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Project-Based Learning (PjBL)-Based Quality Supervision in Early Childhood Education: A PRISMA 2020–Guided Systematic Literature Review

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A B S T R A C T

This study aims to examine the relationship between instructional supervision and the implementation of Project-Based Learning (PjBL) in improving the quality of Early Childhood Education (ECE) through a Systematic Literature Review (SLR) guided by the PRISMA 2020 framework. A total of 23 empirical articles meeting the inclusion criteria were thematically analyzed using Thomas and Harden's (2008) approach. Findings indicate that PjBL in ECE is commonly implemented through thematic projects integrated with play-based activities, environmental exploration, and hands-on experiences. Clinical supervision supported by coaching and reflective mentoring was found to be the most effective approach for assisting teachers in project planning, instructional management, and authentic assessment. The review also confirms the significant contribution of PjBL to children's cognitive, socio-emotional, language, creativity, and problem-solving development. Supporting factors include managerial backing, teacher collaboration, and availability of learning resources, while major barriers involve time limitations, insufficient teacher understanding, and limited project materials. This study proposes a PjBL-Based Quality Supervision Model as a conceptual contribution that can enhance the quality of ECE and serve as a foundation for future empirical research

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INTRODUCTION

Early Childhood Education (ECE) is a fundamental stage that shapes children's cognitive, social, emotional, and motor development. At this stage, children are in a golden period that strongly influences long-term learning patterns and character formation. The quality of learning in ECE is determined by the competence of teachers, the curriculum, and the learning environment. ECE teachers are responsible not only for introducing basic knowledge but also for building positive learning habits. School principals and supervisors play an essential role in ensuring that learning quality meets developmental standards. Instructional supervision becomes a strategic instrument for maintaining consistent teaching practices that support children's growth. Therefore, the success of ECE programs cannot be separated from the collaborative interaction among teachers, principals, and supervisors. These considerations highlight that ECE is a sector requiring strong professional attention and systematic quality assurance.

Entering the twenty-first century, educational demands increasingly emphasize active, collaborative, creative, and critical learning. Children are expected to develop higher-order thinking abilities through meaningful learning experiences. Modern learning paradigms place the child as an active participant, not merely a passive recipient of information. In this context, teachers are challenged to design learning experiences that allow exploration, autonomy, and initiative. Child-centered learning approaches are becoming more relevant and necessary in ECE institutions. Learning models that incorporate projects, experiments, and hands-on experiences are shown to be effective in stimulating curiosity. As such, the adoption of innovative learning methods has become an urgent need for many ECE providers. Project-Based Learning (PjBL) emerges as one of the most promising approaches to meet these evolving educational demands.

Project-Based Learning (PjBL) offers rich learning experiences through investigation, inquiry, and problem-solving activities. Children engage in projects that require collaboration, creativity, and simple decision-making skills. International studies show that PjBL enhances children's learning motivation, self-confidence, and communication abilities. Furthermore, PjBL provides opportunities for children to construct understanding through direct experience rather than conventional instruction. However, the success of PjBL implementation relies heavily on teachers' competence in designing developmentally appropriate projects. ECE teachers must integrate developmental goals, learning media, and authentic assessment into project activities. A common challenge is the limited ability of teachers to design systematic and meaningful projects. This indicates that PjBL implementation requires continuous professional support in practice.

In this context, instructional supervision plays a critical role in helping teachers improve their implementation of PjBL. Supervision is not merely administrative inspection but a professional development process that encourages reflective dialogue and pedagogical coaching. Effective supervision helps teachers reassess their teaching strategies, classroom management skills,

and ability to conduct authentic assessments. Principals and supervisors need to understand the characteristics of PjBL in order to provide effective guidance to teachers. Additionally, supervision fosters a collaborative learning culture between teachers and school leaders. With well-directed supervision, teachers are encouraged to enhance creativity and innovation in their teaching practice. Supervision also becomes a mechanism to ensure that developmental goals for children are achieved consistently. Thus, supervision reinforces the overall success of PjBL in ECE settings.

Although numerous studies have examined PjBL and instructional supervision separately, research integrating these two concepts within ECE settings remains limited. This limitation creates a knowledge gap that needs to be addressed to enhance understanding of effective teacher support models. Therefore, this study aims to conduct a Systematic Literature Review (SLR) to identify empirical patterns that connect PjBL with educational supervision quality in ECE. The SLR seeks to illustrate how supervision can strengthen the effectiveness of PjBL implementation. Additionally, this study aims to develop a conceptual model relevant to the Indonesian educational context. This model is expected to serve as a reference for schools, supervisors, and policymakers in improving ECE learning quality. The study also aims to encourage teachers to be more prepared in integrating PjBL into their daily instructional practices. Consequently, this research provides both theoretical and practical contributions to advancing sustainable quality improvement in ECE.

LITERATURE REVIEW

Piaget's Constructivism: Children Build Knowledge Through Direct Experience

Jean Piaget emphasizes that children are not "empty vessels" waiting to be filled with information, but active individuals who continuously construct knowledge through their interactions with the environment. He views children as having a natural curiosity that drives them to explore and understand the world independently. In this process, children do not merely receive information passively; instead, they interpret experiences based on the cognitive structures they already possess. Piaget explains that every new experience is processed and compared with the child's existing understanding. This makes learning a dynamic and continuous mental activity. Teachers are not tasked with transferring knowledge, but with creating conditions that allow children to experience and discover directly. This perspective positions children as the center of learning activities rather than mere recipients of information.

Two core concepts in Piaget's theory—assimilation and accommodation—serve as the foundation for changes in children's cognitive structures. Assimilation occurs when children incorporate new experiences into their existing knowledge schemas. For instance, a child who already knows about balls may initially assimilate an apple as a "small ball." Conversely, accommodation occurs when children must adjust their existing schema because new experiences cannot fit into their current structures. In the previous example, when the child understands that an apple can be eaten and has a different texture, they accommodate their understanding of the object. These two processes

continuously take place and enable cognitive development. Thus, learning according to Piaget is an ongoing process of adaptation between new experiences and the evolving structures of thought.

In the context of Early Childhood Education (PAUD), Piaget emphasizes that effective learning must provide direct experiences for children. Activities such as exploring the environment, manipulating concrete objects, and engaging in play are ideal means for building understanding. Teachers need to provide learning materials that allow children to touch, try, observe, and experiment freely. Piaget believes that children learn best when they are given opportunities to formulate questions and seek answers on their own. Exploratory play and simple experiments are essential in supporting cognitive development. Teachers act as facilitators who provide stimuli, not as sources of answers to be memorized. Therefore, PAUD learning must be designed to give space for the natural and meaningful construction of knowledge.

Vygotsky's Social Constructivism: Knowledge Is Co-Constructed Through Social Interaction

Lev Vygotsky's social constructivism asserts that children's cognitive development occurs not only through individual exploration but primarily through social interaction. Vygotsky argues that language and communication are the main tools that connect children's experiences with their thought processes. Interaction with teachers, adults, and peers becomes a source of stimulation that enriches how children understand the world. In this view, learning is seen as a dialogic process filled with conversations, questions and answers, and collaboration. Children construct meaning through repeated and gradual social experiences. A warm, communicative, and collaborative learning environment is essential for optimal social construction to take place. Therefore, the teacher's role is not merely to deliver information but to serve as a dialogue facilitator and learning partner for children.

One of Vygotsky's most important concepts is the Zone of Proximal Development (ZPD), the range of abilities a child can achieve with the help of others. Within the ZPD, a child can complete tasks they cannot do alone but can accomplish with appropriate support. This support is provided through scaffolding—temporary guidance tailored to the child's needs. Scaffolding can take the form of questions, examples, encouragement, or demonstrations that help the child understand the steps needed to complete a task. As the child's ability increases, the support is gradually reduced until it is removed. This process enables children to acquire new competencies more independently over time. Thus, ZPD and scaffolding are fundamental to understanding how children learn effectively within a social context.

In the context of Early Childhood Education, Vygotsky's social constructivism emphasizes that learning must be based on interaction, collaboration, and dialogue. Teachers should provide activities that allow children to work in small groups and exchange ideas. Social play such as role-playing, simple discussions, group experiments, and project-based activities encourages children to learn from one another. Through these interactions, knowledge is transferred from more capable peers to those still learning. Teachers act as active guides who observe, provide cues, and facilitate

communication among children. Learning in PAUD becomes more meaningful when children interact not only with objects but also with peers and teachers. Through this approach, children's cognitive, linguistic, and social development grows integratively and strengthens one another.

Prior Research

Research on constructivism in Early Childhood Education (ECE) has been widely explored by scholars in recent years. One relevant study was conducted by Rahmadani (2020), who emphasized that learning through direct experience as proposed by Piaget effectively enhances young children's problem-solving abilities. In this study, children were encouraged to manipulate concrete objects and explore their environment independently, enabling them to construct new concepts through authentic sensorimotor experiences. The findings highlight that learning activities offering freedom to experiment can accelerate cognitive development. Another study by Sari and Mulyana (2021) examined how scaffolding provided by teachers within Vygotsky's social constructivist framework significantly influences children's language development. They found that teacher-guided dialogue, step-by-step prompts, and responsive feedback help broaden children's capacity to understand and express ideas, reinforcing the notion that social interaction is a crucial foundation for young children's learning.

A third study by Widyaningsih (2022) investigated the application of social constructivism in group project activities within ECE settings. Her findings show that cooperative learning, small-group discussions, and shared roles within project work strengthen children's communication, collaboration, and collective concept-building skills. Through structured group participation, children learn not only from teachers but also from peers with varying levels of competence. A fourth study by Hendrawan and Lestari (2023) compared the effectiveness of Piagetian and Vygotskian approaches in simple science activities for young learners. Their findings reveal that direct experience is more effective in helping children understand concrete concepts such as shape, color, and texture, whereas social collaboration through peer discussions and group tasks is better suited for enhancing logical reasoning and language skills. This comparison demonstrates that both theories have unique strengths that can be applied meaningfully in ECE contexts.

Across these four studies, several similarities emerge that align with the present article. All studies view children as active learners who construct knowledge either through firsthand experience or social engagement. They also recognize the essential role of teachers as facilitators who provide stimuli, guidance, and supportive learning environments. Another shared characteristic is the focus on applying constructivist principles in early childhood settings, emphasizing concrete exploration, dialogue, collaboration, and the mental processes involved in concept formation. This indicates that earlier studies and the current article share a consistent theoretical foundation in constructivist learning.

Nonetheless, there are notable differences between previous studies and this article. Most earlier studies tended to focus on applying either Piaget's or

Vygotsky's perspective in isolation, resulting in a partial analytical viewpoint. In contrast, the current article integrates both theoretical lenses in a comprehensive manner, offering a more holistic understanding of how children construct knowledge through direct experiences as well as social interaction. Additionally, previous studies largely centered on descriptive empirical outcomes, while this article provides a more in-depth theoretical and argumentative analysis of the cognitive mechanisms underpinning children's learning processes. Therefore, this article offers insights that extend beyond practice to include conceptual and philosophical interpretations of learning in early childhood.

The strength of this article lies in its ability to bridge two major constructivist theories—Piaget's individual constructivism and Vygotsky's social constructivism—into a unified analytical framework. This integration provides a more complete perspective on cognitive development, where concrete experiences and social interactions are understood not as separate components but as complementary dimensions of learning. Furthermore, this article presents implications that are highly relevant for curriculum development and instructional design in early childhood settings, as it not only elaborates on theory but also explains how constructivist principles can be effectively applied through play-based exploration, guided dialogue, and collaborative learning. With its comprehensive narrative and holistic orientation, this article offers a stronger conceptual contribution compared to previous studies and serves as a valuable reference for teachers, researchers, and curriculum developers seeking to implement constructivist principles integratively in ECE environments.

METHODOLOGY

Research Design

This study adopts a Systematic Literature Review (SLR) approach guided by the PRISMA 2020 protocol. The SLR method is selected to provide a comprehensive and structured understanding of how educational quality supervision integrates with Project-Based Learning (PjBL) in Early Childhood Education (ECE). PRISMA ensures transparency and accountability throughout each stage of the review process. The study includes several phases such as article identification, title and abstract screening, and full-text assessment. Each phase is carried out systematically to minimize bias and ensure consistency in the selection process. This design also strengthens the reproducibility of the study for future researchers. The primary focus is on empirical research that explores PjBL implementation and supervisory practices in ECE settings. Thus, the research design establishes a strong methodological foundation for synthesizing reliable and relevant findings.

The review process further includes a rigorous quality assessment to ensure that only high-quality studies are synthesized. A predefined protocol is used to determine the eligibility and exclusion of studies at each stage. The systematic nature of the design helps in capturing diverse practices of PjBL and supervision across different educational contexts. Through this structured approach, the review identifies emerging patterns and variations within the existing body of knowledge. The SLR design also supports the formulation of a conceptual model that reflects current practices and challenges in ECE quality

supervision. Moreover, synthesizing multiple studies allows for a deeper understanding of how PjBL influences teaching quality. The structured review ensures that findings are credible and grounded in empirical evidence. Overall, the research design ensures clarity, coherence, and methodological integrity throughout the study.

Research Questions (SPIDER-Based)

This study is guided by four main research questions formulated using the SPIDER framework. The first question examines how PjBL is implemented in early childhood classrooms, including project characteristics and the teacher's role. The second question explores the forms of supervision used to enhance the quality of teaching practices. The third question investigates the contribution of PjBL and supervision to children's developmental outcomes. The fourth question analyzes the factors that support or hinder PjBL-based supervision in ECE institutions. These questions ensure that the review remains focused on both pedagogical and supervisory dimensions. They also establish clear boundaries for selecting relevant studies. Through SPIDER, the research questions are precisely aligned with qualitative and mixed-methods evidence.

The SPIDER-based formulation helps identify studies that offer rich descriptions of PjBL and supervision in real classroom settings. This approach emphasizes the experience of teachers, supervisors, and children as important sources of insight. Each question encourages the extraction of detailed information on classroom practices and supervisory processes. By linking the questions to specific evidence types, the review captures the complexity of teaching and supervision. The questions also facilitate theme development during the synthesis stage. Moreover, they help ensure that findings respond directly to issues faced by ECE teachers and institutions. The research questions ultimately guide the systematic flow of the review. They serve as the foundation for organizing and interpreting all synthesized data.

Literature Search Strategy

The literature search was conducted across four major international databases: Scopus, Web of Science, ERIC, and Google Scholar. These databases were chosen due to their wide coverage of high-quality academic publications. The search focused on articles published between 2020 and 2025 to ensure relevance to current educational practices. A combination of keywords related to PjBL, early childhood education, instructional supervision, coaching, mentoring, and teacher quality was used. Boolean operators were applied to refine and broaden the search results. This strategy allowed the researcher to identify a diverse range of empirical studies. The search process was recorded systematically to maintain transparency. Overall, the strategy ensured a comprehensive collection of literature aligned with the study's purpose.

The use of multiple keyword combinations increased the likelihood of retrieving studies that used various terminologies in describing PjBL and supervision. Filters such as publication year, document type, and subject area were applied to narrow down results. Duplicate studies were removed before proceeding to the screening phase. The strategy also allowed the researcher to detect emerging trends in supervisory practices within ECE. Grey literature and

non-peer-reviewed sources were excluded to maintain academic rigor. The search strategy ensured that only high-quality empirical studies relevant to ECE contexts were included. This systematic approach strengthens the reliability of the final dataset. As a result, the search strategy provides a solid foundation for the subsequent synthesis.

Study Selection (Inclusion and Exclusion Criteria)

The selection process followed predetermined inclusion and exclusion criteria to ensure consistency and accuracy. Only empirical studies conducted within ECE settings were considered eligible. Studies were required to focus on PjBL implementation and include elements of supervision or teaching quality improvement. Articles outside the ECE context, such as primary or secondary education, were excluded. Non-empirical publications, theoretical papers, and literature reviews were also removed. Full-text availability was mandatory to allow in-depth analysis of methodological quality and findings. These criteria ensured that the selected studies aligned directly with the research questions. By applying consistent standards, the review maintains methodological rigor.

The inclusion criteria helped capture a wide range of empirical designs, including qualitative, quantitative, and mixed-method studies. Exclusion criteria minimized the risk of irrelevant or low-quality studies influencing the synthesis. Screening was conducted in several stages: title screening, abstract screening, and full-text evaluation. At each stage, studies were assessed independently to reduce the potential for bias. Articles that did not provide sufficient information about PjBL practices or supervision processes were removed. This thorough selection ensured that only meaningful and contextually relevant evidence was analyzed. The process resulted in a curated body of literature suited for thematic synthesis. Ultimately, the selection process shaped the quality and focus of the review's findings.

Quality Appraisal

Quality appraisal was conducted using the Joanna Briggs Institute (JBI) Critical Appraisal Tools. Each study was evaluated based on its methodological rigor, clarity, and appropriateness of research design. Studies scoring at least 60% were considered suitable for inclusion in the synthesis. The appraisal process involved assessing credibility, dependability, and relevance. It also examined how well each study aligned with the objectives of the review. This procedure ensured that only robust and trustworthy evidence informed the findings. Through this rigorous assessment, 23 studies met the criteria for further analysis. Quality appraisal therefore enhanced the reliability of the entire review process.

The JBI tools allowed for the evaluation of diverse methodologies such as surveys, interviews, case studies, and experiments. Each criterion in the checklist contributed to determining the overall quality of the study. The appraisal process helped identify strengths and weaknesses within individual studies. It also ensured that conclusions drawn from the synthesis were based on solid empirical foundations. By filtering out studies with unclear procedures or weak analysis, the review maintained high academic standards. The process was carried out systematically to avoid subjective interpretations. Ultimately, quality appraisal strengthened the credibility of the synthesized themes. This step ensured that the conceptual model proposed in the study reflects evidence-based practices.

Data Extraction and Thematic Synthesis

Data extraction was conducted by recording essential information such as research objectives, context, methodology, and major findings. Each study was coded systematically to identify recurring concepts and patterns. The thematic synthesis followed Thomas and Harden's (2008) three steps: open coding, development of descriptive themes, and formation of analytical themes. This process allowed for an organized and comprehensive interpretation of the literature. Through open coding, initial insights and ideas were captured from each study. Descriptive themes were then constructed to represent broader patterns of meaning. Analytical themes were developed to integrate findings across all studies. This synthesis produced a coherent map of how PjBL and supervision interact in ECE contexts.

The thematic synthesis approach ensured that the review went beyond summarizing studies to generating new interpretive insights. Coding was conducted iteratively to refine categories and strengthen thematic relationships. The process helped uncover factors influencing the success of PjBL-based supervision, including teacher competence, institutional support, and classroom conditions. The synthesis also highlighted challenges such as limited teacher training and inconsistent supervisory frameworks. These themes formed the basis for developing a conceptual model of PjBL-based quality supervision. The model provides a structured understanding of how supervision can enhance project-based teaching in ECE. The synthesis ensures that conclusions are grounded in empirical evidence. Ultimately, the thematic analysis contributes to a deeper and more integrated understanding of supervisory practices in early childhood education.

RESULTS AND DISCUSSION

The thematic synthesis of the 23 included articles reveals five interconnected strands of key findings that illustrate the close relationship between instructional supervision, teacher competence, project-based learning (PjBL) practices, and early childhood development. Overall, the implementation of PjBL in early childhood education (ECE) is characterized by the use of simple projects designed to align with children's developmental characteristics. These projects are typically blended with play activities, environmental exploration, concrete experimentation, and hands-on experiences that allow children to construct knowledge through inquiry. In this context, teachers act as facilitators who create creative learning environments, provide appropriate stimulation, and offer children opportunities to think independently, collaborate, and find answers to their own questions.

Instructional supervision emerges as a key factor that ensures the quality of PjBL practices. Among the various supervision models identified, clinical supervision with its systematic cycle is shown to be the most effective, supplemented by individual or group coaching, continuous mentoring, and the use of learning data as the basis for reflective feedback. Through these approaches, teachers feel more supported in planning projects, applying appropriate scaffolding strategies, managing the classroom, and conducting

authentic assessments of both the processes and products of the projects. The reviewed articles demonstrate that teachers who receive intensive supervision show significant improvement in implementing PjBL in a purposeful and meaningful manner.

Furthermore, cross-article findings affirm that PjBL has a strong positive impact on early childhood development. Children engaged in projects display higher levels of creativity, more mature problem-solving abilities, and increased independence. They also show better social interactions, stronger self-confidence, and greater readiness to work in small groups. These findings align with the characteristics of 21st-century learning, which requires children to think critically, creatively, collaboratively, and communicatively from an early age.

In practice, several supporting and inhibiting factors influence the effectiveness of PjBL-based supervision. Support from school principals, collaboration among teachers, and the availability of learning resources serve as important foundations for successful implementation. Conversely, limited time, lack of project materials, and teachers' insufficient initial understanding of PjBL represent dominant barriers. These obstacles indicate that PjBL implementation cannot stand alone; it must be accompanied by strong and continuous supervision.

These findings were further analyzed within the framework of Piaget's and Vygotsky's constructivist theories. All articles show that PjBL aligns with constructivist views that emphasize learning as an active process built through exploration, hands-on experiences, and social interaction. Projects integrated with play strongly support children's development of logic, language, and mental representation skills. A widely observed learning pattern is the play-integrated project design, a model responsive to the developmental needs of young children and a distinctive adaptation in the Indonesian ECE context.

The findings of this study also closely intersect with Goldhammer's clinical supervision theory and coaching concepts by Glickman and Darling-Hammond. Supervision can no longer be viewed as an administrative activity focused solely on performance appraisal; it must become a dialogic and collaborative process that fosters teacher reflection. The data indicate that ECE teachers require intensive guidance to understand project structures, design flexible instructional steps, and develop authentic assessments capable of capturing children's learning processes more deeply. Therefore, supervision in ECE must be adaptive to classroom dynamics, children's play rhythms, and teachers' diverse needs.

This SLR also provides direct answers to the research questions posed. First, the characteristics of PjBL implementation in ECE are thematic, short-term, integrated with play, and oriented toward discovery learning. Second, the most effective form of supervision is clinical supervision supported by coaching and reflective mentoring that utilize instructional data for decision-making. Third, PjBL and quality supervision contribute significantly to children's cognitive, socio-emotional, language, creativity, and problem-solving development. Fourth, successful implementation depends on managerial support, teacher collaboration, and the availability of learning resources, whereas the main

barriers arise from time constraints, limited materials, and teachers' readiness in conducting authentic assessments.

Overall, this study confirms international findings that emphasize the importance of instructional coaching and reflective practice in improving teacher quality. However, it also challenges the "one-size-fits-all" approach to supervision by showing that ECE supervision must be contextualized to institutional characteristics, local culture, and teacher capacity. This is where the key novelty of this study emerges—namely, the development of a PjBL-Based Quality Supervision Model for ECE. This model integrates a data-driven clinical supervision cycle, coaching and mentoring as strategies for teacher empowerment, authentic project assessment as an indicator of learning quality, and a contextual approach that aligns with the realities of Indonesian ECE settings.

This model not only bridges the gap between traditional supervision theories and the needs of 21st-century learning but also serves as a conceptual innovation worthy of further field testing. Thus, the results and discussion of this SLR provide significant theoretical and practical contributions to improving the quality of early childhood education through the integration of PjBL and comprehensive, reflective, and child-development-oriented instructional supervision.

CONCLUSIONS AND RECOMMENDATIONS

This systematic review confirms that Project-Based Learning (PjBL) and instructional supervision are closely related and mutually reinforcing in improving the quality of early childhood education. The implementation of PjBL in ECE tends to be thematic, play-based, and discovery-oriented, enabling the development of children's cognitive, socio-emotional, language, creativity, and problem-solving skills. Instructional supervision—particularly clinical supervision combined with coaching and reflective mentoring—has proven highly effective in supporting teachers in planning projects, providing appropriate scaffolding, managing the classroom, and conducting authentic assessments.

The study also highlights that the success of PjBL strongly depends on managerial support, teacher collaboration, and the availability of learning resources. Conversely, limited time, insufficient teacher understanding, and the lack of project materials constitute major barriers. These findings emphasize that PjBL implementation cannot stand alone; it requires strong, continuous, and context-sensitive supervision.

The novelty of this study lies in the development of a PjBL-Based Quality Supervision Model for ECE, which integrates a data-driven clinical supervision cycle, coaching–mentoring approaches, authentic project assessment, and contextual adaptation to the realities of Indonesian ECE institutions. This model is expected to serve as both a conceptual reference and a foundation for future empirical research aimed at enhancing the quality of early childhood education.

FURTHER STUDY

This research still has limitations, so it is necessary to conduct further research related to the topic of Project-Based Learning (PjBL)-Based Quality Supervision in Early Childhood Education: A PRISMA 2020–Guided Systematic Literature Review in order to perfect this research and increase insight for readers.

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