

The Development of Teaching Literacy and Numeracy Materials Based on the Problem and Project for 5–6 Year Olds Children

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Abstract. The purpose of this training is to increase the knowledge and skills of teachers in developing problem- and project-based literacy and numerical teaching materials for children aged 5-6 years. This is significant to be implemented, because through the independent curriculum children are directed to have and master literacy and numeracy skills, in addition to having religious values and character and identity. Meanwhile, so far learning is more directed at low-level learning outcomes and tends to be linear and routine. Children tend to only follow the directions and examples of the teacher and get a partial learning experience. The methods used include material deepening activities, workshops, peer and expert reviews, field trials, finalizing games and uploading good learning practices on social media. The results of the training show that the level of participation, activity and ability to develop problem-based and project-based teaching materials is very high. In addition, almost all participants are interested and challenged by this program, so it needs to be followed up with intensive assistance. Another impact of these activities are that children become more active, creative and productive in playing, and on very high literacy and numeracy mastery.

Keywords: Teaching Materials · Literacy · Numerical · Children Aged 5–6 Years

1 Introduction

Early childhood education (PAUD) has a very strategic role in preparing the nation's generation. This is because it serves as a vehicle to explore and develop various potentials possessed by children so that they can develop optimally (Huliyah, 2016). In addition, PAUD also functions to assist the development process of children in accordance with their world, namely playing (Sasi et al. 2019). As the foundation for the development of children's character, early childhood education must always innovate based on the analysis of children's needs, and the noble values of religion and nation. This is intended so that children do not leave their identity as citizens of the nation and continue to anticipate the contemporary civilization that is developing in the current digital era.

However, recently there have been distortions and misconceptions about the nature and function of PAUD, namely its main function is the inculcation of character values and identity through playing into school activities that emphasize reading, writing, and arithmetic as befits elementary school children. This is because there are demands from parents who want their children to immediately be able to read, write and count in order to pass the entrance exam to their favorite elementary school (Sasi et al. 2019) (Narwan 2018). Although there are regulations regarding calistung (reading, writing, and counting), it is not a requirement to enter elementary school, but in practice many elementary school educational institutions require it. If the function of PAUD is to teach calistung, besides being "coerced" on the child's development, it causes the child to be affected by a 'Mental Hectic' (rebellious spirit) and inhibits the development of the right brain and indirectly kills the child's creativity (Narwan 2018).

In facing the challenges of the 21st century and the era of society 5.0, it is necessary to reorient the nature and learning strategies that lead to learning outcomes at the level of higher-order thinking skills so that children master 21st-century competencies which include critical thinking skills and problem-solving, creative and innovative, collaborative and able to build networking and communication skills (Sutama, Astuti, Anisa, 2019). Likewise, in the context of curriculum innovation and learning for early childhood, it is necessary to emphasize the development of the Pancasila student profile as a manifestation of character education which is the basis for preparing a generation that has high well-being and can become citizens and citizens of the world who have good character, able to think critically, creatively and innovatively, collaboratively, and communicatively.

The main strategy of learning in PAUD is learning through playing (learning by playing) (Sriwahyuni, Asvio, and Nofialdi 2017). This is because playing in early child-hood is learning itself, so learning through play activities is an essential activity to achieve development (DAPODIK.co.id 2022). Children learn to explore and explore the environment with the aim of recognizing the world around them. Play strategies that can support the achievement of these goals are through open-ended play (Shirley 2021) (Sutama, Gonadi, Anisa, 2019). While in the 2022 prototype curriculum it is emphasized that learning in PAUD is a play-learning activity based on children's reading books that aim to strengthen early literacy through activities that build children's reading interest (DAPODIK.co.id 2022).

One of the important competencies in this digital era is literacy and numeracy. This is because children are inseparable from the world in which they live digital technology has permeated all aspects of life. McLachlan and Arrow suggested that early literacy skills include complex socio-psycho-linguistic aspects and affect social and contextual aspects which are an integral part of child development (Mardliyah, Siahaan, 2020). In this digital era, children need to master basic literacy and numeracy so that they can interact with things related to reading and writing culture and the use of basic mathematics. Thus, literacy skills for children are not only able to read and write, more than how children can master and use language in a broad social context.

Mastery and literacy skills of children have a very crucial role in the context of the social environment and the subsequent growth and development of children. This is because it can help children understand other people and the surrounding environment; improve children's creativity and ability to think logically; improve children's intelligence in academic, emotional, and spiritual fields; Train children's basic skills such as reading, writing, and arithmetic; children's interest in literacy (Novrani and Purwestri, Annisa 2021). In addition, literacy skills also include the ability to process words and form sentences, these abilities help children develop their social-emotional competencies such as using longer sentences in communicating (Masfufah 2021). Thus, it can be concluded that literacy mastery and skills are very beneficial for children's growth and development. Children can build their knowledge, attitudes, and skills through literacy.

Where can children learn literacy and numeracy? In everyday life, children are faced with a culture of reading and writing. For example, in everyday life, children operate various equipment which contains a lot of literacy and numeracy content. For example, through a remote control that is operated every day, children can find various kinds of letters and numbers, colors, words, and so on. Children will accidentally find various symbols and their functions so that they unwittingly become acquainted with content in the form of number symbols as well as letters and words, brands of things, and so on. Through the packaging of food and beverages, the same thing is also found. Along the road passed by the children, there are also many pictures accompanied by letters and number symbols. Usually, children recognize it through pictures and prominent image elements and then continue with the letters and numbers that are around them in everyday life. Teachers and parents can gradually introduce literacy and numeracy to children functionally.

The concept of literacy in children is a very dynamic continuous process, starting from the emergence of curiosity, critical thinking skills, and spoken language, to the ability to read and write. This ability follows the times to be used in the learning process throughout his life (Novrani and Purwestri, Annisa 2021). The concept of literacy also refers to everything related to listening, listening, speaking/telling, reading, writing, and representing it (Masfufah 2021) (Basyiroh 2017). From this analysis, it can be concluded that literacy is complex and related to reading and writing culture. If children are accustomed to daily reading and writing culture, their understanding of literacy will grow, because it is useful and meaningful as well as functional.

Literacy and numeracy abilities aim to form a generation that is able to think critically in responding to any information obtained (Syahrul 2021). This can be seen from the child's ability to distinguish, ask, compare, and communicate what they encounter on a daily basis. Children can understand various concepts through language symbols. Children also interact using language. So, contextually, children are in a culture of reading and writing in their physical and social environment.

Instilling literacy can make children who are smart to read and write, as well as smart in academics, intelligence, emotions, and spirituality. In addition, children become more creative and can think logically and critically, and are able to solve the problems they face on a daily basis (Yusuf, C, 2021). Therefore, familiarizing children with a cultured life of reading and writing can make it easier for children to interact with their environment. Considering the process of forming schemata (cognitive assimilation process) through the sensing process, everything in the environment "talks" and "purposes". The more children interact with a cultured environment of literacy, the more skilled the child will be in dealing with new things and/or solving problems (accommodation process). If viewed from the literacy competence based on the independent curriculum, there is a lot of literacy content intended for early childhood, namely. Recognize and understand various information, communicate feelings and thoughts orally, in writing, or use various media and build conversations; and build interest, passion, and participation in pre-reading and pre-writing activities. The scope of literacy development for early childhood includes (1) adequate language proficiency; (2) love of books; and (3) sufficient experience in exploring (PAUD Jateng 2022).

In everyday life, early childhood is in a numeracy culture. Number symbols, arithmetic operations, and the use of basic mathematics are part of everyday life. For example, the packaging of food or drinks purchased by children or family members must contain elements of numbers, and wall clocks that are seen by children every day also contain numbers. Not to mention the business of buying and selling, calculating the amount of something, and comparing the contents of something also involves the element of numeration. Various objects in the child's environment contain numeric elements such as car plate numbers, calendars, money values, and lots of other furniture that contains numeric content. Children's mastery of numeracy is part of the pre-mathematical concept that can be used in solving the problems they face. In addition, numeracy also includes algebraic thinking, geometry, measurement, data analysis, and opportunity knowledge, skills, behaviors, and tendencies that a person needs to be able to use mathematics in various situations. Early numeration also refers to the basics of mathematical reasoning acquired at an early age (Novrani, Purwestri, Annisa, 2021). It was further stated that to develop literacy skills, teachers need to do the following. (1) Creating a positive atmosphere (comfortable and fun) when children do numeracy activities. (2) Provide a numeracy-rich and child-friendly learning environment. (3) Designing the development of contextual and meaningful numeracy activities. (4) Facilitating child-centered numeracy activities. (5) Encourage children to use creative ways and work together in solving problems. (6) Conduct an assessment of children's learning outcomes. (7) Cooperate with parents in developing children's numeracy skills. Other things that can also be done in introducing literacy to children are: (1) reading aloud and talking a lot; (2) providing various symbols or letters and number symbols around the house and school; (3) designing literacy activities such as singing, marching, arts and crafts, physical movement and; tasting activities; (4) rejoice with sound; coloring, drawing, writing and rereading it (Husnaini, 2018).

Teachers and parents are models for children in literacy and numeracy. Teachers and parents become role models in a culture of good literacy and numeracy so that children can identify themselves with them. For example, all the time, teachers and parents read, play puzzles, do calculations, and become good speakers as well as loyal listeners. The environment must be rich with nuances of literacy and numeracy. For example, in every corner of the house/school, there is a reading corner, a mini library, and even a digital library so that children are always surrounded by a culture of reading, writing, and arithmetic. Each play material should contain literacy and numeracy. Parents and teachers can create situations and learning objects that contain literacy and numeracy. Or when children are invited to shop, children are accustomed to seeing prices, brands, contents, and the like, so they are unwittingly accustomed to a cultured environment of reading, writing, literacy, and numerals.

Playing is an important part of children's daily lives. The games designed by teachers and parents are colored by the introduction of literacy and numeracy culture. Like when playing on the beach, children are invited to play in the sand and make paintings, letters, and numbers. Or in circuit games, at each stage children are provided with problems related to the use of literacy and numeracy.

In this context, children are invited to play based on problems, for example, completing letters, making words from combinations of vowels and consonants, playing crosswords, and the like. In games like "engklek", there are many numerical things that are used. Such as the concept of distance, size, frequency, number, and marking for example marking with the letter (X), a check mark, or putting labels on the game.

The problem that occurs is that teachers do not understand and are skilled in developing literacy and numeracy teaching materials based on problems and projects. Based on the analysis of the learning plans/designs, most of them still lead to low-level learning outcomes, and the strengthening of literacy and numeracy in learning is still limited to early literacy skills and simple and partial expressive language. Therefore, actions are needed that can equip teachers in developing problem- and project-based literacy and numeracy teaching materials.

2 Methods

The strategic targets of this training are ITGKI administrators and kindergarten teachers in the Jabung sub-district. The number of participants is 40 people. The steps of activities carried out in training teachers in developing literacy and numeracy teaching materials are as follows. (1) Conduct a needs analysis to determine where the teacher is experiencing significant problems. (2) Designing the training design. (3) Carry out training consisting of deepening of material, workshops on the development of teaching materials, reviews of experts and peers on the design of teaching materials, field trials, reviews and revisions of the design of teaching materials, and finalization of teaching materials as well as publications. (4) Evaluation of the implementation of the training to measure the learning outcomes of the participants, including the responses and the results/products of the teaching materials produced by them.

The training targets are kindergarten teachers in Jabung sub-district, Malang district, East Java, with a strategic target of 40 people. Participants consisted of elements of ITGKI management and kindergarten teachers in Jabung District.

3 Results and Discussion

Based on the results of the evaluation of the training implementation, the following data were obtained. (1) During the training the level of activeness and attendance of participants is 95%. Some did not attend in full because it coincided with the accreditation preparation period at their respective institutions. (2) Judging from the motivation of participants in participating in this activity, 13.2% were due to assignments by their superiors; 15.8% because of the invitation of friends, and 71.1% on their own initiative. This means that the participants' interest is very high to take part in the training activities.

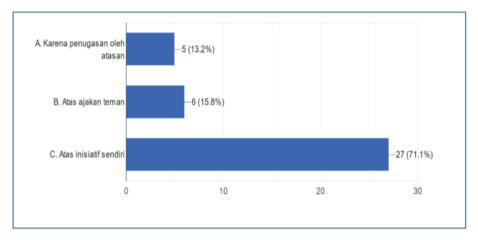


Fig. 1. The Motivation of Training Participants

In addition, participants considered that the existence of this activity was appropriate (44.7%) and 55.3% stated that it was very in line with the need of developing and improving the quality of daily learning, especially with the implementation of an independent curriculum. If it is associated with the demands of the development of digital technology, literacy is currently also developing so that the type of literacy develops in the direction, of digital literacy, media literacy, library literacy, and visual literacy (Suryawati and Akkas 2021). This is what causes the participants to think that this training activity is very urgent to be followed (Fig. 2).

Associated with the relevance of the material presented to the development needs of students, 36.8% said it was relevant and 63.2% said it was very relevant. It can be concluded that the level of relevance of training materials and children's development needs is very high because if a child is introduced to numeracy literacy from the start, it will be easy for him to understand the context of more complex and complicated numeracy literacy later (Rahmadeni 2022) (Fig. 3).

Regarding the material being studied, 97.4% stated that this training material is very helpful in developing innovative learning in the classroom. The development of problem-based and project-based literacy and numeracy skills is very relevant because it has a positive effect on creativity and makes students not feel bored and motivated to learn (Fajri and Wahyuni, 2016). In addition, it can also improve the achievement of student learning outcomes better than conventional learning models (NWY Amanda, I W. Subagia 2014) (Sara Lev, Amanda Clark 2020) (Fig. 4).

Participants stated that this training material was appropriate (39.5%) and very suitable (60.5%) to be used to realize the competencies as stated in the Pancasila student profile. This is because the materials and models used can support the child's ability to have faith, fear God Almighty, have noble character; global diversity; independent; worked together; critical reasoning; and be creative (Susilawati, Saifuddin 2021) (Irawati, Iqbal, Hasanah, 2022) (Fig. 5).

Viewed from the level of relevance of this training material in developing 21stcentury competencies in children, 52.6% said it was high and 47.4% said it was very

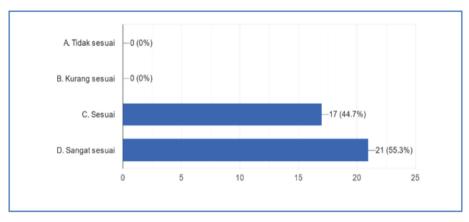


Fig. 2. The relevance of training activities and improving the quality of learning

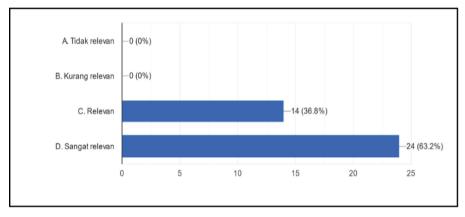


Fig. 3. Relevance of the material to children's development

high. The application of the introduction of problem- and project-based literacy and numeracy can trigger critical, creative and innovative, collaborative, and communicative thinking skills (Meilan Arsanti et al. 2021) (Sutama, et al., 2021), because even though it departs from the exploration of the same problem, Children's analysis of the problems and solutions carried out varies according to the level of the child's imagination and intelligence (Alanna 2021) (Semlin 2021) (Fig. 5).

This is supported by the response from the training participants who stated that 47.4% of the participants stated that it had a high level of relevance and 52.6% was very high. Judging from the strategy implemented in this training, 52.6% said it was appropriate and 47.4% said it was very appropriate, because of the atmosphere created during the training, 84.2% said that the atmosphere was fun and 18.4% said it was very challenging at the same time. In real class trials, the atmosphere in the class became very dynamic (23.7%), children showed a high level of learning achievement (44.7%) and children's creativity and productivity was very high (81.6%) (Fig. 6).

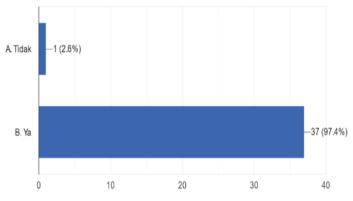


Fig. 4. The suitability of the material and learning innovation

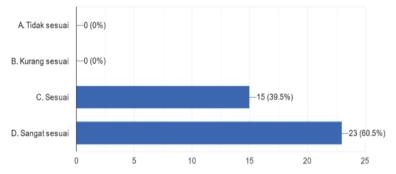


Fig. 5. Appropriateness of the material and the formation of student profiles



Fig. 6. The atmosphere of children playing collaboratively



Fig. 7. Examples of children's artifacts from collaborative projects

From the two illustrations it appears that although children start from the same problem because each group has different creativity and imagination, the results are different (Fig. 7).

Judging from the teacher's ability to design literacy and numeracy teaching materials based on problem-based learning and projects, the following data were obtained. The ability of teachers to develop literacy and numeracy teaching materials is high. Teaching materials made by teachers lead to literacy and numeracy content that is classified as high, activity design leads to problems and projects and leads to high-level development achievements (HOTS).

Exploration of literacy and numeracy content is carried out through open and collaborative play activities. Of the five aspects of the assessment, the average achievement is very high. Based on the opinions of the participants above, this achievement occurred because the participants had high attention and motivation, were very challenging, and had high relevance in developing learning according to the independent curriculum and the achievement of the Pancasila student profile.

In the concept of free play, children have the freedom to imagine and be creative using play materials and tools. In addition, a process of identity formation and child welfare is needed, in addition to the formation of other characteristics such as faith and piety to God Almighty and noble character/noble character, and mastering the basics of literacy and numeracy (Irawati, Iqbal, Hasanah, 2022) (Susilawati, Sarifuddin, 2021).

4 Conclusion

The conclusions obtained from this training are as follows. 1) Participants are very active in participating in this training because the content and strategies applied have very high relevance in learning and the demands of an independent curriculum, which requires high-order thinking skills in children. 2) The ability of teachers to develop literacy and

numeracy teaching materials is classified as very high in the five aspects measured which include literacy and numeracy content, open-ended play, based on the chapter and project model, and the achievement of higher-order thinking skills. 3) The impact of real learning in the classroom, namely the classroom atmosphere becomes more dynamic, children become more creative and productive, and effective collaboration and communication occur. Recommendations from participants, that most of them requested that this activity be followed up with more intensive assistance with a wider reach. This is necessary in order to welcome the implementation of an independent curriculum because the content and process of this training is truly a breakthrough in innovating 21st-century learning.

References

- Alanna: "https://Playlearnthrive.Com/Open-Ended-Play-Its-Value-And-Characteristics/." Bluchic. Privacy Policy. Diambil (https://Playlearnthrive.Com/Open-Ended-Play-Its-Value-And-Characteristics/) (2021).
- Amanda, Subagia, dan Tika: "Pengaruh Model Pembelajaran Berbasis Proyek Terhadap Hasil Belajar Ipa Ditinjau Dari Self Efficacy Siswa." *E-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi IPA* 4 (2014).
- Arsanti, Zulaeha, Subiyantoro, dan Haryati S.: "Tuntutan Kompetensi 4C Abad 21 dalam Pendidikan Di Perguruan Tinggi untuk Menghadapi Era Society 5.0." Hal. 391–324 In *Prosiding Seminar Nasional Pascasarjana*. Semarang: Universitas Negeri Semarang (2021).
- Basyiroh, Iis: "Program Pengembangan Kemampuan Literasi Anak Usia Dini." *Tunas Siliwangi* : Jurnal Program Studi Pendidikan Guru Paud Stkip Siliwangi Bandung 3(2) (2017)
- C, Yusuf: "Literasi untuk Anak Usia Dini Dan Contoh Programnya." *Edumaster*. Diambil (https:// Edumasterprivat.Com/Literasi-Untuk-Anak-Usia-Dini-Dan-Programnya/) (2021).
- DAPODIK.Co.Id: "Struktur Kurikulum Prototype 2022 (Kurikulum Prototype 2022)." *Dapodik.Co.Id.* Diambil (https://Www.Dapodik.Co.Id/2022/01/Struktur-Kurikulum-Protot ype-2022.Html) (2022).
- Fajri, Nurul, dan Wahyuni: "Pengaruh Model Pembelajaran Berbasis Proyek Terhadap Kemampuan Berpikir Kreatif SISWA." Jurnal Biologi Dan Pembelajaran Biologi 1 (2016).
- Huliyah, Muhiyatul: "Hakikat Pendidikan Anak Usia Dini." *As-Sibyan: Jurnal Pendidikan Anak Usia Dini* 1(1):60–71 (2016).
- Husnaini, Nani: "Identifikasi Pola Pengenalan Literasi Pada Anak Usia Dini Di Kota Mataram." *Jurnal Pendidikan Anak* 7(1) (2018).
- Irawati, Iqbal, Hasanah, Arifin: "Profil Pelajar Pancasila sebagai Upaya Mewujudkan Karakter Bangsa." *Jurnal Pendidikan* 6(1) (2022).
- Lev, Clark, Starkey: Implementing Project Based Learning In Early Childhood. New York: Routledge (2020).
- Mardliyah, Siahaan, Budirahayu. "Pengembangan Literasi Dini Melalui Kerjasama Keluarga Dan Sekolah Di Taman Anak Sanggar Anak Alam Yogyakarta." *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini* 4(2) (2020).
- Masfufah, Ulfa: "Bahasa & Perkembangan Literasi Pada Anak Usia Dini: Sebuah Studi Literatur." *Alzam-Jurnal Pendidikan Islam Anak Usia Dini* 1(1) (2021).
- Narwan: "Bahaya, Memaksa Anak Usia Dini Kuasai Calistung." *Siedoo*. Diambil (https://Siedoo. Com/Berita-4260-Bahaya-Memaksa-Anak-Usia-Dini-Kuasai-Calistung/) (2018).
- Novrani, Caturwulandari, dPurwestri, Annisa: *Pengembangan Literasi Untuk Anak Usia 5-6 Tahun*. Pertama. Diedit Oleh L. Koesomawardhani Dan W. R. Mareta Wahyuni. Jakarta: Unicep Dan Kementerian Pendidikan, Kebudayaan, Riset Dan Teknologi (2021).

- PAUD Jateng: "Literasi dan STEAM PAUD Kurikulum Merdeka." PAUD Jateng. Diambil 17 Oktober 2022 (https://Www.Paud.Id/Literasi-Dan-Steam-Paud-Kurikulum-Merdeka/) (2022).
- Rahmadeni, Fevi. "Urgensi Pengenalan Konsep Literasi Numerasi Pada Anak Usia Dini." *Arithmetic: Academic Journal Of Math* 04(01) (2022).
- Sasi, Nawang, Syafrudin: "Meningkatkan Pemahaman Orangtua dan Guru tentang Hakikat Pendidikan Anak Usia Dini melalui Kegiatan Seminar Pendidikan." PAUD Lectura: Jurnal Pendidikan Anak Usia Dini 3(1):30–34 (2019).
- Semlin, Brian: "Open-Ended Play: What It Is and How It Benefits Your Child." Strictly Briks. Diambil 8 Desember 2021 (https://Strictlybriks.Com/Blog/Open-Ended-Play-What-It-Is-And-How-It-Benefits-Your-Child/) (2018).
- Shirley: "Why Open-Ended Play Is Important." Savory Theme on Genesis Framework. Diambil 11 Juli 2021 (https://Theshirleyjourney.Com/Category/For-The-Home/) (2021).
- Sriwahyuni, Eci, Asvio, dan Nofialdi. 2017. "Metode Pembelajaran Yang Digunakan Paud (Pendidikan Anak Usia Dini) Permata Bunda." *Thufula: Jurnal Inovasi Pendidikan Guru Raudhatul Athfal* 4(1):44 (2021).
- Suryawati, Aditya, dan Akkas: Buku Panduan Capaian Pembelajaran Elemen Dasar-Dasar Literasi Dan STEAM. Jakarta: Pusat Kurikulum Dan Perbukuan Badan Penelitian Dan Pengembangan Dan Perbukuan Kementerian Pendidikan, Kebudayaan, Riset, Dan Teknologi (2021).
- Susilawati, Sarifuddin, Muslim: "Internalisasi Nilai Pancasila Dalam Pembelajaran Melalui Penerapan Profil Pelajar Pancasila Berbantuan Platform Merdeka Mengajar." *Jurnal TEKNODIK* 25(2) (2021).
- Sutama, Astuti, Anisa, Farah B. dan Gracia: Peningkatan Higer Order Thinking Skills Melalui Penerapan Open Ended Play Pada Anak Kelompok B TK Dharma Wanita Persatuan 1 Karangsoko, Trenggalek. Malang (2019).
- Sutama, Dkk.: Open Ended Play Dan Kompetensi Abad 21 Dalam Perspektif Pendidikan Anak Usia Dini. 1 Ed. Malang: Inara Publisher (2021).
- Sutama, Gonadi, Anisa: "Developing Learning Models To Increase Higher Order Thinking Skills In Early Childhood." IJICC 5(5):563–78 (2019).
- Syahrul, Ninawati. N.D.: "Model Pembelajaran Literasi Untuk Anak Usia Dini Alternatif Pembelajaran Pada Masa Pandemi Covid-19." In *Konferensi Linguistik Tahunan Atma Jaya 19* (2021).

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