Journal of Public Health Sciences
Vol. 5, No. 03, pp. 939-957
journal.iistr.org/index.php/JPHS
DOI: 10.56741/IISTR.jphs.002465

Implementation of an Oral Health Education Program for Young Children

[1]Loso Judijanto*, [2]Herlina, [3]Evania Yafie, [4]Diana Setyaningsih, [5]Nur Iffah
Corresponding Author: losojudijantobumn@gmail.com
[1] Indonesian Palm Oil Strategic Studies
[2] State University of Makassar, Makassar, Indonesia
[3] State University of Malang, Malang, Indonesia
[4] Cendrawasih University, Papua, Indonesia
[5] PGRI University of Jombang, Jawa Timur, Indonesia

ARTICLE INFO

Article history
Received 30 June 2026
Revised 10 September 2026
Accepted 24 September 2026

ABSTRACT

Dental health problems in early childhood remain a significant concern because they may affect children's physical development, social interaction, and learning processes. This study aims to explore the implementation of an oral health education program in Early Childhood Education (ECE) institutions and identify factors influencing its effectiveness and sustainability. A qualitative case study approach was conducted in ECE institutions in Malang City, Indonesia. Data were collected through interviews with teachers, principals, parents, and health workers, supported by observations and document analysis. The findings revealed that the program was implemented through collaborative planning, interactive educational activities, behavioral reinforcement, and family involvement. Child-centered approaches, including demonstrations, games, and visual media, enhanced children's engagement and supported improvements in oral hygiene awareness and tooth-brushing practices. However, program implementation was influenced by several challenges, including limited facilities, educational resources, and the need for teacher training. This study highlights that sustainable oral health education in early childhood requires collaboration among schools, families, and health professionals. The findings provide practical implications for developing community-based preventive oral health programs integrated into early childhood education settings.

Keywords
Dental Hygiene
Early Childhood
Health Education
Oral Health
Socialization Program

This is an open-access article under the CC–BY-SA license.

Introduction

Early childhood represents a critical developmental period that shapes children's physical, emotional, social, and cognitive growth [1]. During this stage, rapid development occurs and establishes the foundation for future health behaviors and quality of life. One essential but frequently neglected component of early childhood health is oral health. Healthy teeth enable children to chew food effectively, supporting optimal nutrient absorption and physical growth. Conversely, dental problems such as dental caries can reduce appetite, interfere with nutritional intake, and affect children's overall development [2],[3]. Furthermore, proper dental development contributes to speech development, while children with good communication abilities tend to demonstrate greater confidence in social interaction [4], [5]. Therefore, promoting oral health during early childhood is essential as part of a comprehensive approach to supporting children's growth and development.

Oral health is closely associated with children's quality of life because it influences essential daily activities, including eating, sleeping, learning, and social interaction [6]. Untreated dental problems, including pain and infection, may negatively affect children's behavior, concentration, academic performance, and psychosocial well-being [7] Previous studies have demonstrated that early oral health education can improve children's dental hygiene knowledge and establish sustainable oral health behaviors into later childhood [8]. However, effective oral health promotion requires more than teaching tooth brushing techniques; it must also develop children's awareness, attitudes, and responsibility toward maintaining oral hygiene as part of a healthy lifestyle [9]. Oral health problems among Indonesian children remain a major public health concern requiring cross-sectoral attention. According to the 2023 Indonesian Health Survey *(Survei Kesehatan Indonesia [SKI])*, 84.8% of children aged 5–9 years had dental caries. Furthermore, only 11.2% of individuals with oral health problems received care from dental health professionals, indicating a substantial treatment gap. Limited access to dental health services, particularly in disadvantaged and remote areas, further reduces children's opportunities to receive appropriate preventive and curative care [10]. These conditions highlight the importance of strengthening preventive strategies, particularly through educational institutions where children spend a substantial part of their developmental period.

Early Childhood Education (ECE) institutions have strategic potential as settings for implementing sustainable oral health promotion programs. However, previous studies indicate that many ECE institutions have not systematically integrated dental hygiene education into daily learning activities [11] [12]. In addition, limited involvement of health workers reduces opportunities for regular dental monitoring and professional guidance [13]. The absence of strong collaboration between ECE institutions, parents, and health professionals may reduce the effectiveness and sustainability of oral health interventions. Therefore, a structured and collaborative dental health oral health education program is needed to strengthen children's awareness and practices regarding oral hygiene from an early age. Educational approaches that are consistent, interactive, and enjoyable may improve children's understanding while encouraging positive dental care behaviors [4] [14]. Consistent education can also foster dental care behavior, reduce consumption of sugary foods, and form a positive attitude towards dental care.

Although previous studies have examined childhood oral health problems and evaluated various educational approaches, several limitations remain. Existing studies have primarily focused on dental caries prevalence, children's knowledge levels, or the effectiveness of specific educational media, while limited attention has been given to how dental health oral health education program are designed, implemented, and sustained within early childhood education settings. For example, Mendonca [15] and Gupta [16] demonstrated that storytelling, simulations, and educational games could improve children's oral health knowledge; however, these studies did not comprehensively examine the roles of teachers, parents, and health workers or the practical challenges encountered during program implementation.

This limitation indicates the need for a more comprehensive investigation of dental health oral health education program as an educational intervention involving multiple stakeholders. Therefore, this study contributes novelty by examining the implementation process of dental hygiene oral health education program in ECE institutions, including program planning, educational strategies, stakeholder involvement, implementation challenges, and changes in children's dental hygiene awareness and behavior. This holistic perspective provides not only empirical understanding of how oral health education programs operate in early childhood settings but also practical recommendations for developing sustainable and collaborative oral health promotion models.

Dental health problems in early childhood remain a serious issue because untreated dental caries may influence children's general health, cognitive development, and quality of life. Although preventive programs have been introduced, challenges remain in improving children's oral hygiene knowledge and practices due to limited educational integration and insufficient collaboration among ECE institutions, families, and health professionals. Therefore,

evaluating the implementation of dental hygiene oral health education program in ECE is necessary to identify effective strategies for strengthening early childhood oral health promotion.

Based on these research gaps, this study aims to evaluate the implementation of dental hygiene oral health education program in Early Childhood Education (ECE) institutions as an effort to optimize children's oral health from an early age. Specifically, this study aims to:

1. Analyze the implementation of dental hygiene oral health education program in Early Childhood Education (ECE) institutions, including activity forms, frequency, and educational approaches used in delivering oral health education to children.
2. Identify supporting factors and barriers influencing the successful implementation of dental health oral health education program in ECE institutions.
3. Examine the impact of dental health oral health education program on children's oral hygiene knowledge and behavior.

Literature Review

A. Theoretical Framework

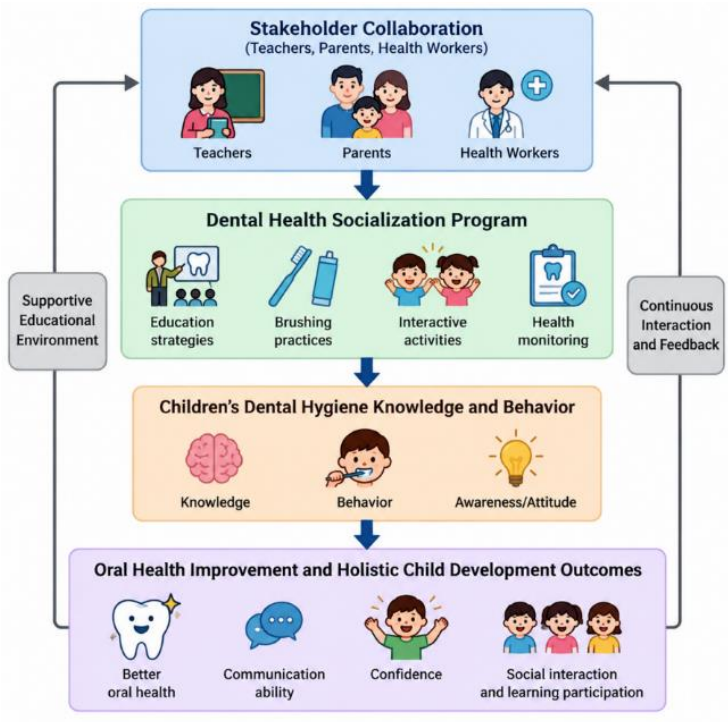
Early childhood is a crucial stage of rapid physical, cognitive, social, and emotional development. According to Piaget's cognitive development theory, children in the preoperational stage learn effectively through concrete, meaningful, and child-centered experiences. Therefore, oral health education is essential because dental problems may affect communication, social participation, confidence, and learning. Bronfenbrenner's ecological theory further explains that children's oral hygiene behaviors develop through interactions with family, school, and community. Parents and teachers consequently play important roles in modeling and reinforcing healthy practices. Maslow's basic needs theory also emphasizes that physical health supports learning, social interaction, and self-expression. Dental caries and gum infections can cause pain, appetite loss, sleep disturbances, and reduced concentration. Consistent with UNICEF and UNESCO's holistic approach, oral health should therefore be integrated into early childhood education as an essential component of children's overall and sustainable development.

Previous studies indicate that early childhood oral health promotion is most effective through preventive education and collaboration among teachers, parents, and health professionals. Early Childhood Education (ECE) institutions provide strategic environments for developing healthy behaviors through structured learning and daily routines. Oral health also supports children's communication, self-confidence, and social participation; children with fewer dental problems tend to demonstrate clearer pronunciation and greater engagement in social interactions [5], [17], [18]. However, previous research has mainly examined knowledge improvement or specific educational media, with limited attention to

program design, delivery, stakeholder support, and sustainability. Therefore, this study positions dental hygiene socialization as a multidimensional intervention involving individual, environmental, and institutional factors and examines its implementation and contribution to improving children's oral hygiene knowledge and behavior in ECE institutions.

B. Conceptual Framework

Oral health supports children's communication, self-confidence, social participation, nutrition, and physical growth. Children with fewer dental problems tend to pronounce words more clearly, communicate confidently, and participate actively in social interactions [5], [17], [18]. However, previous studies have primarily assessed knowledge improvement or specific educational media, with limited attention to program design, delivery, stakeholder involvement, and sustainability. Therefore, this study examines dental hygiene socialization in ECE institutions as a multidimensional intervention involving individual, environmental, and institutional factors. The conceptual framework links healthy diets, proper toothbrushing, parental and teacher involvement, access to dental services, and supportive school environments with optimal oral health and holistic child development. These factors improve chewing and nutrient absorption while supporting speech, confidence, socialization, and learning [5], [18]. Consequently, oral health education should be integrated into ECE curricula and parenting programs.



Source: Author analysis

Fig. 1. Conceptual framework of dental health oral health education program and its impact on early childhood oral health and development.

Material and Methods

This qualitative case study examined the implementation of dental hygiene oral health education program in ECE institutions across five sub-districts of Malang City: Kedungkandang, Sukun, Klojen, Blimbing, and Lowokwaru. Data were collected from September to November 2026.

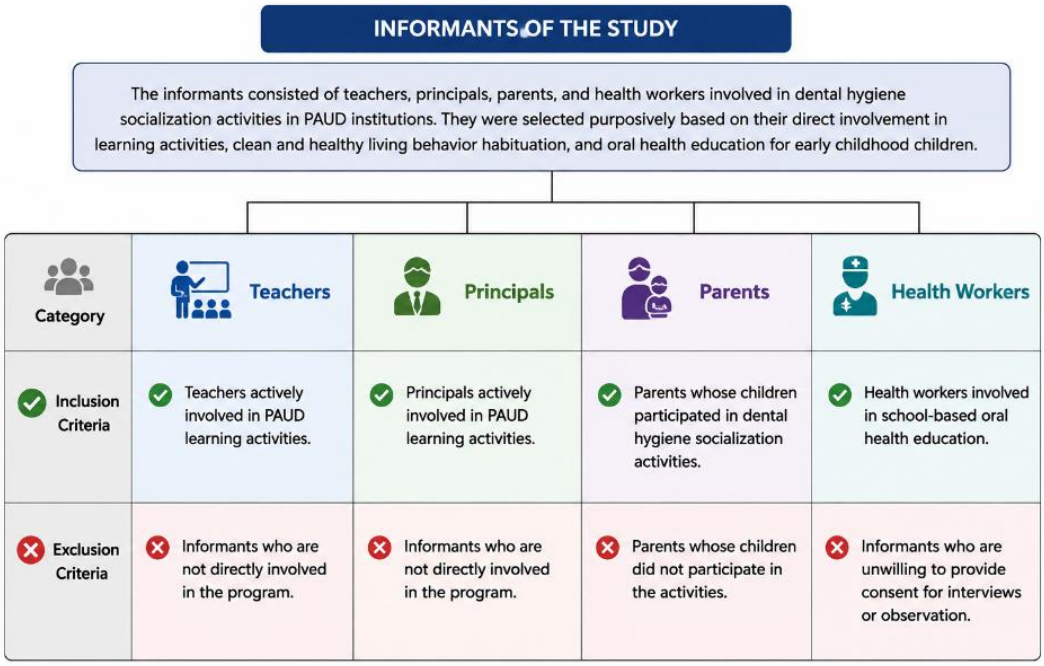


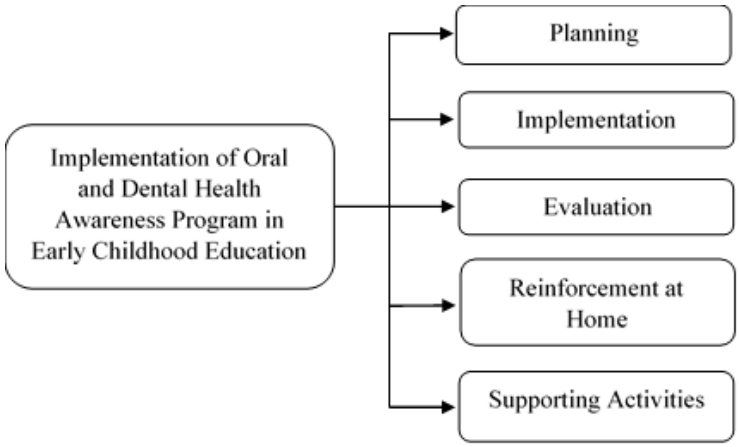
Fig. 2. Informant categories and selection criteria of the study

Data were collected through participatory observations, in-depth interviews, and documentation. These methods explored program implementation, stakeholder involvement, educational strategies, challenges, supporting factors, children's responses, and oral hygiene practices. Data were analyzed using an interactive model comprising data reduction, data display, and conclusion drawing. Interview transcripts, observation notes, and documents were coded and categorized into themes related to planning, implementation, stakeholder involvement, barriers, support, evaluation, and program impacts. Credibility was ensured through source and method triangulation and verification with key informants. All participants provided informed consent, while confidentiality and anonymity were maintained throughout the study.

Results and Discussions

A. Implementation of Oral and Dental Success Socialization Program

Fig. 3 illustrates the implementation of the oral and dental health socialization program, highlighting educational activities designed to increase participants' awareness, knowledge, and understanding of proper oral and dental hygiene practices.



Source: Authors analysis

Fig. 3. Implementation of the oral and dental success socialization program

Table 1 presents the implementation findings of the oral and dental hygiene socialization program in Early Childhood Education (ECE), outlining activity stages, approaches, implementation procedures, data sources, and collection techniques.

Table 1. Findings of the implementation of the socialization of oral and dental success Program in ECE

Activity Stage	Activity Form	Approach Used	Implementation of Dental Hygiene Socialization Program in ECE	Data Source	Data Collection Technique
Planning	Coordination meeting between teachers, principals, and health workers	Collaborative approach between ECE and public health centers	Scheduling, preparing educational materials, and determining methods suitable for early childhood characteristics	Teachers, Principal, Health Workers	Interviews, Documentation
Implementation	Demonstration and practice of brushing teeth with children	Play-based and thematic educational approach	Teaching children the correct brushing technique using interactive methods like role-playing and songs to make it more engaging	Teachers, Health Workers, Early Childhood	Observation, Interviews
Evaluation	Observation of children's behavior and reflective discussion with teachers	Participatory and reflective approach	Evaluating children's understanding of dental hygiene through questions and direct observations during and after the socialization activities	Teachers, Parents, Health Workers	Interviews, Field Notes
Reinforce-ment at Home	Outreach to parents through regular meetings	Collaborative approach between school and family	Providing parents with information and guidance to support the practice of dental hygiene at home, reinforcing the program provided at ECE	Parents	Interviews, Educational Leaflets

Activity Stage	Activity Form	Approach Used	Implementation of Dental Hygiene Socialization Program in ECE	Data Source	Data Collection Technique
Supporting Activities	Screening educational videos and educational games	Experiential learning and edutainment approach	Introducing children to the importance of dental and oral health through visual media and engaging games	Teachers, Early Childhood	Observation, Documentation of Activities

Source: Author analysis

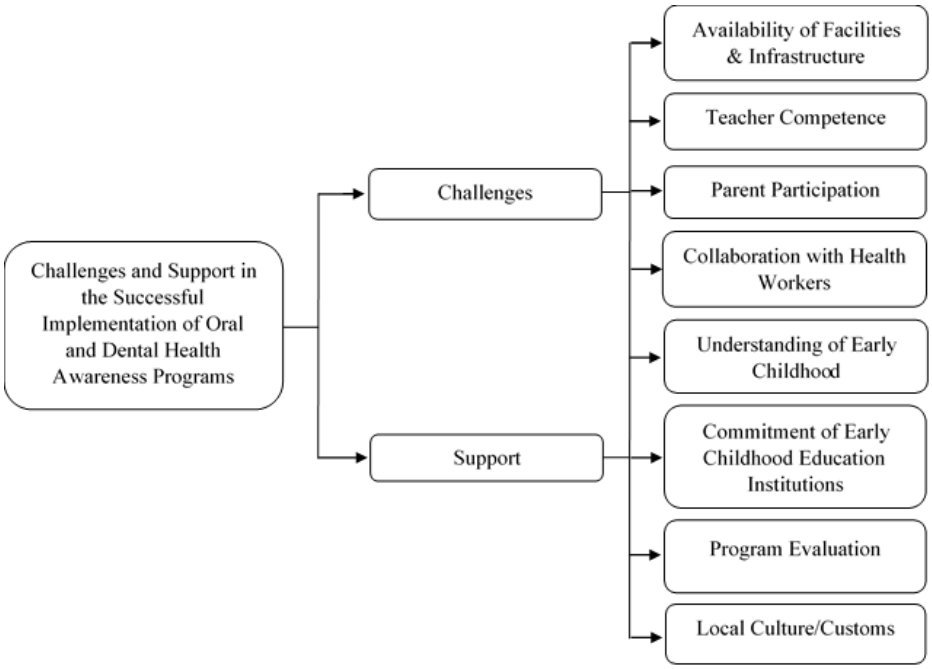
The oral and dental hygiene socialization program in ECE institutions across five sub-districts of Malang City was implemented systematically, from planning to evaluation. Teachers and principals collaborated with community health centers (puskesmas) to determine age-appropriate materials, media, and activities, while health workers provided reliable information. A teacher from Lowokwaru explained:

> "We usually hold tooth brushing activities together once a week. The children are very enthusiastic, especially when they can use their own toothbrushes. We also use short songs about the correct way to brush their teeth so that they remember it faster."

This indicates the effectiveness of play-based and thematic learning. Evaluation involved observing children's brushing behavior at school and home, supported by feedback from teachers and parents and, in some institutions, dental hygiene monitoring books. Regular reflection was also conducted to improve the program. Increased enthusiasm and oral health knowledge demonstrated that the program strengthened children's healthy habits and collaboration among schools, families, and health professionals.

B. Constraints and Support in the Successful Implementation

Fig. 4 illustrates the challenges and supporting factors associated with the successful implementation of oral and dental health awareness programs in Early Childhood Education (ECE) settings. The framework identifies eight interconnected aspects: availability of facilities and infrastructure, teacher competence, parent participation, collaboration with health workers, children's understanding, institutional commitment, program evaluation, and local culture or customs. These factors are grouped into two main categories, challenges and support, reflecting their potential influence on program implementation. Challenges may arise from inadequate facilities, limited teacher competencies, insufficient parental involvement, and children's developmental limitations in understanding oral health practices. Conversely, institutional commitment, effective collaboration with healthcare professionals, systematic program evaluation, and culturally appropriate educational approaches can provide essential support. The framework emphasizes the importance of coordinated efforts among teachers, parents, healthcare professionals, and educational institutions to address implementation barriers, strengthen program sustainability, and promote consistent oral and dental hygiene practices among young children.



Source: Author analysis

Fig. 4. Constraints and support in the successful implementation of the oral and dental health socialization program

Table 2 presents the challenges and supporting factors influencing the successful implementation of oral and dental health socialization programs in Early Childhood Education (ECE). The findings are organized according to assessment aspects, identified implementation barriers, available support mechanisms, and informant sources, providing insights into factors affecting program effectiveness and sustainability.

Table 2. Findings of Constraints and Support in the Successful Implementation of the Oral and Dental Health Socialization Program in ECE

Assessment Aspect	Challenges	Support	Source of Informants
Availability of Facilities & Infrastructure	Limited teaching aids Lack of children's toothbrushes and toothpaste No special washbasins for children	Assistance from health departments Support from foundations or institutions Teacher initiatives to bring simple teaching aids	Teachers, Principals
Teacher Competency	No special training on dental education Lack of literature on ag appropriate teaching methods	Teachers' enthusiasm for training Self-directed training Support from principals for competency improvement	Teachers, Principals
Parental Involvement	Lack of awareness about the importance of dental health Parents are busy and rarely assist Not all children are provided with personal toothbrushes	Regular communication via WhatsApp groups Parental education during school meetings Active role of school committees	Teachers, Parents
Collaboration with Health Workers	Irregular dentist schedules Limited number of children's health workers Socialization is still incidental	Collaboration with public health centers Support from health cadres Dentists' willingness to provide free education	Teachers, Health Workers

Assessment Aspect	Challenges	Support	Source of Informants
Understanding of Early Childhood	Children get bored quickly Difficulty focusing for long periods Not all children have experience brushing teeth	Education using songs and games Attractive visual media Learning through hands-on brushing practice	Teachers, Parents
Commitment of ECE Institutions	Busy schedule causes delays in socialization Not all schools have SOP for dental education activities	Routine school health program support from institution leadership Institutional vision in favor of child health	Principals, Teachers
Program Evaluation	Not all schools conduct regular evaluations Incomplete implementation documentation	Scheduled activity report Evaluation from teachers and parents Monitoring by education/health authorities	Principals
Local Culture/ Habits	High consumption of sweets Lack of dental hygiene education at home, Influence of unhealthy environment	Support from community leaders, Local *PHBS* activities, *Gotong Royong* tradition supporting healthy lifestyles	Parents, Community Leaders, Teachers

Source: Author analysis

The implementation of oral and dental health education in ECE institutions faces several challenges, particularly inadequate facilities, limited teacher training, irregular health-worker visits, and uneven parental awareness. One teacher explained:

> "The children are very enthusiastic when we teach tooth brushing, but sometimes they have to queue for a long time because there is only one sink, and the water sometimes does not flow smoothly."

Many teachers also lack formal training and interactive educational media. Nevertheless, they independently develop creative learning methods. A principal from Blimbing stated:

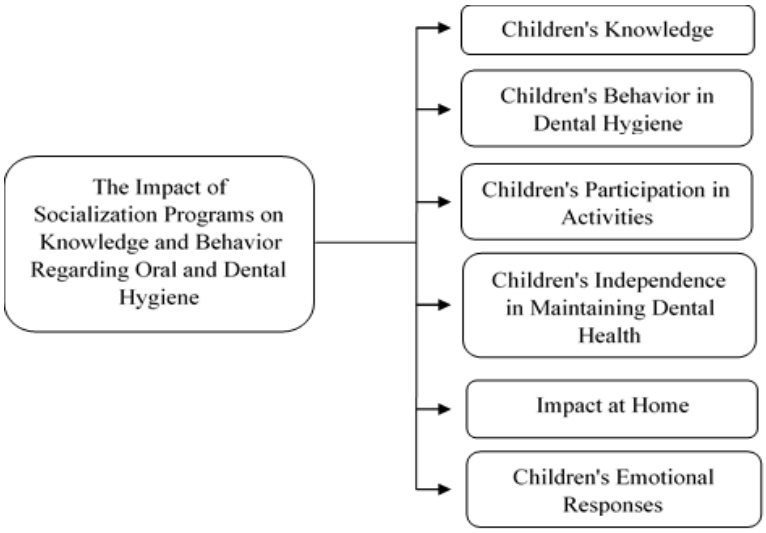
> "We have never received official training from the Health Office, but teachers here learn from the internet, from YouTube, and even make their own songs so that children can easily remember how to brush their teeth properly."

Support from puskesmas motivates children, although visits remain limited. Parental involvement is equally important because oral hygiene practices must be reinforced at home. Therefore, communication among schools, health workers, and parents should be strengthened through meetings and digital platforms. Thematic activities involving games, songs, and practical demonstrations can enhance children's participation while fostering responsibility, cooperation, and healthy habits.

C. Impact of the Socialization Program on Knowledge and Behavior

Fig. 5 illustrates the impact of oral and dental health socialization programs on children's knowledge, behavior, and hygiene practices in Early Childhood Education (ECE). Six key aspects are identified: children's knowledge, dental hygiene behavior, participation in educational activities, independence in maintaining oral health, impact at home, and emotional responses. These aspects provide a comprehensive framework for assessing program outcomes, including children's understanding of oral hygiene, engagement in learning activities, and ability to practice healthy habits independently. Additionally, the framework

highlights the importance of extending healthy behaviors into the home environment and fostering positive emotional responses toward oral and dental hygiene practices.



Source: Author analysis

Fig. 5 Impact of socialization program on oral and dental hygiene knowledge and behavior

Table 3 presents the findings on the impact of oral and dental health socialization programs on children's knowledge and hygiene behaviors. The findings are organized by impact aspects, indicators of behavioral and knowledge changes, main findings, and informant sources, providing a structured overview of reported program outcomes in early childhood education.

Table 3. Findings of the impact of socialization program on oral and dental hygiene knowledge and behavior

Impact Aspect	Change Indicators	Main Findings	Informant Sources
Children's Knowledge	• Knowing the importance of brushing teeth • Recognizing the ideal time for brushing teeth • Recognizing dental hygiene tools and materials (toothbrush, toothpaste)	Children can explain the reasons for brushing teeth and the right time to do it	Teachers, Children
Children's Behavior in Dental Hygiene	• Brushing teeth twice a day • Performing correct brushing movements • Not eating/drinking sweet things before bed	Children start to make a habit of brushing teeth after breakfast and before bed	Parents, Teachers
Children's Participation in Activities	• Participating in tooth brushing practice at school • Asking or answering during socialization • Showing interest and enthusiasm	Children look enthusiastic, follow instructions, and can practice the technique correctly	Teachers, Children
Children's Independence in Maintaining Oral Health	• Taking toothbrush and toothpaste independently • Brushing teeth without being asked • Being able to clean all parts of the mouth	Children show independence and responsibility when brushing teeth at school	Teachers, Parents

Impact Aspect	Change Indicators	Main Findings	Informant Sources
Impact at Home	• Reminding parents about tooth brushing time • Showing consistent clean behavior • Sharing what they learned at school	Parents claim that children are more aware and remind parents when they forget to brush their teeth	Parents
Children's Emotional Response	• Not being afraid of educational activities related to teeth • Enthusiastic when role-playing as a dentist • Showing happy expressions during practice	Children are no longer afraid of dentists and enjoy participating in the education	Teachers, Children

Dental hygiene education positively improved children's knowledge, behavior, participation, independence, and attitudes toward oral health. Children understood the importance and appropriate timing of toothbrushing, recognized dental hygiene tools, brushed their teeth twice daily using correct techniques, and reduced sweet consumption before bedtime. A teacher stated:

> "Children are now easier to talk to about the importance of maintaining dental hygiene. They can explain why we have to brush our teeth twice a day".

Children also participated enthusiastically in practical activities and independently prepared their dental hygiene tools and brushed their teeth without reminders. These habits extended to the home environment, as one parent explained:

> "After this program, my child often reminds me if I forget to brush my teeth before bed, whereas before it was me who had to always remind him".

The program also reduced children's fear of dental activities and encouraged positive emotional responses. One child said:

> "I like being a dentist; I can clean my friends' teeth".

Overall, the intervention promoted comprehensive and potentially sustainable oral hygiene habits.

Discussion

A. Implementation of the Oral and Dental Success Socialization Program

The implementation of the oral and dental health socialization program in ECE institutions involved several interconnected stages, including program planning, implementation, evaluation, and reinforcement through family involvement. These stages demonstrate that oral health promotion in early childhood requires structured collaboration between educational institutions, health workers, and families rather than relying solely on individual behavior change [19]. The planning stage involved coordination between ECE teachers, school principals, and health workers from community health centers (Puskesmas). This stage

focused on determining educational materials, activity schedules, and appropriate learning strategies based on children's developmental characteristics [20] [21]. The collaborative planning process enabled the development of educational activities that were informative, interactive, and suitable for early childhood learners. The learning materials emphasized concrete, visual, and participatory approaches because young children learn more effectively through direct experiences and meaningful activities [22] [23]. The use of songs, educational media, and illustrated stories was therefore selected to increase children's engagement and understanding. This finding supports Anyanwu et al. (2024) who emphasized that cross-sectoral collaboration during program planning contributes to the sustainability of child health interventions.

During the implementation stage, the program emphasized experiential and play-based learning approaches. Children participated in tooth-brushing demonstrations supported by creative learning media, including educational videos, thematic games, role-playing activities, and interactive demonstrations [25]. These approaches enabled children to perceive dental hygiene practices as enjoyable activities rather than formal instruction. The integration of songs, movements, and simple demonstrations helped children understand proper brushing techniques in an age-appropriate manner [26] [27]. This finding is consistent with Le Port et al. [28], who reported that edutainment-based learning approaches can improve children's engagement and understanding of health messages. Additional activities, including educational puzzles and simple quizzes, provided opportunities for children to strengthen their knowledge through direct participation. Such experiential learning strategies support the internalization of healthy behaviors during early childhood development [29].

The evaluation and reinforcement stage demonstrated that program sustainability depended on continuous monitoring and family involvement. Teachers and health workers evaluated children's understanding through direct observation of dental hygiene practices and behavioral responses after educational activities [30]. Changes observed included children's increasing awareness of tooth-brushing routines, such as brushing after meals and before bedtime [31]. However, maintaining these behaviors required reinforcement beyond the school environment. Therefore, parental involvement was strengthened through counseling activities and communication forums that encouraged parents to support children's oral hygiene practices at home [32]. This finding supports Ewelt-Knauer et al. (2025) who highlighted that family involvement is a critical determinant in maintaining health behaviors among children.

B. Constraints and Supporting Factors in Program Implementation

The implementation of the oral and dental health socialization program was influenced by several supporting and inhibiting factors. One major challenge identified was limited facilities

and learning resources. Several ECE institutions experienced limitations related to child-friendly sinks, visual educational materials, and sufficient tooth-brushing equipment [34]. These limitations affected the consistency of practical tooth-brushing activities. However, institutional creativity and external support from health agencies contributed to overcoming these barriers [35]. Teachers adapted available resources by developing simple educational materials and utilizing creative teaching strategies. This finding is consistent with Saripudin & Beni [36], , who reported that attractive and child-oriented learning media influence the effectiveness of dental health education in early childhood settings.

Teacher competence was another important factor affecting program implementation. Limited training and lack of specific references regarding early childhood dental health education created challenges in delivering appropriate learning strategies [37]. Nevertheless, teacher motivation, independent learning initiatives, and support from school leadership contributed positively to program implementation [32]. Research by Tahani et al. [38] also demonstrated that teacher training in children's dental health can improve educators' attitudes and teaching approaches. Parental participation was identified as an essential component in maintaining children's dental hygiene practices. Limited parental awareness and time constraints sometimes reduced consistency in supporting children's tooth-brushing habits at home [30] [39]. However, communication strategies through digital platforms and regular meetings helped strengthen collaboration between schools and families. In addition, health worker involvement supported program implementation, although limitations in schedules and availability remained challenges [31]. Collaboration between ECE institutions, puskesmas, and community health cadres provided opportunities for continuous oral health education.

The findings also indicate that contextual and collaborative approaches are essential for sustainable oral health promotion. Educational activities incorporating games, songs, and visual media were more appropriate for young children due to their limited attention span [29]. Furthermore, community participation through the Clean and Healthy Lifestyle Behavior Behavior *(Perilaku Hidup Bersih dan Sehat (PHBS))* program and local social support strengthened the implementation process. This finding aligns Fisher et al. [40], who confirmed that collaborative dental health education involving schools, families, and communities can improve oral hygiene behavior among young children.

C. Impact of the Socialization Program on Knowledge and Behavior

The implementation of the oral and dental health socialization program contributed to improvements in children's knowledge and practices related to dental hygiene. Children demonstrated better understanding of the importance of tooth brushing, appropriate brushing times, and the function of dental care tools. These findings indicate that early health education

provides an important foundation for developing healthy behaviors. Children were able to identify appropriate brushing times, particularly after breakfast and before bedtime, consistent with previous findings that early educational interventions contribute to long-term oral health behavior formation [39].

Behavioral changes were also observed after program implementation. Children began to practice tooth brushing more regularly, demonstrate improved brushing techniques, and reduce unhealthy habits such as consuming sweets before bedtime [37], [42]. Interactive activities, including demonstrations, songs, and games, encouraged children's participation and increased their confidence in practicing dental hygiene skills [43]. These findings support Alotaibi [44], who stated that participatory and enjoyable learning approaches significantly improve the effectiveness of health education among young children.

Beyond knowledge and practical skills, the program also influenced children's independence and attitudes toward dental care. Some children demonstrated greater responsibility by preparing their own dental hygiene tools, brushing without reminders, and sharing oral health information with family members [35], [43], [45], [46], [47]. Furthermore, simulation activities reduced children's anxiety toward dental-related experiences and encouraged positive attitudes toward oral health practices.

Overall, the findings demonstrate that an effective oral and dental health socialization program in ECE requires integration between educational strategies, institutional support, family participation, and health service collaboration. The program provides a practical model for strengthening promotive and preventive oral health interventions in early childhood education settings. Strengthening teacher capacity, providing child-friendly learning resources, and establishing continuous collaboration among ECE institutions, families, and health workers are important strategies to ensure program sustainability.

Conclusion

This study concludes that the implementation of the oral and dental health socialization program in ECE institutions represents a collaborative educational intervention involving teachers, parents, and health workers. The program was implemented through several interconnected stages, including planning, interactive educational activities, evaluation, and reinforcement at home. The findings indicate that the program contributed to improving children's awareness, knowledge, and practices related to oral hygiene, particularly through child-centered approaches such as demonstrations, games, songs, and visual learning media.

The success of the program was strongly influenced by stakeholder collaboration and the integration of oral health education into the ECE learning environment. Teachers played an important role in facilitating daily dental hygiene practices, while parents and health workers provided reinforcement and professional support. However, several challenges, including

limited facilities, availability of educational resources, and the need for teacher capacity development, remain important considerations for improving program sustainability.

This study contributes to the understanding of how oral health promotion programs can be implemented within early childhood education settings through a contextual and collaborative approach. The findings suggest that sustainable oral health interventions should not only focus on increasing children's knowledge but also strengthen institutional capacity, family involvement, and cross-sector collaboration.

For practical implementation, ECE institutions are encouraged to integrate oral health education into routine learning activities, provide continuous training for teachers, and establish regular collaboration with health centers and health professionals. Parents should also be involved through structured communication and education programs to reinforce healthy dental practices at home. Future studies may further examine the long-term effectiveness of similar programs using broader populations and longitudinal approaches to evaluate sustained behavioral changes.

Limitation and Suggestions

This study has several limitations. First, the research was conducted in five Early Childhood Education institutions in Malang City, which may limit the transferability of the findings to other educational settings with different socio-cultural characteristics. Second, the study employed a qualitative case study approach that focused on exploring participants' experiences and perceptions rather than measuring the long-term effectiveness of the dental hygiene socialization program. Future research is recommended to adopt mixed-methods or longitudinal designs involving a larger number of ECE institutions to evaluate the sustained impact of oral health education programs on children's oral hygiene behaviors and overall oral health outcomes.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] S. Upadhyay, V. P. Mathur, J. K. Dhillon, and S. Poudyal, "Translation and validation of oral health-related early childhood quality of life tool for nepalese preschool children," *Kathmandu Univ. Med. J.*, 2021, doi: 10.3126/kumj.v19i1.49554.

[2] A. Đorđević, J. Pavlović, and B. Martinović, "Parents' knowledge about the effects of oral hygiene, proper nutrition and fluoride prophylaxis on oral health in early childhood," *Prax. medica*, 2020, doi: 10.5937/pramed2004019d.

[3] K. Divaris and A. Joshi, "The building blocks of precision oral health in early childhood: the ZOE 2.0 study," *J. Public Health Dent.*, 2020, doi: 10.1111/jphd.12303.

[4] A. C. Mafla, L. S. Moran, and E. Bernabe, "Maternal oral health and early childhood caries amongst low-income families," *Community Dent. Health*, 2020, doi: 10.1922/CDH_00040Mafla06.

[5] A. R. Alexandra, G. A. J. Alexander, and V. G. Edwin, "Early childhood oral health: Strategy with educators and parents or guardians," *Rev. Cuid.*, 2023, doi: 10.15649/cuidarte.2676.

[6] M. Liu *et al.*, "Association of siblings' presence and oral health-related quality of life among

children: a cross-sectional study," *BMC Oral Health*, vol. 21, no. 1, p. 153, Dec. 2021, doi: 10.1186/s12903-021-01526-y.

[7] A. Militi *et al.*, "Psychological and Social Effects of Oral Health and Dental Aesthetic in Adolescence and Early Adulthood: An Observational Study," *Int. J. Environ. Res. Public Health*, vol. 18, no. 17, p. 9022, Aug. 2021, doi: 10.3390/ijerph18179022.

[8] J. Xiao *et al.*, "Prenatal Oral Health Care and Early Childhood Caries Prevention: A Systematic Review and Meta-Analysis," 2019. doi: 10.1159/000495187.

[9] A. Tadin and M. Badrov, "Oral Health Knowledge, Self-Assessed Oral Health Behavior, and Oral Hygiene Practices among the Adult General Population in Croatia," *Healthcare*, vol. 12, no. 1, p. 88, Dec. 2023, doi: 10.3390/healthcare12010088.

[10] M. Sofian, A. Setiawan, A. Hamdani, N. Pratidina, and A. Suwargiani, "Prevalence of Early Childhood Caries (ECC) in Children Aged 2–6 years in the Highlands and Lowlands of West Java," *Clin. Cosmet. Investig. Dent.*, vol. Volume 17, pp. 77–83, Jan. 2025, doi: 10.2147/CCIDE.S467318.

[11] E. Karikoski, T. Sarkola, and M. Blomqvist, "Oral health behavior during early childhood in children with major congenital heart defects," *Int. J. Paediatr. Dent.*, 2023, doi: 10.1111/ipd.13062.

[12] F. Peedikayil, S. Kottayi, and T. Subbalekshmi, "Malayalam language translation and validation of oral health-related early childhood quality of life tool (OH-ECQoL)," *J. Indian Soc. Pedod. Prev. Dent.*, 2022, doi: 10.4103/jisppd.jisppd_177_22.

[13] N. A. Gordon, P. Brijlal, C. A. Rayner, M. Abdullah, and M. Funa, "Enabling educator oral health literacy: An impetus for oral health promotion in early childhood development," *Int. J. Dent. Hyg.*, vol. 22, no. 3, pp. 639–646, Aug. 2024, doi: 10.1111/idh.12736.

[14] D. N. P. Pratamawari, D. Atikasari, and T. Bramantoro, "The Effect of Parents' Socioeconomic Factors on Their Willingness to Take Care of Their Children's Oral Health in Early Childhood," *J. Int. Dent. Med. Res.*, 2022.

[15] T. S. Mendonça, S. T. de Carvalho, A. Aljafari, M. T. Hosey, and L. R. Costa, "Oral Health Education for Children: Development of a Serious Game with a User-Centered Design Approach," *Games Health J.*, vol. 13, no. 4, pp. 268–277, Aug. 2024, doi: 10.1089/g4h.2023.0055.

[16] P. Gupta, S. Sharma, S. Saxena, S. N. Naik, R. Bhandari, and A. K. Shukla, "Comparison between Conventional, Game-based, and Self-made Storybook-based Oral Health Education on Children\'s Oral Hygiene Status: A Prospective Cohort Study," *Int. J. Clin. Pediatr. Dent.*, vol. 14, no. 2, pp. 273–277, Jul. 2021, doi: 10.5005/jp-journals-10005-1811.

[17] M. Abdat and I. Ramayana, "Relationship between mother's knowledge and behaviour with oral health status of early childhood," *Padjadjaran J. Dent.*, 2020, doi: 10.24198/pjd.vol32no2.24734.

[18] B. Das, S. Barman, A. Baishya, R. Haloi, and D. Das, "Knowledge, Awareness, and Practice of Pediatricians Regarding Infant Oral Health Care and Early Childhood Caries in the State of Assam, India," *Cureus*, 2024, doi: 10.7759/cureus.52060.

[19] S. N. Tabassum, A. R. Tupalli, S. R. Cheruku, M. Abidullah, K. T. S. S. Rajajee, and T. A. Hussain, "The Impact of Early Childhood Caries on Oral Health-Related Quality of Life of Children and Caregivers Residing in Rural and Urban Areas of the Rangareddy District," *J. Med. Life*, 2020, doi: 10.25122/jml-2020-0063.

[20] L. Carpenter, L. Gibbs, A. Magarey, S. Dashper, M. Gussy, and H. Calache, "Nutrition and oral health in early childhood: Associations with formal and informal childcare," *Public Health Nutr.*, 2021, doi: 10.1017/S1368980020001676.

[21] B. Ghasemi, R. Mazaheri, N. FalLah, and N. Feizi Najafi, "Knowledge, Attitude & Practice of Pediatricians regarding Oral Health and Early Childhood Caries," *J. Isfahan Dent. Sch.*, 2021, doi: 10.18502/ijds.v17i1.5910.

[22] M. A. Simancas-Pallares *et al.*, "Children's oral health-related behaviours and early childhood caries: A latent class analysis," *Community Dent. Oral Epidemiol.*, 2022, doi: 10.1111/cdoe.12645.

[23] T. Marquillier, P. Lombrail, and S. Azogui-Lévy, "Social inequalities in oral health and early childhood caries: How can they be effectively prevented? A scoping review of disease predictors," *Rev. Epidemiol. Sante Publique*, 2020, doi: 10.1016/j.respe.2020.06.004.

[24] E. C. Anyanwu, C. P. Maduka, O. Ayo-Farai, C. C. Okongwu, and A. I. Daraojimba, "Maternal and child health policy: A global review of current practices and future directions," *World J. Adv. Res. Rev.*, vol. 21, no. 2, pp. 1770–1781, Feb. 2024, doi: 10.30574/wjarr.2024.21.2.0306.

[25] V. De La Roche Colorado, Á. M. Franco Cortés, E. M. Ochoa Acosta, and V. Bran Muñoz, "Assessment of an educational strategy and application of an oral health preventive protocol in early childhood," *Rev. Fac. Odontol.*, 2020, doi: 10.17533/udea.rfo.v32n1a1.

[26] A. Nation, M. Pukallus, N. Stormon, M. Foley, and R. Lalloo, "Health professionals delivering oral health interventions in early childhood: A scoping review of Australian and New Zealand

literature," 2023. doi: 10.1002/hpja.678.
[27] M. K. S. Alsharif, A. I. N. Mohd Nazan, and S. Ismail, "Association of parental knowledge, attitude, and practice of oral health with early childhood caries among preschool children: A systematic review," 2020.
[28] A. Le Port *et al.*, "A community edutainment intervention for gender-based violence, sexual and reproductive health, and maternal and child health in rural Senegal: a process evaluation," *BMC Public Health*, vol. 22, no. 1, p. 1165, Dec. 2022, doi: 10.1186/s12889-022-13570-6.
[29] M. S. Gumilar, M. Muliadi, and W. Warsono, "Development of Virtual Reality Application for Oral and Dental Health Promotion on Early Childhood," *J. Kesehat. Gigi*, 2022, doi: 10.31983/jkg.v9i2.8008.
[30] K. Bekes, C. Solanke, T. Waldhart, J. Priller, and T. Stamm, "Effect of method of administration on the oral health–related quality of life assessment using the Early Childhood Oral Health Impact Scale (ECOHIS-G)," *Clin. Oral Investig.*, 2021, doi: 10.1007/s00784-021-03818-7.
[31] A. Behbahanirad, H. Joulaei, J. Jamali, A. Golkari, and M. Bakhtiar, "Dimensional structure of the early childhood oral health impact scale," *Iran. J. Med. Sci.*, 2021, doi: 10.30476/ijms.2019.82060.0.
[32] A. Irfan, A. Khan, A. Irfan, Z. Mehmood, and R. Tahir, "Effects of Parental Oral Health knowledge on Early Childhood Caries and Oral Health Status of Children 3-5 Years of Age in Abbottabad," *Pakistan J. Heal. Sci.*, 2023, doi: 10.54393/pjhs.v4i02.554.
[33] C. Ewelt-Knauer, F. Herrmann, S. Mai, A. Pleger, and H. Schuetz, "Keeping the balance: the impact of an instructional edutainment-based video series on students' motivation and performance," *Account. Educ.*, pp. 1–37, Apr. 2025, doi: 10.1080/09639284.2025.2482690.
[34] A. Shmueli *et al.*, "Promoting oral and dental health in early childhood - knowledge, views and current practices among paediatricians in Israel," *Front. Pediatr.*, 2023, doi: 10.3389/fped.2022.956365.
[35] R. Raghu, K. Gauba, A. Goyal, A. Kapur, A. Gupta, and S. K. Singh, "Oral Health-related Quality of Life of Children with Early Childhood Caries before and after Receiving Complete Oral Rehabilitation under General Anesthesia," *Int. J. Clin. Pediatr. Dent.*, 2022, doi: 10.5005/JP-JOURNALS-10005-2086.
[36] A. Saripudin and H. Beni, "Building the Future of Early Childhood: Optimizing Basic Services through the Holistic Integrative Early Childhood Development Model," *Indones. J. Early Child. Educ. Res.*, vol. 4, no. 1, p. 142, May 2025, doi: 10.31958/ijecer.v4i1.14983.
[37] R. S. Naidu, J. H. Nunn, B. Pahel, and R. Niederman, "Editorial: Promoting Oral Health in Early Childhood: The Role of the Family, Community and Health System in Developing Strategies for Prevention and Management of ECC," 2021. doi: 10.3389/fpubh.2021.716695.
[38] B. Tahani, I. Asgari, S. Golkar, A. Ghorani, N. Hasan Zadeh Tehrani, and F. Arezoo Moghadam, "Effectiveness of an integrated model of oral health-promoting schools in improving children's knowledge and the KAP of their parents, Iran," *BMC Oral Health*, vol. 22, no. 1, p. 599, Dec. 2022, doi: 10.1186/s12903-022-02644-x.
[39] J. Chen *et al.*, "Oral Health Policies to Tackle the Burden of Early Childhood Caries: A Review of 14 Countries/Regions," *Front. Oral Heal.*, 2021, doi: 10.3389/froh.2021.670154.
[40] J. Fisher *et al.*, "Achieving Oral Health for All through Public Health Approaches, Interprofessional, and Transdisciplinary Education," *NAM Perspect.*, vol. 2, no. 13, Feb. 2023, doi: 10.31478/202302b.
[41] A. George *et al.*, "Long-term effectiveness of the midwifery initiated oral health-dental service program on maternal oral health knowledge, preventative dental behaviours and the oral health status of children in Australia," *Acta Odontol. Scand.*, vol. 81, no. 2, pp. 164–175, Feb. 2023, doi: 10.1080/00016357.2022.2108896.
[42] G. Öztürk and H. Gümüş, "Evaluation of oral health-related quality of life following dental rehabilitation under general anesthesia in Turkish children with early childhood caries," *Int. J. Paediatr. Dent.*, 2024, doi: 10.1111/ipd.13096.
[43] L. Andrew, R. Wallace, N. Wickens, and J. Patel, "Early childhood caries, primary caregiver oral health knowledge and behaviours and associated sociological factors in Australia: a systematic scoping review," *BMC Oral Health*, 2021, doi: 10.1186/s12903-021-01887-4.
[44] M. S. Alotaibi, "Game-based learning in early childhood education: a systematic review and meta-analysis," *Front. Psychol.*, vol. 15, Apr. 2024, doi: 10.3389/fpsyg.2024.1307881.
[45] R. Shakeel *et al.*, "Association of maternal oral health with early childhood caries among rural areas of Punjab," *Pakistan J. Med. Heal. Sci.*, 2021, doi: 10.53350/pjmhs211571578.
[46] K. Taoufik, K. Divaris, K. Kavvadia, H. Koletsi-Kounari, and A. Polychronopoulou, "Development and Validation of the Greek version of the Early Childhood Oral Health Impact Scale (ECOHIS),"

Open Dent. J., 2020, doi: 10.2174/1874210602014010088.
[47] N. Sabel, L. O. Ylander, S. E. Ståhlberg, and A. Robertson, "Dental caries and oral health-related quality of life in Preschoolers – introducing the Swedish version of the early childhood oral health impact scale (ECOHIS)," *Acta Odontol. Scand.*, 2024, doi: 10.1080/00016357.2023.2287235.

Authors



Loso Judijanto is a senior researcher affiliated with IPOSS Jakarta, Indonesia. His research interests encompass public policy, economics, human capital development, management, finance, statistics, corporate governance, and sustainability. His academic activities involve examining interdisciplinary issues related to organizational performance, economic development, and sustainable management practices. Through his research, he seeks to contribute to evidence-based policymaking, institutional improvement, and the advancement of knowledge across various fields of social and economic sciences. (email: losojudijantobumn@gmail.com).



Herlina is a lecturer at State University of Makassar, Indonesia. Her academic interests focus on early childhood education, children's learning processes, cognitive development, and online learning in kindergarten settings. Her scholarly activities explore educational approaches and learning environments that support children's developmental needs. She is particularly interested in understanding how instructional strategies, digital learning resources, and appropriate educational practices can enhance learning experiences and promote holistic development during early childhood. (email: herlina@unm.ac.id).



Evania Yafie is a lecturer specializing in Early Childhood Education at State University of Malang, Indonesia. Her research interests include early childhood education, instructional media development, educational technology, and cognitive development in young children. Her academic work explores the integration of innovative learning resources and technology-supported instructional approaches into early childhood education. She is interested in developing effective, engaging, and developmentally appropriate learning experiences that support children's cognitive growth and educational development. (email: evania.yafie.fip@um.ac.id).



Diana Setyaningsih is a lecturer in Early Childhood Education at Cenderawasih University, Indonesia. Her areas of expertise encompass educational games, physical and motor development, affective development, moral and religious education, language development, and early childhood mathematics. Her academic interests emphasize developmentally appropriate learning approaches that integrate play, creativity, and meaningful educational experiences. She is particularly interested in supporting children's holistic development through innovative instructional strategies and engaging early childhood learning activities. (email: diananing24@gmail.com).



Nur Iffah is a lecturer at PGRI University of Jombang, Indonesia. Her academic responsibilities encompass teaching, research, and community service within higher education. She is actively involved in academic activities that support knowledge development, educational practices, and community engagement. Her professional interests include strengthening educational quality, facilitating meaningful learning experiences, and contributing to institutional academic development. Through her academic role, she supports the integration of teaching, scholarly inquiry, and community-oriented educational initiatives. (email: nur91iffah@gmail.com).