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Research Article

Parent perspectives on digital play-based early literacy-learning in marginalized communities

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Abstract: This study examined parent perspectives on digital play-based learning for early literacy development in non-formal educational settings in Pakistan and Bangladesh, where access to quality education remains limited for marginalized communities. Drawing on neo-ecological theory as a guiding framework, we conducted a qualitative focus group study in which we analysed discussions with 40 parents whose children participated in a three-month digital play-based literacy intervention implemented through community learning centres and refugee camps. The parents reported significant improvements in their children's English language capabilities and digital literacies, often describing instances that reversed traditional knowledge hierarchies within families, with children teaching their parents English pronunciation and digital navigation. However, the parents simultaneously expressed concerns about traditional writing skill development and future educational transitions. The intervention affected parent–child engagement in education, with many parents reporting increased school visits and children showing a newfound enthusiasm for attending classes. Notable variations emerged between communities with different levels of prior educational access, with refugee parents in Bangladesh showing greater enthusiasm for digital interventions than those with previous exposure to conventional education. The study demonstrated how parents in marginalized communities carefully evaluated digital play through contextual lenses, and challenged simplistic narratives about technology adoption in resource-constrained environments. The parents' perspectives highlight both the transformative potential of digital play for early literacy and the importance of contextually responsive approaches to implementing interventions.

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Introduction

Digital play-based early-childhood education represents a promising yet understudied approach for promoting literacy-learning among young children, particularly in marginalized communities. In these resource-constrained environments, limited access to qualified teachers, educational infrastructure and learning materials create significant barriers to quality education (Jamal, 2016; Shohel, 2022). Evidence implies that digital technologies offer potential pathways to addressing these challenges by providing structured learning opportunities in places where traditional educational resources are scarce, enabling more equitable access to early literacy development (Chu et al., 2024; Patel et al., 2018; Pereira et al., 2023).

The introduction of touchscreen devices and children's interactions with digital technologies have transformed the learning landscape, with children often engaging with these technologies from an early age (Lowrie & Larkin, 2020). Recent ethnographic research by Lewis et al. (2024) demonstrates how children's digital experiences at home are situated within complex social and cultural contexts, and that children show a natural inclination to interact playfully with digital technologies despite varying levels of access and parental mediation. These interactions seem to naturally become playful, regardless of the intent.

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As the lives of young children become more deeply intertwined with digital technologies, the value and methods of safely and meaningfully integrating these technologies into early-childhood learning environments are becoming a significant topic of discussion (Ihmeideh & Al-Maadadi, 2018; Pereira et al., 2023). Children generally hold favourable views of digital play, and exposure to educational digital games enhances their tendency to endorse play-based learning (Xie et al., 2021). However, literacy teachers, although recognizing the potential of digital play to boost student motivation and engagement, often face challenges due to a lack of practical skills and training in effectively integrating digital play into their pedagogy (Von Gillern et al., 2022).

Recent systematic reviews have highlighted the complex relationship between children and digital technologies in different learning contexts, including homes. Liu et al. (2024) found that digital play most effectively promoted language acquisition and literacy development when technological interventions included strategic features and appropriate adult mediation – a role often fulfilled by parents in home environments. The findings of Liu et al. (2024) and Chu et al. (2024) emphasize that successful outcomes depend not only on technological design elements but also on contextual factors, including adult support and guidance. This mediating role calls for deeper examination of parental perspectives on digital play-based learning, as these viewpoints reveal the underlying beliefs, values, and contextual factors that shape children's digital learning experiences.

Parents as Digital Learning Mediators

Parents play a significant role as mediators of young children's access and engagement with digital technology (Dias et al., 2016; Soyoof et al., 2024). Their beliefs, concerns, and levels of acceptance can significantly influence the adoption, effectiveness, and sustainability of innovative educational approaches such as digital play-based learning. This educational landscape has led to differing perceptions of digital play between children and adults, particularly parents. In digital play-based learning contexts, children predominantly experience digital interactions as playful activities, whereas parents interpret these same digital engagements as learning opportunities (Sulaymani et al., 2018). This fundamental perceptual difference influences how each group approaches screen time boundaries and content selection (Slutsky & DeShetler, 2017).

In the past decade, multiple studies have explored parental perspectives on children's digital engagement. In one study, the parents generally expressed concerns about whether excessive reliance on digital play might displace time spent on traditional learning methods such as hands-on exploration, physical play and social interaction (Siskind et al., 2022). At the same time, many worry that screen time limits a child's imaginative play and opportunities for outdoor activity (Canadian Pediatric Society, 2019; Mączyńska et al., 2025; Slutsky & DeShetler, 2017).

The conflicting guidelines on appropriate screen time complicate parents' ability to set healthy boundaries for digital play (Kerai et al., 2022; Straker et al., 2018). Although there is no formal clinical evidence of digital addiction among young children (Winther, 2017), academic discourse has raised questions about potential risks (e.g. Dresp-Langley, 2020; Pekonidi, 2021), and parents frequently express concerns about their children's preference for screen-based activities (Houghton et al., 2015; Wiseman et al., 2019). This is compounded by parents finding it difficult to encourage their children to disengage from digital devices (Johnston, 2021).

In the specific context of early literacy development, these parental concerns intersect with questions of effective mediation. Soyoof et al. (2024) found that parental mediation plays a critical role in shaping young children's digital literacy practices and learning outcomes. Their narrative review reveals that effective parent mediation can enhance children's digital literacy development while mitigating potential risks, though many parents feel inadequately prepared to provide this guidance. We argue that this parental guidance-related challenge becomes even more pronounced in cases of digital play for early literacy in marginalized communities.

Despite the established importance of parental involvement in children's education (Dias et al., 2016;

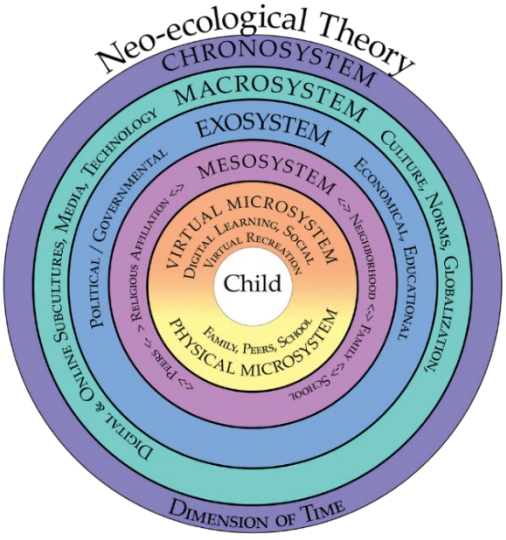
Soyoof et al., 2024), studies of parental perspectives on digital learning have predominantly focused on higher-income countries (Canadian Pediatric Society, 2019; Kerai et al., 2022; Straker et al., 2018), and research in lower-income countries and vulnerable populations has remained scarce (Ahmed et al., 2022, 2024). This research gap is particularly problematic, as parents in marginalized communities face unique challenges that shape their perspectives on educational technologies, including limited access to technological resources, varying levels of parental digital literacy, and competing priorities related to meeting basic needs (Ahmed et al., 2022). This study addresses this significant gap by asking: How do parents in marginalized communities perceive digital play-based education for early literacy-learning? By investigating parent perspectives in non-formal educational settings in Pakistan and Bangladesh, we make a novel contribution to this understudied intersection of digital education, early literacy, and marginalized contexts.

Contextualizing Digital Learning Through Neo-Ecological Theory

To help organize our analysis of parent perspectives on digital play-based literacy-learning in marginalized communities, we drew on concepts from neo-ecological theory as a guiding framework (Navarro & Tudge, 2023), using it as a heuristic tool. This approach recognizes that children's development and learning occur within interconnected environmental systems, from immediate learning experiences to broader social contexts. Rather than applying the full theoretical model, we used these specific ecological concepts as flexible analytical lenses to examine whether parents' perspectives on digital play are influenced by different contextual factors. Specifically, we employed concepts related to microsystems (the immediate settings in which children engage with digital technologies), mesosystems (the interconnections between these settings, such as home–school relationships), macrosystems (the cultural beliefs and values surrounding technology and education), and the interplay between personal characteristics (such as parents' digital literacy) and contextual features. These concepts helped us describe how parent perspectives are shaped by practical considerations, social connection and cultural values, while allowing us to remain responsive to the specific contexts represented in our data.

Figure 1

Five Ecological Systems (Bronfenbrenner, 1977), Adapted to Neo-ecological Theory



Neo-ecological theory expands on Bronfenbrenner's original ecological systems model (Bronfenbrenner, 1977) by specifically accounting for technological environments as contexts for development (Navarro & Tudge, 2023). Not dismissing the familiar nested systems (micro-, meso-, exo-, and macrosystems), neo-ecological theory introduces the critical distinction between physical and virtual microsystems, recognizing that digital contexts create unique spaces in which development occurs. Unlike traditional ecological theory, neo-ecological theory acknowledges that individuals can simultaneously

navigate multiple environmental systems and emphasizes how digital interactions reshape traditional developmental contexts. This theoretical adaptation provided a sophisticated framework for examining parental perspectives in marginalized communities, allowing us to consider how digital technologies create new ecological dynamics within resource-constrained environments, where the boundaries between physical and virtual contexts become particularly significant for understanding how parents interpret and mediate their children's early literacy experiences.

Method

This study employed a qualitative research design to examine parent perspectives on digital play-based learning in non-formal educational settings. Drawing on concepts from neo-ecological theory (Navarro & Tudge, 2023), we explored how parents in marginalized communities perceive digital play-based education for their children's early literacy-learning.

Research Design

We employed a qualitative research design, using focus group discussions with parents across Pakistan and Bangladesh to examine perceptions of digital play-based learning in marginalized communities. The constant comparative method guided our analysis through a neo-ecological theoretical lens, enabling us to systematically examine how parents' perspectives might be shaped by interactions across multiple environmental systems. This analytical approach facilitated the exploration of how immediate microsystems (both physical and virtual learning spaces), mesosystemic relationships (connections between home and educational settings), and broader macrosystemic influences (cultural values and socioeconomic constraints) potentially informed parents' evaluations of digital play interventions. By coding and categorizing data according to these ecological levels, we were able to identify patterns in how contextual factors influenced parental perspectives.

Participants

The study involved 40 parents from marginalized communities in Pakistan and Bangladesh. In Bangladesh, the participants were mothers from the urban slums in Dhaka, and Rohingya refugee women from Cox's Bazar, where children had limited access to formal early-childhood education. Only five of their five- to eight-year-old children participating in the interventions were enrolled in informal education provided by aid organizations. In Pakistan, the study was conducted in the remote areas of Sultanabad and Karabathang, and the densely populated urban slums of Karachi. The children of the interviewed parents in Pakistan had more access to formal education – approximately half of the parents reported that their children attended school.

These participants, all of them women aged between 20 and 35, were from diverse backgrounds but were united by similar socioeconomic challenges. Most of them had received limited formal education, and their educational attainment ranged from first grade to completion of high school. Their economic circumstances were characterized by limited financial resources: many were engaged in intermittent informal sector work such as tailoring or stitching. Despite these constraints, the parents demonstrated remarkable commitment to their children's education during the interventions, and many regularly visited the learning spaces to monitor their children's progress.

The digital literacy of the participants reflected their resource-constrained environments: approximately one quarter had access to smartphones and virtually none owned tablets or computers. Those with smartphone access mainly used its basic functions for calling and taking photographs, and had limited experience navigating other applications.

The 359 children (aged 5 to 8) of the study took part in a three-month play-based digital early literacy intervention implemented through community-based learning centres, after-school programmes, and educational initiatives in refugee camps. The 40 parents who participated in the focus group discussions represented 45 of these children. The digital platform used for literacy-learning was the English language

version of the Footsteps2Brilliance (F2B) application, designed to deliver educational content through interactive, engaging and playful formats (Rosenthal & Narciso, 2018).

Data Collection Tools and Process

The parent participants were organized into four distinct focus groups across two countries, and comprised 40 individuals whose children participated in the three-month digital play intervention programme. The research design incorporated four separate focus group discussions to ensure comprehensive data collection across different marginalized communities. In Karachi, Pakistan, two focus group discussions were conducted with nine and eleven Pakistani women respectively, totalling twenty participants. In Dhaka, Bangladesh, two additional focus group discussions were conducted with eight and twelve Rohingya refugee women respectively, also totalling twenty participants. This four-group structure enabled comparative analysis between different types of marginalized communities while maintaining cultural sensitivity in its data collection.

These parents were not present during the classroom interventions, but they received detailed descriptions of the interventions from supporting NGOs and observed their children's engagement in digital learning at home. Many of them visited outside the classrooms and interacted with the teachers before and after the classes. The parents were recruited during their children's initial enrolment in the intervention programme, and were all invited to participate in focus group discussions at the end of the three-month intervention period.

The four focus group discussions were conducted in parallel in both Pakistan and Bangladesh, and careful attention was paid to maintaining consistency in data collection procedures while accommodating the local contexts. These discussions were structured to last approximately twenty minutes, providing sufficient time for the participants to share their observations and experiences but remaining mindful of their other commitments. All the discussions were conducted in the participants' preferred languages – Urdu for the Pakistani participants, and Rohingya and Bengali in the Bangladesh sessions – to ensure they could express their views comfortably and authentically.

The parent protocol was designed to explore the participants' awareness and understanding of digital play-based learning, their observations of their children's engagement with the technology at home, and their perspectives on their children's learning and development. The focus group discussions followed a semi-structured format with nine primary topics: (1) awareness of the digital learning project in the school; (2) frequency of school visits and tracking children's progress; (3) familiarity with the concept of digital play-based learning; (4) use of technology at home (e.g., smartphones, tablets, computers); (5) purposes for which technology was used at home; (6) perceptions of digital play-based learning as an educational approach; (7) observed impacts of digital play-based learning on their children; (8) children's adaptation to the new methodology; and (9) perceived advantages and disadvantages of digital play-based learning.

The discussions were recorded, with the participants' consent, and subsequently transcribed verbatim to preserve the integrity of the responses. The transcripts were translated from Urdu, Rohingya and Bengali into English by translators who ensured that the educational terminology and concepts were accurately conveyed.

Analysis of Data

We employed the constant comparative method, a qualitative research technique central to grounded theory (Boeije, 2002; Glaser & Strauss, 1967), to analyse the focus group discussion data through a neo-ecological theoretical lens (Navarro & Tudge, 2023). This analytical approach began with initial coding as the focus group discussion transcripts became available. This was followed by systematic comparison of these initial codes across multiple dimensions. The analysis process was facilitated by

ATLAS.ti software, which supported the systematic organization and categorization of the qualitative dataset in accordance with the neo-ecological framework.

In practice, this involved first developing open codes that captured the parents' expressed perspectives on digital play, and then refining these into axial codes that reflected the connections between the perspectives and the contextual factors. Employing neo-ecological theory as our analytical lens, we paid particular attention to the interplay between the physical and virtual environments, recognizing how digital technologies create unique ecological dynamics within resource-constrained settings. Our coding process examined how the parents negotiated their children's simultaneous navigation of multiple ecological systems – from the immediate microsystems in which the digital learning occurred to the broader macrosystemic influences such as cultural attitudes toward technology and education. When contradictions emerged in the data, we employed negative case analysis to examine these instances, which was particularly valuable when we compared the perspectives of the refugee parents with limited prior educational access and those of the parents from communities with a more established educational infrastructure. Throughout the analysis, we systematically documented in ATLAS.ti how the parents' perspectives were shaped by the dynamic intersection of technological affordances, socioeconomic limitations, and educational aspirations specific to marginalized contexts. This structured yet adaptive approach enabled us to develop an understanding of parental perspectives while maintaining theoretical alignment with neo-ecological principles.

Results

The analysis of the four focus group discussions with 40 parents from marginalized communities revealed detailed perspectives on digital play-based early literacy-learning. The parents' views reflected complex interactions across multiple ecological levels, from immediate observations of their children's learning to broader concerns about educational futures.

Parents' Observations of Children's Learning and Development

Parents from both countries consistently reported observing significant changes in their children's language capabilities through engagement with digital play. Mothers from both rural Pakistani communities and Bangladeshi refugee settlements described pronounced improvements in their children's English language acquisition. One Pakistani mother explained with evident pride,

> My child didn't know the alphabet, but since she has started using a tablet, now she's able to read the alphabet well.

Several of the Rohingya mothers in Bangladesh noted their children's newfound ability to recite English nursery rhymes and use more English vocabulary at home.

The parents frequently described instances in which their children demonstrated English pronunciation skills that surpassed their own knowledge. As one mother from Dhaka explained,

> My child sometimes explains and corrects us that this is how it is pronounced. They correct our mistakes.

This reversal of the traditional knowledge hierarchy between parent and child emerged as a significant theme in the focus group discussions, with several parents expressing surprise at their children's rapid language acquisition.

Alongside language development, the parents observed their children developing digital competencies, despite limited previous exposure to technology. A mother from an urban slum in Dhaka expressed her astonishment:

> I was amazed when I saw my child being able to download programmes on nursery rhymes and sounds. I don't know how to do that but my daughter is able to do it.

The parents particularly valued this development in digital skills, viewing it as essential preparation for their children's futures, despite their own limited digital literacy.

However, in both countries, the parents consistently expressed concern about traditional writing skill development. One Bangladeshi mother articulated this worry:

> The advantage of this system is our children are able to learn easily and quickly. On the other hand, though, they can't learn to write.

This concern was especially pronounced among parents who anticipated that their children would eventually need to transition to conventional schools with no access to tablets.

Parents' Engagement with Educational Settings

The digital play intervention transformed how parents engaged with their children's education. Many reported increased involvements, despite socioeconomic constraints. Mothers in different settings described visiting the school more frequently, motivated by their interest in observing digital learning activities. As one mother from Karachi explained,

> [Every week] I come two or three times to the school and talk with the teacher about my child.

In Bangladesh, several mothers reported standing outside classrooms during sessions to observe their children's educational activities.

The parents consistently noted dramatic changes in their children's attitudes toward school attendance. A recurring theme across the focus group discussions was the children's newfound enthusiasm for education, with one Pakistani mother reporting,

> My son is really excited to come to school for this programme and focuses on his studies more.

This increased motivation was particularly emphasized by Bangladeshi parents: one mother explained:

> They don't want to go to coaching, but to this class they come themselves. We don't have to force them. I don't have to bring my kid to the class, he's motivated and keeps asking me when is it time to go to the class.

The intervention also created new forms of educational continuity between home and school environments. Despite limited access to technology, the parents described how their children attempted to transfer digital learning practices to their home settings. Several parents noted their children asking to use family smartphones for educational purposes, while others reported their children applying newfound digital navigation skills at home. As one mother from Dhaka shared with us:

> My child is able to open YouTube and go on to sounds and other programmes. I was amazed when I saw my child doing this.

This intergenerational knowledge transfer was particularly notable given the parents' own limited digital literacy, and many expressed surprises at their children's rapid acquisition of technological competencies.

Parents' Perspectives on Educational Systems and Resources

The parents demonstrated a sophisticated awareness of how the digital play interventions intersected with broader educational systems, particularly concerning future educational transitions. A consistent concern among the parents in both the countries was how their children would adapt to conventional educational settings after experiencing digital learning. A Bangladeshi mother articulated this directly:

> When they go to another school where they don't use this method, how will our children compete with other children?

The parents also expressed specific concerns about assessment practices and curriculum balance. Several Pakistani mothers questioned whether the digital intervention adequately prepared their children for traditional written examinations. One parent noted:

> We are all praising the tablet but not talking about other subjects. We should measure what students are doing in other subjects.

This reflected the parents' understanding of the broader educational requirements beyond the immediate digital intervention.

Resource constraints also shaped the parents' perspectives on the sustainability of digital learning. Although they valued the intervention, the parents in both countries recognized the limitations of their home environments for supporting the continuity of digital learning. One Pakistani mother suggested:

> If you let me know what the child is expected to do, we can help them at home

Which reflects the parents' desire to support educational continuity despite limited resources. Several parents requested expanded applications covering mathematics and local languages, indicating their desire for more comprehensive digital learning resources.

Parents' Cultural and Value Orientations

The parents in both countries navigated complex value orientations towards digital education, balancing traditional educational expectations with aspirations for technological advancement. One Pakistani mother captured this duality by stating:

> In today's context, this is extremely valuable for our kids and for their futures

reflecting a forward-looking perspective that was shared by many parents. Several parents explicitly connected digital literacy to future opportunities, with one mother noting:

> Yes, the coming era is one of technology.

However, these aspirational views were tempered by cultural concerns about appropriate technology use and supervision. The parents emphasized the importance of monitoring children's digital engagement, with one mother explaining:

> We shouldn't give it to them alone. We should supervise them. We should know what they're looking at, what they're listening to.

In addition to desires to monitor and observe, several parents expressed concern about children becoming overly reliant on digital devices, particularly regarding screen time and content access after, as well as during, the intervention.

The regional variations in the parent perspectives reflected different cultural and educational contexts. The Bangladeshi parents, particularly those from refugee communities with minimal prior access to education, showed greater enthusiasm for the digital intervention and fewer reservations. As one Rohingya mother explained:

> We are all aware of this, they started a very useful education system for our children. We hope that this digital learning project will help our children get better education in the future.

In contrast, the Pakistani parents, whose children had often previously been exposed to conventional education, more often evaluated the digital approach by comparing it to traditional approaches. One mother from Pakistan articulated a critical perspective:

> Students are getting weaker in written assignments, I've discussed this with the teacher as well. They were confused when it came to recognizing letters in the written test. They are young, maybe that's the reason. There should be a writing/written aspect in the programme.

This reflects how the parents in the communities with established educational traditions evaluated digital innovations against familiar learning outcomes such as writing proficiency, whereas those in more educationally marginalized settings prioritized access to any structured learning opportunity.

Despite these variations, the parents in all the communities expressed a desire for balanced educational approaches and did not completely reject digital innovations. One mother said:

> We do not want to stop the programme but do something to improve on it', reflecting the parents' nuanced approach to integrating digital learning into their cultural and educational values.

Conclusion and Discussion

Previous research on digital play in educational contexts has primarily focused on children's experiences (Lowrie & Larkin, 2020; Xie et al., 2021) and teacher perspectives (Pereira et al., 2023; Von

Gillern et al., 2022), and only a few studies have explored parents' perspectives (Johnston, 2021; Soyoof et al., 2024; Sulaymani et al., 2018). In this article, we have addressed this gap by exploring how parents from marginalized communities perceive their children's digital play-based early literacy-learning.

Our study demonstrates that parents in marginalized communities navigate complex considerations when engaging with digital play interventions for early literacy. Through a neo-ecological lens, these parent perspectives reveal dynamic interactions across multiple environmental systems, as they show sophisticated balancing of immediate educational benefits with broader cultural and practical concerns. The transformation of parent–child learning hierarchies, in which children become technological knowledge-bearers within family systems, illustrates what neo-ecological theory describes as bidirectional influences between personal characteristics and environmental contexts, creating new pathways for intergenerational knowledge exchange that transcends traditional microsystem boundaries.

In our study, the parents observed significant immediate benefits in their children's language acquisition and digital competency, but they also expressed concerns about traditional skill development, reflecting tensions between virtual and physical microsystems. The digital learning intervention created virtual microsystems in which the children engaged in complex proximal processes with educational content and symbols, while the parents observed these interactions from their physical home microsystems. These observations align with the findings of Liu et al. (2024) on the effectiveness of digital technologies for language development. However, our research reveals a critical tension specific to marginalized contexts: digital tools that effectively support new literacy skills may simultaneously challenge traditional literacy development in environments in which maintaining both learning pathways is particularly difficult. This tension highlights how technological interventions create overlapping learning environments that parents must help their children navigate, despite their limited resources.

The parents' observations of their children's increased motivation to attend school and engagement in learning expand on the previous findings of Deci & Ryan (2012) regarding the motivational impacts of educational games. The dramatic increases in the children's enthusiasm for education, reported in all the focus groups, suggest that digital play may serve as a particularly powerful motivational tool when educational opportunities have previously been limited or disrupted. This finding is especially significant given that low motivation and irregular attendance represent considerable barriers to educational success in marginalized communities (Shah et al., 2019).

Through a neo-ecological lens, the digital play intervention strengthened mesosystemic connections by creating new linkages between the virtual microsystem (digital learning platform), the physical home microsystem and the physical school microsystem. This three-way mesosystemic relationship represents a fundamental departure from the traditional two-system home–school connection. The children also engaged with virtual learning microsystems while physically present in their school microsystem, creating overlapping developmental contexts that later required the parents to mediate between virtual and physical learning environments despite their own limited experience with digital technologies.

The varying perspectives of the communities with different levels of prior access to education provide important insights into how local contexts and cultural value systems shape the reception of digital innovations. The parents in Bangladeshi refugee communities, where the children had extremely limited previous access to structured education, demonstrated notably higher enthusiasm and fewer reservations about digital learning than the Pakistani parents, whose children had prior exposure to conventional education. This is in line with the findings of Livingstone et al. (2017), as it demonstrates how marginalized communities actively negotiate between traditional educational values and perceived future needs rather than simply accepting or rejecting digital innovations.

A particularly significant finding concerns the transformation of parent–child educational interactions. Parents' descriptions of their children teaching them English pronunciation or demonstrating digital skills beyond their own capabilities represents a reversal of traditional knowledge hierarchies. This finding supplements those of Soyoof et al. (2024) on parental mediation by illustrating how digital interventions reshape family learning dynamics in resource-constrained environments, positioning

children as technological knowledge-bearers within family systems. It demonstrates how virtual microsystems can enhance personal characteristics that children then carry into physical microsystems, creating new opportunities for relational proximal processes between parents and children.

The perspectives shared by the parents in this study reveal how marginality shapes their engagement with digital play-based learning in distinct ways. Unlike parents in environments with more resources, who might primarily evaluate educational technologies on the basis of pedagogical preferences, the parents in our study navigated the practical considerations directly tied to their economic realities. Their evaluations balanced immediate learning benefits against everyday challenges – they wondered how digital skills would help their children in their educational settings, which had limited technology. The Pakistani mothers worried about their children transitioning from digital learning to traditional schools that emphasize handwriting and paper-based assessment, while Rohingya refugee mothers focused on how digital skills might create future opportunities for their children. These different concerns highlight that the parents' perspectives were influenced by their past experiences with education systems and what they believed would be valuable for their children's futures. Their careful approach shows that implementing technology in marginalized communities requires understanding the real-world constraints that families face when moving between different learning environments.

Our research ultimately reveals the sophisticated ways in which parents from marginalized communities evaluate educational technologies through multiple contextual lenses. Their perspectives transcend simple acceptance or rejection of digital innovations, instead demonstrating nuanced consideration of how these tools function within their children's broader educational ecosystems. The parents recognized both the transformative potential of digital play for early literacy and its limitations in resource-constrained environments. This balanced view challenges researchers and practitioners to move beyond technology-centred approaches towards more contextually responsive implementations that acknowledge the complex realities of marginalized communities. The insights gained from these parents suggest that successful digital literacy interventions must not only deliver engaging content; they must also address the transitional challenges that children face as they navigate between different learning environments with varying technological affordances. By understanding these parental perspectives, educators and policymakers can more effectively design interventions that bridge technological innovation with existing educational practices, creating more sustainable pathways for literacy development in marginalized contexts.

Limitations and Future Research

Several important limitations should be considered when interpreting these findings. The focus group methodology, while effective for capturing collective perspectives, may have limited the expression of minority viewpoints or concerns that the participants felt uncomfortable sharing in group settings. Although the focus on two specific cultural contexts provided rich comparative data, it may have limited transferability to other marginalized settings with different cultural and educational traditions. From a chronosystem perspective, our single time-point data collection does not quite reveal how parental perspectives evolve as digital learning technologies become more embedded within cultural contexts over historical time, representing what neo-ecological theory describes as macrotime influences on development.

To build on these findings, future research should explore several key areas. Longitudinal investigations could examine how parent perspectives evolve as digital play interventions become established within marginalized communities, and study how initial concerns and expectations align with long-term outcomes. Comparative research on parent perspectives in different types of marginalized communities would deepen our understanding of how cultural and socioeconomic factors influence the reception and implementation of digital play interventions. Investigating effective methods for addressing parent concerns about traditional skill development within digital play programmes would be particularly valuable for future implementation efforts.

Research on how parents with limited formal education can be effectively helped to mediate their

children's digital learning experiences could address a critical gap identified in this study. Such research directions could inform the development of more culturally responsive and parent-informed implementation strategies, in turn which could ultimately lead to more effective and sustainable digital play interventions in marginalized communities.

Practical Implications

The perspectives revealed in this study suggest significant practical considerations for implementing digital play interventions in marginalized communities. The parents' observations highlight the need for integrated approaches that support both digital and traditional skill development. Their specific concerns about writing skills and educational transitions underscore the importance of hybrid learning environments that maintain foundational practices while also embracing digital innovations.

The pronounced differences between the perspectives of the communities with varying levels of prior educational access suggest a need for contextually sensitive approaches to implementation. In settings in which digital play offers the first structured learning opportunity, implementation could focus on maximizing engagement and basic skills development. In contexts in which children have previously been exposed to conventional education, greater attention may need to be paid to ensuring a smooth integration into existing educational practices and to preparing for future transitions.

The parents' limited digital literacy, alongside their strong aspirations for their children's technological competence, indicates the importance of creating support mechanisms for parent engagement with digital learning. Simple guidance materials, regular opportunities for parents to observe, and clear communication about educational objectives could help bridge the gap between limited parental digital experience and their desire to support their children's learning.

Despite significant contextual challenges, the predominantly positive reception of digital play for early literacy-learning suggests substantial potential for carefully designed pedagogies based on digital play-based learning. By addressing parent concerns across multiple dimensions and remaining responsive to local contexts, digital play approaches can make meaningful contributions to early literacy development in some of the world's most challenging educational environments.

Declarations

Authors' Declarations

Acknowledgements: Not applicable.

Authors' contributions: All authors collaboratively designed the overall study framework and methodology. Lasse Lipponen identified neo-ecological theory as the relevant theoretical framework for the study. Lauri Pynnönen conducted the literature review, prepared the focus group discussion protocols and consent forms for parent participants in the intervention, and applied the constant comparative method for data analysis. All authors contributed to the data analysis process, with Lasse Lipponen and Kristiina Kumpulainen providing significant analytical contributions to develop the thematic narrative and theoretical interpretation of findings. Lauri Pynnönen served as the primary author of the manuscript, while Lasse Lipponen and Kristiina Kumpulainen provided substantial guidance, critical feedback, and editorial contributions throughout the writing process. All authors reviewed and approved the final manuscript.

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Ethics approval and consent to participate: This research adhered to the ethical standards established by the University of Helsinki and the Finnish National Board on Research Integrity, while also respecting local research ethics guidelines in Pakistan and Bangladesh. All ethical procedures were designed to acknowledge the unique considerations required when working with marginalized communities and followed the relevant ethical codes for scientific research.

Informed consent was obtained from all the participants through a process that emphasized voluntary participation and the right to withdraw at any time without any consequences. As regards the parents in the refugee communities and urban slums, we took particular care to explain the purpose, process, and potential implications of the research in culturally appropriate ways and in their preferred languages (Urdu, Rohingya and Bengali). This approach acknowledged the power dynamics inherent in research in marginalized communities and we sought to create equitable, respectful relationships throughout the research process.

All the data were anonymized during transcription, and all identifying information was removed and pseudonyms used in the

reporting of the results. The data were securely stored and access was limited to the research team, in accordance with the data protection protocols established by the University of Helsinki Confidentiality was maintained throughout the research process and in all subsequent publications.

Our research embraced an 'ethics-in-action' approach (Hilppö et al., 2019), which recognized that ethical considerations extend beyond procedural compliance to include ongoing reflexivity and responsiveness to participants' needs and cultural contexts. This approach included regular reflection on our positionality as researchers and the potential impact of our presence in these communities.

Following data collection, we shared the preliminary findings with the participating communities in accessible formats and languages to provide opportunities to give feedback and to ensure that the representation of their perspectives was faithful. Throughout the process, we remained attentive to the specific vulnerabilities of the participants in resource-constrained environments and adapted our ethical protocols accordingly.

Publisher's Declarations

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