



Numeracy Introduction Strategies For Children Age 3-4 Years

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ABSTRACT

Amid the low average literacy levels among students in Indonesia, it becomes essential to introduce various numeracy strategies from an early age. This study aims to understand the different numeracy introduction strategies for children aged 3-4 years at Kelompok Bermain Islam (KBI) Riyadlotut Thalabah, an Islamic Playgroup focused on developing independence, interest, and capabilities of early childhood. The research employs a case study approach with observations conducted over at least three months, involving 15 children in group B1 as subjects. Data collection techniques include participant observation, interviews with parents, and documentation. Triangulation is conducted by comparing observation results with interviews or vice versa. This study concludes that teachers at KBI Riyadlotut Thalabah have introduced various innovative strategies that effectively stimulate and develop the basic numeracy interest and skills of early childhood children. The variety of numeracy activities and games, along with the intensity and closeness built by educators with the students, are significant factors in the success of introducing numeracy to young children. Additionally, the abilities and improvisation of teachers, as well as the strategy of having double teachers, contribute to achieving optimal numeracy introduction goals. However, this study has limitations, as it did not observe differences in numeracy introduction strategies when applied to different biological genders of students, between boys and girls. Therefore, it cannot be determined whether the impact is the same or different. The study also recommends the proactive role of parents in accompanying the introduction of numeracy to early childhood for more optimal results.

INTRODUCTION

Early childhood is a crucial period for a person's growth and development. This stage is often referred to as *the golden age*, a critical phase in human development because, during this time, brain development and intelligence are at their peak. At this stage, a child's intellectual development is said to reach 80% (Hewi & Shaleh, 2020). Therefore, it is essential to introduce key skills that will serve as a foundation for future development, including numeracy (Rahmadeni, 2022). *The Programme for International Student Assessment* (PISA), for example, uses three main skills to measure a student's literacy in various countries: reading literacy, mathematical literacy, and scientific literacy. Numeracy is the foundation of mathematical literacy.

Numerous studies on numeracy literacy in early childhood have been conducted by researchers. Wahyuni conducted a study analyzing the numeracy skills of early childhood based on their learning styles. The findings of this study indicated that children's numeracy skills can vary depending on their learning styles. Wahyuni distinguished between three learning styles (auditory, visual, and kinesthetic) and their impact on numeracy literacy skills (Wahyuni, 2022). Roostin conducted a study analyzing the number concept skills of children aged 3-4 years using a specific medium, *Montessori Number Rods*. The findings suggested that the use of this medium could enhance children's numerical skills, making them feel like they are playing rather than learning (Roostin, 2021). Meanwhile, Christianti, in her study, emphasized the importance of literacy games in supporting early childhood literacy development. Enjoyable and varied literacy games can support children's literacy development (Christianti, 2021). Rahmah et al., in their study, concluded that introducing numeracy to children aged 4-5 years could use various engaging and non-boring media and methods (Rachmah et al., 2024). Najnuddin et al. investigated the application of STEAM-based learning (*Science, Technology, Engineering, Art, and Mathematics*) at TK Azzahra NU Magelang to enhance early childhood literacy in reading, writing, and arithmetic (Setiani & Listyowati, 2023).

Lestari et al., in their study, concluded that parents play a crucial role in fostering interest and enhancing early childhood numeracy literacy. The development of children's numeracy literacy skills is a family responsibility, where both parents play a vital role as the child's first and foremost teachers (S. Lestari, Gustami, Devi, & Gumelar, 2023). Herlina et al., in their survey in Magelang, Central Java, found that despite having high self-confidence, early childhood education teachers generally have low levels of mathematical competence (Sulistyaningtyas, 2023). This presents a significant challenge for numeracy learning in early childhood.

Based on the studies, there remains a gap in the research on numeracy learning strategies for early childhood, especially at ages 3-4 years, highlighting the urgency of this research. This study aims to examine numeracy introduction strategies for early childhood at the early childhood education institution, Kelompok Bermain Islam Riyadlotut Thalabah. This research is expected to serve as a reference source and enrich numeracy learning strategies for early childhood. This is crucial given the low average literacy levels of Indonesian students. According to the 2022 *Programme for International Student Assessment* (PISA) survey, Indonesia ranked 62nd out of 70 countries (Kementrian Pendidikan dan Kebudayaan, 2023). This survey covers three basic skills required by students: reading literacy, mathematical literacy, and scientific literacy (PISA Result 2022, 2022). Therefore, introducing numeracy, which is an integral part of mathematical literacy, needs to be emphasized from an early age (Hera & Sari, n.d.: 715).

METHODS

The object of this research is the Islamic Playgroup (KBI) Riyadlotut Thalabah or KBI Riyadl, located in Sidorejo village, Sedan district, Rembang regency. The subjects of this research are 15 students from group B1, aged 3-4 years. This study employs a qualitative method with a case study approach. A case study is defined as scientific research conducted intensively, in detail, and in-depth about a phenomenon, event, activity, or program at the individual group, institution, or organization level to gain deep knowledge about the event (Rahardjo, 2017: 3).

Data collection techniques in this research include participant observation, where the researcher (first author) is not only an observer but also an educator at KBI Riyadlotut Thalabah. Thus, the researcher is actively involved in the learning process, enabling them to observe and understand the numerical literacy development of the students. Data is collected through interviews, primarily with the parents or guardians of the students, as well as the class teachers, to understand each student's numerical literacy development. Another technique used is documentation. Triangulation is conducted by comparing the results of interviews with observations and vice versa. Data analysis is carried out in three stages: *data reduction*, *data display*, and *conclusion drawing*. Data obtained from observations and interviews are sorted according to research needs, displayed, and analyzed according to categories, and then conclusions are drawn.

RESULT

This brief overview of Islamic Playgroup Riyadlotut Thalabah aims to highlight the institution's dedication to the fostering learner autonomy and creating a conducive environment for preschoolers to holistically develop their fundamental skills, including numeracy. Islamic Playgroup Riyadlotut Thalabah, commonly known as KBI Riyadl, is an early childhood education institution catering to children aged 2-4 years. It is situated under the auspices of the Riyadlotut Thalabah Foundation in the village of Sidorejo, Sedan District, Rembang Regency, Central Java, Indonesia. KB Islam Riyadlotut Thalabah stands as the first PAUD (Early Childhood Education) institution in Sedan District, adopting a unique conceptual framework and curriculum that distinguishes it from other PAUD institutions in the surrounding areas. This playgroup emphasizes the cultivation of essential character traits in young learners, with a particular focus on fostering independence and self-confidence. Consequently, from the very first day of school, parents are not permitted to accompany their children beyond the school gate and may only pick up the students once the school day has concluded.

According to the management, this policy aims to instill a sense of self-reliance in children from the outset. Learners are also accustomed to eating and drinking independently from the first day, according to a predetermined schedule. Meals are provided by the school. In addition to introducing age-appropriate learning activities for children aged 2-4 years, KBI Riyadl also cultivates a culture of independent task completion during healthy snack and lunch breaks. KBI Riyadl also implements a *double* teacher strategy for each class,

comprising a homeroom teacher and an assistant teacher. This strategy is designed to maximize learning outcomes, including numeracy introduction.

Besides an array of engaging educational toys, safe and air-conditioned classrooms, KBI Riyadl also provides a dedicated *nap* facility for learners, ensuring they return home refreshed and energized. Additionally, learners are granted the freedom to play with the provided toys at any time during school hours. Play facilities are deliberately provided to encourage exploration, which is crucial for their development (Yuliantina et al., 2023) and to prevent boredom and foster engagement with various learning models, including numeracy instruction (Rachmah et al., 2024). Schedule of Activities at KBI Riyadl

Table 1. Schedule of Activities at KBI Riyadl

No	Time	Activity
1	07.00-07.30	Welcoming children
2	07.30-08.00	Morning journal
3	08.00-08.30	<i>Sorogan</i> of the book <i>Ar-Riyadl</i>
4	08.30-09.00	Praying together
5	09.00-09.30	<i>Nice morning</i>
6	09.30-10.00	Healthy snack
7	10.00-11.00	Main activity
8	11.00-12.00	Healthy lunch
9	12.00-13.00	Resting and taking a nap
10	13.00-13.30	Closing prayer
11	13.30-13.45	Picking up the students

Numeracy introduction strategies at KBI Riyadl are implemented during the Core Activity Hours, from 10:00 AM to approximately 11:00 AM. The specific strategies employed to introduce numeracy concepts to 3-4-year-old children in Group B1 of KB Riyadl Islamic can be outlined as follows.

1.1 Object Counting

Before introducing formal number recognition, it is crucial to engage students in counting activities. Besides traditional classroom-based counting exercises for numbers 1-10, KB I teacher Riyadl also incorporates various objects in the classroom environment to make counting activities more engaging and enjoyable for students. Common objects utilized include fruits, seeds, small pebbles, dried leaves, large buttons, plastic balls, and colorful bottle caps that have been prepared by the teacher. These materials are provided by the school or the teacher.

The first learning process is placing objects on a table and introducing students to count them aloud and repeating the process several times. This activity emphasizes auditory learning, focusing on the sense of hearing. The learning process begins with the identification of objects used as teaching aids, conducted jointly by the teacher and students. Identification involves introducing the type or name of the object, its shape, and its color. The teacher initiates an interactive dialogue with the students. The following dialogue illustrates how the process of numeracy introduction takes place at KBI Riyadl.

The teacher, "What is this, guys?"

The students, "A ball"

The teacher, "Let's guess the colours, what are the colours?"

The students, "Yellow! Red! Green!"

The teacher, "Let's count them together. One, two, three, four, five, six, seven, eight, nine, ten".

Students are guided to count the number of objects brought by the teacher collectively using the classical method. For initial sessions on introducing numerical identification and the process of counting objects, the activity is typically repeated multiple times, ranging from 3 to 5 repetitions. Subsequently, the students are asked one by one to repeat the counting of the objects. In subsequent weekly sessions, object counting activities are usually conducted using different objects, such as common classroom items like chairs, crayons, oranges, or sometimes, learners are taken outside the classroom to count the number of shoes on a rack.

In addition to building self-confidence, by coming forward one by one, learners become more focused on recognizing numbers by seeing and then storing them in their memory. Moreover, the teacher at KBI Riyadl can also provide more effective guidance and direction during their learning process.

Daily observations of early student indicate that active involvement in counting activities fosters increased enthusiasm for counting objects in their surroundings. This enthusiasm extends beyond the classroom setting, as some children continue counting at home. For instance, during playtime, Danial, a young learner, spontaneously counts objects, saying, "One, two, three, four, five, six, seven, eight, nine, ten..." This demonstrates his ability to recognize numbers up to ten, albeit through memorization.

The interviews with parents corroborate these observations, highlighting the increased interest among early learners in counting objects at home. During an interview on May 2, 2024, Mam Herlina, the parent of Faeyza, remarked, "My daughter has become more interested in counting various objects around the house. She counts everything, from sandals and shoes to scattered toys and other household items, even though the order of her counting is sometimes reversed."



Figure 1. The students at KBI Riyadl acquire counting skills through both auditory and visual model.

1.2 Introducing the shape of number with *flash* card or number card

The next strategy is to introduce them to the shapes of numbers. This strategy is implemented by KBI Riyadl teachers after students have begun to grasp counting objects from one to ten. For this introduction, *flash cards* or number cards are used as the tool. *Flash cards* are made by the teacher themselves from colorful paper on which the numbers are written using black markers. In one meeting, usually two to three number shapes are taught, depending on the speed at which the learners respond to what is being taught.

Two methods are employed in teaching numbers using flash cards. The first method involves simultaneous instruction using loud voices. The teacher first provides an example by displaying a single flashcard, pronouncing the number aloud, and prompting the students to follow suit. After several repetitions, typically five to six, the second method involves students approaching the front of the class one at a time to identify or name the number displayed on *the flash card*.

The observations conducted with group B1 at the KBI Riyadl demonstrate that this teaching strategy is effective and can make children enthusiastic and more focused during the process of learning to recognize numbers. The teacher further reinforced this

strategy by creating various quizzes with prizes of stars or simply cute stickers, on the condition that the children can answer the numbers displayed. Each child who answers the question correctly will receive a prize.

Several parents extended this learning model at home by creating their own *flash cards*, which were then used as learning tools. Based on an interview with Mam Rusda, the parent of student Arsyila, on May 4, 2024, she described her child's interest in learning with *flash cards*: "At home, Arsyila asked me to make number cards like the ones they use at school. After we made them, she asked me to teach her using guessing games with the number cards." The teachers at KBI Riyadl emphasize the importance of parental involvement in monitoring and supporting children's development, particularly their numeracy skills, as a crucial strategy for fostering early childhood literacy. This effort is typically carried out through regular discussions between teachers and parents when picking up children, through WhatsApp groups, or through other meeting forums, such as when there is a student's birthday.



Figure 2. The students at KBI Riyadl come forward one by one to guess the number using *flash card* as the tool.

1.3 Number Puzzle

The next strategy, after the students have begun to understand the number forms, is for the educator to provide an activity in the form of arranging number puzzles. The strategy of using this puzzle in the Riyadh KBI is usually taught in the even semester, when the children have been able to count and recognize the number forms. This is because the game requires at least three basic skills: counting, recognizing the form of numbers, and understanding how the object is arranged according to its position or shape. This activity aims not only to have the students be able to sequence the numbers correctly, but also to train them to think logically and coherently. The puzzles are usually created using small-sized paper media with images, as well as educational props in the form of puzzle boards, which are provided by the institution.

The learning process using the picture-based paper media is as follows. The educator prepares cut-out paper media in specific shapes. The ones commonly used in Riyadh KBI are shapes of animals, fruits, vehicles, family members, and various occupations or professions, according to the theme being studied in that session. The papers are written with numbers. The learning begins with the teacher demonstrating how to arrange the puzzle according to the sequence of numbers and shapes. Then, the students are directed to try arranging and sequencing the puzzle pieces one by one. With the double teachers strategy, each student can practice assembling the puzzle more than once, and the teacher can more easily guide them to solve the problems.

The observation results show that the students are highly interested in learning using this puzzle. In fact, they often request to play and arrange the puzzles again. This is likely because the attractive images and colors are a particular draw in the puzzle game. As a form of collaboration with parents, the KBI Riyadh teachers suggest to the students' parents that they continue the learning at home by repeating what the educators taught at school.



Figure 3. The teacher at KBI Riyadh is explaining how to assemble the number puzzles using the picture-based paper media.

1.4 Matching the Geometric Shapes

As a variation in numeracy learning, the students at KBI Riyadh are also taught about the shapes of simple geometric forms. Squares, triangles, circles, and rectangles are the geometric shapes that are taught. The first thing the teachers at KBI Riyadh do is introduce the students to the geometric shapes in front of the class. After that, the next activity is for the students to come up one by one to match the geometric shapes that have been arranged randomly on the teacher's desk. The students' task is to choose the appropriate geometric shape. This activity aims to introduce simple geometric shapes, which is one aspect of early childhood numeracy learning. This activity is designed to

ensure the students don't get bored and can learn joyfully. The following is a description of the learning process based on observations

The teacher: " What is the name of this shape, children?". asks the educator while showing the geometric shape.

And the students respond with various answers, "Circle.....triangle, square....."

The teacher, " Allright, this one is called a triangle".

Next, the students are asked one by one to match the appropriate geometric shapes by placing the matching shapes in their respective positions, guided by the educator and the assistant teacher. The presence of the double educator allows the students to receive maximum assistance in matching the geometric shapes. Especially since the introduction of numeracy is a more difficult stage compared to other stages.



Figure 4. The KBI students are learning to match simple geometric shapes using colored cardboard paper as the media.

DISCUSSION

The numeracy introduction strategies employed by teachers in Group B1 of KBI Riyadlotut Thalabah, as mentioned above, have been implemented gradually and integratively. These strategies are considered integrative because they are interconnected and complement each other. They are also implemented gradually, as certain strategies, such as using puzzles, are introduced once the students have acquired specific basic skills. Introducing numeracy through counting not only familiarizes students with numbers but also begins with identifying object names and colors. Through this process, students are subconsciously introduced to new vocabulary, expanding their word bank. This strategy is crucial; according to a study by Novita et al., there is a correlation between vocabulary skills and numeracy skills in early childhood in Indonesia (Novita, Anindhita, Adhi, & Wijayanti, 2023). This implies that the more extensive a child's vocabulary, the better their numeracy

skills will be. The effectiveness of numeracy introduction strategies in early childhood classrooms, according to Wood et al., is closely related to the capacity and productivity of teachers in developing the learning process (Wood & Frid, 2005). Therefore, the improvisation and productivity of educators at KBI Riyadlotut Thalabah, who combine various strategies, media, and teaching aids, play a significant role in achieving optimal learning outcomes. Additionally, having two educators in each class further enhances the achievement of learning objectives.

The numeracy introduction strategies are also integrated with the environment and other activities at KBI Riyadlotut Thalabah. For instance, while playing in the designated play area, students often count or memorize numbers. Observations show that children frequently count "one, two, three" when starting to slide or even count up to ten while riding toy horses or cars. In her study, Christianti pointed out that a major issue in literacy development for children is the lack of variety in activities and media that support such activities. Therefore, it is essential to create and introduce various literacy games to foster literacy in early childhood (Christianti, 2021). Abdolmalaki et al. also emphasized the importance of early childhood educators actualizing learning objectives through play (Abdolmalaki, 2024). At KBI Riyadl during activities like Healthy Snacks or Healthy Meals, children can learn counting by tallying the food items they will consume.

Teachers at KBI Riyadl also strive to involve parents in continuing the numeracy introduction strategies at home. This is often done through WhatsApp groups for parents or during conversations when parents pick up their children. Several studies highlight the importance of collaboration between educators and parents in fostering early childhood numeracy literacy. Similarly, the role of parents in developing children's numeracy skills is crucial (G. D. Lestari, Widodo, & Yusuf, 2022). Husna et al. underscored that collaboration between educators and parents is vital for monitoring children's development and ensuring the success of classroom learning objectives (Husna et al., 2023).

Observations indicate that the various numeracy introduction strategies at KBI Riyadl have positively impacted students' ability to memorize counts, perform counting, and even read simple numbers. On average, students can memorize counts up to the teens, count up to ten, and some can read numbers up to ten. For example, a student named Inas Tsurroyya can memorize counts up to 50, count up to the twenties, and read numbers up to the teens. This exceeds the basic numeracy skills expected for her age. Interviews with her parent, Santi Suwarni, revealed that at home, Inas has access to various numeracy tools like flashcards and numeracy books, and her parent actively supports her numeracy development. Her mother proactively inquires about what is introduced at school and continues it at home. This case differs from the findings of Samad et al., who concluded that early childhood with non-working mothers better meets their cognitive development needs, including numeracy (Samad, & Haris, 2023). Inas's case involves a mother who works as an elementary school teacher and is also a single parent.

CONCLUSION

This research concludes that KBI Riyadl has been making efforts to introduce numeracy skills to students in Group B1 (ages 3 to 4 years) using various strategies specifically designed and tailored to the children's interests and needs. At least four strategies were employed by the teachers to introduce numeracy, namely: counting objects involving children with an emphasis on auditory and visual learning, introducing number shapes with flashcards, involving students in playing number puzzles, and matching geometric shapes. Through the productivity and improvisation of the teachers and prioritizing the principle of enjoyable learning through play, this research found that these various strategies proved effective in fostering students' interest and ability in numeracy. Additionally, the double educator strategy maximized the achievement of learning objectives. On average, Group B1 students at KBI Riyadl were able to recognize basic numeracy forms required for early childhood, such as memorizing numbers up to the teens, counting objects around them from 1 to 10, and some were able to read simple numbers from 1 to 5. However, they generally still had difficulty distinguishing basic geometric shapes. A case was found of a student who could memorize numbers up to 50, count up to around 20, and read numbers up to the teens. This certainly exceeded the basic numeracy skills expected for their age. However, after interviewing the parents, it was found that at home the child was provided with various numeracy tools such as flashcards, books containing numeracy content, and was guided by the parents in developing their numeracy skills. The mother was always proactive in asking about what was introduced at school and then continued it at home.

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