Open Access
AL-MANAR: Jurnal Komunikasi dan Pendidikan Islam
Vol. 15, No. 1, June 2026
https://journal.staimsyk.ac.id/index.php/almanar/index

Implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy to Enhance the Engagement and Collaboration Skills of Early Childhood Children

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ARTICLE INFO
Article history:
Received
May 28, 2026
Revised
June 19, 2026
Accepted
June 30, 2026

Abstract

This study aims to analyze the implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy in enhancing early childhood participation and collaboration skills. This study was motivated by the importance of developing learning approaches that encourage children's active involvement, social interaction, and collaborative abilities from an early age. The research employed **a** qualitative approach with a case study design**.** The study was conducted at TK Negeri Pembina Blambangan Umpu, Way Kanan Regency, Lampung Province, involving classroom teachers and Group B children as research participants. Data were collected through participant observation, semi-structured interviews, and documentation. Data analysis was conducted using the interactive model of Miles, Huberman, and Saldaña, consisting of data condensation, data display, and conclusion drawing. The findings reveal that the JJA Strategy generates three interconnected learning mechanisms in early childhood education. First, the active participation mechanism developed through the Jigsaw component encouraged children to become active contributors by providing roles and responsibilities within cooperative groups, thereby strengthening confidence, communication, and learning engagement. Second, the social collaboration mechanism developed through the Jelajah component provided meaningful experiential activities that enabled children to practice teamwork, negotiation, task sharing, and collective problem-solving. Third, the digital engagement mechanism developed through interactive applications enhanced children's motivation, curiosity, and collaborative interaction during learning activities. This study contributes to the understanding that integrating cooperative learning, experiential exploration, and digital technology through the JJA Strategy can create an active, collaborative, and developmentally appropriate learning environment for early childhood education.

Keywords: Jigsaw Jelajah Aplikasi, early childhood education, active participation, collaboration skills, digital learning.

Published by STAI Masjid Syuhada Yogyakarta
Website https://journal.staimsyk.ac.id/index.php/almanar/index
ISSN 2615-8879
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INTRODUCTION

The rapid advancement of digital technology in the twenty-first century has brought significant transformations across various aspects of human life, including the field of education. Digital transformation has encouraged educational institutions to redesign learning processes to prepare students for future challenges that require not only academic knowledge but also essential skills such as communication, creativity, problem-solving, critical thinking, and collaboration(Ardiansyah, 2025). In the context of early

childhood education (ECE), these changes have become increasingly important because children growing up today are part of a digital generation that is familiar with technology from an early age(Tangkin et al., 2025). Therefore, early childhood learning should no longer focus solely on knowledge transmission but should provide meaningful, interactive, collaborative, and developmentally appropriate learning experiences that prepare children for twenty-first-century competencies. However, the emergence of the digital era also presents new challenges for early childhood education. Although young children are increasingly exposed to digital devices, technology utilization in educational settings is often limited to entertainment purposes or one-way instructional media. The inappropriate use of digital technology may reduce opportunities for children to engage in direct social interactions, cooperative activities, and meaningful communication with peers(Adeyemi, n.d.). Therefore, the main challenge of contemporary early childhood education is not merely introducing technology into classrooms, but integrating technology through pedagogical approaches that strengthen children's social interaction, active engagement, creativity, and collaborative learning experiences.

One of the essential competencies that children need to develop in the current era is collaboration skills. Collaboration has become a fundamental twenty-first-century skill because future learning and professional environments require individuals who are able to communicate effectively, work with others, negotiate ideas, and solve problems collectively. In early childhood education, collaboration skills involve children's ability to share, cooperate, respect others' opinions, take responsibility, and participate in group activities. Alongside collaboration, children's active participation in learning is also a critical indicator of effective early childhood education. Active participation reflects children's emotional, cognitive, and behavioral involvement, including their willingness to ask questions, express ideas, explore learning environments, and interact with peers.

Early Childhood Education (ECE) plays a fundamental role in fostering children's cognitive, social, emotional, language, and moral development during the golden age of growth. Learning experiences provided at this stage significantly influence children's readiness for formal education and lifelong learning(Solang et al., 2024). Therefore, ECE should emphasize child-centered learning that actively engages children in meaningful, enjoyable, and developmentally appropriate activities. Active participation enables children to construct knowledge through direct experiences, develop curiosity, enhance communication skills, and build positive social relationships. Consequently, promoting children's active engagement has become one of the primary indicators of quality learning in early childhood education. In addition to active participation, collaboration skills have become increasingly important in preparing children for the demands of the twenty-first century. Collaboration encompasses the ability to communicate effectively, share responsibilities, respect others' opinions, solve problems collectively, and work toward common goals. These competencies are recognized as essential life skills that should be nurtured from an early age through interactive and cooperative learning experiences(Thornhill-miller et al., 2025). Children who regularly engage in collaborative activities demonstrate stronger social competence, greater empathy, improved communication skills, and higher levels of learning motivation.

Despite the growing recognition of active and collaborative learning, classroom practices in many early childhood education settings remain predominantly teacher-centered. Learning activities often emphasize teacher explanations and individual task completion, limiting children's opportunities to explore, interact, discuss, and collaborate with peers. Furthermore, although digital technology has become increasingly accessible

in educational settings, its implementation in early childhood classrooms is frequently limited to presenting instructional materials rather than facilitating interactive, collaborative, and exploratory learning experiences. As a result, children's active participation and collaboration skills are often insufficiently developed.

Previous studies have demonstrated that the Jigsaw cooperative learning model effectively promotes learners' participation, responsibility, communication, and teamwork through structured group interactions(Putri & Utama, 2024). Likewise, research on digital learning applications has reported positive effects on children's motivation, engagement, and learning outcomes by providing attractive and interactive learning media(Aryfien et al., 2025). Other studies have also highlighted the effectiveness of exploratory learning approaches in encouraging children to investigate, discover, and construct knowledge through direct experiences(Benefits et al., n.d.). However, these instructional approaches have generally been examined independently. Studies on the Jigsaw model have primarily focused on elementary and secondary education, whereas research on digital applications in early childhood education has largely emphasized cognitive development or digital literacy. Similarly, exploratory learning has often been implemented without integrating cooperative learning structures and educational technology into a comprehensive instructional strategy.

This condition reveals a significant research gap. There remains limited research that integrates cooperative learning (Jigsaw), exploratory learning activities (Jelajah), and digital learning applications (Aplikasi) into a single instructional strategy specifically designed to enhance both children's active participation and collaboration skills in early childhood education. The absence of such an integrated framework indicates the need for innovative learning strategies that combine collaborative interaction, exploration, and technology-assisted learning in accordance with the developmental characteristics of young children.

To address this gap, this study proposes the Jigsaw Jelajah Aplikasi (JJA) Strategy, an innovative instructional approach that combines three complementary components: the Jigsaw cooperative learning model, exploratory learning activities, and interactive digital applications. Through JJA, children work collaboratively in small groups, actively explore learning tasks, and utilize digital applications to reinforce understanding, solve problems, and communicate learning outcomes. This integrated strategy is expected to create a more engaging, interactive, and meaningful learning environment while simultaneously promoting children's active participation and collaborative competence. Accordingly, the objectives of this study are to examine the implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy in early childhood classrooms and to analyze its effectiveness in improving children's active participation and collaboration skills. In addition, the study aims to describe how the integration of cooperative learning, exploratory activities, and digital applications contributes to creating a child-centered learning environment that supports holistic development.

The novelty of this research lies in the development of the Jigsaw Jelajah Aplikasi (JJA) Strategy as an integrated instructional framework that combines three pedagogical dimensions—Jigsaw cooperative learning, exploratory learning (Jelajah), and interactive digital applications (Aplikasi)—within a single learning model for early childhood education. Unlike previous studies that have implemented these approaches separately, this research offers a comprehensive strategy designed to simultaneously foster children's active participation and collaboration skills. The proposed strategy contributes theoretically by extending the integration of cooperative learning and educational technology within early childhood pedagogy, while practically providing early childhood educators with an innovative and systematic instructional approach to support active, collaborative, and technology-enhanced learning.

METHOD

This study employed a qualitative approach with a case study design (*qualitative case study*)(Gammelgaard, 2017). This approach was selected because the study aimed to gain an in-depth understanding of the implementation process of the Jigsaw Jelajah Aplikasi (JJA) Strategy in improving early childhood participation and collaboration skills. The qualitative approach enabled the researcher to explore learning processes naturally, including teacher-child interactions, children's learning experiences, and the mechanisms through which the JJA Strategy encouraged active involvement and collaborative behaviors. The case study design was applied because the research focused on a specific phenomenon within a particular educational context, namely the implementation of an innovative learning strategy in early childhood education(Warren & Bell, 2022). Through this design, the researcher was able to examine how the JJA Strategy was implemented, how children responded to learning activities, and what factors supported or hindered the implementation process.

This research was conducted at TK Negeri Pembina Blambangan Umpu, Way Kanan Regency, Lampung Province. The research site was selected purposively based on the consideration that the institution has implemented child-centered learning activities, group-based learning experiences, and efforts to develop children's social skills through innovative instructional practices. The research focused on the implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy in Group B, consisting of children aged 5–6 years old. The JJA Strategy represents an integrated learning approach that combines three main components:

1. Jigsaw, as a cooperative learning model that encourages children to work in small groups, exchange information, and take responsibility for group tasks.
2. Jelajah (Exploration), as an exploratory learning activity that provides opportunities for children to discover knowledge through direct experiences, observation, educational games, and interaction with their environment.
3. Aplikasi (Application), as the utilization of interactive digital applications to support children's learning experiences, increase engagement, strengthen understanding, and facilitate collaborative activities.

The participants were selected using purposive sampling, which involves selecting participants based on their direct involvement and relevance to the research phenomenon(Tajik et al., 2024). The main participants of this study were Group B children aged 5–6 years at TK Negeri Pembina Blambangan Umpu who participated in learning activities using the JJA Strategy. In addition, the study involved the classroom teacher as the primary supporting informant because the teacher had direct experience in designing, implementing, and evaluating the learning process. The school principal was also involved as an additional informant to provide information regarding institutional support, educational policies, and the implementation of innovative learning strategies. The number of participants was not determined statistically but was based on the principle of data saturation, meaning that data collection continued until sufficient information was obtained and no significant new findings emerged.

Data were collected through three main techniques: participant observation, semi-structured interviews, and documentation(Mihr, 2006). First, participant observation was conducted to directly examine the implementation of the JJA Strategy during classroom activities. The observations focused on children's learning behaviors, including their

involvement in group activities, willingness to express ideas, communication with peers, ability to share responsibilities, cooperation, and participation in completing collaborative tasks. Second, semi-structured interviews were conducted with classroom teachers and the school principal. The interviews aimed to obtain deeper information regarding lesson planning, teachers' experiences in implementing the JJA Strategy, children's behavioral changes during learning activities, and the supporting and inhibiting factors influencing the implementation process. Third, documentation was used as supporting evidence, including lesson plans, learning materials, photographs of classroom activities, videos of learning processes, children's work, and other relevant school documents related to the implementation of the JJA Strategy.

Data Analysis The data were analyzed using the interactive analysis model proposed by Miles, Huberman, and Saldaña, consisting of three stages: data condensation, data display, and conclusion drawing/verification(Cahyanto et al., 2025). During the data condensation stage, the researcher selected, organized, and categorized relevant information obtained from observations, interviews, and documentation. The data were classified into several themes related to the implementation of the JJA Strategy, children's active participation, collaboration skills, and supporting or inhibiting factors. In the data display stage, the findings were presented in the form of descriptive narratives, thematic categories, and relationships among emerging themes to facilitate interpretation. The final stage involved drawing conclusions and verifying findings to understand how the JJA Strategy contributed to developing children's active participation and collaboration skills. The analysis process was conducted continuously throughout the research period to ensure a comprehensive understanding of the investigated phenomenon.

The credibility of the research findings was ensured through source triangulation and technique triangulation. Source triangulation was conducted by comparing information obtained from classroom teachers, school principals, and observations of children's learning activities(Ediyanto et al., 2025). Meanwhile, technique triangulation was performed by comparing data obtained through observations, interviews, and documentation. Furthermore, this study applied member checking by discussing the research interpretations with the classroom teacher to ensure that the findings accurately represented the actual conditions in the field. These procedures were conducted to enhance the credibility, dependability, and trustworthiness of the research findings. Through this qualitative case study approach, the research provides a comprehensive understanding of how the Jigsaw Jelajah Aplikasi (JJA) Strategy functions as an innovative learning approach to support the development of active participation and collaboration skills among early childhood learners.

RESULT AND DISCUSSION

1. RESULT

The findings of this study reveal that the implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy contributed significantly to the development of early childhood children's active participation and collaboration skills. Data obtained from observations, interviews, and documentation were analyzed using the interactive analysis model of Miles, Huberman, and Saldaña, consisting of data condensation, data categorization, data display, and conclusion drawing(Biesta, 2020). The analysis process indicates that the JJA Strategy functioned not merely as a teaching technique but as a pedagogical mechanism that transformed classroom interactions from teacher-centered learning toward child-centered learning. The findings demonstrate that the

integration of cooperative learning, exploratory activities, and digital applications created a learning environment that encouraged children to participate actively, communicate with peers, and develop collaborative behaviors.

Based on the thematic analysis, four major themes emerged: (1) transformation of children's roles through the Jigsaw learning structure, (2) development of collaboration skills through Jelajah exploratory activities, (3) strengthening learning engagement through digital application utilization, and (4) the integration of JJA as a holistic learning strategy for early childhood education.

A. Transformation of Children's Roles through the Jigsaw Learning Structure

The first finding demonstrates that the Jigsaw component of the JJA Strategy played a crucial role in transforming children's positions from passive recipients into active participants in the learning process. Before the implementation of the strategy, classroom observations indicated that some children tended to wait for teacher instructions, followed examples provided by the teacher, and showed limited initiative in expressing their ideas. However, after implementing the Jigsaw structure, children's participation patterns gradually changed. The formation of small cooperative groups provided each child with specific responsibilities and opportunities to contribute to group activities. Each child became an important member whose participation influenced the success of the group task.

Observation data revealed several emerging behaviors, including children's willingness to explain their ideas, ask questions, share information, and assist peers during group activities. These behaviors indicate that the Jigsaw structure created a social learning environment where children developed confidence through interaction with their classmates. The teacher's interview supported these findings:

> "Children who were usually quiet became more confident because they had responsibilities in their groups. They felt that their ideas were needed by their friends." (Teacher Interview)

Documentation data further showed that children actively engaged in group discussions, shared learning materials, and participated in completing collaborative tasks. This finding suggests that the Jigsaw component of JJA functioned not only to increase children's participation but also to strengthen their sense of responsibility and ownership of the learning process. Therefore, the Jigsaw structure served as a mechanism that encouraged children to move from passive learners to active contributors within a collaborative learning community.

B. Jelajah Activities as a Process of Developing Children's Collaboration Skills

The second finding highlights the role of Jelajah (Exploration) activities in developing children's collaboration skills. The exploratory component provided children with opportunities to learn through direct experiences, investigate learning materials, and solve simple challenges collectively(Activities et al., 2025). Based on classroom observations, children's collaborative behaviors were reflected in several activities, including sharing learning tools, discussing possible solutions, helping friends who experienced difficulties, and distributing responsibilities within groups. These behaviors developed gradually through repeated social interactions during learning activities.

At the beginning of the implementation, some children still preferred to complete tasks individually and showed limited awareness of group responsibilities. However, through exploration-based activities that required teamwork, children gradually

developed an understanding that successful completion of tasks depended on cooperation among group members. The teacher explained:

> "When exploration activities were implemented, children became more enthusiastic because they could move, discover, and experience learning directly. They also realized that group tasks needed to be completed together." (Teacher Interview)

The analysis indicates that Jelajah activities functioned as a social context where children learned not only academic concepts but also important interpersonal skills, such as communication, negotiation, empathy, and mutual support. Thus, the Jelajah component was not merely an exploratory learning activity but became a medium for developing authentic collaborative experiences among young learners.

C. Digital Applications as a Medium for Strengthening Learning Engagement

The third finding relates to the role of the Aplikasi (Digital Application) component in enhancing children's engagement and motivation during learning activities. The integration of digital applications within the JJA Strategy provided additional learning experiences that were interactive, attractive, and relevant to children's characteristics(Anggraeni et al., 2025). Observation results showed that children demonstrated higher curiosity and enthusiasm when digital applications were incorporated into group activities. Children actively explored digital learning tasks, discussed answers with peers, and supported each other in completing application-based activities. An important finding from the analysis was that digital applications did not encourage individual learning only; instead, they became a medium that strengthened social interaction. Children shared opportunities to use the application, discussed possible answers, and helped peers who experienced difficulties in operating the digital media(Wahyuni et al., 2024).

The teacher stated:

> "The application makes children more interested, but it must be directed as a collaborative activity. Children should not only play individually but also discuss and help each other." (Teacher Interview)

Documentation data supported this finding by showing children's active involvement during digital activities. Children demonstrated cooperation, communication, and shared responsibility while interacting with digital learning media. This finding indicates that technology becomes meaningful in early childhood education when it is integrated with appropriate pedagogical strategies. In the context of JJA, digital applications functioned as collaborative learning tools rather than merely technological resources.

D. Integration of Jigsaw Jelajah Aplikasi (JJA) as a Holistic Learning Strategy

The overall analysis demonstrates that the main strength of the Jigsaw Jelajah Aplikasi (JJA) Strategy lies in the integration of three interconnected components. Each component contributed uniquely while forming a comprehensive learning mechanism. The Jigsaw component developed children's communication skills, responsibility, and active participation through structured group interaction(Yuniendel et al., 2026). The Jelajah component provided meaningful learning experiences through exploration, discovery, and direct interaction with learning environments(Tsalatsatunnisa et al., 2025). Meanwhile, the Aplikasi component strengthened children's motivation and

engagement through interactive digital experiences. The thematic analysis revealed that the implementation of JJA created three interconnected mechanisms:

a. Active participation mechanism
   Developed through the assignment of roles and responsibilities within cooperative groups. The Jigsaw structure encouraged each child to become an active contributor rather than merely a receiver of information from the teacher. By assigning children specific responsibilities within their groups, JJA created a sense of ownership and accountability toward the learning process. Children were encouraged to share ideas, communicate their understanding, and support their peers in completing group tasks. The observation data showed that children who initially tended to remain passive gradually became more involved in classroom interactions. The structured group arrangement reduced children's hesitation because they learned within a supportive peer environment. Each child had an opportunity to express opinions, ask questions, and contribute according to their abilities. This indicates that the Jigsaw mechanism functioned as a social support system that increased children's confidence and willingness to participate actively in learning activities.
b. Social collaboration mechanism
   Emerged through exploration activities that required communication, negotiation, and teamwork. The Jelajah component provided children with opportunities to engage in meaningful experiences where learning tasks could not be completed individually but required cooperation among group members. Through exploration activities, children learned to discuss ideas, divide responsibilities, listen to others, and find solutions collectively. The analysis of classroom interactions revealed that collaboration skills developed through repeated social experiences. Children gradually learned to manage differences, wait for their turns, provide assistance, and appreciate contributions from their peers. Therefore, the Jelajah component became more than an exploration activity; it functioned as a social learning space where children practiced essential collaborative behaviors in authentic situations.
c. Digital engagement mechanism
   Was developed through the integration of interactive applications as learning facilitators. The application component strengthened children's motivation and attention by providing attractive and interactive learning experiences. However, the findings indicate that the role of digital applications in JJA was not merely to introduce technology into the classroom, but to facilitate interaction, discussion, and collaborative problem-solving among children. During digital learning activities, children did not simply interact individually with technological devices. Instead, they discussed answers, helped peers operate applications, and made decisions together. The application became a medium that stimulated curiosity and encouraged children to communicate and collaborate. This finding suggests that technology, when integrated with appropriate pedagogical strategies, can strengthen social interaction rather than replace human interaction in early childhood learning.

Overall, these three mechanisms demonstrate that the JJA Strategy operates through a dynamic relationship between individual involvement, social interaction, and technological support. The active participation mechanism builds children's willingness to engage in learning, the social collaboration mechanism develops their ability to work with others, and the digital engagement mechanism enhances motivation through meaningful technology integration(Santi, 2023).

The combination of these mechanisms creates a learning environment that is active, collaborative, and developmentally appropriate for early childhood

education(Zuva et al., 2025).These findings indicate that the JJA Strategy successfully transformed classroom learning into a more participatory, collaborative, and meaningful environment. Children were not only involved physically in learning activities but also developed social awareness, communication abilities, and collaborative problem-solving skills. Therefore, the Jigsaw Jelajah Aplikasi (JJA) Strategy can be conceptualized as an integrated instructional approach that supports holistic early childhood development by combining cooperative learning, experiential exploration, and technology-enhanced learning experiences.

2. DISCUSSION

The findings of this study demonstrate that the implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy creates three interconnected learning mechanisms, namely the active participation mechanism**,** social collaboration mechanism**,** and digital engagement mechanism(Ruming & Mcfarland, 2021). These findings indicate that JJA is not merely a combination of cooperative learning, exploration activities, and digital media utilization, but represents an integrated pedagogical approach that transforms the learning process into a more participatory, collaborative, and meaningful experience for early childhood learners(Acharya, 2024).

The finding regarding the active participation mechanism developed through the Jigsaw structure is consistent with the perspective of Vygotsky's Social Constructivism Theory**,** which emphasizes that children's cognitive and social development occurs through interaction with others. According to Vygotsky, learning is not an individual process but a socially mediated activity in which children construct knowledge through communication and collaboration with more capable peers and adults(Of et al., 2021). In the context of this study, the Jigsaw component provided a social learning environment where each child had a role and responsibility within the group. This condition encouraged children to actively participate because their contribution became meaningful for achieving group goals.

The findings also support the principles of Cooperative Learning Theory developed by Johnson and Johnson**,** particularly the concept of positive interdependence and individual accountability(Johnson, n.d.). The Jigsaw structure requires each group member to contribute specific information or skills, creating a situation where children depend on one another to complete learning tasks. In this study, children who initially demonstrated limited participation gradually became more confident in expressing ideas, asking questions, and assisting peers(Mataram & Mataram, n.d.). This finding strengthens previous research indicating that cooperative learning strategies can improve children's communication skills, social interaction, and classroom engagement because learning occurs through meaningful peer relationships.

Furthermore, the findings are in line with previous studies on early childhood cooperative learning, which suggest that structured group activities provide children with opportunities to practice negotiation, problem-solving, and social responsibility. However, this study extends previous findings by demonstrating that cooperative learning in early childhood contexts becomes more effective when combined with exploration and technology-based activities. Thus, the JJA Strategy provides a broader framework where participation is not only generated through group organization but also supported by meaningful learning experiences. The second mechanism identified in this study is the social collaboration mechanism**,** which emerged through the Jelajah (exploration) component. This finding supports Kolb's Experiential Learning Theory, which explains that meaningful learning occurs through direct experiences, reflection, conceptual understanding, and application. The exploration activities in JJA provided children with opportunities to actively engage with learning materials, investigate situations, and solve

problems together. Rather than receiving knowledge passively from teachers, children constructed understanding through concrete experiences and social interactions.

The findings also reinforce previous research emphasizing that play-based and experiential learning approaches are effective in developing children's social competence. Previous studies in early childhood education have shown that activities involving exploration, discovery, and group problem-solving can strengthen children's communication skills, empathy, cooperation, and self-regulation(Development, 2023). In this study, the Jelajah component contributed to these developmental processes by creating authentic situations where children needed to negotiate roles, share resources, listen to peers, and make collective decisions. However, this research provides a new perspective by showing that exploration activities become more powerful when positioned within a structured cooperative framework. Unlike exploration activities that are often conducted individually or guided directly by teachers, the Jelajah component in JJA is designed to encourage collective exploration. Therefore, children's collaboration skills develop not only because they interact with learning environments but also because they experience shared responsibility within their peer groups.

The third mechanism identified is the digital engagement mechanism, which emerged through the integration of interactive applications. This finding can be understood through the Technological Pedagogical Content Knowledge (TPACK) framework proposed by Mishra and Koehler, which emphasizes that effective technology integration requires the alignment between technology, pedagogy, and learning content. In this study, digital applications were not positioned as technological tools alone but were integrated into pedagogical activities that encouraged interaction, discussion, and collaboration(Koehler, 2008).

The findings support previous studies indicating that digital media can increase children's motivation, attention, and engagement when used appropriately according to developmental characteristics. However, this study challenges the assumption that digital technology in early childhood education primarily encourages individual learning. The findings demonstrate that digital applications within the JJA framework became a collaborative learning medium because children discussed answers, helped peers, and solved digital tasks together. This finding is consistent with research highlighting that technology has greater educational value when embedded within socially interactive learning environments. Digital tools do not automatically improve learning outcomes; rather, their effectiveness depends on how teachers design learning experiences around them. The JJA Strategy demonstrates that technology can function as a facilitator of social interaction when combined with cooperative and exploratory approaches.

Overall, the findings contribute to existing theories and previous research by proposing that early childhood learning improvement requires an integrated mechanism involving participation, collaboration, and digital engagement. Previous studies have generally examined cooperative learning, experiential learning, and digital learning separately. In contrast, this study introduces the Jigsaw Jelajah Aplikasi (JJA) Strategy as an integrated model that connects these three dimensions within one learning framework. The novelty of this study lies in explaining the mechanism through which JJA works: the Jigsaw component activates children's participation through structured responsibility; the Jelajah component develops collaboration through meaningful exploration; and the Aplikasi component strengthens engagement through interactive technology integration**.** Therefore, JJA represents an innovative learning strategy that aligns with the characteristics of early childhood education by emphasizing active involvement, social interaction, experiential learning, and appropriate technology utilization.

CONCLUSION

This study concludes that the implementation of the Jigsaw Jelajah Aplikasi (JJA) Strategy provides a meaningful contribution to enhancing early childhood participation and collaboration skills through an integrated learning approach. The findings demonstrate that JJA is not merely a combination of cooperative learning, exploration activities, and digital media utilization, but represents a pedagogical strategy that creates interconnected learning mechanisms supporting children's holistic development.

The thematic analysis revealed three main mechanisms through which JJA operates. First, the active participation mechanism developed through the Jigsaw component encouraged children to become active contributors in the learning process. The assignment of roles and responsibilities within cooperative groups strengthened children's confidence, accountability, communication skills, and willingness to express ideas. Second, the social collaboration mechanism developed through the Jelajah component provided children with authentic experiences to practice teamwork, negotiation, problem-solving, and mutual support through exploration-based activities. Third, the digital engagement mechanism developed through the integration of interactive applications enhanced children's motivation, curiosity, and involvement while positioning technology as a facilitator of interaction rather than a replacement for social learning.

The study contributes theoretically by proposing that early childhood learning effectiveness can be strengthened through the integration of three complementary dimensions: cooperative interaction, experiential exploration, and technology-supported engagement. While previous studies have often examined these dimensions separately, this research demonstrates that their integration through the JJA Strategy creates a more comprehensive learning environment that supports both individual participation and social development. Practically, this study suggests that early childhood educators can utilize the JJA Strategy as an alternative instructional approach to design child-centered learning experiences. Teachers should not only focus on the use of digital media but also ensure that technology is embedded within collaborative and exploratory learning processes. Through appropriate pedagogical design, digital tools can strengthen children's communication, cooperation, and active involvement.

Although this study provides valuable insights, it was conducted within a specific early childhood education context. Future research may examine the implementation of the JJA Strategy in different educational settings, involve broader participants, and explore its long-term impact on other aspects of child development, such as creativity, critical thinking, and socio-emotional competence.

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