



Jarimatika Extracurricular Method in Developing Early Numeracy Skills: Implementation and Challenges in Islamic Early Childhood Education

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ABSTRACT

This research was motivated by the need to examine how the Jarimatika extracurricular activity contributes to the development of numeracy skills in children at RA Masjid Al-Azhar. The purpose of this study was to describe the implementation process, children's responses, improvements in numeracy skills, and challenges faced during the activity. The methods and techniques used were descriptive qualitative, and data were collected through observation, interviews, and documentation involving Jarimatika instructors and the principal at RA Masjid Al-Azhar. The researcher revealed that Jarimatika is a structured and concrete method that improves children's accuracy, speed, concentration, and confidence in performing counting operations. Although challenges arise regarding children's limited attention span, this is successfully overcome through various strategies such as quizzes, finger warm-ups, and interactive activities. The results of the study suggest that Jarimatika is a valuable alternative to support early numeracy and can be integrated into learning programs to create more engaging and developmentally appropriate mathematical experiences. Children's responses during the activity generally increased very positively. They appeared enthusiastic about each step, displaying happy expressions, actively answering questions, and even initiating the use of their fingers to count before instructions were given. Increased engagement was also seen in children who were initially passive but became more active after the instructor introduced the Jarimatika method with games like a quick answer contest or guessing numbers.

INTRODUCTION

Early childhood experiences a crucial developmental period, where every aspect of development, physical, emotional, social, and cognitive, balances out each other. Stimulating this development requires early methods, habits, and educational support. This is crucial so that children can learn to be responsible, proactive, and able to solve problems independently without relying on adults (Halimatussa'diah & Napitupulu, 2023).

Numeracy is a fundamental competency that needs to be developed in early childhood education (Nafaikah et al., 2019). Numeracy is the foundation for mastery of mathematics at subsequent levels and plays a role in developing logical, systematic, and structured thinking patterns (Aritonang & Elshap, 2019). Many young children still struggle to grasp the concept

of basic arithmetic operations because mathematics instruction is presented in an abstract, monotonous manner, and lacks the use of developmentally appropriate media (Himmah et al., 2021). This condition leads to low understanding, motivation, and confidence in completing arithmetic assignments in class.

At the early stages of mathematics, young children need concrete visualizations to facilitate their understanding of abstract symbols. Therefore, one effective and easy-to-use alternative is the Jaritangan method, better known as Jarimatika (Hendayanti et al., 2021).

The Jarimatika method is a simple and unique approach because it relies on motor activity and the direct involvement of children's fingers in the thinking process. This use of fingers has proven effective as a cognitive bridge that transforms initially abstract mathematical concepts into concrete and tangible mental representations for young children (Lafay et al., 2013). Through this visual and kinesthetic mechanism, children can more easily internalize number symbols without the boredom of traditional memorization methods.

Early childhood mathematics learning is delivered through an engaging, meaningful approach that involves hands-on experience (Lestari et al., 2024). The choice of learning method is a crucial factor in optimizing learning outcomes (Pertiwi & Asti, 2023). One approach widely applied in numeracy learning is Jarimatika, a counting method using fingers as a visual and kinesthetic aid (Muliana et al., 2025). Jarimatika provides a clear representation by utilizing the ten fingers as concrete props representing units and tens. This visual and kinesthetic mechanism makes it easier for children to understand the step-by-step counting process, making the transition from abstract to conceptual mathematical concepts easier to follow than traditional methods (Rahayu & Utami, 2022).

Several previous studies have shown that the Jarimatika method has significant potential in improving children's numeracy skills. Classroom action research conducted by (Munawaroh & Westhisi, 2026) demonstrated that the structured application of Jarimatika significantly improves learning outcomes and basic arithmetic skills in early childhood. Internationally, this effectiveness aligns with the concept of finger-based strategies, where finger-based activities have been shown to directly stimulate early numeracy skills in children aged 3 to 5 years (Roesch et al., 2024). The use of finger-pattern representations not only serves as a visual aid but also activates the sensorimotor areas of the child's brain, strengthening cognitive processes when solving basic arithmetic problems (Artemenko et al., 2022). However, findings differ, such as a study by (Fitriati & Mustakimah, 2024) that suggests its application is not yet fully effective in certain age groups.

Addressing these differences in effectiveness, a qualitative study by (E. Odiri, 2023) confirmed that the success of early mathematics introduction is highly dependent on the use of manipulative media and interactive approaches based on hands-on activities. These strategies are effective in helping children understand early mathematical concepts in a fun way, while simultaneously stimulating problem-solving and critical thinking skills from an early age. In the local context, the alignment of these concrete strategies is reflected in the Jarimatika method as a kinesthetic approach that has been proven to significantly improve children's basic numeracy skills through direct, contextual experiences.

On the other hand, several studies emphasize that the effectiveness of Jarimatika is determined not only by the method itself, but also by how it is implemented in the learning

process. In general, numerous studies have shown positive results on the Jarimatika method in improving early childhood numeracy skills, particularly in optimizing basic numeracy skills (Ichsan et al., 2025). International studies and mixed-methods research have even shown that using this hands-on, activity-based approach can increase children's motivation, self-confidence, and active engagement during learning (Rosita et al., 2022)

However, upon closer examination, much of the previous literature remains heavily oriented toward quantitative measurement of learning outcomes, such as classroom action research or experimental designs that focus solely on improving grades and mastery (Ichsan et al., 2025; Rini & Margorini, 2020). On the other hand, research examining implementation aspects does exist, but tends to be limited to general descriptions without delving deeply into the dynamics of the process, children's natural responses, obstacles in the field, and teachers' pedagogical strategies in managing activities contextually (Aritonang & Elshap, 2019; Herlina & Sulistyaningtyas, 2023). Furthermore, differences in findings across age groups suggest that the success of Jarimatika is also influenced by environmental factors, approaches, and student characteristics. Based on these conditions, a research gap exists in the form of a lack of comprehensive studies that integrate aspects of the process, children's responses, and specific teacher strategies within the context of extracurricular activities. The novelty and main contribution of this research lies in the efforts to integrate all aspects of children's cognitive performance and teachers' pedagogical strategies holistically, where this has never been tested in the scope of non-formal education such as the Jarimatika extracurricular.

In fact, the effectiveness and ease of the Jarimatika method can be further enhanced when combined with demonstrative learning methods and other creative media. For example, the use of Jarimatika has been shown to be effective in helping students understand the concept of arithmetic operations through simple and enjoyable steps (Salilama et al., 2022). In fact, the effectiveness of this method has been found to increase significantly when combined with creative songs, where children learning using song-based Jarimatika have significantly higher motivation compared to conventional methods (Rahayu & Utami, 2022).

Based on these needs, this study aims to describe the development of Jarimatika extracurricular activities in Class B RA Masjid Al-Azhar in the learning process, students' responses during the activities, the increase in children's numeracy skills after participating in the learning, as well as the obstacles and strategies of teachers in overcoming obstacles that arise during the implementation of the program.

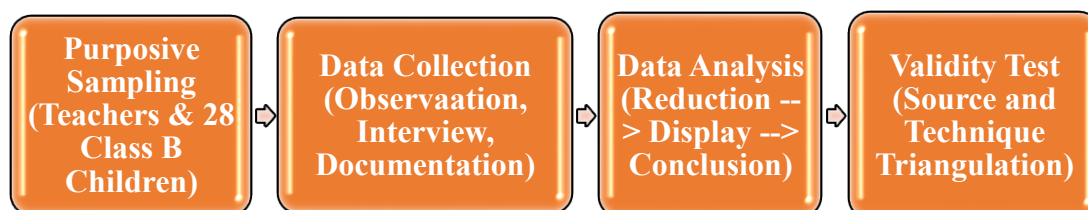
METHOD

This study uses a descriptive qualitative approach aimed at providing an in-depth description of the implementation process of the Jarimatika extracurricular activity and the development of numeracy skills in early childhood. The study was conducted at the RA Masjid Al-Azhar. The selection of informants was carried out using a purposive sampling technique with the following inclusion criteria: (1) Extracurricular teachers who have Jarimatika certification or training, (2) School principals as program managers, and (3) Class B children (aged 5-6 years) who have actively participated in Jarimatika extracurricular activities for at least one semester. Based on these criteria, the research subjects consisted of 28 class B students, 1 supervising teacher, and 1 principal.

The data collection procedure was carried out systematically through three main stages. (1) Preparation Stage: Conducting an initial interview with the principal and compiling an observation sheet instrument based on indicators of children's numeracy development. (2) Implementation Stage: Conducting passive participatory observations during extracurricular activities (once a week, duration (60-80 minutes) to assess children's arithmetic performance. (3) Evaluation Stage: Conducting semi-structured interviews with the supervising teacher after the lesson and documenting the results of the child development assessment (BB, MB, BSH).

The validity of the data in this study was maintained through source triangulation and technical triangulation techniques. Source triangulation was carried out by comparing and cross-checking data from child observations, the results of interviews with the supervising teacher, and the principal's views. Meanwhile, technical triangulation was carried out by confirming the correspondence between the data from the child development observation sheet with interview transcripts and photographic documentation evidence of field activities.

Data analysis was conducted inductively and interactively using the Miles and Huberman model, which consists of three simultaneous activity flows: (1) Data Reduction: Summarizing the results of field notes from 12 observations, sorting interview transcripts relevant to the implementation focus and obstacles of Jarimatika, and eliminating irrelevant data. (2) Data Presentation (Data Display): Presenting the data that has been reduced into a systematic descriptive narrative form and supported by a table of categories of numeracy development (Not Yet Developing (BB), Starting to Develop (MB), Developing as Expected (BSH)) to facilitate mapping of children's learning dynamics. (3) Conclusion Drawing/Verification: Reviewing the patterns formed from the data presentation, re-verifying with play-based learning theory, and formulating final conclusions regarding the impact and challenges of the Jarimatika extracurricular.



RESULT

The development of early childhood numeracy skills through the Jarimatika extracurricular activity in Class B RA Masjid Al-Azhar is measured based on five main achievement indicators, namely: (1) Counting units and tens of non-formulas; (2) Distinguishing units and tens of fingers and working on mixed problems; (3) Counting using the "little friend" formula; (4) Counting using the "big friend" formula; and (5) Counting using the "combined" formula, the distribution results of which can be seen in Table 1.

Table 1. Frequency Distribution and Percentage of Achievement of Jarimatika Assessment Indicators Before and After Implementation (n=28)

No	Jarimatika Assessment Achievement Indicators	Condition	Not Yet Developing (BB)	Starting to Develop (MB)	Developing as Expected (BSH)
1	Students are able to calculate using the non-formula unit and tens finger arithmetic method.	Before	13 (46,4%)	11 (39,3%)	4 (14,3%)
		After	1 (3,6%)	0 (0%)	27 (96,4%)
2	Students are able to differentiate between units and tens digits and work on mixed problems (units and tens digits).	Before	22 (78,6%)	6 (21,4%)	0 (0%)
		After	1 (3,6%)	0 (0%)	27 (96,4%)
3	Students are able to calculate using the Jarimatika method with the little friend formula.	Before	26 (92,9%)	1 (3,6%)	0 (0%)
		After	1 (3,6%)	0 (0%)	27 (96,4%)
4	Students are able to calculate using the large friend formula	Before	27 (96,4%)	1 (3,6%)	0 (0%)
		After	1 (3,6%)	2 (7,1%)	25 (89,3%)
5	Siswa mampu menghitung dengan Metode Jarimatika menggunakan rumus gabungan	Before	27 (96,4%)	1 (3,6%)	0 (0%)
		After	1 (3,6%)	5 (17,9%)	22 (78,5%)

Based on the data mapping in Table 1, it can be seen empirically that there is a very significant transformation in increasing the numeracy skills of class B children after intervention using the Jarimatika method. In the initial conditions (before implementation), children's initial mathematical abilities were still very low. This is evidenced by the dominance of the Not Yet Developed (BB) category in almost all achievement indicators, even reaching 96.4% to 100% in the small friend formula indicator, big friend, and combined formula. This field fact indicates that in the initial conditions, children are still at a very basic stage of numeracy exploration and experience cognitive difficulties in understanding the abstraction of number symbols.

With the ongoing implementation of the Jarimatika extracurricular activities, there has been a drastic positive shift in achievement patterns. Most children are beginning to shift toward the Developing as Expected (BSH) category. From basic to intermediate indicators (indicators 1, 2, and 3), 27 of 28 children (96.4%) successfully achieved the BSH category. Meanwhile, at the highest level of complexity, the combined formula, 22 children (78.5%) have achieved the BSH category, and 5 children (17.9%) are in the Beginning to Develop (MB) category.

Conversely, one child (3.6%) consistently remained in the Not Yet Developing (BB) category from the beginning to the end of the indicator. Based on field data tracking, the child's developmental delays were caused by environmental adaptation factors, given his status as a

new student in Class B RA Masjid Al-Azhar, requiring a longer social-emotional adjustment period than his peers.

Based on the results of field observations with extracurricular instructors, class teachers, and the principal, it was revealed that class B students experienced ease in counting since the Jarimatika extracurricular program was held. This can be seen from the responses of class B students who were very active in answering group and individual quizzes. Children were also found to be more enthusiastic during the activity because of the variety of activities in the guidebook, where after completing the counting practice mission, children were given the opportunity to color pictures. Visual documentation of the active interaction and high enthusiasm of children in this kinesthetic-based learning process is presented directly in the script in Figure 1.



Figure 1. Active Involvement and Enthusiastic Interaction of Class B Children in Completing Counting Missions Using the Jarimatika Method.

Findings from in-depth interviews with instructors also confirmed the existence of structured efforts to maintain the attention span of children who tend to be easily distracted in class. The implementation of the Jarimatika method in the field was creatively combined by teachers using affective stimulation such as "focus clapping" and continuous verbal motivation. This persuasive approach has proven effective in restoring children's concentration while simultaneously fostering high levels of self-confidence in the results of arithmetic operations they obtain independently without fear of error.

DISCUSSION

Based on the results of research in Class B RA Masjid Al-Azhar, empirically there was a significant positive escalation in children's early math abilities after intervention using the Jarimatika method. This transformation was marked by a massive shift in children's performance from being predominantly in the Not Yet Developing (BB) and Starting to Develop (MB) categories during the pre-test, shooting up to the Developing According to Expectations (BSH) category during the post-test. This success can be explained by the fundamental characteristics of the Jarimatika method which integrates concrete, visual, and kinesthetic elements simultaneously. These characteristics align with the basic needs of early childhood who require structured, meaningful, and experience-based stimulation to optimize their academic potential (Lestari et al., 2024; Pertiwi & Asti, 2023).

The use of ten fingers in Jarimatika acts as a concrete teaching aid that mechanically and visually represents the units and tens digits (Muliana et al., 2025). When children move

their fingers to operate the "little friend" formula, "big friend" formula, or "combined formula," they are building a cognitive bridge that transforms abstract mathematical symbols into tangible and easily understood mental representations (Hendayanti et al., 2021; Lafay et al., 2013). This concrete experience frees children from the cognitive burden of traditional memorization methods, which tend to trigger boredom and reduce learning motivation (Himmah et al., 2021; Nafaikah et al., 2019). The success of this transition is also proven by the increase in children's finger motor dexterity, the speed of the duration of solving arithmetic problems (from 15-20 minutes to under 15 minutes), and the growth of children's independence and self-confidence when completing independent quizzes without relying on instructors, in accordance with the essential targets of early childhood development (Halimatussa'diah & Napitupulu, 2023).

The program's implementation in the form of extracurricular activities has proven to provide a highly conducive ecological space for children's numeracy development. Observations revealed a lively and interactive classroom atmosphere, with children demonstrating high levels of affective enthusiasm. Children's interest was sparked by the instructor's strategy of integrating Jarimatika exercises into recreational-manipulative activities, such as quick answer contests, number guessing, and rewarding activities such as coloring pictures in the guidebook. This approach successfully activated children's intrinsic motivation through the principles of play-based learning, which is enjoyable (Rosita et al., 2022).

However, in-depth observations in the field also recorded the existence of natural obstacles in the form of the short attention span of early childhood children which causes them to be easily distracted by stimuli around the class. To address this dynamic, instructors implemented responsive pedagogical strategies through affective stimulation in the form of "focus clapping" techniques, rhythmic activities, and counting songs, combined with continuous verbal reinforcement. Interviews and reflections with instructors confirmed that teacher creativity in modifying delivery strategies in the field played a crucial role. The use of songs and clapping variations was not only effective as a managerial tool to restore class learning attention, but also multiplied the effectiveness of Jarimatika in fostering understanding of place value transition concepts in advanced material (Rahayu & Utami, 2022).

On the other hand, the finding that 1 child (3.6%) consistently remained in the Not Yet Developing (BB) category from beginning to end provides a valuable qualitative critical dimension. This child's developmental obstacles were purely caused by sociometric factors related to environmental adaptation as a new student who still needs time for social-emotional adjustment. This fact confirms that children's early numeracy development is not linear and absolute, but rather individual (individual differences) that are simultaneously influenced by the child's level of psychological comfort within the new learning ecosystem (Nugraha & Muntazhimah, 2024).

To test the validity of these findings, the results of the study at the Masjid Al-Azhar Kindergarten (RA Masjid Al-Azhar) were systematically contextualized with current scientific literature debates. These research findings confirm and strengthen the results of classroom action research by (Munawaroh & Westhisi, 2026) which stated that the structured application of Jarimatika significantly impacts children's basic arithmetic operational mastery. Globally, the success of finger manipulation tactics at the Masjid Al-Azhar Kindergarten supports the

concept of finger-based strategies in massively stimulating early numeracy skills in children aged 3 to 5 years (Roesch et al., 2024). The use of adaptive finger formations in this study has been theoretically proven to activate the sensorimotor areas of the child's brain, thereby strengthening cognitive retention when solving arithmetic problems involving units-tens transitions (Artemenko et al., 2022).

However, the positive findings in this research raise an interesting antithesis to a previous qualitative study (Fitriati & Mustakimah, 2024) that concluded that the Jarimatika method was less effective in improving early childhood numeracy skills in certain age groups. This striking difference in results occurs due to the differentiating variable in the learning management aspect. The study (Fitriati & Mustakimah, 2024) tended to highlight Jarimatika in a rigid formal classroom setting, while the research at RA Masjid Al-Azhar placed Jarimatika within a flexible, interactive extracurricular framework, combined with dynamic multi-activity manipulative media. This aligns with the thesis (E. Odiri, 2023) that the effectiveness of early mathematics introduction depends entirely on the flexibility of a hands-on, interactive approach.

Furthermore, the findings of this study successfully fill a research gap left by the majority of previous researchers. Until now, the literature on Jarimatika has been dominated by purely quantitative or experimental approaches that are too oriented towards numerical results alone (Ichsan et al., 2025; Rini & Margorini, 2020). Previous research designs neglected to describe the in-depth process, children's natural psychological responses, real-life classroom management challenges, and teacher tactics in maintaining classroom conduciveness (Aritonang & Elshap, 2019; Herlina & Sulistyaningtyas, 2023). Through a holistic, descriptive qualitative approach, the study at the RA Masjid Al-Azhar successfully presented balanced data on children's numeracy cognitive performance and the managerial dynamics of instructors in the field.

Theoretically, this research makes an important contribution to cognitive development theory, particularly in expanding Jean Piaget's perspective on the pre-operational stage in early childhood. These findings demonstrate that although children aged 5-6 years have not yet theoretically reached the concrete operational stage, using the body (fingers) as a biological manipulative medium can eliminate the barrier of mathematical abstraction. Fingers act as an external cognitive subsystem that accelerates the internalization of number schemes in the child's brain.

Practically, this research provides a blueprint for early childhood education institutions regarding the importance of implementing non-formal (extracurricular) numeracy programs that do not burden children mentally. The results imply that the successful implementation of learning methods is not solely determined by the method's internal excellence but is multidimensionally influenced by the teacher's creativity in creating psychological comfort in the classroom, the use of songs and games, and patience in addressing the unique pace of each child's individual development.

This descriptive qualitative study acknowledged several contextual limitations that warrant attention. First, data collection focused on a single RA institution with a limited number of subjects (28 children), so the findings cannot be absolutely generalized to other PAUD institutions with different cultural and geographic characteristics. Second, the observation instrument based on formal developmental categories (BB, MB, BSH) has

limitations in capturing the micro-nuances of children's daily developmental fluctuations in detail. Third, this study did not analyze in depth external factors to the child, such as background numeracy stimulation in the family environment and parental parenting styles, which could potentially influence the speed of a child's adaptation to Jarimatika (Ichsan et al., 2025).

Based on these limitations, concrete recommendations for further research are that future researchers should expand the scope of research using mixed methods by involving a larger sample size from various PAUD institutions across regions. Furthermore, future research is suggested to integrate parental involvement variables through cognitive home-composting programs or synchronized Jarimatika exercises at home to test the resilience of long-term numeracy understanding in children. For practitioners at the RA Masjid Al-Azhar, it is recommended to continue maintaining this extracurricular rhythm by providing intensive attention based on a personalized approach (one-on-one tutoring) specifically for children who are new students so that their social and cognitive adaptation processes can run more optimally.

CONCLUSION

Based on the results of the data analysis and discussion that have been presented, this study concludes that the development of early childhood numeracy skills through the Jarimatika extracurricular activity in Class B RA Masjid Al-Azhar was successfully implemented systematically, measurably, and adaptively. The success of this program clearly answers the four main objectives of the study. First, the process of implementing the extracurricular was proven to be effective because it was guided sequentially using manipulative media that were friendly to the stages of cognitive development of early childhood. Second, the affective and psychological responses of children throughout the program implementation showed a very positive trend, where children displayed high enthusiasm, stable focus resilience, and consistent active involvement in each game-based learning session. Third, the Jarimatika method was proven to have a very significant impact on the escalation of children's early numeracy skills, which was concretely marked by increased speed of calculation duration, accuracy of the results of transitional number operations of units-tens, and the emergence of cognitive independence of children when completing independent quizzes. Fourth, the natural obstacles of short attention spans and sociometric barriers faced by new learners in the field were successfully mitigated through responsive teacher pedagogical strategies such as creative song stimulation, classroom conditioning techniques, and a persuasive personal approach. Theoretically, this descriptive qualitative research provides an important scientific contribution in bridging the gap in previous literature, by presenting a holistic synthesis between children's numeracy cognitive performance and classroom managerial dynamics in the scope of non-formal education. As a concrete recommendation for further research, future researchers are advised to test the long-term effectiveness of this Jarimatika method using a mixed-methods approach involving a wider sample scale in various institutions. In addition, further research is also recommended to integrate external variables such as synchronization of numeracy stimulation in the family environment and forms of active parental involvement at home to monitor the resilience of retention of children's early mathematical understanding on an ongoing basis.

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