INDONESIAN JOURNAL OF RESEARCH IN PHYSICAL EDUCATION, SPORT, AND HEALTH
e-ISSN: 2986-8831
Vol. 2 No 2, October 2024
Research Article

Development of a traditional game "engklek" based on numeracy literacy to improve locomotor movements of elementary school students

Silvie Roikhatul Jannah[1]*, Nur Ahmad Muharram[2], Reo Prasetiyo Herpandika[3], Irwan Setiawan[4]
[1,2,3,4] University of Nusantara PGRI Kediri, Jl. KH. Achmad Dahlan No 76, Kediri City, East Java Province, Indonesia
*Corresponding author, email: silvieesilvie@gmail.com

ABSTRACT
Background: Locomotor movement is crucial for elementary school students as it enhances their physical development, motor skills, and overall engagement in physical activities. However, the development of locomotor movements among elementary schools has not been associated with literacy and numeracy, so it is necessary to have a traditional game media that contains elements of literacy and numeracy to improve locomotor movements in elementary school students. Objective: This study aims to create a product in the form of a literacy and numeracy-based "engklek" game to improve locomotor movements of elementary school students. Methods: This study uses the research and development (R&D) method using the ADDIE model, which consists of 5 stages: analyze, design, develop, implement, and evaluate. The subjects of this study were upper-grade students of State Elementary School 3 Watudandang, namely classes IV and V (22 students). Result: The results of this study are (1) the percentage of assessment results from material experts is 100% with a very effective category to be used in the application of traditional games "Engklek" based on numeracy literacy; (2) the percentage of media expert assessment results is 100% with a very feasible category to be applied to upper-grade students in improving locomotor movements; and (3) the percentage of assessment results from students is 85% with a very feasible category to be applied to upper-grade students in improving locomotor movements. Conclusion: In conclusion, the traditional game "Engklek" based on numeracy literacy is practical and feasible for physical education teachers to use in improving locomotor movements.

ARTICLE HISTORY
Received July 21, 2024
Accepted October 10, 2024
Published October 24, 2024
KEYWORDS
Traditional game; Engklek; numeracy literacy; locomotor movements.

Introduction

Traditional games were popular among people in the past and played by children with a simple way of playing and distinctive characteristics (Indriyani, Muslihin, & Mulyadi, 2021). These games can help improve motor skills, train children's agility and dexterity in playing, and develop communication and strategy skills (Indriyani et al., 2021). In addition, these games can also help children manage emotions and learn to work together in groups. This is because traditional games can be done individually or in groups. According to Komalasari (2021), "Sondah," commonly referred to as "Engklek," is a traditional game popular in Java and other regions in Indonesia where players jump over a line using one foot. This game involves using particular objects and counting and has rules that must be followed by the players in its implementation (Munawaroh, 2017). Engklek is one type of traditional game that contains elements of mathematics because it involves a step-by-step calculation process when jumping over the line (Anggraini & Pujiastuti, 2020). Therefore, cricket not only improves locomotor movements but also supports the development of children's numeracy skills.

Locomotor movement is crucial for elementary school students as it enhances their physical development, motor skills, and overall engagement in physical activities. Research indicates that structured locomotor activities, mainly through games, significantly improve students' movement

abilities and encourage active participation in school settings. Active learning interventions, such as traditional games, have significantly improved basic locomotor skills in students (Fadlan, Dwi, Anshor, & Andong, 2023). A study demonstrated that locomotor-based learning can enhance gross motor skills, with improvements noted from 45% to 85% across cycles. Unfavorable locomotor movements in children can significantly impact their physical, psychological, and social development. These effects can manifest in various ways, influencing mobility, self-esteem, and overall quality of life. Locomotor impairments can lead to restricted mobility, which affects a child's ability to engage in play and exploration, which is crucial for cognitive and social development (Delcour et al.,2018). Referring to the disadvantages of poor locomotor movements, an approach to improving locomotor movements in students through games is needed.

Locomotor movements in children can be improved through the traditional game "Engklek." The traditional game of Engklek, a popular children's activity in Indonesia, is an effective educational tool that enhances various developmental skills. Engklek is a traditional game that has been played by generations of Indonesian children. It is a game that not only promotes physical activity but also fosters social interaction and strategic thinking. Research indicates that Engklek fosters physical coordination and supports cognitive and social-emotional growth among children. This is due to the characteristics of this game, namely the jumping activity. The way to play the game is straightforward: only by making a picture/pattern of several boxes on the ground and looking for fragments of tiles as the Gacu. The "Gacu" is thrown into one of the boxes or patterns, and players may not step on the box that the Gacu has thrown. However, this simplicity will make children less interested in traditional games and is supported by existing technological developments. In addition, the traditional game of "Engklek" is also less safe if played by elementary school children because the arena is used with a pattern drawn on the ground, and the ground usually has much gravel, so it is less safe and comfortable for elementary school students. Therefore, researchers developed the traditional game of cranklek by replacing the cranklek playing arena with a mat measuring 42cm × 42cm × 2cm.

The importance of literacy and numeracy for primary school children is multifaceted, impacting their academic performance, problem-solving abilities, and character development. These foundational skills are essential for navigating everyday life and fostering critical thinking. Literacy and numeracy are directly linked to improved learning outcomes. Students with strong numeracy skills tend to perform better in mathematics and related subjects (Nursyifa & Masyithoh, 2023). Mastery of literacy and numeracy equips children with the ability to tackle real-world problems, such as budgeting and interpreting information (Amir, Ashari, Warsidah, & Tavita, 2022). Literacy and numeracy contribute to character education by fostering critical thinking and responsible citizenship, as evidenced by systematic reviews (Tanjung, 2024). In the face of modern challenges such as digital distractions and safety concerns, the role of traditional games in strengthening these skills becomes even more crucial. Therefore, promoting the use of traditional games like Engklek to enhance children's skills is not just a nostalgic pursuit but a practical and effective solution, inspiring a holistic approach to character development. The traditional game of “Engklek” based on literacy and numeracy is the development of the usual traditional game of “Engklek”, whose arena is replaced by a mat. In developing the traditional game “Engklek” based on literacy and numeracy, researchers also replaced Gacu with a digital-based application, namely the Spinner application. Researchers have collaborated between traditional games and digital-based applications through existing technological developments. This is in line with Warisyah (2019), who states that by using gadgets, children can access game applications that can develop their developmental aspects so that students will have a sense of interest in the literacy and numeracy-based “Engklek” game developed by researchers. The game model of the traditional game “Engklek” based on literacy and numeracy is that students do Spinner. Then, students answer the literacy and numeracy questions that have been provided. If the student has correctly answered the question,

then the student must jump over the mat with the answer and take the paper star in the answer box. After the student jumps, the student must run zigzag by passing through several cones and run to the end post. Students will proceed to the next round if they arrive first at the end post. The traditional game was chosen because it is considered that the movements in the game "Engklek" contain elements of body movements that move the body from one place to another through jumping, walking, and walking on tiptoe. In addition, literacy and numeracy are more easily included in the traditional game "Engklek".

Nurhidayat (2020) added that learning media acts as a tool that assists teachers in delivering material in the classroom learning process to create a more pleasant classroom atmosphere. One of the factors that can influence the success of the learning process is the use of learning media (Magdalena, 2021). Creative and innovative learning media can increase students' motivation and interest in receiving learning material so that student's understanding of the material can also increase. The role of the teacher as a facilitator is vital in helping students reach their maximum potential (Ramli, Rahmatullah, Inanna, & Dangnga, 2018). Thus, the effective use of learning media is expected to improve student learning outcomes.

Based on this, this study seeks to create a product in the form of the traditional game "Engklek," which collaborates with literacy and numeracy to improve locomotor movements in elementary school students. The results of these findings are expected to enrich physical education teachers' knowledge of improving locomotor movements. In addition, preserving traditional games with literacy and numeracy is the latest innovation that can be used as a reference for physical education teachers, especially in achieving the goals of The 17 Sustainable Development Goals (SDGs).

Method

Research Design

This research is research and development used to produce specific products and test the effectiveness of these products (Sugiyono, 2019). In this study, researchers used the Analyze, Design, Development, Implementation, and Evaluation (ADDIE) development model as a research implementation procedure. At the Analyze stage, researchers conducted a preliminary study of the subject to be studied. Furthermore, at the Design stage, researchers design products that will be developed and adapted to the characteristics of students obtained at the analysis stage. The Development stage is the third stage, namely the development stage, where the products made have been realized and will be tested by several experts, namely material experts and media experts, to be assessed first so that the products made are even more perfect. Next is the Implement stage, which is the stage of applying the product that has been made. At this stage, before the product is tested on students, the product has been validated by material experts and media experts that the product is feasible and ready to be tested. The last stage is the evaluation stage of the product that has been implemented. Products made will be evaluated to produce even more exciting products.

Participants

The subjects of this study were fourth and fifth-grade students of State Elementary School 3 Watudandang, Nganjuk Regency, Indonesia, totaling 22 students consisting of 14 fourth-grade students and eight students from fifth grade. The sampling technique used was purposive sampling, with inclusion criteria being male students and exclusion criteria being female students.

Research Instruments

The research instrument used in this research is a questionnaire. Questionnaires will be distributed to two experts, material experts, media experts, and research subjects, namely class IV and V State

Elementary School 3 Watudandang Nganjuk Regency. Tables 1, 2, and 3 are lattices of data collection instruments used.

Table 1. Material Expert Assessment Instrument Grid

No.	Indicator	Question Item
1.	The purpose of the literacy and numeracy-based traditional game "Engklek" for learning	1
2.	Appropriateness of material formulation	2,3,4
3.	Non-academic benefits	5
4.	Academic benefits	6,7,8

Source: Arifin, Pujiastuti, & Sudiana (2020)

Table 2. Media Expert Assessment Instrument Grid

No.	Indicator	Question Item
1.	The feasibility of media that has been developed for learning media	1,2,3,4,5,6
2.	Safety of the media when applied in the field	7,8
3.	Attractiveness of the media to be applied to elementary school students	10,11

Source: Arifin, Pujiastuti, & Sudiana (2020)

Table 3. Student Assessment Instrument

No.	Indicator	Question Item
1.	Effectiveness of tools on improving locomotor movements of elementary school students	1,2
2.	Students' interest in the game	3,7
3.	Safety and convenience of equipment	4,5
4.	Appropriateness of material formulation	6,10
5.	Kepraktisan dari alat	9

Source: Arifin, Pujiastuti, & Sudiana (2020)

Data Analysis

At this stage, researchers analyze the data obtained by filling out the distributed questionnaire. At this stage, the data obtained will be calculated using the percentage formula. The percentage results will be adjusted to the category. The following percentage formula is used:

$$P = \frac{Tse}{Tsh} \times 100\%$$

Description:
P : Percentage
Tse : Total empirical score
Tsh : Total maximum score

After calculating the percentage of the data, adjust the percentage according to the criteria listed in the effectiveness table (Table 4) and the feasibility table (Table 5).

Table 4. Criteria for Effectiveness

No.	Persentase	Kriteria
1.	81-100%	Highly Effective
2.	61-80%	Effective
3.	41-60%	Moderately Effective
4.	21-40%	Less Effective
5.	0-20%	Ineffective

Sumber: Akbar (2017)

Table 5. Feasibility criteria

No.	Persentase	Kriteria
1.	81-100%	Highly Feasible
2.	61-80%	Feasible
3.	41-60%	Moderately Feasible
4.	21-40%	Less Feasible
5.	0-20%	Not Feasible

Source: Riduwan (2015)

Results and Discussion

Result

The description of the results of the research on the development of traditional games "Engklek" based on literacy and numeracy to improve students' locomotor movements based on the procedures and stages of the ADDIE model obtained the following results:

1. Analyze

At the analysis stage, researchers conduct a needs analysis and analyze existing problems so that it becomes the basis for determining solutions that can be used. At this stage, it resulted in the need for more skilled students to perform locomotor movements, the absence of development media on traditional game material, and the lack of literacy and numeracy scores of students, with an average score of 45.9375. After knowing the existing problems, the researcher chose a solution: developing a traditional game, "Engklek," based on literacy and numeracy to improve students' locomotor movements.

2. Design

At the design stage, researchers design media and game models based on existing problems. In the model of the traditional game "Engklek" based on literacy and numeracy, there are several locomotor movements that are deliberately made with the aim that students can be skilled in performing locomotor movements by applying the traditional game "Engklek" and can support students' literacy and numeracy through the questions that have been presented, namely literacy and numeracy questions. Figure 1 is the design of the literacy and numeracy-based "Engklek" traditional game field.

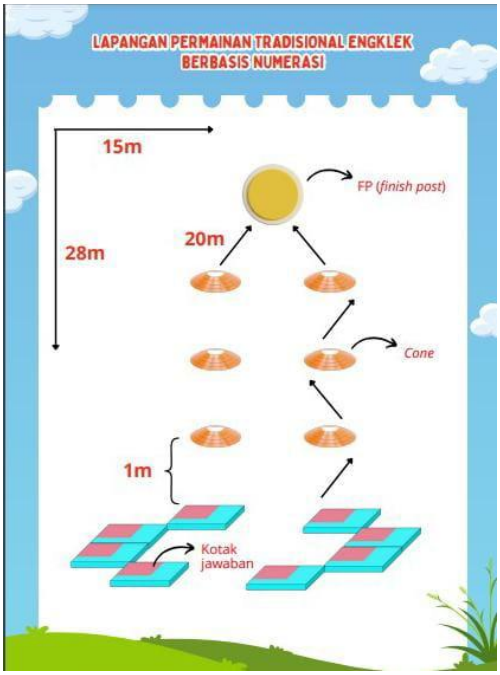

Figure 1. Field Illustration

From Figure 1, the media to be used is a mat of 42cm × 42cm × 2cm. The mat is covered with attractive coloured sofa stickers and a rubber base to be non-slip when used.

3. Development

At this stage is the product realization stage, where the product that has been made is ready to be implemented. At this stage, it must go through several stages so that the product that has been developed is based on the needs analysis. The product will be implemented if it is done through the needs analysis.

4. Implementation

At the implementation stage is the application of the product that has been made. At this stage, before the product is tested on students, the product has been validated by material experts and media experts that the product is feasible and ready to be tested. At this stage, it will produce data and improvements from several experts who have assessed the product. After this stage is implemented, several suggestions from two experts regarding the literacy and numeracy questions have been presented..

5. Evaluation

The evaluation stage is the last stage of the ADDIE model. This stage is the stage after product assessment. At this stage, it will produce a more attractive product because there have been suggestions and input from two experts, namely material and media experts.

In the research, a questionnaire was distributed to obtain data. Questionnaires were distributed to material experts, media experts, and students. The aim is to determine the effectiveness and feasibility of the traditional game "Engklek" based on literacy and numeracy. Table 6 results of the assessment of material experts, media experts and students:

Table 6. Results of the Assessment

No.	Assessment	Score earned	Maximum score	Percentage
1.	Material expert	8	8	100%
2.	Media expert	11	11	100%
3.	Students	187	220	85%

Discussion

From the results obtained, the percentage of assessments by material experts is 100%, which is a very effective category, and the percentage of assessment results by media experts is 100%, which is a very feasible category. In the assessment of material and media experts, suggestions were put forward by the two experts, namely, related to literacy and numeracy questions that should be shorter. However, adding literacy and numeracy elements only supports students' abilities. Meanwhile, the student assessment obtained a percentage of 85% with a feasible category.

The findings concluded that the traditional game "Engklek" based on literacy and numeracy is practical and feasible to improve students' locomotor movements and can support students' literacy and numeracy. This is because in the traditional game system "Engklek," based on literacy and numeracy, there are several locomotor movements, namely jumping, zigzag running, and running. Wulan (2015) revealed that basic locomotor movements require guidance and practice so that children can do it correctly because the formation of motion does not occur by itself but through a process of practice and learning by doing it repeatedly so that they can understand the movements performed.

Locomotor movement skills training can be applied in the traditional game "Engklek" based on literacy and numeracy. According to the results obtained, the category is convenient and very feasible, and traditional literacy and numeracy-based cricket games can make students more skilled in performing locomotor movements, namely by doing it many times and training, which will later be able to evaluate students. Training locomotor movements in children is the same as helping children's gross motor development because, in locomotor movements, the activities carried out by children involve moving all or most parts of the child's body.

Improving locomotor movement in elementary school students can be effectively achieved through various engaging and interactive methods. Research highlights several strategies that can enhance these fundamental skills. Implementing active learning interventions based on traditional games has significantly improved locomotor skills among grade 5 students. This approach fosters an interactive and enjoyable learning environment, leading to better motor skill development (Fadlan et al., 2023). The Kids Athletics model, validated by experts, has effectively improved basic locomotor movements in elementary students. This structured approach ensures a reliable and practical framework for skill development (Zakia et al., 2023). Incorporating simple game-based learning models like the follow jump game has also enhanced locomotor abilities. This method not only promotes movement but also encourages cooperation among students.

Improving locomotor movement in children can be effectively achieved through various educational and therapeutic interventions. Research highlights several methods that enhance these skills, focusing on engaging activities and targeted exercises. Flash Card Learning Media: This method significantly improved locomotor skills such as running and galloping among grade 3 students, with a

notable increase in performance metrics (p-value = 0.00) (Bikalawan et al., 2024). Follow Jump Game: Implemented with grade 2 students, this game led to a marked improvement in locomotor abilities, with a transition from low to high-performance categories observed in subsequent cycles (Hidayatullah et al., 2023). Engklek promotes gross motor skills, enabling children to develop balance and coordination through hopping and jumping (Herniawati et al., 2024).

Other evidence that traditional games have several benefits include Engklek, which has been shown to improve children's mathematical logic intelligence, with significant performance increases observed through structured play (Alam & Aviva, 2023). The game enhances pre-mathematics abilities, allowing children to independently perform basic arithmetic operations, thus making learning enjoyable and effective (Nurkayatin & Fitri, 2024).

This study has limitations, including limited implementation of literacy and numeracy by a few methods. The subjects involved are also very minimal, so further studies are recommended to enrich the literacy and numeracy models integrated into traditional games to enrich ways to improve locomotor movements as well as strengthen literacy and numeracy in elementary school students.

Conslusions

The findings can be concluded that the traditional game "Engklek" based on literacy and numeracy can be used as a medium for improving locomotor movements of elementary school students, and the addition of literacy and numeracy elements can make students familiar with questions about basic literacy and numeracy.

Authors' contributions

SRJ is responsible for study design, data collection, statistical analysis, and manuscript preparation. NAM, RPH, and IS are responsible for manuscript preparation. AG is responsible for study design, statistical analysis, and manuscript preparation.

Competing interests

The authors declare no competing interests.

References

Akbar, S. (2017). *Instrumen Perangkat Pembelajaran*. Bandung: PT Remaja Rosdakarya.

Alam, M., & Aviva, A. N. R. (2024). Efektivitas Permainan Tradisional Engklek dalam Meningkatkan Kecerdasan Logika Matematika Anak di TK Al Quran Baitul Qurro Ciputat. *El-Athfal: Jurnal Kajian Ilmu Pendidikan Anak*, *4*(1), 10-18. [Crossref]

Amir, A., Ashari, A. M., Warsidah, M. S. J. S., & Tavita, G. E. (2022). Profile Of Learning Literacy And Numeracy For Students Of Elementary School Through Campus Teaching 3 Activities. *Jurnal Pendidikan dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, *5*(3), 85-89. [Crossref]

Anggraini, G., & Pujiastuti, H. (2020). Peranan permainan tradisional engklek dalam mengembangkan kemampuan matematika di Sekolah Dasar. *JUMLAHKU: Jurnal Matematika Ilmiah STKIP Muhammadiyah Kuningan*, *6*(1), 87–101.

Arifin, A. M., Pujiastuti, H., & Sudiana, R. (2020). Pengembangan media pembelajaran STEM dengan augmented reality untuk meningkatkan kemampuan spasial matematis siswa. *Jurnal Riset Pendidikan Matematika*, *7*(1), 59–73. [Crossref]

Bikalawan, S. S., Al Ardha, M. A., Indahwati, N., Wijaya, A., Nurhasan, N., Ridwan, M., & Yang, C. B. (2024). Flash card learning media in physical education improves students' locomotor movement skills. *Retos: nuevas tendencias en educación física, deporte y recreación*, (57), 80-87. [Crossref]

Delcour, M., Massicotte, V. S., Russier, M., Bras, H., Peyronnet, J., Canu, M. H., & Coq, J. O. (2018). Early movement restriction leads to enduring disorders in muscle and locomotion. *Brain Pathology*, *28*(6), 889-901. [Crossref]

Fadlan, M. N., Dwi, D. F., Anshor, A. S., & Landong, A. (2023). Improving Basic Locomotor Movement Skills in Elementary School Students Through an Active Learning Approach Based on Traditional Games. *Pedagogik Journal of Islamic Elementary School*, *6*(2), 229-238. [Crossref]

Herniawati, A., Hidayat, Y., Ernasari, S., & Susanti, E. (2024). Analisis Penggunaan Permainan Tradisional Engklek Terhadap Perkembangan Fisik Motorik Kasar Anak Usia 5-6 Tahun Di PAUD Mawar. *JOECE: Journal of Early Childhood Education*, *1*(1), 30-43. [Crossref]

Hidayatullah, M. A., Hafiani, M., Rasyid, I. N., Tagap, B. F. S., Anshari, H., Nashih, M., & Normawarni, H. (2023). Improving Locomotor Movement Ability Through The Follow Jump Game. *Riyadhoh: Jurnal Pendidikan Olahraga*, *6*(2), 317-323. [Crossref]

Indriyani, D., Muslihin, H. Y., & Mulyadi, S. (2021). Manfaat permainan tradisional engklek dalam aspek motorik kasar anak. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *9*(3), 349–354.

Komalasari, D. (2021). Pengembangan Permainan Tradisional Engklek Berbasis Digital Untuk Meningkatkan Kemampuan Problem Solving Pada Anak Usia 5-6 Tahun.

Magdalena, I. (2021). *Belajar Makin Asyik dengan Desain Pembelajaran Menarik*. CV Jejak (Jejak Publisher).

Munawaroh, H. (2017). Pengembangan model pembelajaran dengan permainan tradisional engklek sebagai sarana stimulasi perkembangan anak usia dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *1*(2), 86-96. [Crossref]

Nurhidayat, D. (2020). Efektifitas E-Learning Sebagai Media Pembelajaran. *Jurnal Tata Rias*, *10*(1), 26–35.

Nurkayatin, W., & Fitri, R. (2024). Penerapan Permainan Tradisonal Engklek Untuk Meningkatkan Kemampuan Pramatematika Dan Kemampuan Kemandirian Anak Di TK Negeri Bung Karno Surabaya. *EDUKASIA: Jurnal Pendidikan dan Pembelajaran*, *5*(1), 1039-1046. [Crossref]

Nursyifa, A., & Masyithoh, S. (2023). Analisis Hubungan Literasi Numerasi Dan Hasil Belajar Siswa. *Jurnal Pendidikan Dasar Dan Keguruan*, *8*(1), 22-29. [Crossref]

Ramli, A., Rahmatullah, R., Inanna, I., & Dangnga, T. (2018). Peran media dalam meningkatkan efektivitas belajar. *Lembaga Pengabdian Kepada Masyarakat Universitas Negeri Makassar*, *1*(7), 5–7.

Riduwan, M. B. A. (2015). Skala pengukuran variabel-variabel penelitian. Alfabeta.

Sudirman, R., & Arini, I. (2022). Locomotor-Based Learning to Improve Motor Skills of Elementary School Students. *QALAMUNA: Jurnal Pendidikan, Sosial, dan Agama*, *14*(1), 317-328. [Crossref]

Sugiyono. (2019). Metode Penelitian dan Pengembangan (R&D), (Bandung:Alfabeta,) 2.

Tanjung, B. N. (2024). Actualization of Numeracy Literacy in Character Education at Elementary School Level in the Era of Disruption. *Indonesian Journal Education*, *3*(2), 55-66. [Crossref]

Warisyah, Y. (2019). Pentingnya pendampingan dialogis orang tua dalam penggunaan gadget pada anak usia dini. *Seminar Nasional Pendidikan 2015* (hal. 130–138).

Wijayanti, V., Prasetyo, Y., & Fakhrurozi, Z. A. (2024). Development of a Simple Game-Based PJOK Learning Model to Improve Locomotor Basic Movements and Cooperation of Lower Grade Elementary School Students. *International Journal of Multidisciplinary Research and Analysis, 7*(2), 694-704. [Crossref]

Wulan, D. S. A. (2015). Peningkatan Kemampuan Gerak Lokomotor Melalui Permainan Lari Estafet Modifikasi. *Jurnal Pendidikan Usia Dini*, *9*(1), 163–180.

Zakia, A., Barlian, E., Bafirman, Firdaus, K., & Andika, H. (2023). Improving Fundamental Locomotor Skills of Elementary School Students in Padang City Through the Kids Athletics Model. *International Journal of Research and Review, 10*(8), 691-696. [Crossref]