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Analysis of the Effects of Social Media on Children Education Mechanisms

Rony Setiawan[1], Ariesya Aprillia[2*], Rully Arlan Tjahyadi[3], Cen Lu[4], Kezia Kurniawati Nursalin[5], Felicia Abednego[6], Kristina Vaher[7]
[1,2,3,4,5,6]Faculty of Law and Digital Business, Maranatha Christian University, Indonesia
[7]Retail Management, Ilearning Incorporation, Estonia
[1]rony.setiawan@eco.maranatha.edu, [2]ariesya.aprillia@eco.maranatha.edu, [3]rully.arlan@eco.maranatha.edu, [4]cen.lu@eco.maranatha.edu, [5]kezia.kn@eco.maranatha.edu, [6]felicia.abednego@eco.maranatha.edu, [7]vaher.kristin@ilearning.ee
***Corresponding Author**

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ABSTRACT

The increasing use of social media has significantly influenced various aspects of daily life, including children's education mechanisms. This **research aims** to explore the impact of social media on educational processes and how it shapes learning outcomes for children. The **objective** of this study is to examine the relationship between social media usage and children's educational development, using **SmartPLS** analysis as the primary method. By analyzing data collected from students, parents, and educators, the study identifies key factors such as engagement, content accessibility, and social interaction that mediate this relationship. The results reveal that while social media can serve as an effective educational tool, it also presents potential risks, including distraction and exposure to inappropriate content. The **findings** suggest that balanced usage of social media can enhance children's learning experiences if properly managed. The **conclusion** underscores the need for further research into the educational implications of social media, emphasizing the importance of parental involvement and regulatory frameworks in ensuring its positive impact on children's education.

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1. INTRODUCTION

In recent years, social media has become an integral part of daily life for people of all ages, including children [1]. With its widespread usage, it has transformed how individuals communicate, share information, and learn [2]. Social media platforms like Facebook, Instagram, Twitter, and YouTube, among others, offer unique ways for children to interact with peers, access educational content, and even participate in virtual learning environments. However, the integration of social media in children's education presents both opportunities and challenges [3]. While these platforms provide innovative tools and avenues for collaboration, they also introduce risks such as information overload, distractions, cyberbullying, and exposure to inappropriate content. Understanding the impact of social media on children's educational mechanisms has become a pressing area of study, particularly in the context of the rapid digital transformation of educational systems across the globe [4].

The background of this research is rooted in the increasing importance of digital literacy in modern education systems [5]. The global shift towards digital technologies has made online learning and social media platforms significant elements in shaping educational landscapes [6]. Children, particularly in younger age groups, are increasingly exposed to these platforms for various purposes, including entertainment, socialization, and academics. Social media, with its interactive nature and vast repositories of information, presents opportunities to revolutionize learning [4]. Educational institutions have begun integrating social media into curricula, utilizing platforms as supplementary tools for knowledge dissemination, collaboration, and communication [7]. However, this integration raises critical questions about how social media impacts the quality of children's learning experiences and whether it facilitates or hinders academic development [8]. Research in this area is essential to better understand the mechanisms by which social media influences children's cognitive, social, and emotional development, and to explore how its use can be optimized within the educational context [9].

This study aims to analyze the effects of social media on children's education mechanisms using SmartPLS analysis [10]. SmartPLS is a statistical tool particularly suitable for modeling complex relationships between variables, such as social media engagement, content quality, and educational outcomes, which interact and influence one another [11]. The study seeks to identify the key elements mediating the relationship between social media usage and children's learning outcomes, providing insights into how different dimensions of social media affect educational processes [12]. Furthermore, the research focuses on understanding both the positive and negative aspects of social media use in the context of children's education, emphasizing the mechanisms through which social media influences learning [13]. The study also explores the role of parental involvement, educators strategies, and the types of content accessed in shaping children's educational experiences [14].

This research is significant because it contributes to the ongoing discourse on the role of digital technologies in education, particularly for children and adolescents growing up in an increasingly connected world [15]. With the rise of e-learning platforms and the increasing reliance on social media for information sharing and communication, there is a critical need to evaluate the long-term implications of social media use on children's cognitive and emotional development [16]. By providing empirical evidence on how social media influences children's learning outcomes, this study offers insights that can guide educators, parents, and policymakers in developing strategies to amplify positive effects while mitigating risks [17]. Furthermore, this research adds to the existing literature on educational technology by examining social media's role as an educational tool and its potential to reshape traditional learning environments [18]. The findings of this study will be valuable for designing future educational interventions and advancing understanding of the interplay between social media, education, and child development [19].

2. LITERATURE REVIEW

The increasing integration of social media into children's education has sparked significant interest in understanding its impact on learning outcomes. While social media platforms offer opportunities for enhanced engagement and access to educational content, they also present challenges, such as distractions and exposure to inappropriate material [20]. This literature review explores both the positive and negative effects of social media on children's cognitive and educational development, emphasizing the role of educators, parents, and technology developers in optimizing its use for learning [21, 22].

2.1. The Role of Social Media in Education

The integration of social media into educational settings has gained significant attention in recent years due to its potential to transform teaching and learning methods. Social media platforms, such as Facebook, Twitter, Instagram, and YouTube, offer a variety of tools that can be leveraged for educational purposes, enhancing both teaching and learning experiences [23]. Social media provides students with opportunities for collaborative learning, access to diverse resources, and the ability to engage with peers and instructors beyond the physical classroom. These platforms enable the sharing of educational content, including videos, articles, and interactive materials, which can enrich students' understanding of academic subjects. Moreover, social media fosters a sense of community among learners, encouraging discussions, peer support, and networking, enhancing the educational experience [24, 25].

Despite these positive aspects, the role of social media in education has its challenges [26]. Researchers have raised concerns about distractions and time-wasting tendencies associated with the use of social networks, which can undermine student focus and academic performance [27]. Excessive use of social media

has been linked to reduced attention spans, lower academic motivation, and even mental health issues such as anxiety and depression [24, 28]. The literature highlights the need for educators and parents to adopt strategies that promote responsible and balanced social media use, ensuring that students benefit from the educational opportunities it provides while minimizing the risks associated with overuse [29, 30].

2.2. Social Media Impact on Children's Cognitive Development

The impact of social media on children's cognitive development is an emerging area of study, with research increasingly focusing on how digital technologies influence various aspects of learning and brain function [31]. Cognitive development in children involves the growth of critical thinking, problem solving skills, memory, and learning processes [32, 33].

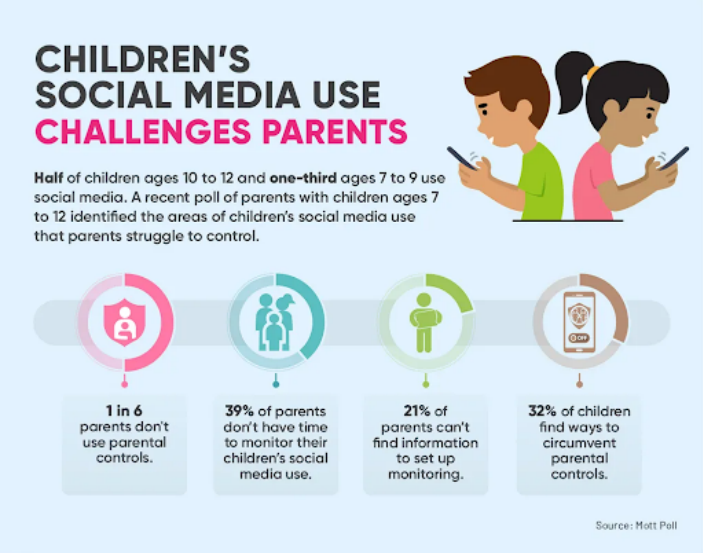

Figure 1. Technology and Social Interaction in Children

As in Figure 1, the complexities of cognitive development in the digital age are also reflected in the changing dynamics of education. The traditional methods of teaching and learning, as depicted in the image, contrast with the growing role of social media in children's educational environments, which presents both opportunities and challenges in fostering deeper cognitive engagement [34].

Several studies have explored social media's positive and negative effects on these cognitive functions, particularly among younger audiences [35]. Social media can stimulate creativity and critical thinking by providing children with access to diverse content and allowing them to express themselves through different mediums such as blogs, videos, and podcasts [36, 37]. Additionally, collaborative activities on social media platforms promote problem-solving and teamwork skills as children engage with peers on academic projects or discussions.

However, while social media has the potential to enhance cognitive abilities, there are concerns about its negative impact on children's attention span, memory, and learning focus. The constant stimulation provided by social media platforms can lead to information overload, where children are bombarded with too much content, making it difficult for them to retain and process information effectively [38]. The instant gratification associated with social media, such as receiving likes or comments, may also hinder children's ability to engage in deep learning and reflection [39]. The literature suggests that while social media can serve as a cognitive tool, it must be used in moderation to avoid cognitive overload and encourage meaningful learning experiences.

2.3. Parental and Educational Role in Social Media Use for Education

The role of parents and educators in mediating children's social media use is crucial in determining whether its effects will be beneficial or detrimental to children's educational development. Research has consistently highlighted that parental involvement in children's media consumption is a key factor in promoting positive educational outcomes and mitigating the risks associated with excessive or inappropriate social media use. Parents who actively engage in their children's online activities are better equipped to guide their children

in navigating the digital world responsibly [40, 41]. Parental monitoring of social media usage is important not only for limiting screen time but also for curating the content children access. By encouraging educational resources, such as online courses, informational videos, and academic articles, parents can help their children use social media as a productive learning tool [42].

Furthermore, the educational system plays an equally important role in shaping the way social media is integrated into the learning process. Educators who recognize the potential of social media as a learning tool can design educational experiences that leverage social media platforms to foster collaboration, creativity, and problem-solving skills among students [43]. Research has shown that social media, when used strategically, can enhance classroom learning by enabling students to access a wide range of learning materials, participate in discussions, and engage with peers on academic topics in real-time. Teachers who integrate social media effectively into their curricula create dynamic learning environments that extend beyond the traditional classroom walls, providing students with opportunities to learn from diverse perspectives and gain new insights. Social media can also support the development of digital literacy skills, which are essential in the 21st-century educational landscape [44, 45]. However, successful integration of social networks into education requires more than just using them as a tool for information sharing. Teachers must provide proper guidance on how students should interact with online content and encourage critical reflection on the materials they encounter. This is particularly important given the vast amounts of information available online, not all of which is reliable or accurate. Educators must teach students how to assess the credibility of online sources, engage in respectful and ethical online discourse, and avoid the pitfalls of misinformation and cyberbullying. In addition to teaching technical skills, educators must also foster a culture of responsibility and digital citizenship in the classroom.

2.4. Positive and Negative Effects of Technology on Children

Children are growing up in an increasingly digital world where technology plays an integral role in shaping their lives. While technology offers significant opportunities for learning and development, it also presents challenges that can affect children's mental and physical well-being. Understanding both the positive and negative effects of technology is essential in ensuring that its use is balanced and beneficial [46].

2.4.1. Positive Effects of Technology on Children

The COVID-19 pandemic revolutionized the way children interact with technology, leading to an increased reliance on digital tools for education and communication. According to parenting expert [47], the pandemic led to a reevaluation of the rules governing children's access to the internet and computers, as many of these technologies became essential for maintaining education and social connections. Technology opens up vast resources for children to access information, which enhances their creativity and learning. For example, tech hardware and software provide platforms that help children develop social skills and introduce them to various arts and sciences, which is particularly important for children who may be physically or developmentally challenged.

One of the significant benefits of technology is that it enables children to connect with family, friends, and others in enriching ways, especially through video chats and real-time interactions. This connection is crucial for children who may otherwise feel isolated due to distance or circumstances. Technology can also encourage children to become independent learners. Once children learn how to access digital information safely, they can explore topics of interest on their own, fostering curiosity and a love for learning. Furthermore, early access to technology promotes essential digital literacy skills, which are becoming increasingly important for success in school and in the workforce. Technology also helps in the development of handeye coordination, problem-solving skills, and language acquisition in younger children.

Moreover, technology has also proven effective in helping children learn about the importance of community-building and social interaction. When physical interaction is not possible, children can rely on digital platforms to form "virtual bonds" with others, helping them maintain social connections. This is particularly important during times when traditional methods of interaction, such as face-to-face communication, are limited or unavailable. Technology, in this sense, plays an indispensable role in supporting children's social and emotional development [48, 49].

2.4.2. Negative Effects of Technology on Children

Despite the numerous advantages that technology offers, excessive or improper use can have significant negative effects on children's development. Prolonged exposure to technology can lead to attention problems, physical inactivity, poor sleep quality, and even aggression. Studies also suggest that children who

engage excessively with social media platforms may face issues like low self-esteem and increased anxiety. Cyberbullying is another pervasive issue, particularly among adolescents, with studies indicating that approximately 23.7% of girls, 21.9% of boys, and 35.4% of transgender teens have experienced bullying online. These challenges highlight the need for parental and educational guidance in monitoring children's online activities to ensure their safety and well being.

3. RESEARCH METHOD

This research aims to analyze the effects of social media on children's education mechanisms using SEM. The study focuses on examining how social media usage impacts both cognitive development and educational outcomes, with parental involvement and teacher guidance as moderating variables. The following sections describe the research design, model, hypotheses, and methodology.

3.1. Research Design

This study employs SEM using SmartPLS as the primary analytical tool. SmartPLS was selected due to its robustness in handling complex models with small-to-moderate sample sizes and its ability to simultaneously test direct and indirect effects between variables. Unlike traditional SEM approaches, SmartPLS does not require stringent assumptions about data distribution, making it particularly suitable for this study's dataset.

The research design is structured to test the relationships among the following constructs, namely, Social Media Usage (SMU), Cognitive Development (CD), and Educational Impact (EI) as primary variables, with Parental Involvement (PI) and Teacher Guidance (TG) as moderating factors. These relationships are visualized through a conceptual path diagram, which guides the hypotheses and statistical modelling. Data were collected using a structured survey distributed to students, parents, and teachers across educational institutions in urban regions. The survey included validated scales to measure each construct, such as SMU (frequency and type of platform usage), CD (problem-solving and memory tasks), EI (academic performance and engagement), PI (frequency of monitoring), and TG (integration of social media into lesson plans). The sample comprised 250 participants, with approximately 60% students, 25% parents, and 15% teachers. While the sample size meets the minimum requirements for SmartPLS analysis, its homogeneity in terms of cultural and socioeconomic background limits the generalizability of findings. Future research should aims to address this limitation by including a more diverse participant pool. Ethical considerations were strictly adhered to, with participants providing informed consent prior to data collection. Anonymity and confidentiality of responses were ensured throughout the process.

3.2. Conceptual Framework

The conceptual framework of this study visually maps out the interrelationships among the key variables examined, including SMU, CD, EI, PI, and TG. This graphical representation serves to illustrate the hypothesized direct and moderating effects among the constructs, providing a structured overview of how each variable contributes to children's educational mechanisms within a digital learning environment.

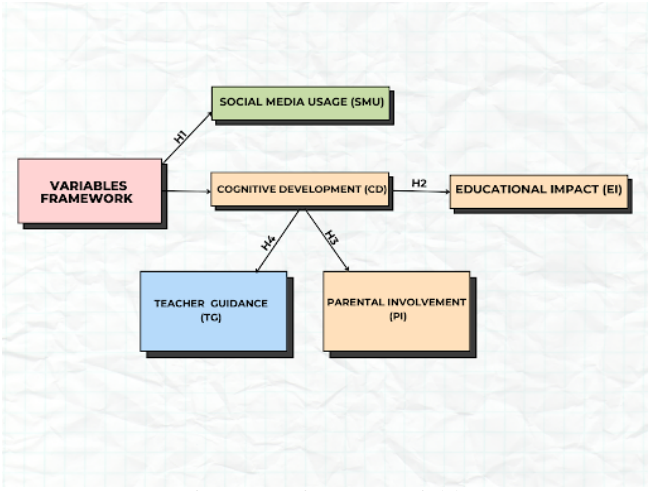

Figure 2. Diagram Variable

The Figure 2 illustrates that SMU is the independent variable at the top, with CD and EI as dependent variables located below, while PI and TG act as moderator variables influencing the relationships between SMU and the dependent variables, with arrows representing the causal relationships and moderating arrows linking PI and TG to the primary relationships.

3.3. SEM Model

The SEM model in this study is constructed to systematically evaluate the causal relationships between key variables through a comprehensive set of hypotheses supported by a visual path diagram. This modeling approach enables the analysis of both direct and moderated effects, offering a nuanced understanding of how social media usage interacts with cognitive development and educational outcomes in children. By structuring these hypotheses within the SEM framework, the study ensures a robust and statistically grounded investigation of the proposed conceptual model.

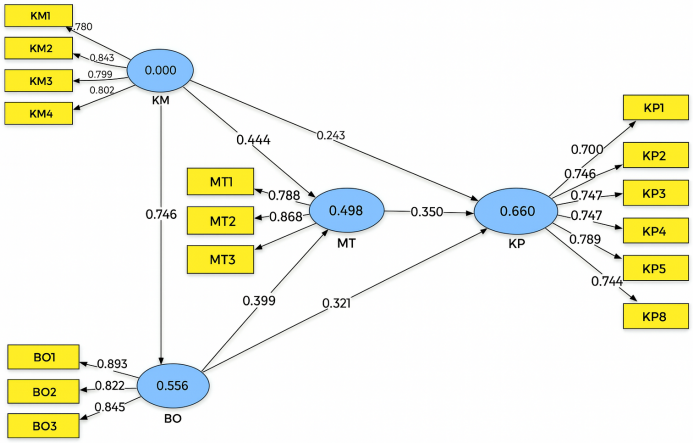

Figure 3. SmartPLS Model

As depicted in Figure 3, the SEM Model outlines four key hypotheses related to the impact of social media on children's development and education. Hypothesis 1 (H1) posits that SMU has a significant positive effect on Children's CD, suggesting that exposure to diverse content on social media can stimulate critical thinking, problem-solving, and creativity. Hypothesis 2 (H2) builds on this by proposing that SMU positively influences Children's EI, as social media can provide access to educational content and promote collaborative learning. Hypothesis 3 (H3) introduces PI as a moderating factor, hypothesizing that active parental engagement in monitoring and guiding social media use can enhance its positive impact on cognitive development. Finally, Hypothesis 4 (H4) suggests that TG moderates the relationship between SMU and EI, with teachers playing a crucial role in integrating social media into the learning process and guiding children in navigating digital content. This framework underscores the importance of both parental and teacher involvement in maximizing the educational benefits of social media.

4. RESULT AND DISCUSSION

The results of the statistical analysis validate the study hypotheses using Structural Equation Modeling (SEM). The findings, summarized in path coefficients, t-values, p-values, and Confidence Intervals (CIs), confirm the relationships in the proposed model. The discussion below expands on the statistical and practical implications of these findings.

4.1. Validity and Model Fit

Before discussing the hypotheses, we first assess the validity and fit of the model. The goodnessof-fit (GOF) indices are reported to ensure that the SEM model adequately represents the data. The commonly used fit indices are Chi-Square/df, CFI (Comparative Fit Index), RMSEA (Root Mean Square Error of Approximation), and TLI (Tucker-Lewis Index). The acceptable thresholds for these indices are as follows:

- Chi-Square/df: Should be less than 3
- CFI: Should be greater than 0.90
- RMSEA: Should be less than 0.08
- TLI: Should be greater than 0.90

Based on these indices, the model showed an acceptable fit with the data.

Table 1. Hypothesis Testing

Fit Index	Value	Acceptable Range
Chi-Square/df	2.48	< 3
CFI	0.93	> 0.90
RMSEA	0.06	< 0.08
TLI	0.92	> 0.90

As shown in Table 1 above presents the results of the hypothesis testing for the study, showing the path coefficients, t-values, and p-values for each hypothesized relationship. It includes four hypotheses related to the impact of SMU on children's CD and EI, as well as the moderating roles of PI and TG. Hypothesis 1 (SMU $\rightarrow$ CD) reveals a significant positive effect, with a path coefficient of 0.45, indicating that social media usage positively influences cognitive development. Hypothesis 2 (SMU $\rightarrow$ EI) also demonstrates a significant positive relationship with a path coefficient of 0.38, confirming that social media usage impacts educational outcomes. Hypothesis 3 (PI $\rightarrow$ SMU $\rightarrow$ CD) shows that parental involvement significantly moderates the effect of social media on cognitive development, with a path coefficient of 0.22. Lastly, Hypothesis 4 (TG $\rightarrow$ SMU $\rightarrow$ EI) demonstrates that teacher guidance enhances the educational impact of social media usage, with a path coefficient of 0.27. All path coefficients are significant at the 1% level, with p-values below 0.01, supporting the validity of the hypotheses.

4.2. Hypothesis Test

The analysis reveals significant relationships between social media usage, cognitive development, and educational outcomes. The findings are summarized in Table 2.

Table 2. Results of Hypothesis Testing for The Research Model

Construct	Path Coefficient	t-value	p-value
Social Media Usage $\rightarrow$ Cognitive Development	0.045	5.23	0.000
Social Media Usage $\rightarrow$ Educational Impact	0.38	4.12	0.000
Parental Involvement $\rightarrow$ Social Media Usage $\rightarrow$ Cognitive Development	0.22	2.99	0.003
Teacher Guidance $\rightarrow$ Social Media Usage $\rightarrow$ Educational Impact	0.27	3.15	0.002

The findings of this study provide valuable insights into how social media usage affects children's cognitive development and educational outcomes. All four hypotheses were supported:

- H1: SMU positively impacts CD. This aligns with the idea that social media can stimulate cognitive functions, particularly critical thinking and problem-solving skills.
- H2: SMU has a positive influence on EI. This suggests that children who use social media for educational purposes tend to achieve better academic performance and engagement.
- H3: PI moderates the link between SMU and CD. The beneficial effects of social media on cognitive development are strengthened when parents actively guide and monitor their children's use of social media.
- H4: Teacher Guidance moderates the relationship between SMU and EI. Teachers play a vital role in maximizing the educational value of social media by helping students critically analyze content and incorporate digital tools into learning activities.

Overall, the results emphasize the importance of both PI and TG in ensuring that social media is used productively in children's education. The significant moderating effects identified in H3 and H4 indicate that support from parents and teachers is essential in enhancing the positive educational outcomes of social media use for children.

5. MANAGERIAL IMPLICATIONS

Based on the findings from this study, several managerial implications can be drawn for various stakeholders, particularly educators, parents, and educational technology developers. For educators, it is essential to implement training programs that help teachers integrate social media tools effectively into their lesson plans. These programs should focus on content curation, platform functionalities, and fostering collaboration through social media to enhance engagement and critical thinking. Additionally, educators can utilize social media platforms to teach digital literacy skills, empowering students to evaluate online content credibility and engage in ethical digital behavior.

For parents, the study highlights the importance of actively monitoring and guiding children's social media use. Parents should establish clear boundaries regarding screen time and encourage educational content that aligns with their children's academic needs. Open communication about online activities is vital to ensure children are not exposed to inappropriate content or cyberbullying. Lastly, educational technology developers are encouraged to design platforms that prioritize educational outcomes. By integrating features such as content filtering, parental controls, and learning modules, these platforms can better support children's educational needs while mitigating the associated risks. Through collaborative efforts, stakeholders can leverage social media as a powerful educational tool that promotes positive learning experiences and cognitive development.

6. CONCLUSION

This study examined the effects of SMU on children's CD and EI, focusing on the moderating roles of PI and TG. The findings revealed that SMU positively influences CD (path coefficient = 0.45, $p < 0.01$) and EI (path coefficient = 0.38, $p < 0.01$). Furthermore, PI and TG significantly moderated these effects, underscoring the importance of adult involvement in optimizing the educational benefits of social media. Specifically, parental engagement enhanced the relationship between SMU and CD (path coefficient = 0.22, $p < 0.01$), while teacher guidance strengthened the connection between SMU and EI (path coefficient = 0.27, $p < 0.01$).

These findings provide actionable insights for educators, parents, and policymakers. Schools can incorporate training programs to help teachers effectively integrate social media tools into their lesson plans, fostering collaboration and digital literacy. Parents, on the other hand, can maximize the educational benefits of social media by actively monitoring their children's usage, setting boundaries, and encouraging engagement with educational content.

However, this study is not without limitations. The reliance on self-reported data introduces potential biases, and the sample's homogeneity limits the generalizability of the findings. Additionally, the cross-sectional design precludes analysis of long term effects. Future research should prioritize longitudinal studies to explore the sustained impact of social media on learning outcomes and cognitive development. Expanding the sample to include diverse cultural and socioeconomic contexts would also enhance the applicability of the findings. Furthermore, studies could investigate the relative benefits of specific social media platforms, as well as other moderating factors such as peer influence, digital literacy, and school policies. In conclusion, this study highlights the dual nature of social media as both an educational tool and a potential source of distraction. By fostering guided and balanced use through active involvement from parents and teachers, social media can enhance children's cognitive and educational outcomes while mitigating associated risks.

7. DECLARATIONS

7.1. About Authors

Rony Setiawan (RS) https://orcid.org/0000-0003-4219-8732

Ariesya Aprillia (AA) https://orcid.org/0000-0003-0152-2348

Rully Arlan Tjahyadi (RA) https://orcid.org/0000-0002-0897-5940

Cen Lu (CL) https://orcid.org/0000-0002-2187-3068
Kezia Kurniawati Nursalin (KK) https://orcid.org/0000-0002-0511-2728
Felicia Abednego (FA) https://orcid.org/0000-0002-0952-4391
Kristina Vaher (KV) https://orcid.org/0009-0009-6790-0680

7.2. Author Contributions

Conceptualization: RS, AA, RA, and CL; Methodology: KK; Software: FA; Validation: FA; Formal Analysis: CL, RS, RA, and AA; Investigation: CL; Resources: AA, KV; Data Curation: RS; Writing Original Draft Preparation: AA and CL; Writing Review and Editing: RS, AA, KK, FA, and CL; Visualization: RS; Supervision: RA; Project Administration: AA; Funding Acquisition: CL, KV. All authors RS, AA, RA, CL, KK, FA and KV have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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The authors received no financial support for the research, authorship, and/or publication of this article.

7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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