation became more coherent and inquiry-oriented

Across the nine intervention-class observations, IT used the five-phase sequence to connect activities across the three project cycles. Earlier child questions, drawings, group plans, and artefacts were revisited when later tasks were introduced, while project-wall materials kept prior evidence visible during subsequent activity. Material stations and small-group roles further supported inquiry by giving children structured opportunities to investigate, compare ideas, and develop different representations. Across the nine comparison-class observations, CT more often organised classroom activity around discrete theme-based tasks and predetermined outputs.

In the post-implementation interview, IT explained:

I now first look at what questions the previous activity left behind before deciding what to do next. Before, I arranged activities one by one; now I think about how what emerged in one activity can enter the next. The task chain helped me a great deal.

By contrast, CT described a different organising logic:

I mainly connect activities according to the thematic unit and weekly plan. If content from the previous activity needs to be reviewed, I mention it again at the beginning of the next activity, but I do not turn every child question into a follow-up task.

Teacher questioning became more open and evidence-oriented

Observation records showed that IT increasingly used prompts that invited explanation and verification, including “What did you notice?”, “How can we find out?”, “Why do you think this happened?”, and “What could we try next?” IT also used incomplete child responses as starting points for further questions. Across the comparison-class observations, CT relied more heavily on recall, confirmation, and procedural questions that kept activity within the predetermined sequence.

IT reflected:

The most obvious change is that I remind myself not to explain immediately. The question bank gives me a pause; I first ask what they saw and how they know. If an answer is incomplete, I follow it with another question instead of giving the standard answer.

CT stated, “I still emphasise that children understand the task and the steps. Open discussion happens, but when it takes too long I need to bring the activity back to the planned objective.”

Teacher-child interaction became more dialogic

IT described the shift in her role:

I used to be more like someone checking the steps. Now I first stand back and watch how they work and listen to why they divide the roles that way. If they disagree, I ask them to explain their reasons before I decide whether to help.

CT described her regular role as “mainly walking around, reminding them of the rules, helping children who have difficulty, and demonstrating when necessary.”

Across the intervention-class observations, IT increasingly acted as a co-inquirer by observing children's strategies, asking them to explain decisions, inviting peers to compare ideas, and supporting negotiation of group roles. CT more commonly introduced the task, demonstrated procedures, monitored progress, and checked whether the final product met the expected form. The contrast was also visible in how each teacher responded to different child solutions: IT asked children to explain and test their reasoning, whereas CT more often provided a clarifying summary or demonstration.

Child participation provided contextual evidence of inquiry

Across the three intervention-class cycles, observation and artefact records documented children asking follow-up questions, comparing materials or proposed solutions, negotiating group roles, and returning to earlier drawings or plans when observations differed from expectations. These indicators show that the changed teacher routines created opportunities for sustained participation and inquiry. They are not interpreted as child-development outcomes or learning gains. IT noted that children “started to look back at earlier drawings and records themselves, and they asked peers why they used different materials.”

Documentation became a planning resource

IT collected and interpreted drawings, photographs, observation notes, project-wall materials, and group discussion records. During later activities, these records were used to identify what children had noticed, what remained unclear, and what could be investigated next. In the comparison class, documentation was used mainly to preserve the activity process, prepare environmental displays, and confirm activity completion.

IT explained, “After the activity, I look at what the children already know and where they are stuck, and then decide what materials to provide and what questions to ask next.” She also described the workload adjustment: “At first it felt more troublesome because I wanted to record everything. After the form was simplified, I recorded only what was genuinely related to the next plan, and the records became more useful.” CT stated that records were “mainly used to preserve the activity process, prepare displays, and document teaching” rather than routinely determine the next activity.

Change depended on the framework and professional support

The observed changes occurred within a combined implementation configuration. IT received the five-phase framework together with orientation, worked examples, a task-chain template, an open-question bank, collaborative review, and simplified documentation forms. The framework made the sequence of inquiry visible, while the accompanying supports helped IT interpret and sustain the new routines. CT did not receive the same support package and continued regular theme-based teaching.

IT explicitly linked the two components: “The five phases showed me the overall sequence, but without the examples, question bank, task chain, and discussion with others, I might still have understood them in the old way. For me, these elements worked together.” She added that continuation required “stable planning time, records that are not too complicated, and someone with whom to review the children's evidence and discuss the next step.” Table 5 summarises the cross-case patterns across the five analytic domains.

Table 5 Cross-case comparison across the five domains of pedagogical practice

Domain	Intervention teacher (IT)	Comparison teacher (CT)	Main supporting sources
Curriculum organisation	Connected activities through five-phase task chains; revisited earlier questions, plans, and artefacts	Followed thematic units and weekly plans; activities were more often discrete and output-oriented	9 observations per class; 3 planning sets; pre/post interviews; project-wall records
Teacher questioning	Used more open and evidence-oriented prompts; delayed direct explanation; used partial answers for follow-up	Used more recall, confirmation, and procedural questions to maintain the planned sequence	Observation records; IT and CT interview excerpts; open-question bank

Domain	Intervention teacher (IT)	Comparison teacher (CT)	Main supporting sources
Teacher-child interaction	Observed strategies, invited explanations and peer comparison, and supported role negotiation	Introduced tasks, demonstrated procedures, monitored progress, and checked products	Observation records; interview excerpts; researcher memos
Documentation practice	Used drawings, photographs, notes, and project-wall evidence to plan subsequent materials and questions	Used records mainly for process preservation, displays, and completion documentation	Observation records; artefacts; project walls; planning sets; interviews
Planning and professional support	Framework plus orientation, examples, task-chain template, question bank, collaborative review, and simplified forms	Continued regular theme-based planning without the same support package	Framework records; expert reviews; planning sets; interviews; researcher memos

DISCUSSION

This bounded case identifies specific mechanisms through which a preschool PjBL curriculum framework can reorganise teacher practice. The task-chain template externalised continuity across activities; the open-question bank interrupted habitual explanation and redirected attention toward children's evidence; project walls preserved earlier questions and artefacts across time; documentation routines connected assessment with next-step planning; and collaborative review helped stabilise new routines when uncertainty or workload encouraged a return to familiar practice. This mechanism-based account sharpens the contribution beyond the general claim that a framework mediated change ^[4, 19].

Curriculum design and professional development were intertwined. IT did not encounter the five phases as an abstract model: implementation included orientation, examples, planning templates, question prompts, feedback, and opportunities to review evidence. The study therefore cannot isolate the contribution of the five-phase framework from the accompanying support package. Its contribution is to describe a practice-oriented configuration in which curriculum structure and professional-learning tools jointly redirected attention and planning. This interpretation is consistent with research on sustained, practice-focused professional learning ^[9, 10, 26].

The findings offer design propositions for kindergarten leaders rather than evidence of established effectiveness. Schools can provide protected planning time, short evidence-review routines, manageable documentation, and collaborative discussion of child questions. Leaders should recognise that inquiry requires tolerance for uncertainty and that rigid product expectations can undermine dialogic exploration. The project-cycle example and cross-case matrix show how these supports can be translated into observable routines, while replication across teachers and settings is needed to evaluate transferability.

LIMITATIONS

Several limitations restrict the conclusions. The empirical base comprised one kindergarten, the two focal teachers (IT and CT), and 20 children. The eight-week period and one formative design cycle do not establish durable teacher change or intervention effectiveness. The comparison class strengthened contextual interpretation but did not provide experimental equivalence. The framework was implemented together with orientation, examples, collaborative review, and feedback, creating implementation-support confounding. Researcher involvement in framework design, implementation support, observation, and analysis may have influenced classroom behaviour and interpretation, and observation itself may have produced Hawthorne effects. Although reflexive memo writing, descriptive observation fields, disconfirming evidence, and cross-

source comparison strengthened trustworthiness, no independent observer or second analytic team was used. The child-participation indicators were qualitative, and no child learning outcomes were measured. Expert review was formative and did not include a formal content-validity index.

Future studies should examine multiple teachers, kindergartens, regions, and curriculum areas, use longer follow-up, and separate framework components from professional-development supports. Prospective protocols should retain observation timing metadata, implementation-fidelity records, complete planning-file inventories, independently verified transcript excerpts, and child-level evidence. Independent observers and external framework review would further strengthen the credibility of comparative conclusions.

CONCLUSION

This study developed a five-phase preschool PjBL curriculum framework and examined its enactment as a practice-oriented tool for IT in a Chinese kindergarten. Across three project cycles, the framework and its associated supports made inquiry continuity, open questioning, peer comparison, children's prior thinking, and documentation-based planning more visible in classroom practice. CT provided contextual contrast across the same launch, development, and closing stages, but the non-randomised design does not support causal attribution.

The contribution lies in identifying how task-chain planning, open-question prompts, project walls, documentation routines, and collaborative review may redirect teacher attention and support reflection-in-action. The framework is best understood as a provisional, practice-oriented mediating tool developed through formative review and examined in one bounded implementation, not as a validated intervention with established effectiveness. Replication across teachers and sites, independent observation, longer follow-up, and child-level evidence are required before broader claims can be made.

ACKNOWLEDGEMENTS

The authors thank the participating kindergarten, teachers, and children for their support of the project implementation. The authors also acknowledge the guidance and administrative support provided during the funded project.

Funding

This study was supported by the 2025 Young Scholars Growth Plan Special Project of the Shandong Provincial Philosophical and Social Sciences Innovation and Development Research Association, under the project titled Research on Preschool Curriculum Design and Teacher Pedagogical Behaviour Change from the Perspective of Project-Based Learning. Official grant number was Z-QNX25016.

Ethics Approval and Informed Consent

The study was reviewed and approved in 2025, before data collection, by the Ethics Review Committee of Shandong Vocational and Technical University of International Studies. Written informed consent was obtained from the participating teachers and from the parents or legal guardians of all children whose classroom activities were observed. Teachers and guardians received information about the study purpose, procedures, voluntary participation, confidentiality protections, and the right to withdraw without penalty. Children received age-appropriate explanations, and their willingness to participate was respected during classroom observations. All records were anonymized, and no personally identifiable information about the children, teachers, or kindergarten is reported.

Data Availability Statement

The qualitative data contain classroom and interview information involving teachers and young children and are not publicly available. De-identified excerpts and analytic materials may be made available by the

corresponding author on reasonable request, subject to institutional permission and participant confidentiality requirements.

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

1. Ministry of Education of the People's Republic of China. (2012, October 9). Notice on the issuance of the Guidelines for the Learning and Development of Children Aged 3–6 [in Chinese].
2. OECD. (2020). Early learning and child well-being: A study of five-year-olds in England, Estonia, and the United States. OECD Publishing.
3. Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140.
4. Markula, A., & Aksela, M. (2022). The key characteristics of project-based learning: How teachers implement projects in K–12 science education. *Disciplinary and Interdisciplinary Science Education Research*, 4, Article 2.
5. Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, 102, Article 101586.
6. Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, 19(3), 267–277.
7. Katz, L. G., & Chard, S. C. (2000). *Engaging children's minds: The project approach* (2nd ed.). Ablex.
8. Helm, J. H., & Katz, L. G. (2011). *Young investigators: The project approach in the early years* (2nd ed.). Teachers College Press.
9. Egert, F., Dederer, V., & Fukkink, R. G. (2020). The impact of in-service professional development on the quality of teacher–child interactions in early education and care: A meta-analysis. *Educational Research Review*, 29, Article 100309.
10. Sims, S., & Fletcher-Wood, H. (2021). Identifying the characteristics of effective teacher professional development: A critical review. *School Effectiveness and School Improvement*, 32(1), 47–63.
11. McKenney, S., & Reeves, T. C. (2018). *Conducting educational design research* (2nd ed.). Routledge.
12. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
13. Dewey, J. (1938). *Experience and education*. Macmillan.
14. Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE.
15. Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE.
16. Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.
17. Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199.
18. Egert, F., Fukkink, R. G., & Eckhardt, A. G. (2018). Impact of in-service professional development programs for early childhood teachers on quality ratings and child outcomes: A meta-analysis. *Review of Educational Research*, 88(3), 401–433.
19. Tawfik, A. A., Gish-Lieberman, J., Gatewood, J., & Arrington, T. L. (2021). How K–12 teachers adapt problem-based learning over time. *Interdisciplinary Journal of Problem-Based Learning*, 15(1).
20. Aljabreen, H. (2020). Montessori, Waldorf, and Reggio Emilia: A comparative analysis of alternative models of early childhood education. *International Journal of Early Childhood*, 52(3), 337–353.

21. Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597.
22. Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative data analysis: A methods sourcebook* (4th ed.). SAGE.
23. Zudaire, I., Buil, R., Uriz, I., & Napal, M. (2022). Mars Explorers: A science inquiry-based learning project in preschool. *International Journal of Early Childhood*, 54(2), 297–320.
24. Carlsen, K., & Clark, A. (2022). Potentialities of pedagogical documentation as an intertwined research process with children and teachers in slow pedagogies. *European Early Childhood Education Research Journal*, 30(2), 200–212.
25. Tan, X. R., & Yang, W. (2022). Pedagogical documentation as a curriculum tool: Making children's outdoor learning visible in a childcare centre in Singapore. *European Early Childhood Education Research Journal*, 30(2), 281–295.
26. Liu, M., Hedges, H., & Cooper, M. (2024). Effective collaborative learning for early childhood teachers: Structural, motivational and sustainable features. *Professional Development in Education*, 50(2), 420–438.