

Parent Partnership Model for Using Digital Learning Media in Early Childhood Education

Luluk Elyana

Department of Early Childhood Education, Universitas Ivet, Semarang, Indonesia

Supianto

Department of Elementary School Teacher Education, Universitas Sebelas Maret, Indonesia

Ratno

Department of Early Childhood Education, Universitas Ivet, Semarang, Indonesia

Received: 16 July 2026 | Received Revised Version: 29 July 2026 | Accepted: 08 August 2026 | Published: 27 Aug 2026

Volume 08 Issue 08 2026 | Crossref DOI: 10.37547/tajas/Volume08Issue08-03

Abstract

Parent-school partnerships play a crucial role in enhancing the quality of early childhood education, particularly in supporting meaningful learning through digital media. Parents, as primary partners of schools, contribute significantly to facilitating and monitoring children's digital learning experiences at home. This study aims to develop and empirically validate an effective parent partnership model for the use of digital learning media in early childhood education. The research employed a Design-Based Research (DBR) approach that integrates theory and practice through iterative collaboration between teachers and parents in technology-supported learning activities. Participants consisted of parents of kindergarten children aged 4–6 years. Data were collected through interviews, observations, and questionnaires across multiple DBR cycles, including problem identification, design, implementation, and evaluation. The findings indicate increased parental involvement through structured parenting education, technology-use training, and activity-based partnership programs. The study resulted in a participatory partnership model emphasizing active collaboration, awareness building, and sustained engagement between schools and parents. This model enhances learning effectiveness and contributes to ongoing digital transformation in early childhood education.

Keywords: Parent Partnership, Digital Learning Media, Educational Technology, Early Childhood Education

© 2026 Luluk Elyana, Supianto, Ratno, this work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0). The authors retain copyright and allow others to share, adapt, or redistribute the work with proper attribution.

Cite This Article: Elyana, L., Supianto, & Ratno. (2026). Parent Partnership Model for Using Digital Learning Media in Early Childhood Education. *The American Journal of Applied Sciences*, 8(08), 25–37. <https://doi.org/10.37547/tajas/Volume08Issue08-03>

Introduction

Early Childhood Education (ECE) represents a

foundational phase that is critically important for children's holistic development. At this stage, children require appropriate stimulation and high-quality

educational services to establish the foundations of cognitive, socio-emotional, and motor development for subsequent educational levels (UNESCO 2022). To ensure high-quality provision, parental partnership constitutes an essential managerial component that cannot be separated from the governance of early childhood education institutions (Epstein 2011; OECD 2020c). Collaboration between schools and parents plays a strategic role in strengthening the quality of learning, including the effective use of technology-based learning media. (Smith et al. 2020)

Technological advancements in the global era have significantly transformed educational paradigms. Educational service systems increasingly rely on digital technologies, ranging from learning applications and Learning Management Systems (LMS) to blended learning models and the integration of artificial intelligence (AI) into learning activities (Holmes and Tuomi 2022; OECD 2020a; World Bank 2023b). In Indonesia, educational digitalization has been further reinforced through various policy initiatives, such as the use of official government learning platforms, digital-based educational reporting systems, and the provision of educational infrastructure through school automation systems (UNESCO 2022; World Bank 2020, 2023a). The implementation of deep learning approaches within the Merdeka Curriculum also emphasizes the importance of technology integration as a core element of the instructional framework (OECD 2020b; UNESCO 2024).

The use of digital media in early childhood education has the potential to enhance accessibility, enrich learning experiences, and provide interactive methods that are engaging for young learners (Liu et al. 2024). However, the successful integration of technology does not solely depend on school readiness; it is strongly influenced by the level of parental involvement. Parents play a crucial role in supporting, supervising, and creating a safe and positive learning environment at home (Livingstone and Zhang 2021; OECD 2020c). Consequently, a strong partnership between schools and parents becomes a necessity in the digital era. (Chen and Rivera-Vernazza 2023)

Nevertheless, empirical evidence indicates that parental partnership practices in early childhood education continue to face substantial challenges. Findings from both international and national surveys reveal that parental involvement in school programs remains

relatively low, particularly in technology-based learning contexts (OECD 2020b; World Bank 2023b). Many parents experience limited knowledge, low levels of digital literacy, and time constraints due to work commitments (Livingstone and Zhang 2021). Furthermore, parent associations in many schools tend to focus primarily on administrative or consumptive activities, rather than evolving toward educational collaboration that supports children's learning processes. These challenges are further exacerbated by suboptimal teacher-parent communication, which ultimately reduces the effectiveness of digital learning initiatives (Jeynes 2003; Kim 2022)

From a theoretical perspective, various parental partnership models have been proposed, including traditional, collaborative, community-based, and technology-based models (Epstein 2011; Sheridan and Kim 2015). However, none of these models has specifically addressed the demands of parental partnership within the context of digital learning in early childhood education, which requires active participation, role awareness, and sustained collaboration (Rampersaud, Swardh, and Parada 2024). This gap highlights a critical research problem that warrants further investigation.

Therefore, this study aims to develop and validate a parental partnership model that is responsive to the demands of digitalized learning in early childhood education. Employing a Design-Based Research (DBR) approach, this study explores how a participatory partnership can be constructed through structured parenting education programs, digital media training, and activity-based partnership designs between parents and schools (Barab and Squire 2004; Brown, Collins, and Duguid 1989). The study is expected to contribute theoretically to the development of technology-based parental partnership models and practically to early childhood education institutions adapting to ongoing digital transformation.

Literature Review

Parental Partnership in Early Childhood Education

Parental partnership is an integral component of service quality in Early Childhood Education (ECE). This partnership is understood as a collaborative relationship between schools and families in supporting children's

holistic development. (Kambouri et al. 2022) In the context of modern education, parental involvement extends beyond moral or administrative support to include active participation in children's learning at home. Such involvement has been shown to exert a significant influence on children's learning development, particularly in terms of school readiness and self-regulation.

According to Bronfenbrenner's Ecological Systems Theory, child development is shaped by interactions among environmental systems, including the family, school, and community. (Navarro and Tudge 2023) Within the microsystem and mesosystem levels, parent-teacher collaboration plays a decisive role in determining the quality of children's learning experiences. International studies further confirm that parent-school partnerships enhance children's engagement, learning motivation, and adaptation to educational technologies.

Nevertheless, numerous studies indicate that parental partnerships often weaken due to time constraints, limited digital literacy, and the absence of clear collaborative structures. (Chen and Rivera-Vernazza 2023) These conditions highlight the need for partnership models that are structured, adaptive, and responsive to ongoing technological developments. (Bakker Eddie Denessen and Brus-Laeven 2007; Monfrance et al. 2025)

Digital Learning Media in Early Childhood Education

Digital learning media hold considerable potential for enriching learning experiences in early childhood education. Technologies such as interactive applications, instructional videos, augmented reality, and digital platforms have been shown to enhance children's engagement and cognitive stimulation (Hirsh-Pasek et al. 2015; Kucirkova 2019). The use of technology in children's learning is also aligned with deep learning principles that emphasize mindful, meaningful, and joyful learning experiences (Fullan, Quinn, and Mceachen n.

In Indonesia, educational digitalization is supported by national policies, including government learning platforms, the Siplah application, and digital-based reporting systems. However, implementation in early childhood education settings often remains suboptimal due to disparities in digital competencies between teachers and parents. (Hutchison, Paatsch, and Cloonan 2020) Globally, recent research suggests that digital technologies used collaboratively by teachers and parents can enhance the quality of learning interactions and strengthen the transfer of learning from school to home. (Hsu and Chen 2023) These findings underscore the importance of intentionally involving parents in technology-based learning processes.

Parental Partnership Models: From Classical to Technology-Based Approaches

Various parental partnership models have been developed to support parental involvement in education. Traditional models position parents as passive recipients of one-way information from schools. (Hart et al. 2024; Hornby 2011) Collaborative models emphasize parental participation in planning and decision-making related to children's education. Community-based models involve multiple stakeholders to create broader support ecosystems. (Tamblyn et al. 2024)

In the digital era, technology-based partnership models have emerged, utilizing communication applications, learning platforms, and interactive media to enhance parental engagement. However, most of these models focus primarily on communication rather than on educational partnership, and they do not explicitly integrate participatory elements with digital learning processes simultaneously.

Recent international literature highlights the need for partnership models that emphasize co-learning, digital scaffolding, and sustained collaboration through technology. (Timotheou et al. 2023) This indicates a clear gap in existing partnership models, particularly those designed to support digital learning in early childhood education contexts.

Table 1. Comparison of Parental Partnership Models in Early Childhood Education

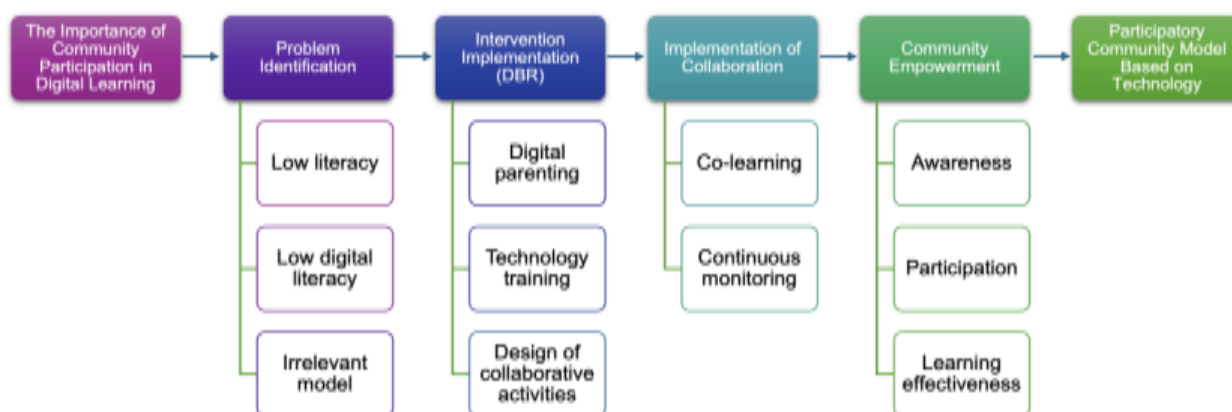
Partnership Model	Key Characteristics	Limitations / Gaps	Relevance to Digital Learning
Traditional Model	Parents are passive recipients of one-way information from schools.	Minimal participation; does not support digital literacy.	Very low
Collaborative Model	Parents are involved in planning and decision-making.	Limited focus on digital aspects and co-learning.	Moderate
Community-Based Model	Involves local organizations or community stakeholders.	Socially oriented; not specifically targeted at digital learning.	Low
Technology-Based Model	Utilizes applications, digital media, or LMS for communication.	Focuses more on communication than on educational partnership.	High, but limited
Technology-Based Participatory Partnership Model (This Study)	Active collaboration, co-learning, technology training, and shared digital activities.	Addresses gaps in previous models.	Very high

Sumber : Kesimpulan hasil wawancara dengan orang tua murid, 2025

Conceptual Framework

Based on the literature review and analysis of existing partnership models, this study develops a conceptual framework that illustrates the relationship between parental partnership challenges, the demands of digital

learning, and the development of a technology-based participatory partnership model. This framework serves as the foundation for designing interventions within the Design-Based Research (DBR) approach. The conceptual framework is presented in Figure 1.

**Figure 1. Conceptual Framework**

he framework indicates that the development of an effective partnership model must begin with the identification of field-based problems, particularly low levels of parental involvement and limited digital competencies in supporting children's learning. In response to these challenges, interventions are designed to focus on three core components: digital parenting education, training in the use of technology-based learning media, and collaborative activities between parents and teachers.

These interventions are then implemented iteratively through collaborative practices using digital media. This process leads to increased parental involvement, improved digital literacy, and enhanced learning effectiveness for children. The iterative outcomes subsequently form the basis for the development of the Technology-Based Participatory Partnership Model, which represents the primary contribution of this study.

Method

This study employed a Design-Based Research (DBR) approach, a research methodology aimed at developing and testing educational designs through iterative processes that focus on solving real-world problems in educational contexts (Brown et al., 1989). This approach was selected because it enables direct collaboration among researchers, teachers, and parents in designing solutions that are responsive to the challenges of digital learning in early childhood education.

The DBR procedure in this study consisted of several interconnected and iterative stages, including problem identification, initial design development, design implementation, reflection and revision, testing of the revised design, and dissemination of findings.

Research Design and Procedures

The DBR process in this study was conducted through four main iterative stages:

1. **Problem Identification and Needs Analysis.** In the initial stage, the researchers identified key problems related to the low level of parental involvement in technology-based learning. Data were collected through preliminary observations, interviews with teachers, and focus group discussions (FGDs) with parents. This stage generated in-depth insights into barriers to parental involvement, levels of digital

literacy, and existing forms of collaboration between parents and schools.

2. **Partnership Model Design.** Based on the findings from the first stage and the literature review, the researchers developed an initial design of a technology-based parental partnership model. The design comprised three core components: digital parenting education, training in the use of technology-based learning media, and the design of partnership activities grounded in collaboration between parents and teachers. The initial design was subsequently validated through consultations with early childhood education practitioners and educational technology experts.
3. **Design Implementation and Trial.** The developed design was implemented with parents of early childhood education learners through parenting programs, digital media training sessions, and collaborative activities. The researchers observed the implementation process and documented parental responses, levels of participation, challenges encountered, and the dynamics of collaboration between teachers and parents. This stage produced empirical data for the evaluation and revision of the design.
4. **Design Evaluation and Revision.** Evaluation was conducted to assess the effectiveness of the design and to identify areas requiring improvement. The evaluation focused on parental involvement levels, digital media usage competencies, and the quality of interaction within collaborative activities. Based on the evaluation results, the design was revised and refined into the Technology-Based Participatory Partnership Model.

Research Participants

The participants in this study consisted of 150 parents from various early childhood education settings, including kindergartens, Pos PAUD, and playgroups. Participant selection considered representation across four levels of involvement: not involved, involved, neutral, and actively involved parents.

Early childhood education teachers were also engaged as key collaborators in the research process. Teachers contributed additional information regarding parental interaction patterns, observed the dynamics of technology-based learning activities, and participated in designing and validating interventions across each DBR cycle. By involving diverse participants, this study was

able to capture a comprehensive picture of variations in parental involvement in technology-based learning.

Data Collection Techniques

Data were collected using a combination of in-depth interviews, observations, questionnaires, and documentation. Interviews were conducted during the initial stage to explore parents' perceptions of digital learning, barriers to involvement, and home-based support conditions. Observations were carried out during the implementation of parenting activities and technology training sessions to examine parental behaviors, responses, and participation levels.

Questionnaire instruments were developed based on preliminary interview findings and relevant literature on parental involvement. These questionnaires measured comfort levels, technological knowledge, and the frequency of parental involvement in digital learning activities. Documentation, including teacher notes, activity photographs, and recorded sessions, was used to enrich the data and provide empirical evidence of changes occurring throughout the research process.

Data Analysis Techniques

Data analysis employed a combined qualitative and descriptive quantitative approach. Qualitative data obtained from interviews and observations were analyzed through thematic coding processes, including data reduction, categorization, and the development of key themes. This analysis was used to identify patterns of change in parental involvement and partnership dynamics throughout the program implementation.

Quantitative data from the questionnaires were analyzed descriptively using percentages and frequency distributions to illustrate trends in parental involvement based on specific indicators. To enhance the validity of the findings, triangulation was conducted by comparing data from parents, teachers, and observational findings, thereby strengthening the consistency and credibility of the results.

Design Validity

Design validity in this study was ensured through three primary aspects: process validity, implementation validity, and outcome validity. Process validity was achieved through active and consistent engagement among researchers, teachers, and parents throughout

each DBR cycle, ensuring that interventions were closely aligned with field-based needs. Implementation validity was established by examining the alignment between the formulated technology-based partnership design and actual practices in the field, including how parents applied digital media use and collaborated with teachers.

Outcome validity was evaluated based on observable improvements in parental involvement, readiness to use technology, and the effectiveness of digital learning activities following the interventions.

Research Ethics

This study was conducted in accordance with ethical principles in educational research. All participants, including parents and teachers, were informed about the research objectives and procedures prior to providing consent to participate. Data confidentiality was maintained by excluding participant identities from research reports. Participation was voluntary, without coercion or obligation from schools or researchers.

Throughout the data collection process, the researchers ensured that all activities were conducted in a safe and comfortable environment and posed no risks to participants, particularly children as the primary beneficiaries of the learning process.

Result

This study generated findings through an iterative Design-Based Research (DBR) process, beginning with problem identification, followed by initial design development, implementation, evaluation, and refinement of the parental partnership model. The results are presented according to the DBR stages and are organized based on quantitative and qualitative findings across each domain of parental partnership.

Identification of Parental Partnership Problems in Digital Learning

The problem identification stage revealed that parental partnership in early childhood education services remained relatively low. Initial data indicated that most parents had not actively participated in supporting technology-based learning at home. Results from the preliminary survey (N = 210) showed varying levels of parental involvement, as presented in Table 2. Specifically, 65.63% of parents were not involved,

21.88% were involved, 6.25% were neutral, and 6.24% were not involved at all.

Table 2. Parental Involvement in Learning Support

Partnership Function	Parental Role	Percentage (%)
Learning Support	Not Involved	65.63
	Involved	21.88
	Neutral	6.25
	Not Involved at All	6.24

interviews with parents representing the four involvement categories revealed several major barriers to engagement. These barriers included work-related time constraints, limited digital literacy, the absence of

structured parenting education programs, and parenting practices that delegated learning responsibilities entirely to schools or caregivers. In general, parents categorized as “involved” tended to participate only in limited ways, such as accompanying children to school, rather than engaging directly in learning activities at home.

Table 3. Barriers to Parental Involvement Based on Involvement Categories

Parental Role	Key Findings
Not Involved	Work-related busyness; limited knowledge of technology-based learning; lack of structured parenting education programs
Involved	Participation mainly limited to accompanying children to school; emerging interest in supporting learning at home
Neutral	Strong reliance on school-based learning
Not Involved at All	Parenting styles characterized by neglect or full delegation of learning to caregivers

Engagement in Digital Parenting

Following the implementation of the digital parenting program, a significant increase in parental engagement was observed. Of the 210 respondents, 46% were actively involved, 27% were partially involved, 12% were aware but not practicing, and 15% did not understand the use of digital media in learning activities. These findings indicate an improvement in parental awareness and participation after the intervention.

The distribution of parental engagement levels in digital parenting activities is illustrated in Figure 2.

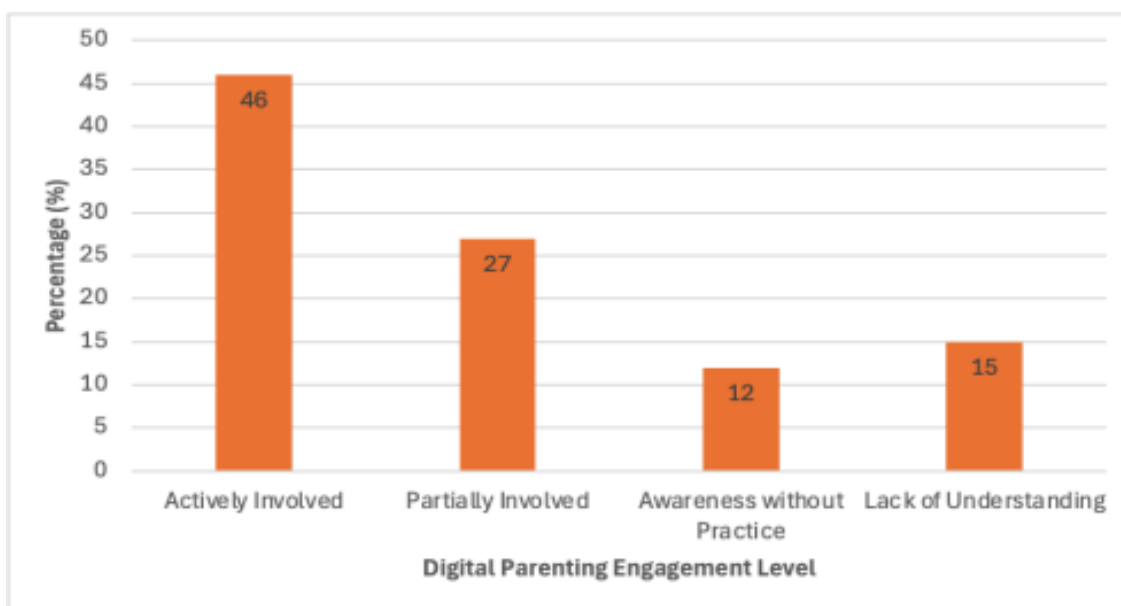


Figure 2. Digital Parenting Engagement Levels

Outcomes of Digital Learning Media Training

The training on the use of digital learning media received highly positive responses from parents. A total of 57.4% of participants reported that the training was very enjoyable and helped them better understand digital

learning practices. Approximately 34% perceived the training as quite enjoyable, while a smaller proportion indicated that repeated practice was still needed to achieve full mastery of the technology.

These results are presented in Figure 3.

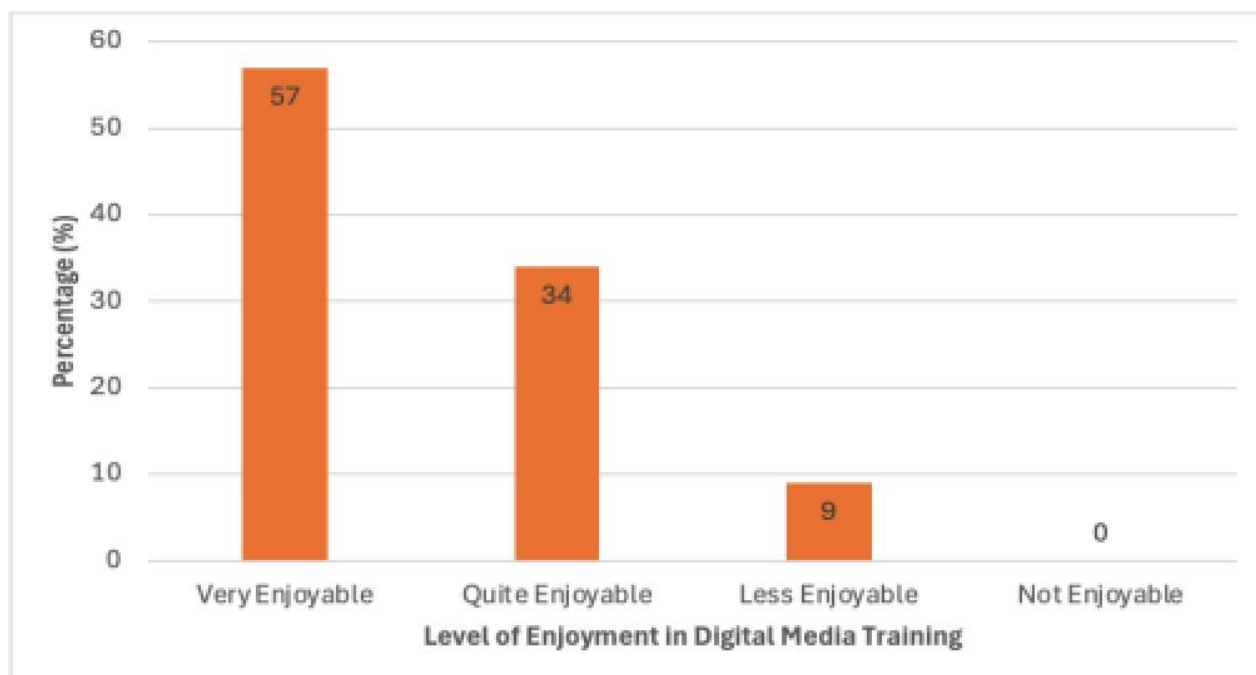


Figure 3. Level of Enjoyment in Digital Media Training

Parental Involvement in Partnership Design

In the third domain—partnership design—the findings showed that 44.1% of parents were actively involved in the formulation of partnership designs, 24.5% were aware but not involved, 20.7% were not aware, and 10%

had never been involved. These results indicate increased parental literacy and engagement in the program design process.

The distribution of parental involvement in partnership design is shown in Figure 4.

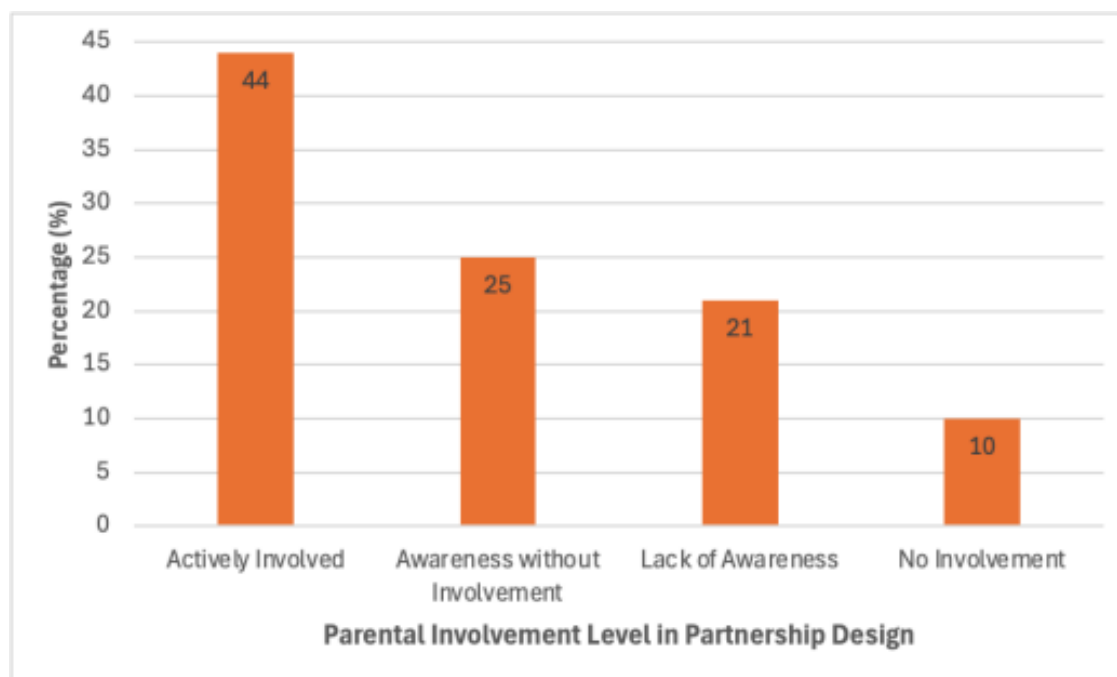


Figure 4. Parental Involvement Level in Partnership Design

Analysis of Three Domains: Digital Parenting, Technology Training, and Partnership Design

Analysis across the three main domains—digital parenting, technology training, and partnership design—demonstrated improvements in the following aspects:

1. Parents' competence in using digital learning media
2. Comfort and confidence in participating in technology training
3. Active involvement in collaborative activities with schools

Collectively, these findings indicate that the DBR intervention successfully fostered parental skills, awareness, and meaningful participation across multiple dimensions of partnership.

Synthesis of Findings and Development of the Participatory Partnership Model

Both quantitative and qualitative findings indicate that existing parental partnership models—traditional, collaborative, community-based, and technology-based—have not adequately addressed the demands of parental involvement in the digital era. The DBR process revealed that effective partnerships require:

1. Active participation
2. Co-learning among parents, children, and teachers
3. Continuous technology training
4. Collaborative involvement in the design of learning activities

Discussion

Enhancing Parental Involvement through Digital Parenting Programs

The findings of this study demonstrate a significant increase in parental involvement following the implementation of the digital parenting program. This result confirms that structured educational interventions are effective in enhancing parents' awareness of their roles in supporting children's digital learning. When parents are provided with systematic guidance and clear explanations regarding digital learning practices, they are more likely to recognize that learning does not end at school but continues within the home environment.

This finding aligns closely with Bronfenbrenner's ecological systems theory, which emphasizes the importance of the mesosystem—specifically the interaction between home and school—in shaping children's development. (Kambouri et al. 2022; Navarro and Tudge 2023) Strengthening parental engagement through digital parenting programs enhances the quality of these interactions, thereby creating a more coherent learning ecology for children. In this context, digital parenting programs function as a bridge that connects institutional learning practices with family-based learning support.

Furthermore, as parents developed a clearer understanding of learning processes and digital pedagogical goals, they began to demonstrate more active and intentional forms of participation. This supports previous findings indicating that parents' knowledge of instructional processes is a critical predictor of effective school-family collaboration (Monfrance et al. 2025) Thus, the digital parenting program not only increased participation quantitatively but also improved the quality and intentionality of parental involvement, particularly in addressing limitations related to digital literacy (Livingstone and Zhang 2021).

Technology Training as an Entry Point for Parental Digital Literacy

The technology training component yielded positive responses from parents, with most participants reporting increased confidence and enjoyment when using digital tools. This outcome is particularly important because digital literacy has consistently been identified as one of the primary barriers to parental involvement in early

childhood education, especially within technology-mediated learning contexts (OECD 2020a).

Previous studies have shown that parents often avoid engaging in children's digital learning activities due to low self-efficacy and fear of misusing technology. (Hart et al. 2024) In this study, hands-on technology training helped parents overcome these psychological and technical barriers by providing direct experience and guided practice. As a result, technology was no longer perceived as a threat or source of anxiety, but rather as a shared learning tool.

Importantly, the training functioned as a form of digital scaffolding, enabling parents to gradually transition from passive observers to active co-learners alongside their children. (Chen and Rivera-Vernazza 2023) This shift is crucial in early childhood contexts, where joint engagement and guided participation are essential for meaningful learning. The increased comfort and participation observed after the training sessions can therefore be understood as the result of both skill acquisition and changes in parental attitudes toward digital learning.

Parental Participation in Partnership Design: A Foundation for Sustainability

One of the most significant contributions of this study lies in the increased parental involvement during the partnership design stage. The finding that 44.1% of parents actively participated in designing partnership activities suggests that meaningful collaboration can be fostered when schools provide structured and inclusive participatory spaces.

Traditionally, collaborative partnership models have emphasized parental involvement in decision-making processes but have not explicitly integrated digital learning contexts into these roles (Epstein 2011; Sanders 2006). Conversely, technology-based partnership models often prioritize efficiency and communication rather than shared educational decision-making (Kambouri et al. 2022). By integrating participatory decision-making with digital learning activities, this study addresses a critical gap in existing partnership frameworks.

This approach aligns with research indicating that parental involvement in instructional and program design enhances ownership, commitment, and long-term sustainability of partnerships. (Kim 2022) When parents are involved not only as users but also as co-designers of

learning activities, they are more likely to sustain their engagement over time. Consequently, participation in partnership design emerges as a foundational mechanism for building resilient and sustainable parent–school collaboration in digital learning environments.

Integrating Three Domains: Digital Parenting, Technology Training, and Partnership Design

The findings indicate that digital parenting, technology training, and partnership design are not isolated components, but interdependent domains that collectively shape participatory partnerships. Digital parenting initiatives enhanced parental awareness and role clarity, technology training strengthened practical competencies, and partnership design activities institutionalized parental involvement within the school structure.

These domains follow a logical progression consistent with the Design-Based Research (DBR) framework, beginning with problem identification, followed by solution design, iterative testing, and refinement leading to a final model (Barab and Squire 2004; Brown et al. 1989). This progression ensures that interventions remain grounded in real-world needs while allowing continuous improvement through reflective practice.

The improvements observed across all three domains underscore that parental collaboration in digital learning cannot be achieved through information dissemination alone. Instead, it requires active engagement, experiential learning, and opportunities for shared decision-making that empower parents to meaningfully support their children's learning (Hirsh-Pasek et al. 2015; Liu et al. 2024; Yelland 2018). This integrated approach strengthens both individual competencies and systemic collaboration.

Positioning the Participatory Partnership Model within International Literature

The technology-based participatory partnership model developed in this study offers several important contributions to the international literature. First, it bridges the longstanding divide between traditional collaborative partnership models and technology-based models, which have often been implemented separately rather than synergistically.

Second, the model explicitly positions parents as active partners in digital learning processes, rather than merely

as recipients of information or passive users of educational technology. This positioning aligns with emerging research on digital co-learning, which emphasizes joint engagement between parents and children as a key mechanism for effective digital learning in early childhood. (Hutchison et al. 2020)

Furthermore, the model is consistent with global policy discourses that recognize families as central stakeholders in digital education reforms. By situating parental participation at the core of digital learning initiatives, this study contributes a theoretically grounded and contextually relevant framework that remains underexplored in prior research, particularly within developing country contexts such as Indonesia.

Practical Implications for Early Childhood Education in the Digital Era

The findings of this study offer strong practical implications for early childhood education institutions seeking to enhance the effectiveness of digital learning. The proposed model demonstrates that parental involvement can be systematically strengthened through intentional program design rather than relying on informal or ad hoc engagement.

Specifically, early childhood institutions are encouraged to implement regular digital parenting education, provide practice-oriented technology training, and create structured collaborative design spaces for teachers and parents. These strategies move beyond communication-based partnerships toward more participatory and skill-oriented collaboration.

When implemented collectively, these strategies have been shown to enhance parental involvement, improve digital competencies, and strengthen learning effectiveness, while simultaneously reinforcing family–school relationships in the digital era. As such, the model offers a practical roadmap for early childhood education institutions navigating the challenges of digital transformation.

Conclusion

This study demonstrates that parental partnership plays a critical role in supporting the effectiveness of technology-based learning in early childhood education. Through a Design-Based Research (DBR) approach, the study successfully identified key challenges in parental involvement, designed relevant interventions, and

produced an innovative partnership model grounded in real-world educational needs.

Interventions implemented through digital parenting programs, technology-based media training, and collaborative activity design were shown to enhance parents' knowledge, skills, and participation in children's digital learning. The results indicate increased involvement across all examined domains, particularly in parents' ability to more effectively support children's use of digital learning media.

The primary contribution of this study is the development of the Technology-Based Participatory Partnership Model, which positions parents as active partners throughout the digital learning process—from education and practice to collaborative program design. This model addresses a gap in existing literature, which has not fully integrated participation, co-learning, and technology within a single structured partnership framework.

Theoretically, the model enriches scholarship on family-school partnerships by offering a new perspective on technology-mediated collaboration in early childhood education. Practically, it provides a viable framework for early childhood education institutions to strengthen collaborative cultures, enhance parental digital literacy, and ensure learning experiences that are meaningful, safe, and responsive to the demands of the digital era.

Finally, this study opens avenues for future research, particularly in evaluating the effectiveness of the model across diverse early childhood education contexts, exploring the integration of more advanced technologies, or testing large-scale implementation. In this way, the findings are expected to contribute not only to academic discourse but also to practical efforts supporting the successful digital transformation of early childhood education.

References

1. Bakker, Joep, Eddie Denessen, and Mariël Brus-Laeven. 2007. "Socio-economic Background, Parental Involvement and Teacher Perceptions of These in Relation to Pupil Achievement." *Educational Studies* 33(2):177–92. doi:10.1080/03055690601068345.
2. Barab, Sasha, and Kurt Squire. 2004. "Design-Based Research: Putting a Stake in the Ground." *Journal of the Learning Sciences* 13(1):1–14. doi:10.1207/s15327809jls1301_1.
3. Bronfenbrenner, Urie. 1979. *Experiments by Nature and Design*. Harvard University Press.
4. Brown, John Seely, Allan Collins, and Paul Duguid. 1989. "Situated Cognition and the Culture of Learning." *Educational Researcher* 18(1):32–42. doi:10.3102/0013189X018001032.
5. Chen, Jennifer J., and Dahana E. Rivera-Vernazza. 2023. "Communicating Digitally: Building Preschool Teacher-Parent Partnerships Via Digital Technologies During COVID-19." *Early Childhood Education Journal* 51(7):1189–1203. doi:10.1007/s10643-022-01366-7.
6. Epstein, Joyce L. 2011. *School, Family, and Community Partnerships*. 2nd ed. Taylor & Francis.
7. Garang, Johannes. 1974. *Adat Und Gesellschaft : Eine Sozio-Ethnologische Untersuchung Zu Darstellung Des Geistes- Und Kulturlebens Der Dajak in Kalimantan*. Wiesbaden : F. Steiner, 1974.
8. Hirsh-Pasek, Kathy, Jennifer M Zosh, Roberta Michnick Golinkoff, James H Gray, Michael B Robb, and Jordy Kaufman. 2015. "Putting Education in 'Educational' Apps: Lessons From the Science of Learning." *Psychological Science in the Public Interest* 16(1):3–34. doi:10.1177/1529100615569721.
9. Holmes, Wayne, and Ilkka Tuomi. 2022. "State of the Art and Practice in AI in Education." *European Journal of Education* 57(4):542–70. doi:10.1111/ejed.12533.
10. Hornby, Garry. 2011. *Parental Involvement in Childhood Education: Building Effective School-Family Partnerships*. London: Springer.
11. Jeynes, William H. 2003. "A Meta-Analysis: The Effects of Parental Involvement on Minority Children's Academic Achievement." *Education and Urban Society* 35(2):202–18. doi:10.1177/0013124502239392.
12. Kim, Sungwon. 2022. "Fifty Years of Parental Involvement and Achievement Research: A Second-Order Meta-Analysis." *Educational Research Review* 37:100463. doi:https://doi.org/10.1016/j.edurev.2022.100463.
13. Kucirkova, Natalia. 2019. "Children's Reading With Digital Books: Past Moving Quickly to the Future." *Child Development Perspectives* 13(4):208–14. doi:https://doi.org/10.1111/cdep.12339.
14. Liu, Sylvia, Barry Lee Reynolds, Nathan Thomas, and Ali Soyoof. 2024. "The Use of Digital

- Technologies to Develop Young Children's Language and Literacy Skills: A Systematic Review." *Sage Open* 14(1):21582440241230850. doi:10.1177/21582440241230850.
15. Livingstone, Sonia, and Dongmiao Zhang. 2021. *How and Why Parents Support Their Children's Learning Online Parenting for a Digital Future: Survey Report 5*. www.parenting.digital.
 16. OECD. 2020a. *Building a High-Quality Early Childhood Education and Care Workforce*. TALIS. OECD Publishing.
 17. OECD. 2020b. *Early Learning and Child Well-Being: A Study of Five-Year-Olds in England, Estonia, and the United States*. OECD Publishing.
 18. OECD. 2020c. *Quality Early Childhood Education and Care for Children Under Age 3*. TALIS. OECD Publishing.
 19. Palts, Karmen, and Veronika Kalmus. 2015. *Digital Channels in Teacher-Parent Communication: The Case of Estonia*. Vol. 11.
 20. Rampersaud, Marsha, Kristin Swardh, and Henry Parada. 2024. "Child Welfare, Immigration, and Justice Systems: An Intersectional Life-Course Perspective on Youth Trajectories." *Laws* 13(3). doi:10.3390/laws13030034.
 21. Sanders, Mavis G. 2006. *Building School-Community Partnerships: Collaboration for Student Success*. Corwin Press, Inc.
 22. Sheridan, Susan M., and Elizabeth Moorman Kim. 2015. *Research on Family-School Partnerships*. Springer International Publishing.
 23. Takeuchi, Lori, Reed Stevens, Brigid Barron, Erica Branch-Ridley, Mindy Brooks, Hillel Cooperman, Ashley Fenwick-Naditch, Shalom Fisch, Rebecca Herr-Stephenson, Carlin Llorente, Siri Mehus, Shelley Pasnik, William Penuel, and Glenda Revelle. 2011. *The New Coviewing: Designing for Learning through Joint Media Engagement The Joan Ganz Cooney Center at Sesame Workshop and LIFE Center*. <http://get.adobe.com/reader/>.
 24. UNESCO. 2022. *World Conference on Early Childhood and Education*.
 25. UNESCO. 2024. *Global Report on Early Childhood Care and Education: The Right to a Strong Foundation*. UNESCO. doi:10.54675/fwqa2113.
 26. World Bank. 2020. *The Promise of Education in Indonesia*.
 27. World Bank. 2023a. *Assessment of Indonesia's Early Childhood Education and Development Accreditation Process Rights and Permissions Country Context*. www.worldbank.org.
 28. World Bank. 2023b. *Using Education Technology to Improve K-12 Student Learning in East Asia Pacific: Promises and Limitations*. www.worldbank.org.
 29. Yelland, Nicola J. 2018. "A Pedagogy of Multiliteracies: Young Children and Multimodal Learning with Tablets." *British Journal of Educational Technology* 49(5):847–58. doi:<https://doi.org/10.1111/bjet.12635>.