



ECE Teachers' Roles of Developing Numeracy Literacy in Special Needs Children

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ABSTRACT: Special needs ECE children should be prepared with early literacy and numeracy skills to strengthen their competencies during the transitional phase to primary school. To help this transitional phase, teachers can provide a variety of diverse play activities. This study aims to explore and evaluate the pedagogical strategies employed by teachers in reinforcing special needs children's literacy and numeracy, as a support to their transition process from ECE to primary year. The research applied a qualitative method with data collection techniques through interviews, observations, and documentation. The sample selection applied purposive sampling based on the criteria and objectives of this study. The sample consisted of inclusive classroom teachers from ten ECE institutions in five regions of Central Java, including Semarang City, Pekalongan City, Surakarta City, Wonosobo District, and Jepara District. The study concludes that ECE teachers still see several limitations in dealing with special needs children. Therefore, teachers should modify plans and play activities to strengthen literacy and numeracy skills for special needs children to help them embark on primary school. Teachers expect necessary support for their improvement through training and guidance in dealing with special needs children, especially in developing their literacy and numeracy.

Keywords: literacy and numeracy, special needs children, ECE-primary school transition

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1 INTRODUCTION

The government is currently promoting preliteracy and prenumeracy development programs in ECE units, considering that early childhood education serves as the basis for the stimulation of all development aspects in children, including literacy and numeracy skills (Nurhayani & Nurhafizah, 2022). Teachers can also provide many opportunities and support to offer them meaningful literacy experiences. Children can access a meaningful literacy experience by interacting with their peers, teachers, and the surrounding environment in a pleasant atmosphere (Sari, 2017; Suryawati & Akkas, 2021). A strong literacy experience will provide a foundation for their reading and writing skills, in addition to stimulating their problem-solving skills in daily life and the other necessary skills for the upper levels of education (Purab & Purwono, 2022).

Teachers who handle special needs children in inclusive classrooms should acquire special strategies to support their learning (Winarsih et al., 2013). Special needs children may face various obstacles, and thus require a special service to help them achieve optimal development. Special needs learners are learners with various characteristics of different needs, both physical and mental, including acceptance, special attention, appropriate services, and support for their environment (Davenport, 2012). The variety of special needs children in each institution demands teachers to have relevant skills to plan and design interesting activities for children, including special needs children. It is important to note that developing preliteracy and prenumeracy skills does not mean intensely exposing children to learning how to read, how to write, and how to count like adults (Justice et al., 2018). Such learning methods may stress them out and jeopardize their development. Teachers are expected to avoid similar mistakes in serving special needs children, so the reinforcement of their preliteracy and prenumeracy skills can be properly managed.

Information literacy among teachers will have a positive impact on learning (Fatmawati & Safitri, 2020; Haerudin, 2021; Ningsih et al., 2022). Teachers can have proper knowledge and skills in managing learning, especially for inclusive classrooms. Teachers should optimally implement their information literacy in various settings to create the same opportunity for special needs children to develop their potential despite some obstacles and limitations (Alberta, 2019). Kiyment (2010) mentioned, "*Teachers need to improve knowledge of management and instructional skills to enhance improvement and exploration of their teaching practice*" (Jurmang, 2014). It is fundamental to support efforts in improving teachers' ability in learning management through their information literacy skills (Kurnianingsih et al., 2017; Sanches, 2018). Considering the diverse classroom conditions and children's different characteristics, teachers are encouraged to nurture their learning management ability.

ECE teachers who teach inclusive classrooms are required to design play activities that lead children to basic literacy and numeracy skills. Regarding this notion, one of the challenges for ECE educators is providing early literacy and numeracy activities for

children in a way that reflects their developmental stage and needs. Only a few teachers with sufficient competencies can serve special needs children during their learning activities. Special needs children have limitations that require special attention to nurture their preliteracy and prenumeracy skills, as they prepare to solve daily life problems. However, teachers sometimes could not modify the activities for their learning experiences.

Studies on inclusive education that cover the mapping, model development, and implementation of inclusive teaching models for ECE institutions have been started since 2017 (Diana et al., 2020a; Diana et al., 2020b). This research follows the national research priority scale in the socio-humanities of cultural arts and education to explore and provide an overview of the information literacy skills among ECE educators, especially inclusive classroom teachers, who design preliteracy and prenumeracy development for special needs children. This study aims to explore information related to teachers' roles in facilitating preliteracy and prenumeracy development activities for special needs children in five regions in Central Java. The findings of this study will encourage further research in improving teachers' competencies and developing models for good practice, especially in inclusive classrooms.

2 THEORETICAL STUDY

2.1 *Literacy and Numeracy Skills*

Literacy and numeracy have broader and richer scopes compared to reading, writing, and counting in almost all coverage of life (Comunity Child Care Victoria, 2011), as cited below:

“Literacy is the ability, confidence, and willingness to use language in all its forms. Literacy includes not only speaking, listening, seeing, reading, and writing, but also music, movement, dance, storytelling, and visual arts that combine various forms. Meanwhile, numeracy is the ability to count and solve problems in everyday life” (*Department of Education and Early Childhood Development, 2009*).

Early childhood marks the informal numeracy stage, so children should be able to count sequentially and recognize the properties of an object. Relevant activities at this stage consist of counting or identifying the number of objects. Children need the ability to understand, write, and read information related to numerical symbols (Indah, 2023). Providing literacy experiences in early childhood is essential. These experiences can motivate children to learn reading and writing. Early literacy refers to the first stage for children to practice writing before learning formal reading and writing education (Shvartsman & Shaul, 2023). These literacy skills, including awareness of alphabets and phonology, verbal language, and writing, develop the foundation of literacy tests used in this study (Barham et al., 2019).

Numeracy is the ability to recognize and apply mathematical concepts in all areas of life. Numeracy skills include understanding numbers, counting, solving numerical problems, measuring, estimating, sequencing, noticing patterns, adding, and subtracting numbers, and so on. The Core Numerical Skills Model divides skills into four categories, including the understanding of symbolic/non-symbolic numbers, mathematical relationships, numeracy skills, and basic numeracy skills. Symbolic and non-symbolic skills are the processes that estimate the size of a symbol (Shvartsman & Shaul, 2023). Mathematic skills at the informal numeracy stage do not much involve algorithms or symbols yet focus more on associating numerical words with quantities and understanding the relationship between different quantities. Core numerical skills focus on four main factors, comprising (1) understanding symbolic and non-symbolic numbers, (2) understanding mathematical relationships (early logical-mathematical principles, arithmetic principles, mathematical operational symbols, place value system, and base ten); (3) counting skills (knowledge of numerical symbols, word order, counting the concrete objects); and (4) basic arithmetic skills (arithmetic combination skills, addition, and subtraction with numerical symbols) (Aunio & Räsänen, 2016).

2.2 ECE to Primary School Transition

The transition from ECE to primary school is a complex phenomenon. A smooth transition to primary school helps children feel safe, relaxed, and comfortable in their new environment (Stein et al., 2019). The concept of “school readiness” has different meanings and interpretations in the context of early childhood education practice. The concept of “school readiness” has different meanings and interpretations in ECE practice. A nativist view of readiness in common believes that children are ready to start school when they reach maturity, proven by the ability to sit quietly, focus on work, interact with peers in socially acceptable ways, and comply with the directions and rules given by teachers and coaches (Kokkalia et al., 2019). Researchers note that developmental status does not determine readiness because the skills and abilities for school success may substantially differ from one school to another or even from one classroom to another within a school (Brooks-Gunn & Markman, 2005).

Many children might experience difficulty during the school transitional phase at an early age, in which children with Autism Spectrum Disorder (ASD) often have greater challenges during this phase (Fontil et al., 2019). Previous research informs that transition to secondary school among adolescents with disabilities affects their academic outcomes (Mazzotti et al., 2021). These results, coupled with other influencing factors (e.g. poverty, culture, marginalization), suggest that many youths with disabilities do not access the necessary transition-related instructions and supports they need to achieve post-academic success (Trainor et al., 2020), in addition to the importance of collaboration between parents, children, and support staff during the transition to school in facilitating a successful start to school (Fontil et al., 2020).

3 METHOD

This study applied a descriptive qualitative model with a sample consisting of 20 teachers from ten inclusive ECE institutions located in five regions in Central Java. The qualitative data was derived from interviews, observations, and documentation studies from both primary and secondary data sources. Interviews and observations were set using relevant guidelines regarding classroom management, teaching strategies, and monitoring and evaluation of literacy and numeracy skill development activities for special needs children. Teachers who taught in inclusive classrooms were categorized as primary data sources.

Teachers should well understand the essence of literacy and numeracy, as a foundation to determine the first strategy related to their skills or competencies. The current measurement of literacy and numeracy skills still refers to the results of assessments during the primary and secondary education levels. The following graphs illustrate the results of national assessments and education reports for literacy and numeracy achievements between primary, junior high, and senior high school levels in Central Java (BBPMP, 2022).

3.1 Respondent Demographic

The illustrations reflect that children in the primary and high school levels have shown literacy and numeracy skills in the “proficient” category, implying that they have surpassed the minimum level of proficiency. There are other problems, including why literacy and numeracy skills are not prepared starting from the previous level (ECE) and whether children can receive literacy and numeracy skill development in ECE due to the prevailing teaching activities of reading, writing, and counting for children. This research embarked on the objectives to explore and evaluate pedagogical strategies performed by teachers in reinforcing special needs children to improve their literacy and numeracy skills and support their transition process from ECE to primary year. The respondents in this first-year study were teachers with the following details of demographic data.

3.1.1 Kindergarten Teachers as Respondents Characteristics by Age

The following data present the characteristics of teacher respondents based on their age range. Most respondents were kindergarten teachers aged 41-50 years and the least number of respondents included teachers aged 51-60 years. The data reflects that most respondents were in a productive age range for self-development (see Table 1).

Table 1. Teacher Respondents by Age

Age (Years)	Frequency
21-30	3
31-40	8
41-50	7
51-60	2
Total	20

3.1.2 Characteristics Based on Teaching Experience

The following data presents the characteristics of teacher respondents based on their teaching experience. The respondents in each group shared a common distribution based on the duration of their teaching experience. The records of teaching experience can strengthen the learning process for children. Brandenburg et al. (2016) revealed a direct linear relationship between years of teaching experience and teaching quality. This suggestion should be interpreted by considering other factors that may affect teaching quality in classroom settings (Table 2).

Table 2. Teacher Respondents Based on Teaching Experience

Time (Years)	Frequency
1-10	7
11-20	7
21-30	6
Total	20

3.1.3 Characteristics Based on Educational Backgrounds

Most teachers held an Undergraduate degree in the ECE program, sharing a total of ten respondents. Two teachers graduated from the psychology program, while the other eight teachers were from other disciplines. Teachers' educational backgrounds contribute to the quality and ability to educate students. Teacher's education affects self-competence, performance, and creativity in learning (Rehalat & Nurul 'ainy, 2022; Yin et al., 2013). What about ECE teachers? Does the educational background affect their quality and ability to educate children, especially special needs children? Concerning this issue, qualified and competent ECE teachers are required to improve ECE learning management (Manning et al., 2017). The requirements of ECE educators follow the provisions set by the government. There are at least two requirements that ECE teachers should fulfill, including competence and academic qualifications (Imtiyas & Simatupang, 2022). With adequate backgrounds and experiences in ECE, teachers adapt to recognize and understand the characteristics and needs of each child. Figure 1 show graph displays the characteristics of teacher respondents based on their educational backgrounds.

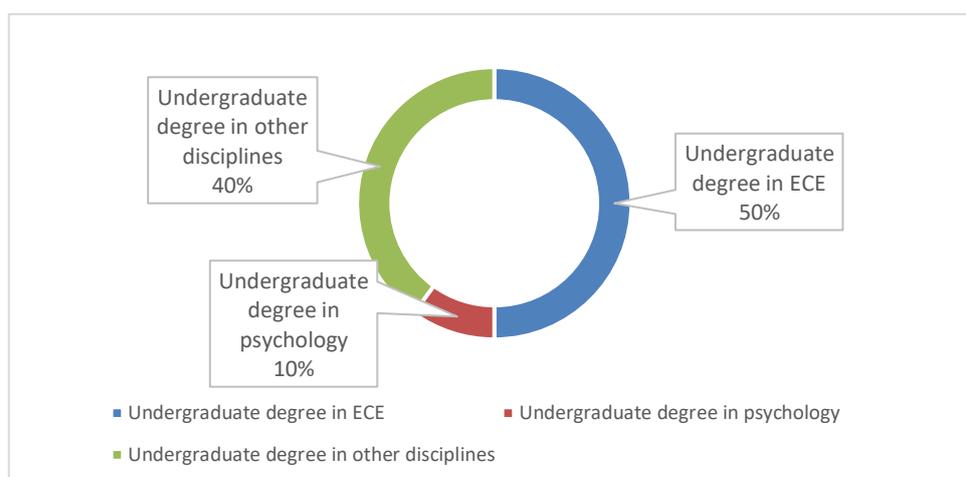


Figure 1. Respondents Based on Educational Backgrounds

3.1.4 Characteristics Based on Experience with Special Needs Children

Demographic data presents the involvement of teacher respondents in handling special needs children. The data depicts the characteristics of teacher respondents' experiences in handling special needs children (see Figure 2).

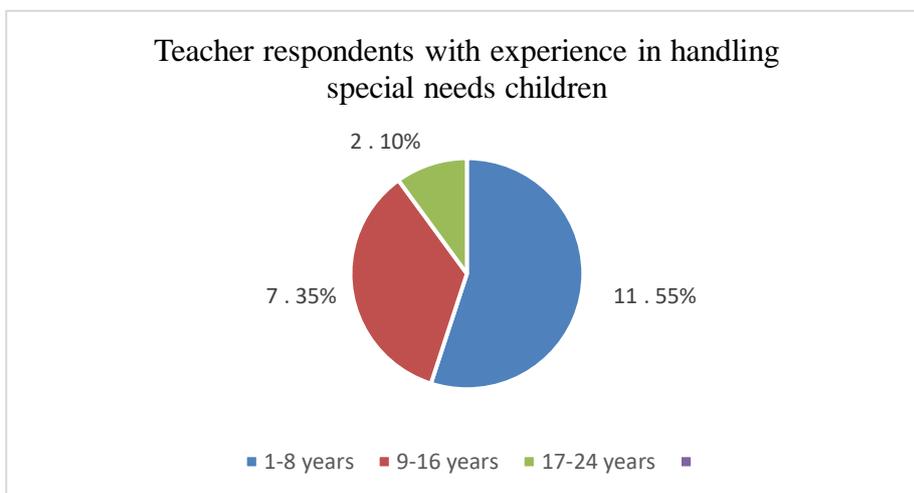


Figure 2. Teacher Respondents with Experience in Handling Special Needs Children

4 RESULT AND DISCUSSION

4.1 Results

Most respondents had experience in teaching special needs children for 1-8 years, reaching 55% or 11 teachers. Seven teachers (35%) were experienced in handling special needs children for 9-16 years and two teachers (10%) were experienced for 17-24 years. Teaching experience in handling special needs children will affect the teacher's knowledge and skills in teaching special needs children (Park et al., 2018). When children start primary school, teachers are expected to strengthen their literacy and numeracy skills, including for special needs children. Teachers can also provide many opportunities and support for children to have meaningful literacy experiences. Children obtain meaningful literacy experiences through their interaction with other children, teachers, and the surrounding environment in a pleasant atmosphere (Sari, 2017; Suryawati & Akkas, 2021). A strong literacy experience will reinforce their reading and writing skills, problem-solving skills for daily life, and other skills needed for the upper levels of education (Purab & Purwono, 2022). Therefore, it is fundamental that teachers should understand literacy and numeracy in early childhood.

Research related to children's transition from kindergarten to primary school started in the 1980s in Shanghai, with an overview of how children were prepared for primary school (Zhao, 2017). The results showed that early childhood teachers understood the urgency of literacy and numeracy skills for preparing children's transition from kindergarten to primary school. Literacy is understood as the ability to process and understand information. The introduction of language to children can be initiated through storytelling methods and reading pictures or books. Meanwhile, numeracy is perceived as an ability to analyze numbers, symbols, and concepts. This idea is confirmed by the

results of interviews conducted with Teacher DV, Teacher WN, and Teacher MF who taught in inclusive classes.

“Literacy aims to introduce children to speaking language, such as recognizing words, reading fairy tales, and telling stories.” (Informant DV)

“Numeracy is a material or learning related to calculation, numbers, and symbols.” (Informant WN)

“Early childhood literacy competencies mark the children’s abilities to think and communicate. It also signs the ability to read and write or understand simple symbols, such as colors.” (Informant MF)

Teachers understand that early childhood literacy and numeracy competencies reflect the children’s abilities to communicate and understand information by reading, writing, listening, and speaking. As part of their abilities, children can read symbols and understand the numerical concept. These competencies are in the Content Standards on Child Development Achievement Levels (STTPA) published by the Ministry of Education and Culture. However, literacy and numeracy competencies for special needs children are adjusted to their abilities. For example, children who cannot pronounce words correctly should be directed to reinforce pronunciation ability. Meanwhile, children who cannot count numbers should be trained to recognize and count 1-10. This is emphasized by DV:

“Literacy and numeracy skills for regular children are adjusted to the levels of their abilities and age development. Meanwhile, special needs children have the adjustment limited to their abilities.” (Informant DV)

Based on the results of interviews with teachers, literacy and numeracy competencies of regular children and special needs children show a gap in the levels of achievement. Therefore, an adjustment of learning activities is needed based on the children’s initial abilities and later abilities following the improvement. Narayana Rao (1987) suggests the following systematics for effective teaching and learning, including (1) a meticulous teaching plan that considers the students' thinking capacity, learning objectives, levels of experiences, and education, (2) the length of the lesson, (3) the use of audio-visual aids for slow learners to enable them to grasp concrete ideas rather than abstract ideas, (4) teachers' awareness to the friendly approach that allows remedial teaching, (5) focus on the development of social skills and social confidence among slow learners as well as emphasis on the effective use of art, music, and drama, (6) preparation of the most important aspects for teaching conduct, repetition, and review, and (7) optimization of human resources to assist slow learners (Mumpuniarti, 2017).

Every school imposes different policies regarding literacy and numeracy learning. Schools may conduct relevant learning activities for this scope on a daily basis, on certain days during special hours, or only during free play activities. The planning process starts with identifying children’s needs and creating a learning plan that includes,

“Identifying children’s special literacy and numeracy skills and planning activities based on their abilities.” (Informant MF)

Literacy and numeracy learning activities for special needs children are performed in different ways by respective schools, such as using flashcards, story books and blocks, occupational therapy, and provision of a private space for stimulation. In general, special needs children share some activities in common with regular children. However, they have an adjustment to the level of difficulty based on their initial abilities.

“Special needs children share activities in common with regular children. However, we adjust their learning based on their needs. For example, autistic children are encouraged to use relevant media that attract their interests instead of forcing them to tell stories, considering the hindrance that they face in expressing their intentions through speaking.” (Informant SP)

The Daily Learning Implementation Plan (RPPH) for special needs children and regular children is different in every school. Not all schools have a specific Individual Daily Learning Implementation Plan (RPPHI)/Individual Education Program. However, learning activities are adjusted to the levels of children's learning achievements and adapted to their abilities. Schools consult their lesson plans with the coordinator of inclusive education and class teacher, while the lesson plans are designed by the homeroom teacher.

“So far, we utilize the same lesson plans with some adjustments to the levels of difficulties based on the abilities of special needs children.” (Informant JF)

Special needs children utilize the same learning media used by regular children for the introduction to literacy and numeracy with an adjustment to each different activity. For example, regular children use a ball to learn addition, while special needs children use a little ball to learn counting.

“Children are divided into their respective groups, yet they still use the same media. We also provide the learning media made of the same safe materials to allow special needs children to have the same opportunity as normal children do.” (Informant TH)

Teachers’ constraints in implementing learning activities for special needs children include limited learning time, unconditioned classes due to the lack of a teaching workforce, insufficient facilities and infrastructure, and children’s moods that change quickly. Special needs children have their personal needs. Schools should ensure their ability to communicate with others, play with others, develop their skills, and recognize the concept of numbers and letters. Lifeskill development for special needs children includes changing their clothes, buttoning their clothes, bathing, wearing properties for performing prayer, toilet training, washing their hands, and eating by themselves. Teachers attract the attention of special needs children, as part of their early strategy in the teaching and learning process. Later, they can provide interesting Educational Game Tools (APE).

“We offer something interesting to the special needs children to attract their attention and trigger their willingness to learn literacy or numeracy. It is important

to ensure that the children show their interest in the first place, for example, through making beadwork, reading stories, or arranging blocks and colors.” (Informant LM)

The results of the literacy and numeracy learning process in special needs children showed an improvement, as shown in children who started to recognize letters and count 1-10. Some children gradually could follow what the teachers said. Every school implements different methods for reporting children's development, such as quarter reports, semester reports, monthly reports, and daily reports. Reports can consist of descriptions, documentation of children's activities, and children's work. Report submission may vary. Several institutions do not segregate regular children and special needs children, while others offer special daily reports for special needs children. The report card submission system utilizes direct meetings and online platforms, such as WhatsApp.

Teachers optimize the provision of literacy and numeracy skills for special needs children. However, several ECE teachers are unable to provide literacy and numeracy skills for special needs children due to the lack of abilities in terms of educators and infrastructure. Meanwhile, teachers with adequate conditions can offer learning with the adjustment to the children's abilities as an assistance for their improvement.

“Everything depends on the shortcomings and abilities of every child. It depends on the types and levels of the group. Some children are not yet proficient in literacy and numeracy, especially those with severe disabilities. Children with mild and moderate disabilities are quite familiar with simple literacy and numeracy.” (Informant DV)

They also require activity references to handle special needs children and improve their literacy and numeracy skills. Teachers still see insufficient in-depth knowledge about handling special needs children in inclusive classrooms. The provision of necessary information and motivation can encourage ECE teachers to develop environmental literacy teaching and learning in early childhood classes (Titi & Siti, 2022). Rachmat et al. (2017) revealed that the encouragement given to teachers will influence their understanding of implementing inclusive education.

4.2 Discussion

Literacy and numeracy skills are interrelated abilities. Early literacy skills for special needs children are fostered through various activities, such as telling stories using objects in their surrounding areas (toys, cutlery, stationery, favorite foods), as a method to train their early reading skills by understanding the meaning of words. Numeracy in early childhood is considered a basic problem-solving ability through the application of mathematics in everyday life. In addition to counting skills, children also foster their understanding of patterns (algebra), geometry (shape, location, and position), measurement, and data analysis. Numeracy consists of knowledge, skills, behaviors, and tendencies (dispositions) that an individual needs to solve problems using a formulation of mathematics in various situations (BSKAP, 2022). The development of early literacy

and numeracy skills serves as an initial foundation for children's readiness at the next level (Keily et al., 2019). The misconceptions that still occur today are the impacts of the inaccurate provision of early literacy and numeracy concepts by early childhood institutions due to the demands of parents and school institutions at the primary school level.

Literacy and numeracy skills for special needs children are a concern for educators, considering that most special needs children have different benchmarks of literacy and numeracy skills compared to the development of children in general (Wackerle-Hollman et al., 2020). Special needs children in early childhood education should be equipped with an adequate foundation of literacy and numeracy skills (Khasanah & Purnamasari, 2023). Children can obtain meaningful literacy experiences through interactions between peers, teachers, parents, and the surrounding environment. Information and skills developed through meaningful literacy experiences will help children solve problems and think critically. Teachers play an important role in providing meaningful literacy experiences for children. Cooperation between teachers and parents is fundamental for the development of children's literacy skills. Many parents expect their children to have good literacy and numeracy skills when starting primary school, so they also supply home-based learning for their children (Elliott et al., 2021; Salminen et al., 2021).

Teaching special needs children is a challenge, considering the uniqueness of every child in the classroom. This situation requires teaching practitioners who emphasize specialized integration of various pedagogical knowledge and skills. Teachers are also encouraged to promote positive attitudes and characteristics in designing activities that develop literacy and numeracy for special needs children (Mumpuniarti, 2017). Teachers can design learning programs that encourage early literacy and numeracy skills based on children's achievements during their development (Atlar & Uzuner, 2023). Not all teachers who assist special needs children have adequate knowledge in teaching basic literacy skills. Most teachers find challenges in designing appropriate learning programs and media to help special needs children. Strategies for teaching basic literacy and numeracy skills should be implemented through adaptive learning programs for special needs children. Learning also requires some supporting facilities that enable children to access manipulative activities during the introduction and comprehension of basic skills, including the recognition of sounds, alphabets, and numbers.

Special needs children learn through the power of their five senses to recognize a variety of things, from which their learning materials should contain literacy and numeracy concepts to train their basic abilities for the next level (Kurniastuti et al., 2023). The use of media can introduce children to basic literacy and numeracy, especially for special needs children who need the intervention of concrete media (Setiawan, 2018). Teachers should provide special needs children with opportunities to express their opinions, emotions, and ideas based on their respective characteristics. To overcome hindrances in numeracy literacy skills, teachers in inclusive schools can facilitate learning with the insertion of concrete and real problems that children may face in their daily lives.

Teachers start with a read-aloud activity and allow children to have their playing-learning time, which is reinforced by the development of basic literacy skills using some relevant learning media (Agustina & Zayyadi, 2023).

The implementation of appropriate methods, media, and learning strategies based on the children's specificities should be performed and publicized, considering the significant point of this information to help teachers in accommodating the learning needs of special needs children, especially in regular schools that admit special needs children. The results of this study confirm that teachers in inclusive schools, especially at the ECE level, still lack the experience to design specialized/individualized programs for special needs children in their classrooms. Teachers should receive education or training on assisting special needs children, so they can work together with other collaborators in properly accommodating learning activities, as a strategy to foster children's initial abilities during their transition process from ECE to primary education level.

5 CONCLUSION

Special needs children have different abilities, including in their preliteracy and prenumeracy skills. ECE teachers in inclusive schools perform the same learning activities for special needs children as they give to regular children. However, they modify these activities based on the achievements that the children are expected to demonstrate based on their needs. Teachers still see some shortcomings related to their skills in providing education for special needs children, especially in developing children's preliteracy and prenumeracy skills. Teachers expect necessary training, references for learning activities, and guidance to improve their abilities in providing stimulation for special needs children to optimize inclusive education.

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