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TRANSFORMING EARLY CHILDHOOD EDUCATION THROUGH DIGITAL PLAY AND INTERACTIVE FLAT PANELS

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Abstract

This study explores the implementation of technology-enhanced Play-Based Learning (PBL) through the use of Interactive Flat Panels (IFPs) in an early childhood education context. Adopting a qualitative case study design at TK Masyithoh Mambaul Ulum Paiton, data were collected through classroom observations, semi-structured interviews with teachers and parents, and analysis of instructional documentation. The study examines how digital pedagogy is enacted within play activities and how such practices relate to holistic child development. Findings suggest that PBL was deliberately structured by aligning developmental objectives with integrated concrete, role-based, and digital play scenarios. The incorporation of IFP technology appeared to influence patterns of classroom engagement, particularly in children's attentional focus and collaborative interaction. Observational data indicate that language and social-emotional domains were more prominently stimulated, while fine motor and analytical domains received comparatively less emphasis. Rather than asserting causal effectiveness, this study provides a context-sensitive account of how digital tools are pedagogically interpreted and integrated within play-based instruction. The findings underscore the importance of teacher readiness and intentional design in shaping balanced developmental stimulation. This case contributes to ongoing discussions on digital pedagogy in early childhood education by highlighting the complexities of integrating interactive technology within a holistic Play-Based Learning framework.

Keywords: *Play Based Learning; Interactive Flat Panel (IFP); Early Childhood Development; Digital Learning Media.*

Abstrak

Penelitian ini mengeksplorasi implementasi Play-Based Learning *(PBL) berbasis teknologi melalui pemanfaatan* Interactive Flat Panels *(IFPs) dalam konteks pendidikan anak usia dini. Dengan menggunakan pendekatan kualitatif jenis studi kasus di TK Masyithoh Mambaul Ulum Paiton, data dikumpulkan melalui observasi pembelajaran di kelas, wawancara semi-terstruktur dengan guru dan orang tua, serta analisis dokumentasi pembelajaran. Penelitian ini mengkaji bagaimana pembelajaran digital diimplementasikan dalam aktivitas bermain dan praktik tersebut berkaitan dengan perkembangan anak secara holistik. Temuan menunjukkan bahwa PBL dirancang secara sadar dengan menyelaraskan tujuan perkembangan anak ke dalam skenario bermain yang terintegrasi, mencakup aktivitas konkret, bermain peran, dan permainan digital. Integrasi teknologi IFP tampak memengaruhi pola keterlibatan di kelas, khususnya dalam hal fokus perhatian anak dan interaksi kolaboratif. Data observasi mengindikasikan bahwa domain bahasa dan sosial-emosional lebih banyak terstimulasi, sementara domain motorik halus dan analitis memperoleh perhatian yang relatif lebih terbatas. Alih-alih menegaskan efektivitas secara kausal, penelitian ini menyajikan pemahaman yang kontekstual mengenai bagaimana perangkat digital dimaknai dan diintegrasikan secara pedagogis dalam pembelajaran berbasis bermain. Temuan ini menegaskan pentingnya kesiapan guru dan perancangan pembelajaran yang disengaja dalam membentuk stimulasi perkembangan yang seimbang. Studi kasus ini berkontribusi pada diskursus mengenai pembelajaran digital dalam pendidikan anak usia dini dengan menyoroti kompleksitas integrasi teknologi interaktif dalam kerangka* Play-Based Learning *yang holistik.*

Kata Kunci: *Play-Based Learning; Interactive Flat Panel (IFP); Anak Usia Dini; Media Pembelajaran Digital.*

INTRODUCTION

Contemporary early childhood education faces increasing tension between developmentally appropriate practice and academic acceleration. In many contexts, instructional practices emphasize early literacy and numeracy at the expense of exploratory and socio-emotional experiences. Such tendencies contrast with constructivist and socio-cultural theories of development (Piaget, 1962; Vygotsky, 1978), which position play as central to cognitive and social growth.

Recent scholarship highlights the potential of Play-Based Learning (PBL) to support multidimensional development (Weisberg et al., 2013; Zosh et al., 2017). At the same time, the rapid expansion of digital technologies has transformed learning ecologies in early childhood classrooms. Digital play, when pedagogically structured, may extend opportunities for engagement and representation

(Edwards, 2016; Marsh et al., 2016). However, research on technology integration in early childhood education often focuses on well-resourced urban settings. Limited attention has been given to how interactive technologies are interpreted and enacted in small or resource-constrained institutions.

However, empirical evidence suggests a gradual shift toward academic acceleration in early childhood institutions, particularly in literacy and numeracy. Sapriani and Depaliana (2025) describe this phenomenon as an "acceleration bias," in which school readiness is narrowly defined through measurable academic indicators. Studies across various contexts indicate that increased instructional time devoted to worksheets and teacher-directed tasks often reduces opportunities for exploratory and imaginative play. This shift may result in diminished intrinsic motivation, lower engagement, and uneven developmental stimulation across domains.

This misalignment is observable at TK Masyitoh Paiton, Probolinggo. Preliminary observations revealed that play activities were frequently positioned after academic sessions and functioned primarily as transitional or recreational activities rather than as the central instructional strategy. Teachers reported awareness of play-based principles, yet implementation remained inconsistent and insufficiently structured. As a result, developmental stimulation tended to concentrate on cognitive and gross motor domains, while fine motor, systematic thinking, and certain aspects of creativity received less emphasis. These conditions reflect a broader pedagogical paradigm in which academic completion is prioritized over holistic developmental balance.

Play-Based Learning (PBL) has been widely proposed as an alternative framework capable of addressing such imbalance. Research by Cheung et al. (2022), Yin et al. (2024), and Haile and Ghirmai (2024) demonstrates that intentionally designed PBL can simultaneously stimulate multiple developmental domains, including executive function, language acquisition, social competence, and creativity. Importantly, these studies emphasize that effective PBL requires structured planning, teacher facilitation, and alignment with developmental goals rather than reliance on spontaneous free play alone.

Nevertheless, much of the existing PBL research has been conducted in well-resourced institutions with strong pedagogical infrastructures and sustained professional development systems. Limited research has explored how PBL can be systematically implemented in small, locally based early childhood institutions operating under constraints such as limited play materials, varying levels of teacher digital literacy, and administrative pressures. Consequently, a contextual research

gap remains regarding how structured PBL models can be adapted in resource-limited environments without compromising developmental integrity.

The emergence of Interactive Flat Panel (IFP) technology introduces new possibilities for enriching PBL implementation. As touchscreen-based multimedia tools, IFPs provide multisensory stimuli that can enhance engagement and expand exploratory opportunities. Digital applications such as Marbel Islamic Kids offer interactive features capable of supporting early literacy, memory reinforcement, and moral concept internalization. However, the pedagogical effectiveness of such technologies remains contingent upon teachers' ability to integrate them meaningfully within developmentally appropriate play designs. Moreover, limited empirical research has examined how technology-enhanced PBL influences the distribution of stimulation across the six domains of early childhood development in non-urban contexts.

In response to these theoretical and contextual gaps, this study investigates the implementation of Play-Based Learning integrated with Interactive Flat Panel technology at TK Masyitoh. Rather than assuming that digital integration automatically enhances learning, this research critically examines how play design, teacher readiness, and technological utilization interact to shape developmental outcomes. The study also pays particular attention to whether the integration of digital media contributes to balanced stimulation across cognitive, language, motor, social-emotional, moral, and creative domains.

This study aims to optimize six domains of early childhood development through a play-based learning (PBL) approach. To achieve this objective, the research employed a qualitative approach with a case study design (Winarni, 2021). A case study was selected as it allows the researcher to observe and analyze in depth the implementation of PBL within an early childhood education context, as well as its impact on children's development (Subhaktiyasa et al., 2025). Specifically, this study analyzes how Play-Based Learning is designed and implemented in a resource-limited early childhood education setting, examines how Interactive Flat Panel (IFP) technology is pedagogically integrated into PBL activities, identifies patterns of developmental stimulation emerging from technology-enhanced PBL implementation, and evaluates the balance of developmental outcomes across the six domains of early childhood development.

RESEARCH METHODS

The research participants consisted of 15 children from Group B at TK Masyithoh Mambaul Ulum Paiton, Probolinggo (8 boys and 7 girls), five classroom teachers, and four parents/guardians who served as supporting informants to

provide a more comprehensive perspective on the implementation of Play-Based Learning (PBL) and its relation to children's development.

The study was conducted over a one-month period from July to August. Data were collected using multiple instruments (Dewi & SH, 2025), including: (1) an observation protocol to document children's behaviors and developmental progress during play-based activities; (2) semi-structured interview guidelines for teachers and parents to explore their experiences and perceptions of PBL implementation; (3) documentation in the form of photographs, videos, and daily instructional records; and (4) a brief parent questionnaire to complement data on children's developmental experiences in the home environment.

Table 1. Interview Protocol Matrix for Teacher and Parent Participants

No.	Participant Code	Participant Group	Age (years)	Role/Relationship	Interview Focus Areas
1	T1	Teacher	34	Homeroom Teacher, Group B1	Understanding of play-based learning (PBL); instructional planning; social–emotional interaction; teacher role
2	T2	Teacher	29	Assistant Teacher	Cognitive development; motor development; effectiveness of play activities; teacher facilitation
3	T3	Teacher	41	Curriculum Coordinator	Alignment of developmental objectives; developmental assessment; language stimulation
4	T4	Teacher	32	Arts and Creativity Teacher	Fine motor skills; creativity; imaginative play; teacher's stimulative role
5	T5	Teacher	27	Moral Education and Habituation Teacher	Moral values; rules in play; emotional regulation
6	P1	Parent	33	Mother of AN (Group B)	Perceptions of PBL; behavioral changes; motor development;

					language development; creativity
7	P2	Parent	38	Father of FR (Group B)	Cognitive development; language development; parental support; expectations of PBL
8	P3	Parent	36	Mother of MK (Group B)	Social–emotional development; moral values; behavioral changes; parental role
9	P4	Parent	42	Father of DR (Group B)	Motor development; social–emotional development; family support; expectations of the school

Data analysis was conducted using thematic analysis techniques. Data collected from observations, interviews, documentation, and questionnaires were categorized and subsequently analyzed to identify major themes relevant to the six domains of early childhood development, namely moral–spiritual, cognitive, language, physical–motor, social–emotional, and artistic development. To ensure data trustworthiness, source and method triangulation were employed, along with member checking involving educators and parents to verify the accuracy of data interpretation. This study also adhered to established research ethics principles, including obtaining informed consent from the school and parents, maintaining the confidentiality of participants' identities, and ensuring that participation was voluntary and free from coercion. Through this approach and methodology, the study is expected to provide a more comprehensive understanding of the effectiveness of play-based learning in optimizing the six domains of early childhood development.

RESULTS AND DISCUSSION

Results

Through observations, interviews with educators and parents, and analysis of learning activities, the study provides an overview of the stages employed in the effective implementation of play-based learning (PBL) within early childhood learning processes.

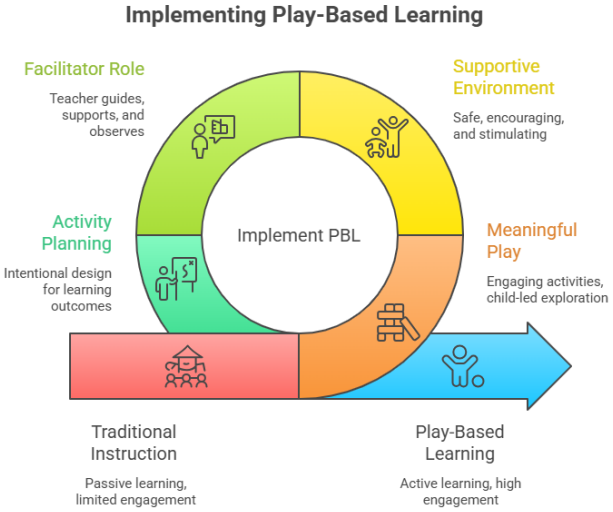

Figure 1. Implementation of Play-Based Learning (PBL)

First, findings indicate that although teachers conceptually recognize play as an appropriate pedagogical approach, its implementation has not consistently positioned play as the primary instructional strategy. In general, teachers reported an understanding that play constitutes an ideal approach for early childhood education; however, its implementation has not been consistent and has not yet been designed as the primary instructional strategy (Dzamesi et al., 2025). Academic demands continue to shape classroom practices. As one teacher stated, *"We want to incorporate more play, but academic targets often lead us back to worksheet-based activities."* Observations confirmed that play frequently functioned as a complementary activity rather than a core learning strategy, with limited variation in role play, exploratory science play, and creative activities. This statement illustrates that the pressure to achieve basic academic skills—such as reading, writing, and numeracy—continues to dominate teachers' pedagogical paradigms. Furthermore, classroom observations revealed that play activities were more frequently conducted after academic sessions, positioning play as a supplementary activity rather than an integral component of the learning process (Kim et al., 2024).

Data derived from the observation protocol indicate that the implementation of Play-Based Learning (PBL) at TK Masyithoh demonstrates both progressive integration and structural imbalance across developmental domains. Observations conducted during July–August reveal that play activities were implemented regularly; however, their duration and frequency varied depending on academic scheduling demands.

In sessions integrating Interactive Flat Panels (IFPs), children displayed heightened attentional focus, particularly during interactive digital tasks such as drag-and-drop matching, quizzes, and animated storytelling through the *Marbel Islamic Kids* application. Children demonstrated collaborative engagement by negotiating turn-taking and discussing answer choices before selecting responses on the screen.

However, observational records also indicate that social–emotional and language stimulation occurred more prominently than fine motor and analytical skill development. While children actively engaged in group dialogue and role play, activities requiring sequential reasoning or manipulative precision (e.g., beading, structured pattern construction) were implemented less consistently.

Teacher intervention patterns were also noted. In several instances, teachers provided directive guidance during play, occasionally limiting children's independent problem-solving processes. These findings suggest that while digital PBL increased engagement, its developmental distribution remained uneven.

Second, regarding technology integration, the incorporation of IFP and the *Marbel Islamic Kids* application introduced new forms of digital engagement. Teachers who received internal training demonstrated greater readiness in aligning digital features with developmental objectives. One teacher (RH) explained, *"When using the IFP, children appear more focused. While playing Marbel Islamic Kids, they work together to choose answers and explain to each other."* However, the effectiveness of digital play depended largely on pedagogical preparation rather than the technology itself.

Data presented in the table indicate that play-based learning at TK Masyitoh is being implemented, yet remains insufficiently structured. The frequency of structured play activities is relatively low, occurring only a few times per week and for limited durations. The types of play employed also lack variety; most activities consist of simple physical play or worksheet-based tasks presented in a game-like format. Key forms of play—such as role play, science exploration, and creative play—are rarely implemented due to limited resources and teachers' pedagogical understanding (Mundofi, 2025). Although children demonstrate enthusiasm during play activities, these sessions are often interrupted by overly dominant teacher intervention. Play corners available in the classroom, such as block corners, dramatic play areas, and art corners, are seldom utilized as spaces for exploration. The data further reveal that developmental stimulation predominantly targets cognitive skills and gross motor development, while social–emotional development and creativity receive limited attention. This condition is reinforced by teachers' acknowledgment that shared play rules have not been systematically established,

resulting in frequent minor conflicts among children during play (Legi et al., 2025). Thus, the table illustrates that PBL implementation has not yet been fully structured and has not maximized the potential of play as an instrument for holistic child development.

Patterns emerging from the visual data suggest that play activities at TK Masyitoh have not yet been positioned as a core learning strategy, but rather function as a complement to academic instruction. The inconsistency in play duration and frequency indicates that PBL has not been recognized as a primary necessity for nurturing early childhood potential (Qayyum et al., 2024). Another pattern observed is the predominance of physical play and worksheet-based activities, reflecting teachers' continued reliance on instructional rather than exploratory learning approaches. The limited use of play corners further suggests that the learning environment has not been intentionally designed to support children's independent exploration (Twum, 2025). Frequent teacher interruptions and directive interventions during play indicate a limited understanding of the essential principles of PBL, particularly the importance of allowing children to initiate activities and resolve minor conflicts autonomously. Moreover, an imbalance is evident in the developmental domains being stimulated; teachers tend to emphasize motor and cognitive development, while social–emotional development receives comparatively less attention. Overall, these patterns indicate that play-based learning has not been optimally implemented due to constraints in pedagogical understanding, play resources, and supportive learning environment design (Aisyah et al., 2024).

These patterns emerge largely from the tension between early academic demands and principles of early childhood development. Teachers continue to perceive learning success primarily through children's ability to complete written tasks or achieve specific academic competencies, leading to a reduction in play time. Excessive teacher intervention during play further suggests insufficient professional training on facilitating play without diminishing children's spontaneity. Additionally, the limited availability of creative play materials and the underutilization of exploration corners indicate restricted institutional support in providing a stimulus-rich learning environment (Ningrum et al., 2023). The imbalance in developmental stimulation also reflects a limited understanding that play not only enhances cognitive and motor skills but also serves as a fundamental medium for developing social competence, emotional regulation, and creativity. These findings underscore that optimizing PBL requires a paradigm shift among teachers—from instruction-centered learning toward exploration-centered learning. Accordingly, this study emphasizes that the success of play-based learning

is determined not solely by the availability of play materials, but also by teachers' readiness, activity design, and a learning environment that holistically supports children's developmental processes.

Third, patterns of developmental stimulation revealed an imbalance. Social-emotional and language domains showed significant growth through collaborative play and digital interaction. A parent (Mrs. ML) noted, *"My child is now more socially confident and willing to share."* Similarly, another parent (Mrs. YN) observed improved recall and confidence after role-playing angel characters. In contrast, fine motor skills and systematic cognitive abilities developed more slowly due to limited manipulative and analytical play activities.

Educators play a central role in creating an environment conducive to educational play activities. This includes organizing classroom spaces that allow children to move freely, providing a variety of play materials that stimulate creativity, and fostering a safe and comfortable atmosphere. Classrooms that offer free-play areas with diverse media—such as sand, water, blocks, and art materials—provide children with opportunities to experiment, imagine, and explore independently.

At TK Masyithoh Mambaul Ulum, the implementation of play-based learning (PBL) through the creation of a supportive learning environment constitutes a key strategy for optimizing the six domains of early childhood development, namely cognitive, motor, language, social, emotional, and moral development. Each environmental element is intentionally designed to encourage enjoyable and exploratory learning experiences. One of the primary principles underlying this approach is granting children autonomy to choose and engage with various forms of play that align with their developmental stages, enabling them to learn actively, creatively, and meaningfully.

Research findings indicate that the integration of play-based learning (PBL) with Interactive Flat Panel (IFP) technology at TK Masyitoh Karanganyar, Paiton, Probolinggo, is carried out through a series of relatively complex preparatory stages and does not rely solely on teachers' classroom improvisation. Observational and interview data reveal that teacher readiness is a decisive factor in the successful implementation of technology-enhanced PBL. Prior to using the IFP, teachers participated in internal training sessions specifically focused on mastering device navigation, selecting age-appropriate applications, and designing play scenarios that connect technological functions with children's developmental objectives. Teachers subsequently conducted independent trials to ensure that IFP features—such as touchscreen responsiveness, audio support, and visual displays—functioned optimally and could be integrated smoothly into the learning process.

This stage underscores that the effective use of technology is inseparable from teachers' pedagogical preparedness in designing meaningful play experiences.

In digital play activities, teachers' preparation in selecting and adapting the Marbel Islamic Kids application emerged as a crucial finding of this study. Teachers did not select the application solely based on its alignment with religious themes, but also carefully considered game levels, types of interactive activities, and duration of use to ensure alignment with children's attention capacities. Teachers designed structured play sequences, beginning with an introduction to the interface, followed by guided facilitation as children completed interactive tasks, and concluding with reflective discussions after gameplay. This approach demonstrates that digital games possess pedagogical value only when they are supported by deliberate instructional design and explicitly linked to developmental goals.

The use of IFPs within PBL was found to have a significant impact on children's learning dynamics. Observations showed that vibrant visual displays, rapid touch responses, and instructional audio features enhanced children's focus and engagement. Interactive features such as drag-and-drop activities, quizzes, and animated simulations supported the development of cognitive processes through exploratory experiences. In the physical–motor domain, children demonstrated improved hand–eye coordination when interacting with the IFP screen, while concrete play activities continued to be used as a balancing component to strengthen gross motor skills.

The integration of digital play is reinforced through role-playing activities. After completing the Marbel Islamic Kids sessions, children engage in role play related to angels and their duties, such as pretending to be Angel Raqib who records good deeds or Angel Mikail who distributes sustenance. Through this process, children gain understanding through two complementary pathways: visual-digital stimulation and motor-symbolic experience (Abi-Akl et al., 2025). This observation aligns with feedback from a parent, Mrs. YN, who noted that her daughter became more confident and capable of retelling the material about angels after participating in these activities. She stated:

> *"My child often talks about angels after learning through Marbel Islamic Kids. She said she once played the role of 'Angel Mikail' during role play. It is clear that play helps her remember the material in a fun way."*

Meaningful play is designed not merely as entertainment, but as a pedagogical strategy that stimulates balanced developmental growth. In block construction play, for example, children do not simply build structures; they also learn concepts of size, balance, and spatial relationships. Through the digital activities provided by Marbel

Islamic Kids, children develop memory skills, early literacy, and intuitive understanding of religious concepts (Dhema et al., 2025). The combination of these play forms creates a multimodal learning pattern that strengthens conceptual understanding through both concrete and symbolic experiences. This pattern was consistently observed, as children who were previously passive became more willing to take on roles and actively contribute during group discussions.

From a social–emotional perspective, group-based play activities supported by the IFP fostered more structured patterns of cooperation. Children took turns completing game tasks, discussed answer choices, and managed their emotions when encountering challenges within the games. In the language domain, teachers utilized game content as a stimulus for conversation, encouraging children to articulate their thinking processes, retell stories from observed animations, and acquire new vocabulary. Moral values were cultivated through digital game rules that emphasized discipline, honesty, and responsibility in task completion. Artistic creativity also showed noticeable growth as children used drawing features on the IFP to express their visual imagination.

Fourth, reflective discussions following play sessions emerged as a meaningful pedagogical component. Teachers facilitated guided reflection using open-ended questions, encouraging children to articulate experiences and emotions. As Teacher RH described, *"Some children can explain the sequence of building a block tower, while others talk about how they learned to share toys."* These sessions strengthened language development, self-awareness, and emotional regulation.

In the cognitive development domain, TK Masyithoh Mambaul Ulum emphasizes the importance of play as a medium for sharpening thinking skills, problem-solving abilities, and understanding basic concepts such as numbers, shapes, and colors. Through educational play activities—such as puzzles, construction games, and object manipulation—children are guided to recognize patterns, understand cause-and-effect relationships, and develop logic and creativity. One teacher, identified as Teacher BL, stated during an interview that:

> *"When children are engaged in number puzzle activities, they are able to recognize and remember numerical shapes more quickly while simultaneously learning to collaborate in assembling challenging parts."*

These findings indicate that play genuinely supports children's understanding of basic concepts in a more enjoyable manner. A learning environment rich in challenging play options enables children to explore their potential by discovering solutions to various problems that emerge during play activities.

In terms of motor development, the learning environment at TK Masyithoh Mambaul Ulum is intentionally designed to encourage children's physical activity through a variety of play experiences that stimulate both gross and fine motor skills. Activities such as running, jumping, and ball play support the development of gross motor skills, while tasks such as block construction, drawing, and playing musical instruments enhance fine motor skills by promoting hand–eye coordination and strengthening the small muscles of the hands and fingers. With ample open space available, children are afforded freedom of movement, allowing them to develop their physical abilities in an enjoyable and pressure-free manner. A parent, identified as Mrs. KN, also stated:

> *"My child has become more skillful in using their hands after frequently engaging in block play at school; even at home, they often continue constructing simple structures independently."*

Figure 2. Integration of Play-Based Learning (PBL), Interactive Flat Panel (IFP), and Marbel Islamic Kids

These findings indicate that children's motor skills development occurs not only within the school setting but also continues in the home environment. Language development is also a major focus of the play-based approach implemented at TK Masyithoh Mambaul Ulum. Children are provided with opportunities to interact through group play and role-playing activities that encourage active communication. Activities such as pretend play and collaborative storytelling not only enrich children's vocabulary but also enhance their speaking and listening skills, as well as their ability to understand others' emotions and perspectives. A learning atmosphere that supports intensive conversations among

peers and between children and educators creates a conducive environment for comprehensive language development (Salsabila, 2024).

In terms of social development, TK Masyithoh Mambaul Ulum emphasizes the importance of cooperation, sharing, and group interaction. Through collaborative play, children learn to take turns, resolve conflicts peacefully, and work together to achieve shared goals. Group activities also foster mutual respect, acceptance of differences, and the development of positive peer relationships (Nada & Hafni, 2022). Educators play an active role in facilitating this process by providing space for dialogue, attentive listening, and problem-solving, thereby supporting the development of children's social skills while shaping their understanding of their roles within a broader social context.

Children's emotional development receives special attention within the learning environment at TK Masyithoh Mambaul Ulum. Through the implementation of Play-Based Learning (PBL), children are given opportunities to express their emotions through role-play activities as well as arts and creative tasks. In an interview, teacher KH stated:

> *"Children who were previously shy are now more confident to perform during drama activities. This has increased their self-confidence, and parents have also noticed similar changes at home."*

With the support of a safe and nurturing atmosphere, children feel free to express their emotions while simultaneously learning how to regulate them. A secure and supportive environment allows children to openly express feelings such as happiness, disappointment, or fear. Educators provide continuous care and encouragement, ensuring that children feel valued and accepted throughout the learning process. Furthermore, through collaborative and sharing activities, children are trained to manage their emotions, build self-confidence, and develop empathy as well as the ability to understand others' feelings.

Moral development is also an integral component of the play-based approach at TK Masyithoh Mambaul Ulum. Through games that involve rules, turn-taking, and consequences, children learn values such as honesty, responsibility, and mutual respect. They are guided to practice sharing, respecting peers, and taking responsibility for their actions. Educators serve as role models by demonstrating moral values in daily interactions, helping children understand that every action has consequences for others and should be carried out with awareness and responsibility.

By creating a supportive environment, TK Masyithoh Mambaul Ulum not only provides a safe and comfortable space for play but also fosters an atmosphere that

promotes holistic child development. Through the Play-Based Learning (PBL) approach, children gain meaningful learning experiences that optimize their potential across multiple developmental domains, including cognitive, motor, language, social, emotional, and moral aspects. Consequently, children are not only academically capable but also develop into independent, empathetic, resilient individuals who are well prepared to face future life challenges (Sihombing et al., 2023).

Overall, the findings suggest that the effectiveness of PBL in this context depends on the alignment between structured play design, teacher readiness, digital integration, and balanced developmental planning. While technology-enhanced PBL enriched engagement and social interaction, greater strategic planning is required to ensure proportional stimulation across all six domains of early childhood development.

From a social-emotional perspective, collaborative play activities—such as angel-themed role play and group-based digital games—provide children with opportunities to practice cooperation, role sharing, and negotiation when differences of opinion arise. These activities also serve as a space for empathy development, as children must understand and respect the roles played by their peers. One parent, Mrs. ML, shared:

> *"My child is now more socially confident and willing to share. When playing Marbel in class, she said she had to take turns and discuss with friends. I believe these play activities strongly support her social development."*

Language development also emerges through group discussions during IFP use, retelling stories about angels after play activities, and role-playing interactions. These verbal exchanges enrich vocabulary, strengthen language structures, and build children's confidence in speaking. During block play or other thematic activities, teachers frequently pose guiding questions such as, "How can you make your building more stable?" or "Why is this angel responsible for recording good deeds?" Such questions encourage critical thinking and support children in expressing ideas more coherently.

In the motor domain, role play, construction play, and other physical activities help develop coordination, balance, and fine motor precision. Meanwhile, digital activities using the IFP support fine motor skills through actions such as touching the screen, dragging icons, and selecting objects. Thus, technology does not replace physical activity but complements it as part of an integrated learning experience.

Overall, the integration of the Play-Based Learning approach at TK Masyithoh provides learning experiences that are both enjoyable and meaningful. Children not

only acquire cognitive knowledge but also develop across social, emotional, motor, moral, and creative domains. The combination of traditional play, role play, and digital play—such as Marbel Islamic Kids supported by IFP technology—creates a learning environment that is adaptive to the developmental needs of early childhood learners. Educators serve as facilitators who ensure that each activity transcends mere play and becomes a comprehensive and holistic educational experience.

Reflection and Discussion

After play activities, educators invite children to engage in collective reflection on the experiences they have just undergone. This reflection is conducted through guided discussions focusing on what children have learned, how they felt during the play activities, and what they would like to try in future sessions. This process provides children with opportunities to express their thoughts and emotions, thereby contributing to the development of language skills and cognitive abilities (Effendy et al., 2023).

The findings confirm that Play-Based Learning, when intentionally structured, aligns with constructivist developmental theory. Consistent with Vygotskian principles, collaborative digital and role-play activities enhanced social mediation and language development. However, the uneven distribution of developmental stimulation suggests that engagement does not automatically guarantee balanced development. While digital tools amplified attention and collaboration, they did not systematically strengthen fine motor precision or sequential reasoning skills.

This finding challenges the assumption that technology integration inherently optimizes holistic development. Instead, the data suggest that pedagogical intentionality—not technological presence—determines developmental balance.
Furthermore, the results extend prior PBL research by demonstrating that structured PBL in resource-limited contexts is feasible, but requires strategic domain mapping. Without deliberate proportional design, PBL may produce domain dominance rather than developmental equilibrium.
Thus, this study proposes that effective technology-enhanced PBL must integrate:
a) developmental domain mapping, b) structured reflective cycles, c) balanced play composition, and d) teacher pedagogical upskilling

Through these activities, children not only enhance their communication skills but also strengthen conceptual understanding and support holistic development across cognitive, physical, social-emotional, language, moral, and creative domains (Suardi, 2024). The implementation of Play-Based Learning (PBL) at TK Masyitoh demonstrates increasingly complex pedagogical dynamics following the integration of Interactive Flat Panel (IFP) technology (Salma & Hidayah, 2025). Research

findings indicate that the presence of IFP expands the range of play-based learning media; however, its effectiveness is highly dependent on teachers' readiness to operate and pedagogically integrate the device. Observations reveal that teachers who have participated in internal training are better able to combine digital play with concrete, hands-on activities, whereas those with limited technological familiarity tend to use the IFP in a more restricted manner. This condition underscores that the quality of implementation is determined not by the technology itself, but by teachers' pedagogical capacity to utilize digital features meaningfully. Consequently, PBL practices in the classroom exhibit two dominant patterns: traditional play rich in direct interaction and digital play that still requires refinement in instructional flow and design.

Document analysis and interviews further reveal that the use of the Marbel Islamic Kids game on the IFP emerges as one of the most effective digital strategies, as it provides stimulation for memory development, early literacy, and intuitive understanding of religious concepts. Nevertheless, the findings also indicate an imbalance in developmental stimulation: play activities emphasizing social interaction—both digital and non-digital—receive a substantially greater proportion than activities designed to develop fine motor skills or systematic thinking abilities (Hussain & Sultana, 2025). This imbalance is evident in observational data showing significant improvements in verbal development, social initiative, and communication skills, while indicators such as accuracy, hand–eye coordination, and sequential task completion progress at a slower pace. These results suggest that a strong preference for collaborative play directly influences the distribution of children's developmental outcomes.

CONCLUSION

This study demonstrates that technology-enhanced Play-Based Learning can revitalize pedagogical practices in resource-limited early childhood institutions. The integration of Interactive Flat Panel technology increased engagement and strengthened language and social-emotional domains. However, developmental outcomes remained uneven due to disproportionate emphasis on collaborative activities over precision-based and analytical tasks.

The findings highlight that technological innovation alone does not ensure holistic developmental optimization. Instead, balanced developmental mapping, teacher readiness, and intentional play design are critical determinants of effectiveness. This study contributes a context-sensitive model of technology-integrated PBL that emphasizes proportional domain stimulation and pedagogical

intentionality. Future research should employ longitudinal and mixed-method approaches to examine sustained developmental impact.

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