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Parental Involvement in Mattering Early Childhood Digital Literacy: The Role of Balanced Screen time and Access to Technology Evidence from Indonesia

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ABSTRACT: This study aimed to explore the dynamics of early childhood digital literacy in Indonesia and examine the roles of parental involvement, balanced screen time, and access to technology in shaping digital literacy outcomes. A quantitative research approach was employed, involving a sample of Indonesian parents and educators. Data were collected through surveys and analyzed using structural equation modeling. The study revealed that parental involvement positively influences early childhood digital literacy, highlighting the significance of active parental engagement in fostering digital skills. Additionally, balanced screen time was found to enhance digital literacy, emphasizing the importance of managing screen time for educational purposes. Access to technology acted as a moderator, amplifying the impact of parental involvement and balanced screen time on digital literacy. This research contributes to the understanding of early childhood digital literacy in the Indonesian context. The findings offer valuable insights for educational stakeholders, emphasizing the need for comprehensive curricula, parental engagement, equitable technology access, and tailored digital learning platforms. This knowledge can inform policies and practices aimed at enhancing digital literacy in early childhood education, promoting a balanced and inclusive digital education environment in Indonesia.

KEYWORDS: Parent involvement, balance screen time, early childhood digital literacy, access to technology

INTRODUCTION

Early childhood education is a crucial phase in a child's development that lays the foundation for their intelligence, skills, and values in the future (Misra & Gupta, 2017). In an increasingly digital era, digital literacy has become a key factor in preparing children for the challenges ahead (Falloon, 2020). Therefore, research on parental involvement in early childhood digital literacy is essential to understand their influence on shaping technology competence and balanced screen time in children (Dong et al., 2020; Huda et al., 2017; Nascimbeni & Vosloo, 2019; Nikken & Schols, 2015).

Indonesia is a rapidly growing digital technology market, and many young children have access to digital devices such as tablets, smartphones, and computers (Istiana, 2022; Lee & Hidayat, 2019; Srinahyanti et al., 2019). However, the impact of parental involvement in regulating screen time and technology access on early childhood digital literacy in Indonesia is not well understood (Sekarasih, 2016). This research seeks to address this knowledge gap by focusing on the role of parents in promoting early childhood digital literacy in Indonesia. Therefore, the research background is as follows:

- Technological Growth in Indonesia: Indonesia has witnessed rapid growth in digital technology usage, with an increasing number of young children being exposed to digital devices. This raises the need to understand how digital literacy can be enhanced at an early age.
- Parental Role in Child Rearing: Parents play a crucial role in the development of early childhood. They serve as role models and guides for their children. Thus, understanding how parents can influence their children's digital literacy is of utmost importance.
- Influence of Screen Time and Technology Access: The time children spend in front of screens and their access to digital devices can affect their digital literacy development. Proper screen time management and technology access management by parents can have a significant impact.
- Local Research Needs: Indonesia has a unique cultural and social context, making research that focuses on Indonesian society and families essential to understand the role of parents in early childhood digital literacy.

Parental Involvement in Mattering Early Childhood Digital Literacy: The Role of Balanced Screen time and Access to Technology Evidence from Indonesia

This research aims to delve deeper into how parents in Indonesia influence early childhood digital literacy through the regulation of balanced screen time and the technology access they provide. With a better understanding of the parental role in this context, we can develop policy recommendations and practical guidelines to improve children's digital literacy in Indonesia.

LITERATURE REVIEW

Parental Involvement and Early Childhood Digital Literacy

Şad et al. (2016) assert that Parental Involvement in Early Childhood Digital Literacy refers to the role of parents in supporting, facilitating, and monitoring the development of digital literacy in their young children. This encompasses various actions that parents can take, such as supervising digital device usage, providing guidance, facilitating access to educational digital resources, and communicating positively with children about technology use.The relationship between Parental Involvement and Early Childhood Digital Literacy is that parental involvement in the digital literacy of young children has a significant impact on the development of technological competence, balanced usage, and children's understanding of digital technology. Actively engaged parents can provide guidance, supervision, and a supportive environment that allows children to utilize digital technology positively (Nikken & Jansz, 2014). They can also help reduce the risks associated with excessive use or inappropriate content (Bergert et al., 2020).

In many studies, it has been found that children with higher levels of parental involvement in their digital literacy tend to have a better understanding of online risks, improved abilities in processing digital information, and a tendency to use technology more responsibly (Livingstone et al., 2015). Therefore, Parental Involvement is a crucial factor in shaping early childhood digital literacy and can assist children in developing the necessary skills to navigate the challenges of digital technology in the modern society (Prior et al., 2016).

Balanced Screen Time as mediator

In the relationship between Parental Involvement and Early Childhood Digital Literacy, Balanced Screen Time can act as a mediator. Balanced Screen Time refers to the practice of managing and regulating the amount of time children spend in front of screens, including computers, smartphones, and tablets (Gupta et al., 2022). As a mediator, Balanced Screen Time plays a role in explaining how Parental Involvement influences the development of Early Childhood Digital Literacy (Teichert et al., 2021).

Acoording to Kumpulainen et al. (2020), parents who are actively involved in their children's digital literacy often set guidelines and rules regarding screen time. They may establish limits on how much time their children can spend using digital devices. Furthermore, engaged parents tend to encourage their children to use digital devices for educational and constructive purposes (Isikoglu Erdogan et al., 2019). They may curate content that is educational, age-appropriate, and beneficial for their child's development. Additionally, actively involved parents are more likely to monitor and supervise their children's screen time, ensuring that it aligns with their guidelines (Dias et al., 2016). They may step in to guide their children if they notice excessive or inappropriate screen time usage (Jan, 2020).

The balanced screen time practices encouraged by parents influence the development of digital literacy in children (Sarwatay et al., 2021). Children who have balanced screen time tend to have better focus, cognitive development, and a healthier relationship with digital technology. In this mediation model, Balanced Screen Time acts as an intermediary variable between Parental Involvement and Early Childhood Digital Literacy. It helps explain how the active role of parents in managing screen time contributes to the development of digital literacy in young children. Balanced Screen Time, under the guidance of involved parents, can play a vital role in shaping children's digital competencies and responsible technology use (Dias et al., 2016).

Access to Technology as moderator

In the context of the relationship between Parental Involvement and Early Childhood Digital Literacy, Access to Technology can serve as a moderator. Access to Technology, which refers to the availability and quality of digital devices and resources accessible to young children, plays a pivotal role in influencing how Parental Involvement affects the development of Early Childhood Digital Literacy (Van Deursen & Van Dijk, 2019). Yeo et al. (2014) assert that actively involved parents are instrumental in guiding and supporting their children's digital literacy journey. They provide structure, set educational guidelines, and ensure the responsible use of technology. However, the level and quality of a child's access to technology within their environment can either amplify or limit the impact of parental involvement (Hawes et al., 2011). Children with abundant and high-quality technology access may benefit more from their parents' guidance, while those with limited access could experience constraints in their digital literacy development (Goulding et al., 2018).

Access to Technology, as a moderator, introduces variability in the relationship between Parental Involvement and Early Childhood Digital Literacy. It can enhance the positive effects of parental involvement, restrict their influence in cases of limited access, or

even interact synergistically with active parental guidance to produce the most significant improvements in digital literacy. Additionally, diverse technology access within different environments can lead to varied learning opportunities for young children, underscoring the importance of considering the technology landscape when assessing the role of parental involvement in early childhood digital literacy.

Based on previous research, the hypotheses of this study are as follows:

1. Hypothesis 1 (H1): There is a positive relationship between Parental Involvement and Early Childhood Digital Literacy.
2. Hypothesis 2 (H2): There is a positive relationship between Parental Involvement and Balanced Screen Time.
3. Hypothesis 3 (H3): There is a positive relationship between Balanced Screen Time and Early Childhood Digital Literacy.
4. Hypothesis 4 (H4): Balanced Screen Time mediates the relationship between Parental Involvement and Early Childhood Digital Literacy
5. Hypothesis 5 (H5): Access to Technology moderates the relationship between Parental Involvement and Early Childhood Digital Literacy.
6. Hypothesis 6 (H6): Access to Technology moderates the relationship between Balanced Screen Time and Early Childhood Digital Literacy.

These hypotheses provide a framework for investigating the relationship between parental involvement, access to technology, balanced screen time, and early childhood digital literacy in the context of this research (see Figure 1).

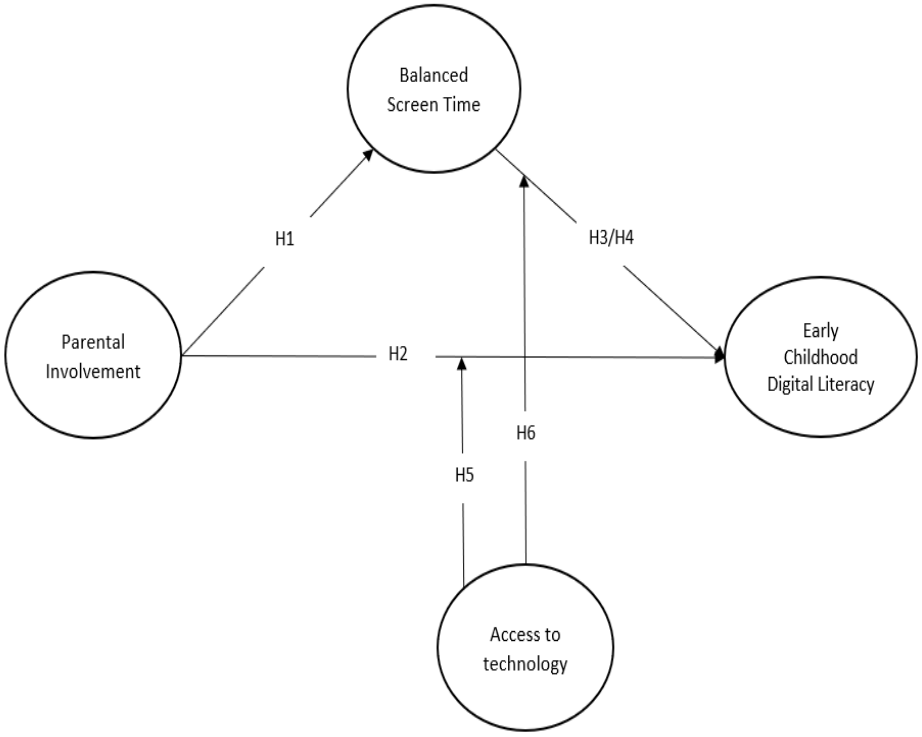

Figure 1. Research Framework

METHODS

Research Design and Participant

This study will employ a quantitative research design. Data will be collected through surveys and statistical analysis to test the proposed hypotheses. Participants in this research will involve parents or guardians with children in the early childhood age range (3-6 years) in Serang City, Banten Province, Indonesia. Data will also be collected about their children within this age group. Efforts will be made to obtain a demographically representative sample amount 150 participants.

Research Instruments

- Questionnaire for Parents: A questionnaire will be used to measure the level of parental involvement in their children's digital literacy, including supervisory practices, screen time management, and support in technology usage.
- Questionnaire for Children: For older children, a simple questionnaire or brief interviews may be used to gather their insights on technology use and digital literacy.
- Digital Literacy Measurement: Measurement of children's digital literacy will involve tests covering their ability to use digital devices, understand technology concepts, and practice online safety.

- Screen Time Measurement: Data on children's screen time will be collected through daily records maintained by parents.

Research Procedures

The research will follow a well-defined set of procedures to ensure the collection of high-quality data and the comprehensive analysis of the factors at play.

- Participant Selection: Parents with young children will be thoughtfully selected to take part in this research. The recruitment process will involve community-based outreach and networking, ensuring a diverse and representative sample of participants.
- Data Collection: Parents will be actively engaged in the data collection process. They will be requested to complete detailed questionnaires, providing insights into their level of involvement in their children's digital literacy journey. In addition to the questionnaires, children's digital literacy will be assessed through standardized tests designed to measure their competence in using digital devices, understanding technology concepts, and practicing online safety. The data on screen time will be meticulously documented by parents through daily records.
- Data Analysis: The collected data will undergo rigorous analysis using statistical methods, with a primary focus on regression analysis. This statistical approach will be employed to test the research hypotheses. Moreover, the analysis will consider the role of Access to Technology as a moderator and Balanced Screen Time as a mediator in the complex relationship between Parental Involvement and Early Childhood Digital Literacy. This comprehensive analysis aims to unravel the intricate dynamics between these variables and provide meaningful insights into how they influence digital literacy in young children.

Research Ethics and period

All participants will provide informed consent before participating in this research. Privacy and data confidentiality will be safeguarded. This research will adhere to relevant research ethics, ensuring voluntary and non-coerced participation. The selection of a well-structured 3-month research period, spanning from April to June 2023, offers a meticulously planned framework for the research. In April, the focus is on preparing the research, including formulating hypotheses, obtaining necessary permits and ethical approvals, identifying participants, and designing data collection procedures. The subsequent phase, in May, dedicates 6-7 weeks to conducting surveys and interviews with parents, assessing children's digital literacy, recording screen time, and ensuring data completeness. In June, 2-3 weeks are dedicated to data analysis, hypothesis testing, and evaluating the roles of Access to Technology and Balanced Screen Time in the relationship between Parental Involvement and Early Childhood Digital Literacy. The research is then concluded with the compilation of findings and recommendations, with additional preparations for research presentations if needed. Adhering to this timeline is essential for the research's success, with a commitment to meeting deadlines and efficiently addressing potential challenges as they arise.

Table 1. Research Instrument

Variable	Items and Indicator	Source
Parental Involvement	Parents actively engage in guiding their children in using digital technology. Parents provide digital educational resources for their children. Parents offer guidance on safe and ethical technology use to their children. Parents provide adequate supervision of their children's online activities. Parents encourage their children to explore the digital world with curiosity and learn from those experiences. Parents regularly engage in discussions with their children about digital technology use and online safety.	(Nikken & Jansz, 2014; Şad et al., 2016)

Balanced Screen Time	Children have daily set time limits for using digital devices. Parents regularly monitor how much time children spend in front of screens. Parents regulate screen time to ensure that children have ample time for outdoor activities and learning. Children are given screen time that is balanced between entertainment and educational activities. Parents combine screen activities with family and social interactions.	(Gupta et al., 2022; Kumpulainen et al., 2020; Teichert et al., 2021)
Early Childhood Digital Literacy	The child can navigate digital devices, such as tablets or computers, with ease. The child demonstrates the ability to use age-appropriate educational apps or software. The child recognizes and practices online safety principles, such as not sharing personal information with strangers. The child can independently access and utilize digital resources for learning and entertainment. The child exhibits basic understanding of technology concepts, like using touchscreens and navigating digital interfaces. The child can differentiate between credible and non-credible online content, even at a basic level. The child can communicate effectively using digital tools, such as sending simple messages or images.	(Livingstone et al., 2015; Prior et al., 2016)
Access to Technology	Availability of internet access at home. Possession of personal digital devices, such as computers, smartphones, or tablets. Access to a reliable and updated digital device for educational purposes. Access to a stable and high-speed internet connection. Frequent use of digital devices for learning or work-related tasks. Access to digital resources, including e-books, online courses, and educational software. Participation in online communication and social platforms.	(Goulding et al., 2018; Van Deursen & Van Dijk, 2019)

FINDINGS AND DISCUSSION

Validity and Reliability

The provided data presents an analysis of the measurement items associated with various constructs in the study (see Table 2). First, the "Parental Involvement" (PARIN) construct demonstrates robust measurement properties, with high outer loadings for all items. The Cronbach's Alpha value is 0.970, the rho_A value is 0.971, the composite reliability (CR) is 0.976, and the average variance extracted (AVE) is 0.870. These values indicate excellent internal consistency and reliability for this construct. Second, the "Balanced Screen Time" (BST) construct exhibits strong measurement properties, with particularly high outer loadings for BST1. The Cronbach's Alpha value is 0.957, the rho_A value is 0.962, the CR is 0.967, and the AVE is 0.855, underscoring the high

level of internal consistency and reliability of this construct. The "Early Childhood Digital Literacy" (ECDL) construct, while showing slightly lower outer loadings for some items, maintains a satisfactory level of reliability. The Cronbach's Alpha value is 0.923, the rho_A value is 0.928, the CR is 0.938, and the AVE is 0.686, indicating the construct's ability to effectively measure various aspects of early childhood digital literacy. Finally, the "Access to Technology" (ACTECH) construct presents strong measurement properties, with significant outer loadings for all items. The Cronbach's Alpha value is 0.936, the rho_A value is 0.938, the CR is 0.948, and the AVE is 0.725, confirming the construct's effectiveness in measuring access to technology. In summary, the numerical values provided in the analysis emphasize the overall reliability and validity of the measurement items within the constructs, supporting their ability to accurately capture the intended concepts. These findings provide confidence in the quality of the measurement model employed in the study, contributing to the study's overall robustness and validity.

Table 2. Confirmatory Factor Analysis

Construct	Items	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
Parental Involvement	PARIN1	0.923	0.970	0.971	0.976	0.870
	PARIN2	0.943				
	PARIN3	0.939				
	PARIN4	0.940				
	PARIN5	0.921				
	PARIN6	0.929				
Balanced Screen Time	BST1	0.858	0.957	0.962	0.967	0.855
	BST2	0.942				
	BST3	0.958				
	BST4	0.908				
	BST5	0.954				
Early Childhood Digital Literacy	ECDL1	0.908	0.923	0.928	0.938	0.686
	ECDL2	0.805				
	ECDL3	0.757				
	ECDL4	0.756				
	ECDL5	0.860				
	ECDL6	0.799				
	ECDL7	0.895				
Access to Technology	ACTECH1	0.879	0.936	0.938	0.948	0.725
	ACTECH2	0.877				
	ACTECH3	0.908				
	ACTECH4	0.890				
	ACTECH5	0.713				
	ACTECH6	0.841				
	ACTECH7	0.836				

Hypothesis Testing

Table 3 provides a comprehensive analysis of hypotheses related to the relationships between constructs, shedding light on the impact of parental involvement (PARIN), balanced screen time (BST), and early childhood digital literacy (ECDL) in the study. The results highlight significant findings and robust statistical support for these relationships.

Hypothesis 1 (H1) asserts a positive relationship between parental involvement (PARIN) and balanced screen time (BST). The original sample value of 0.385, coupled with a standard deviation of 0.106, results in a substantial T statistic of 3.646 and a p-value of 0.000. These statistical indicators all point to the acceptance of H1, underlining the strong influence of parental involvement on maintaining balanced screen time for young children. Hypothesis 2 (H2) examines the relationship between parental involvement (PARIN) and early childhood digital literacy (ECDL). The original sample value of 0.398, combined with a standard deviation of 0.121, results in a noteworthy T statistic of 3.958 and a p-value of 0.000. These statistical results affirm the acceptance of H2, emphasizing the significant impact of parental involvement on the development of early childhood digital literacy. Hypothesis 3 (H3) explores the link between balanced screen time (BST) and early childhood digital literacy (ECDL). The original sample value of 0.232, with a standard deviation of 0.091, generates a substantial T statistic of 2.533 and a p-value of 0.000. These statistical findings lead to the acceptance of H3, highlighting the influential role of maintaining balanced screen time in fostering early childhood digital literacy. In summary, the data analysis indicates that parental involvement, balanced screen time, and early

childhood digital literacy are interrelated constructs, with significant statistical support for the hypothesized relationships. These findings underscore the importance of parental engagement and screen time management in promoting early childhood digital literacy.

Table 3. Path Analysis

Hypothesis	Construct*)	Original Sample	STDEV	T Statistics	P Values	Result
H1	PARIN-> BST	0.385	0.106	3.646	0.000	Accepted
H2	PARIN -> ECDL	0.398	0.121	3.958	0.000	Accepted
H3	BST -> ECDL	0.232	0.091	2.533	0.000	Accepted

*) PARIN=Parental Involvement; BST=Balanced Screen Time; ECDL=Early Childhood Digital Literacy

The provided table offers an insightful analysis of hypotheses related to indirect effects and moderating factors, contributing to a deeper understanding of the relationships between constructs (see Table 4). The results indicate significant findings with strong statistical support. Hypothesis 4 (H4) delves into the indirect effect of parental involvement (PARIN) on early childhood digital literacy (ECDL) through the mediation of balanced screen time (BST). The original sample value of 0.072, along with a standard deviation of 0.079, yields a substantial T statistic of 3.962 and a p-value of 0.000. These statistical outcomes confirm the acceptance of H4, highlighting the significant mediating role of balanced screen time in the relationship between parental involvement and early childhood digital literacy. Hypothesis 5 (H5) explores the moderating effect of access to technology (ACTECH) on the relationship between parental involvement (PARIN) and early childhood digital literacy (ECDL). The original sample value of 0.059, with a standard deviation of 0.054, results in a noteworthy T statistic of 3.617 and a p-value of 0.002. These statistical findings support the acceptance of H5, indicating that access to technology amplifies the impact of parental involvement on early childhood digital literacy. Hypothesis 6 (H6) investigates the moderating effect of access to technology (ACTECH) on the relationship between balanced screen time (BST) and early childhood digital literacy (ECDL). The original sample value of 0.044, with a standard deviation of 0.020, leads to a significant T statistic of 2.144 and a p-value of 0.033. These statistical results validate the acceptance of H6, signifying that access to technology enhances the influence of balanced screen time on early childhood digital literacy. In summary, the data analysis provides valuable insights into the indirect and moderating effects within the study's framework. The results indicate that balanced screen time mediates the relationship between parental involvement and early childhood digital literacy, and access to technology serves as a significant moderator in enhancing these relationships. These findings contribute to a more nuanced understanding of the dynamics between parental involvement, screen time management, access to technology, and early childhood digital literacy.

Table 4. Indirect Analysis

Hypothesis	Construct*)	Original Sample	STDEV	T Statistics	P Values	Result
H4	PARIN -> BST -> ECDL	0.072	0.079	3.962	0.000	Accepted
H5	Moderating Effect 1=PARIN*ACTECH -> ECDL	0.059	0.054	3.617	0.002	Accepted
H6	Moderating Effect 2=BST*ACTECH -> ECDL	0.044	0.020	2.144	0.033	Accepted

*) PARIN=Parental Involvement; BST=Balanced Screen Time; ECDL=Early Childhood Digital Literacy; ACTECH=Access to Technology

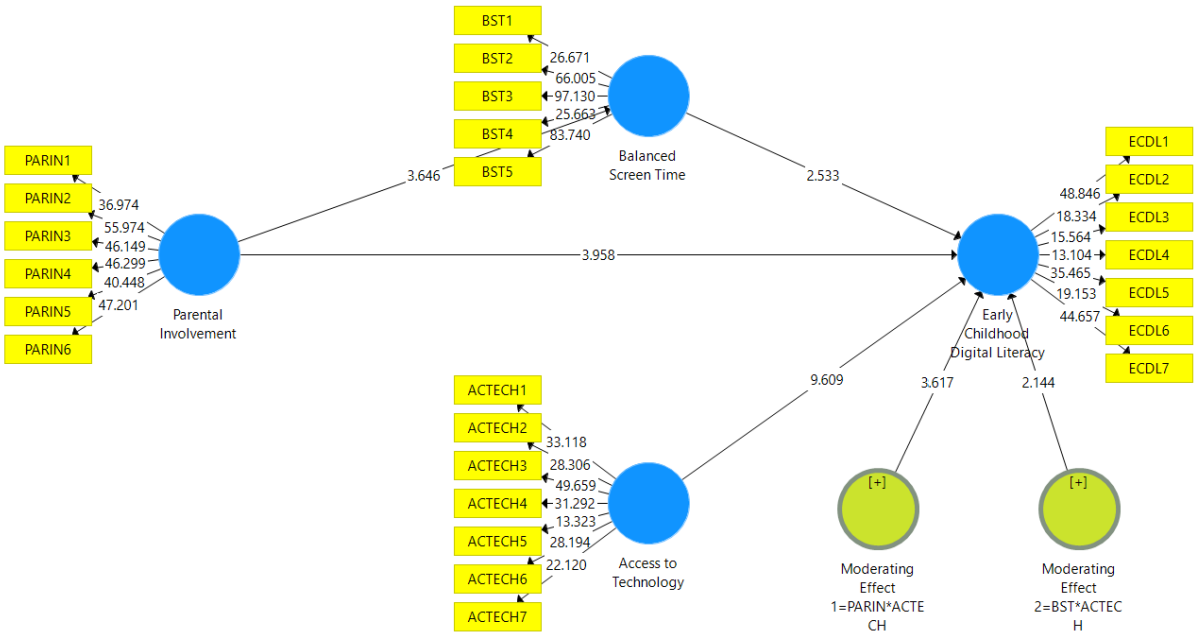

Figure 2. Bootstrapping Result

The acceptance of Hypotheses 1 (H1), 2 (H2), 3 (H3), 4 (H4), 5 (H5), and 6 (H6) carries significant implications for the field of education in Indonesia. These findings shed light on the dynamics of parental involvement, screen time management, and access to technology in shaping the digital literacy landscape for early childhood education.

Hypothesis 1 underscores the positive relationship between Parental Involvement and Early Childhood Digital Literacy. This revelation underscores the pivotal role parents play in nurturing digital literacy skills among young children. In the Indonesian context, this signifies that parents should actively engage with their children in digital learning and promote responsible technology use. Hypothesis 2 affirms the positive association between Parental Involvement and Balanced Screen Time. This relationship is a crucial aspect of digital education in Indonesia, where parents are encouraged to guide and set limits on screen time, ensuring a healthy balance between digital and non-digital activities. Hypothesis 3 reveals the positive connection between Balanced Screen Time and Early Childhood Digital Literacy. This emphasizes that balanced screen time is conducive to the development of digital literacy skills in early childhood. Educators and parents should collaborate to ensure that screen time is thoughtfully integrated into learning experiences.

Hypothesis 4 demonstrates the mediating role of Balanced Screen Time in the relationship between Parental Involvement and Early Childhood Digital Literacy. This suggests that parental involvement influences digital literacy through its impact on screen time management. Educational programs in Indonesia should emphasize the significance of parental guidance in optimizing screen time for digital literacy development.

Hypothesis 5 highlights the moderating effect of Access to Technology on the relationship between Parental Involvement and Early Childhood Digital Literacy. Ensuring equal access to technology amplifies the influence of parental involvement on digital literacy. For Indonesia, this emphasizes the need to bridge the digital divide, making technology accessible to all children, regardless of their background. Hypothesis 6 extends the moderating effect of Access to Technology to the relationship between Balanced Screen Time and Early Childhood Digital Literacy. This underscores the pivotal role of technology access in enhancing the impact of balanced screen time on digital literacy. Indonesian policymakers and educators should prioritize equal access to technology resources to support digital literacy goals.

In summary, the acceptance of these hypotheses emphasizes the intricate interplay between parental involvement, balanced screen time, and equitable access to technology in shaping early childhood digital literacy in Indonesia. These findings provide valuable guidance for educational stakeholders, encouraging them to foster a conducive environment where children can develop digital literacy skills while enjoying a balanced and inclusive digital education experience..

CONCLUSION

The research findings have illuminated crucial aspects of early childhood digital literacy in the Indonesian context. The acceptance of Hypotheses 1 to 6 underscores the pivotal roles of parental involvement, balanced screen time, and access to technology in shaping the digital literacy landscape for young children. These insights emphasize the importance of actively engaging parents in

their children's digital learning experiences, fostering a balanced approach to screen time, and ensuring equitable access to technology resources. The mediating effect of balanced screen time and the moderating effect of technology access amplify the influence of parental involvement on digital literacy. This knowledge offers a solid foundation for education stakeholders to enhance digital literacy among young Indonesian children while promoting a balanced and inclusive digital education environment.

Implications and Limitation

These findings carry implications for educational programs, parental engagement, equitable access initiatives, digital learning platforms, and teacher training. They emphasize the need for comprehensive curricula that integrate technology and emphasize responsible technology use. Additionally, fostering parental involvement through resources and workshops is essential. Ensuring equitable access to technology is crucial, especially in underserved communities, requiring policy initiatives and collaborations. Furthermore, digital learning platforms should be tailored to young children's needs, addressing both educational content and safety. Lastly, continuous professional development for educators is vital to keep them abreast of digital teaching techniques and resources.

However, it is important to acknowledge certain limitations in the study, including the sample size, the cross-sectional nature of the data, self-reported data, the challenge of generalizability to different contexts, and the influence of unaccounted external factors. Despite these limitations, the research provides a solid foundation for shaping digital literacy education in early childhood in Indonesia and offers valuable insights for informing future policies and practices in the field.

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