



Online Learning Interaction in Early Childhood Education: Assessing Potential and Addressing Challenges

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ABSTRACT

Early childhood learning relies on hands-on, game-based interaction. However, as time develops, technological adaptation is demanded. Online learning for Early Childhood Education (PAUD) students has not been widely carried out. This study aims to uncover the challenges and explore the potential of online learning as an alternative solution in learning in the digital era at TKIT An-Najah Jatinom, Klaten Regency, Central Java. The method used is a qualitative descriptive approach, utilizing interviews and documentation. The study's results found that the primary challenge of online learning is children's low literacy skills in language and communication. Lack of enthusiasm in learning because students are required to be independent and concentrated. Limited infrastructure, including inadequate internet access, a lack of digital devices, and low parental involvement due to socioeconomic factors. The strategy to minimize obstacles and maximize potential is designed to utilize interactive digital media, integrate hybrid learning models, provide teacher training in digital pedagogy, and implement inclusive education policies. Online learning in early childhood education presents significant challenges, but with the right strategy, its digital potential can be maximized to support early childhood development optimally. The implementation of interactive digital media and hybrid learning models needs to be ongoing, supported by teacher training and parental involvement. Further research can focus on the effectiveness of blended learning approaches in broader contexts, particularly on their impact on early childhood development outcomes.

ABSTRAK

Pembelajaran anak usia dini mengandalkan interaksi langsung yang bersifat praktik dan berbasis permainan. Namun, seiring perkembangan zaman, adaptasi teknologi menjadi suatu kebutuhan. Pembelajaran daring bagi siswa Pendidikan Anak Usia Dini (PAUD) belum banyak diterapkan secara luas. Penelitian ini bertujuan untuk mengungkap tantangan serta mengeksplorasi potensi pembelajaran daring sebagai solusi alternatif dalam pembelajaran di era digital di TKIT An-Najah Jatinom, Kabupaten Klaten, Jawa Tengah. Metode yang digunakan adalah pendekatan deskriptif kualitatif dengan teknik pengumpulan data melalui wawancara dan dokumentasi. Hasil penelitian menunjukkan bahwa tantangan utama dalam pembelajaran daring adalah rendahnya kemampuan literasi anak dalam aspek bahasa dan komunikasi. Selain itu, kurangnya semangat belajar muncul karena siswa dituntut untuk mandiri dan mampu berkonsentrasi selama proses pembelajaran. Keterbatasan infrastruktur juga menjadi hambatan, meliputi akses internet yang kurang memadai, minimnya perangkat digital, serta rendahnya keterlibatan orang tua akibat faktor sosial ekonomi. Strategi untuk meminimalkan hambatan dan memaksimalkan potensi pembelajaran daring dirancang melalui pemanfaatan media digital interaktif, integrasi model pembelajaran hybrid, pelatihan guru dalam pedagogi digital, serta penerapan kebijakan pendidikan yang inklusif. Pembelajaran daring dalam pendidikan anak usia dini menghadirkan tantangan yang signifikan, namun dengan strategi yang tepat, potensi digitalnya dapat dimaksimalkan untuk mendukung perkembangan anak usia dini secara optimal. Implementasi media digital interaktif dan model pembelajaran hybrid perlu dilakukan secara berkelanjutan dengan dukungan pelatihan guru serta keterlibatan orang tua. Penelitian selanjutnya dapat difokuskan pada efektivitas pendekatan blended learning dalam konteks yang lebih luas, khususnya terhadap dampaknya pada hasil perkembangan anak usia dini.

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Introduction

Early childhood education represents a critical phase in children's growth and development, during which foundational aspects of their intellectual, social, and emotional capabilities are established. In recent years, online learning has gained significant popularity across various educational levels, including for PAUD students. Online learning holds considerable promise for enhancing early learning, offering innovative opportunities for engagement and interaction. However, despite its potential, several challenges persist that must be addressed to ensure the successful implementation and effectiveness of the online learning approach in this context.

From a technical perspective, online learning is implemented from each student's home (Haryadi & Fitria, 2021). This situation highlights the challenges students face in engaging with online learning, primarily due to a lack of preparedness across several dimensions. These challenges include limited access to facilities and infrastructure, such as inadequate internet connectivity, students' low digital literacy in navigating online learning devices and applications, and economic constraints within families that hinder the provision of appropriate learning tools (Wahad & Kahar, 2021). Online learning is particularly ineffective for early childhood education, as unstable internet connections, limited student attention to teachers, insufficient learner independence, and low engagement with online learning platforms all contribute to its inefficacy (Dini, 2021).

Previous research has generally explored the issue from two primary perspectives. First, several studies emphasize the effectiveness of implementing online learning at the PAUD level, yet in practice, it has not yet run optimally and faces various challenges. These challenges include teachers' lack of preparedness to deliver online learning, limited learning media, unclear platforms used, inappropriate method selection, difficulties in the evaluation process, low interaction intensity during lessons, and limited parents' ability to provide supporting facilities. Furthermore, many students lack interest in online learning due to insufficient understanding of the material and difficulties with digital devices/gadgets (Arini & Ida, 2020; Lestari, 2021; Srihartini & Maulidia, 2021; Tahang, 2021; Tiara & Eriqa, 2020). Three significant barriers to implementing online learning in PAUD have been identified: pedagogy, technology, and economics (Basar, 2021). Second, research examining changes in the learning system within PAUD is both necessary and challenging for the education sector. Although online learning in PAUD presents numerous issues, when addressed appropriately, it can also positively influence students' engagement and learning outcomes (Baharuddin, Dizah & Putri 2023; Nirvana, Ambar & Silvia 2025).

From these two perspectives, it is evident that numerous challenges exist in implementing online learning. As educational practices evolve, the shift toward online learning has introduced a range of issues, particularly affecting the participation of PAUD students. These challenges, however, can be systematically analyzed, allowing for the formulation of feasible solutions. Consequently, this study examines both the challenges and potential of online learning for PAUD students from a holistic perspective, thereby providing a more comprehensive understanding of the role of technology in enriching PAUD education.

The problem of this study consists of three things. First, what are the challenges in online learning in PAUD? Second, what are the implementation and obstacles of online learning? Third, what is the strategy to maximize the potential of online learning for early childhood?

In the context of online learning for PAUD students, several notable challenges emerge, including insufficient literacy skills among children, adverse effects on learning motivation, and limited infrastructure that impedes accessibility (see Table 1).

Table 1. Online learning problems

Problem	Findings	Source
Platform	WhatsApp (74.8%), Zoom (6.1%), YouTube (6.9%), Google Classroom (1.5%)	Anggreani (2022)
Accessibility	Networking, quota limitations, and low digital literacy	Novitasari & Mohammad (2022)
Main obstacles	Communication, technology, stuttering, and learning motivation	Anggrayni & Choiri (2022); Triwahyuni, Evan & Irman (2021)
Learning motivation	Students' confidence is still low.	Ilmam (2021)

In the implementation of online learning for PAUD students, WhatsApp was the most widely used platform, with 74.8% of institutions using it. Additionally, 6.9% of institutions used YouTube, 6.1% used Zoom, and only 1.5% used Google Classroom. It highlights the limitations in adopting more interactive and systematic learning platforms (Anggreani, 2022). Concerning accessibility, Novitasari and Mohammad (2022) identified key challenges, including unstable internet networks, limited internet quotas among parents, and low levels of digital literacy among both educators and guardians.

The obstacles encountered during the online learning process indicate that communication emerged as the primary challenge. Parents face difficulties in engaging effectively with the learning process (Anggrayni & Choiri, 2022; Triwahyuni, Evan, & Irman, 2021). Moreover, a significant number of parents struggle with technological issues, and students' motivation to learn tends to decline during the period of distance learning. Furthermore, regarding children's learning motivation, Ilmam (2021) found that it generally falls within the medium category, characterized by students' low self-confidence in learning activities and dissatisfaction with the online learning process.

Online learning is often ineffective due to limited technological support and parental involvement, contributing to children's difficulties in adapting to these new learning methods (Nilapancuran et al., 2025). In addition, a study by Irna and Hidjanah (2022) highlights the pedagogical, technological, and economic constraints that are the primary obstacles to implementing online learning in early childhood education. Although these challenges are considerable, some studies have also noted the potential benefits of online learning when well-managed, such as increased interest in learning and improved academic outcomes for students (Rahmat et al., 2024). This research aims to bridge the existing knowledge gap by comprehensively examining the challenges and potential of online learning for PAUD students, with a focus on literacy skills, learning implementation, and strategies to minimize the obstacles they face.

This research aims to identify the challenges faced in online learning within early childhood education (PAUD), examine the implementation and obstacles encountered during the online learning process, and explore strategies to maximize the potential of online learning for early childhood education in supporting effective and inclusive learning experiences.

Methods

This study uses descriptive qualitative methods. This method was chosen to gain an in-depth understanding of teachers', principals', and parents' experiences and perspectives in the context of online learning. The research was conducted at TKIT An-Najah Jatinom, Klaten Regency, Central Java, for 3 months (September-November) in 2021. The respondents involved were the Principal (KS) to gather their views on the policy and implementation of online learning within the institution, and teachers (G) to

understand their experience in online teaching and the challenges they face. Parents of students (OTS) need to gain perspective on the support provided to their children during online learning. Interviews lasted 40 minutes for each respondent.

The data collection technique involves semi-structured in-depth interviews with principals, teachers, and parents of students to explore their experiences, challenges, and potential in online learning. The documentation study used school data on online learning activities to supplement data from interviews.

Data analysis employs thematic analysis techniques, which involve transcription stages to obtain verbal data, data coding to identify key themes that emerge from participants' experiences, and theme preparation to provide a comprehensive picture of the challenges and potential of online learning. Moreover, finally, to ensure the validity and reliability of the data, the researcher triangulated and did member checking by asking participants to verify the results of the transcribed interviews.

Results and Discussion

Results

1. Challenges of Online Learning in Early Childhood Education

Their limited language and communication skills indicate low literacy levels among students. According to school data, the total number of TKIT An-Najah students is 244. There are 93 students in Class A, aged 4-5, and 151 students in Class B, aged 5-7. Where students who sit in Class A are those who have low language skills, the results of the interview from KS also corroborate this:

About 90% of class B students possess rudimentary language skills, including the ability to speak with coherent words/sentences, listen to the teacher's presentations/explanations/stories/advice, read/watch the material delivered by the teacher, and write simple words/sentences. As for students in class A, they have low wet skills. (KS 2021)

In line with this, students' communication skills remain low. Students have imperfect communication skills, including the ability to ask and answer questions posed by teachers, express their likes and dislikes about the material presented, and articulate their preferences for participating in online learning. As a result of the interview with G:

When the teacher asks a class A student named X, can X memorize the letter "Zalزالah"? X just stared and did not answer. This condition occurs in most class A students. However, this is not the case when asked about class B students. Because some students in class B can answer the teacher's questions, are even able to ask questions about various topics, and can complain to teachers about their dislike of online learning, they can also ask when they can return to learning at school. (G 2021)

Furthermore, the two informants stated that grade B students sometimes use online learning activities as a platform to meet and greet friends, allowing them to communicate and socialize before learning activities begin. It is the challenge of online learning.

2. Implementation and Constraints of Online Learning

According to the Head of TKIT, at first, learning at TKIT An-Najah was carried out face-to-face, with active methods such as learning in the garden, story methods, direct questions and answers, study groups of 10 children, teacher assistance, moving classes, and a BCCT (Beyond Centers and Circle Time) based center approach to meet the needs of early

childhood play. Along with the pandemic, learning has shifted to online, carried out independently at home with parental assistance, without peers, and relying on digital media such as Zoom, Google Meet, and video calls.

Based on the interview with G, it was revealed that:

Online learning was conducted over two semesters (2020-2021), with each session lasting one hour. Considerations for this duration include limited internet quotas, poor signal reception in some areas, a low child concentration, and efforts to avoid boredom. Online learning is conducted three times a day (morning, noon, and afternoon/night), from Monday to Thursday. This flexible scheduling is tailored to the needs of working parents, especially mothers active in the formal and informal sectors, so that children are often accompanied only by other family members or household assistants. (G 2021)

The primary obstacle to implementing online learning is the limited infrastructure. Data from schools also show that about 25% of students live in areas with poor internet signals, and another 10% come from economically disadvantaged families who cannot afford to provide digital devices, internet quota, or WiFi. Even among financially able parents, awareness of the need to support online learning is low.

In addition, interviews with OTS show that:

Government assistance, such as quota subsidies, is only given once (Rp 200,000), far from enough to cover the needs during online learning. Teachers also experience technical obstacles, such as device damage due to full storage capacity, and are forced to purchase high-specification smartphones (4-5 GB RAM), which are expensive. (OTS 2021)

3. Strategies to Maximize the Potential of Online Learning

To maximize the potential of online learning, TKIT Annajah combines online learning with face-to-face learning (offline) to achieve a good balance. Based on the results of the interview, KS and G revealed that:

Our school conducts teacher training in digital pedagogy. Provide teachers with training on the use of technology in learning, equipping them with the skills and knowledge to effectively integrate technology into their teaching. The training includes instruction on using various online learning platforms, teaching techniques suitable for early childhood education, and strategies for communicating with parents to support children's learning at home. (KS and G 2021)

In addition, KS also added that:

We increase parental involvement in the online learning process. Schools can hold workshops or seminars for parents on supporting their children with online learning. Enhance communication between teachers and parents to foster a more supportive learning environment at home. Inclusive education policy. (KS 2021)

TKIT schools formulate policies that support online learning in PAUD, including ensuring adequate infrastructure and access to technology. The policy takes into account the diverse needs of students from various socioeconomic backgrounds. For example, a

subsidy program for internet quotas or the provision of digital devices for students in need can help reduce the access gap in education.

G reveals the strategies applied in the learning process that:

Create an engaging, child-friendly online learning environment by incorporating colors, images, and other visual elements into learning materials to help capture children's attention. Additionally, activities that involve physical movement, such as dancing or playing games, can be integrated into online sessions to help maintain the child's energy and interest. (G 2021)

In addition, KS also revealed that:

We regularly evaluate the effectiveness of online learning and provide feedback to students and parents. It can help identify areas for improvement and ensure that learning remains relevant and beneficial for students. Constructive feedback can also increase students' motivation to keep learning. (KS 2025)

Online learning for early childhood can be more effective, engaging, and inclusive, helping them maximize their learning potential in the digital era.

Discussion

1. Challenges of Online Learning in Early Childhood Education

The low literacy of students in online learning is a significant challenge today, primarily due to their limited language skills (Syahputri, Maria, & Muhammad, 2025). Language skills refer to the ability to express thoughts and feelings using spoken language, writing, signs, numbers, pictures, and facial expressions. (Nurlaelah & Geminastiti, 2020). Children's language can be seen from three aspects. First, his verbal reasoning includes vocabulary (the ability to recognize concepts in specific contexts, such as writing, numbers, or images). Second, verbal relations (the ability to find relationships between objects or events). Third, understanding (the ability to find relationships between objects or events and understand the meaning of words).

To improve student literacy, one area that needs development is language. Language aspects in children's literacy development encompass reading, listening, speaking, and writing skills. (Handayani 2024; Waroh & Syamsiah 2025). In line with this, it is also necessary to develop children's recognition of symbols such as letters, writing, words, and syllables, so that their language can develop. (Guntur et al. 2023).

Low literacy in children also affects their communication skills. Communication skills refer to the ability to exchange messages, which involves conveying and receiving messages reciprocally, accompanied by mutual understanding among all parties involved in the communication process (Fazri, Indry & Suhairi 2022). In line with this, early childhood learning that does not emphasize reading, writing, and numeracy skills can result in children having low numeracy skills, which also affects their imperfect language and communication skills.

The low literacy of children in this aspect of language makes it difficult for children to participate in online learning. So that in online learning, children are unable to understand and digest the teaching materials delivered by teachers, which include explanations/stories/advice, pictures, writings, and video shows, all delivered online through Zoom meetings, Google Meet, and video calls. Low literacy can hinder the effectiveness of online learning, so technology can be enhanced by using interactive media, such as animations, educational games, and videos, to present learning materials more engagingly and enjoyably for PAUD students. This approach can spark students'

interest and engagement in learning, thereby improving their ability to absorb information and encouraging student creativity.

In online learning, students can participate in online art and creative projects, which help them develop creative skills early on. The use of digital devices, such as drawing apps and voice recordings, can open up opportunities for students to explore their creativity in more diverse ways. Online learning allows early childhood education students to access a wide range of global educational resources. For example, they can visit virtual museums, attend art exhibitions, or access learning materials from around the world. Access to these global resources can enrich students' learning experiences and broaden their perspectives on the world.

2. Implementation and Constraints of Online Learning

The shift in learning traditions from face-to-face (offline) to online is due to government policies regarding the education delivery system, in response to the COVID-19 pandemic. The global pandemic has transformed the education system from offline to online. (Hardiansyah et al. 2021). With this phenomenon, online learning has become a promising alternative now and in the future. However, the tradition of learning in PAUD, which was initially conducted face-to-face, has shifted to online learning, where students learn independently at home, without friends or facilitators/teachers, and through mobile phones/laptops. This high demand for independence and concentration makes students less comfortable with learning, which, in turn, affects low student motivation/enthusiasm. According to Shafira and Nur (2021), when carrying out online learning, children need the presence of parents who play a role in accompanying and motivating children, as well as building children's concentration so that they can participate in learning, because children are not yet independent and have not been able to build concentration properly. However, online learning is now and will continue to be an inevitable reality.

In addition to needing parents, children also need friends/groups to play with in their learning, because the child's world is a world of play, and learning is also achieved through play. According to Munisah (2020), early childhood learning is facilitated through play activities, with materials and learning processes tailored to the child's specific conditions and abilities. Through play, children learn to make friends, and it also encourages them to be more active and happier. It aligns with the learning principles applied at TKIT An-Najah, which, in its implementation, adopts an active, joyful learning approach (Tudus, 2024). The shift in learning traditions from offline to online has left children feeling shocked and psychologically affected. As a result, children experience a decrease in enthusiasm/motivation to learn. This is reinforced by Elvina (2023), who notes that when children are at home, their motivation to learn is low and they often struggle. They frequently cry, sulk, and get angry before studying.

Changing traditions in learning is not easy. However, it can begin by providing training and technical support to teachers to help them understand and utilize online learning platforms effectively. Teachers need to be allowed to develop their technology skills, enabling them to deliver online learning with confidence and adapt traditional curricula to the appropriate online format. The curriculum needs to be adapted to online learning features and integrated with relevant technologies to increase learning effectiveness.

In assessment, formative and responsive assessments can be used to monitor student progress regularly and provide constructive feedback. Formative assessments help identify areas that need improvement and strengthen mastery of the material. Involving parents is essential in online learning, as it provides guidance and support to help

students learn at home. Parents can act as supporters and facilitators in ensuring the effectiveness of online learning for PAUD students.

3. Strategies to Maximize the Potential of Online Learning

One of the causes of students' difficulties participating in online learning is inadequate infrastructure. (Rahayu & Mohammad 2021). For children living in urban areas with adequate infrastructure, participating in online learning at home is certainly not an obstacle. However, it is a different story for children who live in remote areas without adequate infrastructure. The infrastructure in question supports facilities/infrastructure, both physical and non-physical, that are necessary to meet the needs of online learning, such as internet networks, quota fulfilment, and smartphone ownership.

Indonesia has a vast area and is not fully reached by technology and internet connections, so there are still many PAUDs including TKIT An-Najah schools that have not been able to carry out online learning optimally because they are constrained by limited learning support facilities such as: (a) Weak internet network, (b) High and unmet internet quota needs, (c) Ownership of gadgets/smartphones that not all students can afford (Abdurahman, Srie & Kanda 2021; Sari & Muhammad, 2024; Sulasih, 2024). Due to inadequate infrastructure, children struggle to participate in online learning.

To achieve effective online learning, adequate facilities and infrastructure are essential. Based on the research results, facilities and infrastructure continue to be obstacles to the learning process. The importance of utilizing free online learning resources, such as YouTube learning videos, learning apps, and educational websites (Utami & Miefthaul, 2021). Many learning resources are available for free or at low cost, helping overcome budget constraints for online learning. Develop a hybrid learning model that integrates online and face-to-face instruction. Thus, students without access to technology or the internet can continue to participate in class-based learning, while other students can continue to learn online.

In addition, collaborate with the surrounding community or donors to provide technology devices or internet access for students in need. Some organizations or companies are willing to donate devices or provide internet access for underprivileged students. Involve parents in the online learning process by providing direction and support in the use of technological devices. Parents can be partners in helping students access learning materials and overcome technical obstacles. By using this strategy, educational institutions and teachers can effectively integrate online learning despite facility limitations and accessibility challenges. In addressing these challenges, collaboration among all relevant parties, including educational institutions, teachers, students, and parents, is crucial in creating an inclusive and effective learning environment.

Conclusion

Students face difficulties in online learning due to low literacy, changes in learning traditions, and inadequate infrastructure. Student literacy can be seen from immature language and communication skills. The learning tradition shifted from face-to-face to online, leading to low student motivation. Less supportive infrastructure includes limited internet connectivity, low quotas, and inadequate government support. This research confirms that online learning has challenges, but also potential as a solution. Strategies to address the limitations of inclusion require teacher technical support, curriculum adaptation, formative assessment, and parental participation. Free online resources, hybrid learning, community collaboration, and use of public facilities are additional

solutions. Collaboration between educational institutions, teachers, students, and parents is the key to creating inclusive and effective online learning. With the right strategy, online learning can be a powerful tool for the future of inclusive education.

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