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TEACHER'S ROLE IN UTILIZING INTERACTIVE FLAT PANEL (IFP) FOR INTERACTIVE LEARNING IN EARLY CHILDHOOD EDUCATION SETTINGS

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ABSTRAK

Penelitian ini bertujuan untuk mendeskripsikan pemanfaatan Interactive Flat Panel (IFP) untuk meningkatkan kualitas pembelajaran anak usia dini, namun keberhasilannya sangat ditentukan oleh peran dan kompetensi guru dalam menggunakannya secara efektif. Penelitian ini menggunakan pendekatan kualitatif dengan jenis penelitian deskriptif. Subjek penelitian meliputi kepala sekolah dan guru, sedangkan Teknik pengumpulan data dilakukan melalui wawancara, observasi, dan dokumentasi. Analisis data menggunakan Teknik reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa 1) guru memiliki peran yang penting dalam pemanfaatan IFP, yaitu sebagai perancang, pelaksana, dan fasilitator pembelajaran. Sebagai perancang, guru Menyusun RPPH yang terintegrasi dengan penggunaan IFP. Sebagai pelaksana, guru mampu mengimplementasikan pebelajaran secara sistematis dengan memanfaatkan IFP pada setiap tahap kegiatan. Sebagai fasilitator, guru memberikan kesempatan kepada peserta didik untuk berinteraksi langsung dengan media pembelajaran. 2) penerapan IFP dilakukan pada saat kegiatan pembuka pembelajaran, kegiatan inti pembelajaran, dan kegiatan penutup pembelajaran.3) selain itu, penelitian ini juga menemukan Adanya faktor pendukung dan penghambat dalam pemanfaatan IFP. Faktor pendukung meliputi dukungan kepala sekolah melalui kebijakan dan pelatihan, ketersediaan sarana dan prasarana, kompetensi dan motivasi guru, serta respon positif dan antusiasme peserta didik. Sementara itu, faktor penghambat meliputi kendala

teknis perangkat dan jaringan internet, dan perbedaan kemampuan guru dalam mengoperasikan teknologi.

Kata Kunci*: Peran Guru, MediaPembelajaran Interaktif, Interactive Flat Panel (IFP)*

ABSTRACT
This study aims to describe the utilization of the Interactive Flat Panel (IFP) to improve the quality of early childhood learning, with its success largely determined by the role and competence of teachers in using the technology effectively. This study employed a qualitative approach using a descriptive research design. The research participants consisted of the school principal and teachers, while data were collected through interviews, observations, and documentation. The data were analyzed through data reduction, data display, and conclusion drawing. The findings indicate that: (1) teachers play an important role in utilizing IFP as learning designers, implementers, and facilitators. As learning designers, teachers develop daily lesson plans (RPPH) that integrate the use of IFP. As learning implementers, teachers are able to systematically implement learning activities by utilizing IFP at each stage of the learning process. As facilitators, teachers provide opportunities for children to interact directly with the learning media; (2) IFP is utilized during the opening, core, and closing activities of the learning process; and (3) the study identifies supporting and inhibiting factors in the utilization of IFP. Supporting factors include school leadership support through policies and training, the availability of adequate facilities and infrastructure, teachers' technological competence and motivation, as well as children's positive responses and enthusiasm. Meanwhile, inhibiting factors include technical problems with the devices and internet connectivity, as well as differences in teachers' ability to operate the technology.
Keywords: *Teacher Roles, Interactive Learning Media, Interactive Flat Panel(IFP)*

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INTRODUCTION

In the contemporary digital era, the rapid advancement of information and communication technology has transformed various aspects of human life, including the field of education. This transformation has created new opportunities for educational institutions to adopt technology-enhanced learning approaches that are more responsive to the changing needs of learners. In early childhood education, the integration of

digital technology is particularly relevant because young children learn through active engagement, exploration, interaction, and meaningful experiences. Therefore, learning media need to be designed not only to convey instructional content but also to stimulate children's curiosity, participation, creativity, and interaction during the learning process (Eliasson et al., 2023).

Within this context, early childhood education institutions serve as important settings for introducing innovative learning media that can complement conventional teaching practices. The use of technology can provide children with more varied and engaging learning experiences through visual, auditory, and interactive features. However, the presence of digital technology alone does not automatically create meaningful learning. Its educational value largely depends on how teachers select, design, integrate, and facilitate its use in accordance with children's developmental characteristics and learning needs. Teachers therefore remain central to the effective integration of technology in early childhood classrooms, functioning not merely as users of digital devices but also as learning designers, facilitators, and guides who create developmentally appropriate and meaningful learning experiences (Arabiat et al., 2023).

One important aspect of supporting the learning process is the use of appropriate learning media. Learning media play an essential role in teaching and learning activities by helping teachers present learning materials in ways that are more accessible, engaging, and meaningful for learners. The use of appropriate media can contribute to a more conducive learning environment, encourage interaction and feedback between teachers and learners, and support the achievement of optimal learning outcomes. Furthermore, well-designed learning media can stimulate learners' interest and motivation, encouraging them to participate more actively and meaningfully in the learning process (Rahmawati et al., 2026).

Learning media in early childhood education serve several important functions. They help clarify the presentation of information and reduce excessive reliance on verbal explanations, while also facilitating children's

deeper understanding of learning content. Appropriate learning media can transform abstract concepts into concrete and comprehensible experiences, as well as help address limitations related to space, time, and children's sensory capacities. The use of suitable media can also reduce children's passive involvement by encouraging greater participation and interaction during learning activities.

Furthermore, learning media can accommodate the diverse characteristics of individual children, particularly differences arising from their family, social, and environmental backgrounds. They can provide greater variety in teaching and learning activities, create opportunities for children to revisit and reinforce previously introduced concepts, and support the smooth implementation of classroom activities. For teachers, appropriate learning media can also facilitate the delivery of learning experiences and help make instructional tasks more manageable, effective, and meaningful for young children(Guslinda & Kurnia, 2018). Through the appropriate use of learning media, teachers can create an enjoyable learning environment, facilitate play-based learning activities, and encourage meaningful social interactions among children.

One technology that offers potential for supporting interactive learning in Early Childhood Education settings is the Interactive Flat Panel (IFP). With its large touch-sensitive display and capacity to present multimedia content, the IFP can facilitate more dynamic interactions between teachers, children, and learning materials. Nevertheless, the effectiveness of IFP-based learning is closely related to teachers' pedagogical competence and their ability to integrate the technology purposefully into classroom activities. Teachers need to determine appropriate content, organize learning activities, encourage children's participation, and maintain a balance between digital interaction and other forms of play and social engagement. Consequently, examining the teacher's role in utilizing IFP as an interactive learning medium is important for understanding how digital technology can be meaningfully integrated into early childhood education. In this context, the Interactive

Flat Panel (IFP) emerges as a potential solution for creating more engaging and interactive learning experiences for young children (Riyadi & Ningsih, 2024)

The use of Interactive Flat Panels (IFP) can support holistic learning objectives by addressing not only the cognitive domain (knowledge) but also the affective domain (attitudes) and psychomotor domain (skills) of young children. Relevant studies suggest that interactive learning media, including interactive display technologies, can enhance learners' interest and engagement in the learning process. In early childhood education (ECE), research has also indicated that the use of interactive media can broaden children's understanding, foster enthusiasm for learning, and create a more enjoyable and engaging learning environment(Rasmani et al., 2023)

Nevertheless, the effective use of Interactive Flat Panels (IFPs) depends largely on the role of teachers. Teachers need to possess not only the technical competence to operate the technology but also the pedagogical competence to select age-appropriate content and adapt instructional methods to children's developmental characteristics and learning needs. They also need to facilitate children's activities in ways that prevent excessive dependence on screen-based interaction while maintaining a healthy balance between digital activities and real-world, hands-on learning experiences. In this regard, teachers play a central role in ensuring that IFP use serves as a meaningful pedagogical tool rather than merely as a technological addition to the classroom (Alam & Rachmadhani, 2025)

A growing body of research has examined the use of interactive technology in early childhood education, including Interactive Flat Panels (IFPs). One relevant study was conducted by Windiastuti et al., entitled *"The Effectiveness of Using Technology Media in Learning at the Early Childhood Education Level."* The study demonstrated that technology-based media, such as interactive videos, touchscreen displays, and

learning applications, could enhance children's attention and participation, particularly when engaging with learning materials that were generally perceived as less interesting. However, the study also highlighted the lack of standardized guidelines for technology use among young children, which may lead teachers to provide screen exposure without adequate control over its duration (Windiastuti et al., 2024). Second, a study by Rasmani et al. (2023), entitled *"Interactive Learning Multimedia for Early Childhood Education Teachers,"* found that the implementation of interactive learning multimedia by early childhood education teachers could enhance children's creativity and engagement in the learning process (Rasmani et al., 2023). The study emphasized the importance of teachers' preparedness in designing digital media-based learning activities while ensuring that these activities remain aligned with the developmental characteristics and learning needs of young children. Third, a study by Ratu Kemala entitled *"The Effect of Interactive Learning Media on Early Childhood Numeracy Skills in Early Childhood Education"* examined the effects of using interactive learning media on young children's numeracy skills. In the study, the children were divided into two groups: an experimental group that received instruction using interactive media and a control group that was taught using conventional methods. Numeracy skills were assessed before and after the intervention to measure changes in children's learning outcomes (Kemala, 2023).

Fourth, Farihah et al., examined teachers' use of Interactive Flat Panels (IFP) to support children's language and cognitive development and found that guided verbal interaction, digital storytelling, educational games, and cognitive scaffolding could support children's listening, speaking, literacy, problem-solving, and critical-thinking skills (Farihah et al., 2025). The study also highlighted teacher competence and technical conditions as important factors influencing IFP implementation. Similarly, Fauziah et al. investigated the effectiveness of IFP-based digital learning in improving early childhood numeracy skills and reported significant differences in children's numeracy abilities following the implementation

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of IFP-based learning, accompanied by increased engagement and understanding of numeracy concepts (Fauziah et al., 2026). In addition, the use of IFP to support the cognitive development of children aged 5–6 years and the function as a concrete and interactive learning medium that corresponds with the developmental characteristics of young children (Lutfiah Lutfiah & Akhmad Iqbal, 2026).

Although previous studies have highlighted the potential of interactive digital media to enhance children's engagement and learning experiences, limited attention has been given to how teachers actually utilize Interactive Flat Panels (IFPs) in early childhood education. Existing studies have largely focused on the benefits of digital technology or interactive media for children's learning, while the pedagogical practices through which teachers plan, implement, and facilitate IFP-based learning remain relatively underexplored. This gap is particularly important in early childhood education, where technology needs to be integrated with play-based, developmentally appropriate, and socially interactive learning experiences.

Pedagogical IFP integration extends beyond displaying digital content, requiring purposeful interactive activities that promote children's exploration, communication, and participation. In early childhood education, technology should support play-based, child-centered, and developmentally appropriate learning, transforming IFPs into meaningful tools for engaging educational experiences.

Based on the background presented above, this study explores teachers' strategic roles in utilizing Interactive Flat Panels (IFPs) as interactive learning media at TK Muslimat NU 22. Technology alone cannot ensure meaningful learning; its educational value depends on teachers' ability to plan, integrate, manage, and evaluate its use according to children's developmental needs. Accordingly, IFPs are examined not merely as technological devices but as pedagogical tools that enrich teacher–child interactions and foster meaningful classroom learning experiences.

METHOD

This study employed a qualitative approach using a descriptive research design to gain an in-depth understanding of the role of teachers in utilizing the Interactive Flat Panel (IFP) as an interactive learning media at TK Muslimat NU 22 Tanjungrejo. A qualitative approach was considered appropriate because the study was not intended to quantitatively measure the effectiveness of the IFP, but rather to explore naturally occurring practices and understand how teachers plan, implement, evaluate, and reflect on the use of IFP in the learning process. Qualitative research enables researchers to examine phenomena within their natural settings and to understand participants' experiences, meanings, and practices within their social contexts (J. W. Creswell & Creswell, 2017). Accordingly, the study was conducted in authentic classroom settings, allowing the researchers to examine the interactions among teachers, children, and technology within the context of early childhood education.

Participants were purposively selected from teachers directly involved in IFP-based learning. Data were gathered through observations, in-depth interviews, and documentation to explore instructional practices, teacher experiences, pedagogical considerations, challenges, classroom interactions, and supporting materials used during technology-integrated learning activities (J. Creswell, 1998).

Data were analyzed using Miles and Huberman's interactive model, comprising data condensation, data display, and conclusion verification. Observation, interview, and documentation findings were categorized according to the research focus (Miles et al., 2014). Thematic presentation helped identify patterns and meanings concerning teachers' roles in IFP utilization. Data credibility was ensured through source and methodological triangulation, comparing teachers' accounts, classroom observations, and documentary evidence. Analysis occurred throughout and after data collection, enabling continuous refinement of interpretations based on emerging findings.

RESULTS AND DISCUSSION

The role of teachers is a key component in the successful utilization of the Interactive Flat Panel (IFP) as an interactive learning medium at TK Muslimat NU 22 Tanjungrejo. The findings indicate that teachers function not merely as users of the technology but also as learning planners, implementers of interactive instruction, facilitators of learning experiences, motivators, and evaluators of children's learning. These roles are interconnected and collectively provide an essential foundation for ensuring that IFP is utilized effectively, purposefully, and in ways that are appropriate to the developmental characteristics and learning needs of young children.

The findings indicate that teachers play an important role as learning designers in utilizing the Interactive Flat Panel (IFP). The use of the IFP is not spontaneous but is deliberately considered during the lesson planning stage by taking into account learning objectives, children's developmental characteristics, instructional content, and activities that encourage active participation. This finding is consistent with Hasjiandito et.al., who found that the utilization of IFP in early childhood education involves teachers' active roles in planning and implementing technology-supported learning activities (Hasjiandito, 2026). Therefore, IFP use in early childhood education should be understood as part of teachers' pedagogical practices rather than merely as the operation of a digital device.

Teachers in this study first determine learning materials and learning experiences that are appropriate to children's developmental stages and subsequently select digital media or activities that can be presented through the IFP. This practice is supported by Nurhayati et al., highlight the potential of IFP through developmentally appropriate activities, such as matching games and tracing exercises (Nurhayati & Kuswandi, 2026). Similarly, Fauziah et al. (2026) emphasize its contribution to children's engagement and understanding. The findings indicate that teachers use IFP not as a learning objective but as a pedagogical medium that presents concepts through concrete, visual, and interactive experiences (Fauziah et al., 2026). This finding is supported by Latifah et al., who reported that IFP

can create more focused, active, and enthusiastic learning experiences for young children when used as an interactive audiovisual learning medium (Latifah et al., 2026).

Overall, the findings demonstrate that teachers' role as learning designers is a central element in the pedagogical utilization of IFP. Teachers determine the learning objectives, select appropriate digital content, design interactive activities, and position IFP as a supporting medium within child-centered learning. This finding is strengthened by recent Indonesian studies showing that the effectiveness of IFP in early childhood education is closely related to how the technology is integrated into meaningful, interactive, and developmentally appropriate learning activities (Latifah et al., 2026)

Technology integration in early childhood lesson planning should consider visual appeal, attention spans, and balanced digital and hands-on activities. Combining technology with play, exploration, and direct interaction supports meaningful learning. Appropriate interactive media can enhance children's interest and engagement when aligned with their developmental characteristics and learning needs (SHALIMAR et al., 2024)

Observation data showed that the IFP was not used continuously throughout the entire school day, but was selectively integrated into specific learning activities that benefited from visual, audio, animated, and interactive features. The IFP was used for activities such as displaying images and videos, educational games, and interactive exercises, while other learning experiences continued through play, hands-on practice, simple discussions, and physical activities. This finding is consistent with Simatupang et al., emphasized that digital technology in early childhood education should be integrated meaningfully into play-based learning rather than replacing children's direct experiences (Simatupang et al., 2026).

The findings further indicate that teachers exercise pedagogical judgment in determining when IFP can provide meaningful learning support and when children require direct engagement with their physical

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and social environment. This approach is consistent with Rizqika et al. (Rizqika & Utami, 2025), who emphasized the importance of embedding technology-supported learning within meaningful social and pedagogical interactions, and Maghfiroh et al., who highlighted that teachers' digital competence involves not only operating technology but also developing meaningful learning practices through technology (Maghfiroh et al., 2026). Therefore, the pedagogical value of IFP does not depend on the frequency or duration of its use, but on the appropriateness of its use for particular learning purposes. In this context, the teachers at TK Muslimat NU 22 Tanjungrejo position IFP as one of several learning resources that complements, rather than replaces, play, movement, hands-on experiences, and teacher-child interaction.

Technology integration in early childhood planning requires attention to visual appeal, developmental needs, attention spans, and balanced digital and non-digital activities. Its educational value depends on teachers' pedagogical decisions in selecting and organizing digital resources appropriately within early childhood learning contexts (Eliasson et al., 2023).

The findings of this study indicate that teachers' planning of IFP use reflects an effort to align technology with learning objectives and children's developmental needs. Teachers do not simply select attractive digital materials, but consider how images, videos, and interactive activities can help children understand the concepts being introduced. Preschool teachers using interactive whiteboards employed various scaffolding actions, including concretizing, questioning, instructing, providing feedback, inviting participation, explaining, and referring children back to previous learning (Maryam et al., 2020).

From this perspective, the teacher's role in planning IFP-based learning can be understood as a process of pedagogical mediation. Teachers determine not only what content will be presented through the IFP but also how children will engage with that content, what questions or stimuli will be provided, and what forms of interaction will follow the digital

activity. Masoumi et al. demonstrated that children's actions during interactive whiteboard activities were closely related to teachers' scaffolding actions (Masoumi et al., 2024). This indicates that children's engagement with interactive technology is not solely determined by the technological features of the device but is shaped by the interaction between children, teachers, and the learning environment.

Furthermore, teachers' competence is an important factor in determining whether technology is integrated meaningfully into early childhood learning. Dardanou et al. (2023), in a systematic review published by the OECD, emphasize that digital competence in early childhood education involves more than technical skills; it also includes the ability to integrate digital technologies responsibly and pedagogically, while considering social and collaborative dimensions (Dardanou et al., 2023).

The implementation of IFP-based learning also indicates a shift in patterns of classroom interaction. When learning materials are presented in visual and interactive formats, children's attention tends to be more readily directed toward the learning objects. Teachers then capitalize on this attention to initiate conversations and foster children's thinking skills through simple questions, such as asking children to classify different types of fruit, count the number of objects, or compare objects.



Picture 1. Practice IFP

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The use of IFP provides teachers with opportunities to create more participatory learning experiences. However, its effectiveness remains highly dependent on teachers' ability to manage the classroom effectively. Teachers need to ensure that children do not merely become passive viewers of the screen, but are given opportunities to interact, explore, and connect digital experiences with their real-life experiences. According to Iskandar et al., animations and simulations in interactive media help explain concepts that may be difficult to convey verbally, thereby enhancing children's conceptual understanding(Iskandar et al., 2023).

Teachers also serve as facilitators by encouraging children's active participation through direct interaction with the IFP, including answering questions, selecting images, matching objects, and playing educational games. They provide gradual assistance according to children's needs while offering positive reinforcement and appreciation to foster confidence, indep



Picture 2. The teacher provides guidance to the students.

This pattern of teacher support demonstrates that the use of IFP requires not only teachers' technical skills but also pedagogical competence to recognize each child's learning needs and readiness. Research on the use of IFPs in early childhood education also indicates that the effectiveness of such technology is strongly influenced by teachers' strategies for providing guided interaction and scaffolding, rather than

merely by the presence of the technological device itself (Farihah et al., 2025). Thus, the teacher's role as a facilitator is a crucial factor in determining the meaningfulness of IFP use. Essentially, the IFP provides a digital environment and opportunities for interaction, while teachers determine how the technology is utilized to support the achievement of learning objectives.

Picture 3. The teacher is preparing materials that are appropriate for the learning theme.

The findings identify three interconnected teacher roles in IFP use: designing age-appropriate learning, implementing interactive activities, and facilitating children's exploration and participation. These roles demonstrate that IFP effectiveness relies not on technological sophistication alone but on teachers' pedagogical competence in creating meaningful, child-centered, play-based, and experiential learning experiences (Li et al., 2026). A systematic review by Eliasson et al.(Eliasson et al., 2023) similarly shows that technology in early childhood education should be embedded within educational practices rather than treated as an isolated technical resource.

The utilization of the IFP as an interactive learning medium is influenced by several factors that may either facilitate or hinder the integration of technology into the learning process. Identifying these factors is important for understanding the actual conditions in the field and

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for developing recommendations to improve the quality of technology-enhanced learning. In this study, the identified factors are categorized into two main groups: supporting factors and inhibiting factors.

Based on the findings, several key supporting factors were identified. Adequate infrastructure, including functional IFP devices, stable electricity, and supportive classroom spaces, facilitates teachers' consistent integration of interactive visual technology into learning activities. According to Kemala, adequate infrastructure and facilities represent an important indicator of successful technology integration in education. Without sufficient technological equipment, teachers may face difficulties in implementing interactive learning strategies effectively (Kemala, 2023).

The availability of adequate infrastructure should therefore be understood not merely as a technical requirement, but as an enabling condition for meaningful technology integration in early childhood education. The presence of an IFP, stable electricity, and an appropriate classroom environment provides teachers with the necessary affordances to design more varied and interactive learning experiences. However, infrastructure alone does not guarantee effective technology integration (Eliasson et al., 2023). Similarly, the OECD (OECD, 2023) highlights that digital technologies can support quality improvement in early childhood education and care when accompanied by appropriate professional capacities among educators. Thus, the findings suggest that adequate infrastructure creates the conditions for IFP utilization, while teachers' pedagogical competence determines how these technological affordances are transformed into meaningful learning experiences for young children.

The second supporting factor is the principal's institutional support. The principal provides guidance, training opportunities, and collaborative discussions to strengthen teachers' competence in using IFP. Such support enhances teachers' confidence and encourages innovation in technology-integrated learning. This finding aligns with Nabila's argument that educational quality is influenced by principals' leadership and support. In

the digital era, principals must demonstrate proactive leadership by establishing strategic initiatives, promoting innovation, and creating a supportive environment that enables teachers to integrate technology effectively into the curriculum and learning activities (Nabila, 2025).

The third supporting factor is learners' enthusiasm and responses. The findings indicate that children who demonstrate a high level of interest and enthusiasm when using interactive media provide additional motivation for teachers. Children's natural curiosity makes learning activities involving the IFP more dynamic and engaging. According to Windiastuti et al., engaging visual and interactive features can help reduce boredom among young children (Windiastuti et al., 2024).

Children's positive responses to interactive media contribute to more engaging and enjoyable learning experiences. Rasmani et.al., found that interactive multimedia enhances meaningful learning, attention, and enthusiasm among young children (Rasmani et al., 2023). Similarly, the present study reveals that children's interest in IFP visuals, animations, and interactive activities encourages greater classroom engagement. Such enthusiasm provides opportunities for teachers to stimulate curiosity, strengthen interaction, and promote active participation. Supporting this finding, Waruwu reported that interactive learning media increase children's motivation, reflected in their attention, enthusiasm, and participation throughout learning activities.(Waruwu, 2026).

Although several supporting factors facilitate IFP integration, challenges remain regarding teachers' digital competence, technical issues, and classroom management. The findings show that some teachers lack confidence and familiarity with advanced IFP features, limiting its use to displaying images and videos rather than supporting interactive learning. Similar observations in early childhood education reveal that insufficient digital skills hinder teachers from developing digital instructional materials, designing technology-based learning media, and maximizing interactive features. Therefore, strengthening teachers'

technological competencies is essential to optimize IFP utilization and enhance learning experiences (Rasmani et al., 2023).

This study also identified several technical challenges in utilizing the IFP as a learning medium, particularly those related to unstable internet connectivity and occasional technical problems with the IFP device. These conditions sometimes disrupted the smooth implementation of learning activities, especially when teachers used videos, animations, or interactive content that required internet access and the device to function optimally (Priyanti & Haryanto, 2023). When the content could not be displayed or loaded properly, teachers needed to make adjustments to ensure that learning activities could continue without reducing children's engagement.

These findings indicate that the effective technology integration requires teacher preparedness, functional devices, and adequate infrastructure. To overcome technical barriers, schools should provide offline learning alternatives, conduct regular equipment maintenance, and enhance teachers' troubleshooting skills. These preventive measures minimize disruptions, maintain learning continuity, and ensure flexible, supportive activities that address children's developmental needs (Sirjon et al., 2023)

Thus, it can be concluded that the supporting and inhibiting factors influencing teachers' implementation of IFP at TK Muslimat NU 22 Tanjungrejo are as follows

Category	Factors	Findings from the Study
Supporting Factors	**Adequate infrastructure and facilities**	The availability of an Interactive Flat Panel (IFP), stable electricity, and a suitable classroom environment provides teachers with the basic conditions needed to integrate digital technology into learning activities. These facilities allow teachers to present visual and audiovisual materials and design more interactive learning experiences for children.
Supporting Factors	**School principal's support**	The support of the school principal encourages teachers to use the IFP with greater confidence. The principal provides opportunities for teachers to learn, share experiences, and discuss ways of using the technology in

Category	Factors	Findings from the Study
		classroom activities. This support contributes to a positive environment for teachers' professional development and technology integration.
Supporting Factors	**Learners' enthusiasm and responses**	Children generally show enthusiasm and positive responses when the IFP is used in learning activities, particularly when teachers present pictures, videos, animations, and interactive games. Their curiosity and active participation encourage teachers to continue exploring ways of using the IFP to create engaging and meaningful learning experiences.
Inhibiting Factors	**Teachers' competencies**	Differences in teachers' digital competencies remain a challenge. Some teachers are comfortable using basic IFP functions, such as displaying pictures and videos, but are less familiar with more advanced interactive features. This limitation may affect the variety and depth of technology-supported learning activities.
Inhibiting Factors	**Technical aspects**	Technical problems, particularly unstable internet connections and occasional delays when accessing digital materials, can interrupt the flow of learning. Such challenges require teachers to be flexible and prepared with alternative materials or activities when technology does not function as expected.
Inhibiting Factors	**Classroom management**	Managing children's attention and participation while using the IFP requires careful pedagogical judgment. Teachers need to ensure that children do not become overly focused on the screen and that technology use remains balanced with play, hands-on activities, movement, discussion, and direct interaction with teachers and peers.

CONCLUSION

Based on the findings, it can be concluded that the utilization of the Interactive Flat Panel (IFP) as an interactive learning medium in early childhood education settings cannot be separated from the strategic role of teachers in integrating technology with children's developmental needs and characteristics. Teachers do not merely function as technology users but also as learning designers, implementers, and facilitators. As learning

designers, teachers integrate IFP use into lesson planning by considering learning objectives, content, activities, and children's learning needs. As implementers, teachers utilize the IFP progressively across the opening, core, and closing stages of learning through the use of images, animations, videos, and interactive activities. Meanwhile, as facilitators, teachers provide children with opportunities to interact directly with the medium, offer support according to individual abilities, and create learning environments that are enjoyable, active, and meaningful.

The findings also demonstrate that IFP utilization can enrich children's learning experiences when its use is appropriately designed and does not replace direct interactions between teachers and children. The IFP can serve as a means of capturing children's attention, fostering curiosity, encouraging participation, and supporting development across various domains, including cognitive, language, social-emotional, and creativity. Nevertheless, the implementation of IFP continues to face several challenges, particularly technical problems involving the device and internet connectivity, as well as differences in teachers' technological proficiency. Therefore, optimizing the use of IFP requires sustained institutional support through the provision of adequate infrastructure, regular device maintenance, strengthening teachers' digital competencies, and preparing alternative learning activities in the event of technical disruptions. Ultimately, the successful utilization of IFP in early childhood education is determined not by the sophistication of the technology alone, but by teachers' ability to integrate technology wisely and creatively while remaining oriented toward children's needs and learning experiences.

AUTHOR CONTRIBUTION STATEMENT

Nur Lailatul Fitri contributed to the conceptualization of the study, development of the research design, formulation of the research focus, data collection and analysis, interpretation of the findings, and preparation of the initial draft of the manuscript. **Siti Mas'udah** contributed to data

collection and validation, analysis and interpretation of the findings, and provided substantive input to the manuscript. **Nurul Novitasari** contributed to data collection and processing, literature searching and reference management, refinement of the discussion, and manuscript review. All authors contributed to the revision and refinement of the article, approved the final version of the manuscript, and are accountable for the integrity and accuracy of the research content.

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