



Ethnomathematics in Traditional Game of Engklek for Mathematics Learning in Elementary Schools

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Abstract: *Mathematics is a subject that must be taken by students. Mathematics has become a part of human culture inherent from the past to the present. Ethnomathematics is a term for mathematical values that exist in everyday life. Ethnomathematics is a learning mathematics related to certain cultures. In addition, Ethnomathematics can be used to apply mathematics in the context of the current cultural system and the natural environment. Indonesia has a variety of cultural wealth, including in terms of traditional games. Although traditional games are very popular because they are in demand by all levels of society, as time goes by, slowly traditional games began to be forgotten because of the emergence of online games that are more easily accessible in various situations and conditions. Inspiring this, the writer feels interested in expressing mathematical values in the context of traditional games, especially the crank game. This research is a descriptive qualitative research with an ethnographic approach, considering this research is rooted in the phenomenon of Indonesian culture, namely traditional games. The purpose of this study is to identify hidden mathematical values in traditional games, with the hope of supporting the preservation of the traditional game. The results of this study include the description of the crank game which includes mathematical aspects such as geometry, comparison, and opportunities. In addition, research also shows that the game crank can be used as a container to teach multiplication material on integers.*

Keywords: *Mathematics learning, Ethnomathematics, Traditional game “Engklek”*

INTRODUCTION

According to Law No. 20 of 2003 Chapter I Paragraph 1 About the National Education System Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual power, self -control, personality, intelligence, noble character, and skills What is needed by him, society, nation and state (UNDANG UNDANG REPUBLIK INDONESIA NOMOR 20 TAHUN 2003 TENTANG SISTEM PENDIDIKAN NASIONAL, 2003). In Indonesia, mathematics becomes a subject that must be taken by students. Mathematics becomes an integral part of human life involved in every activity. The presence of mathematics is very important in various aspects of life, so that many human activities are unconsciously part of mathematics (Rudyanto, 2019).

Over time, mathematics has become a part of human culture inherent from the past to the present. One of the objectives of learning mathematics is to form new schemata in the cognitive structure by considering the child's schemata so that it becomes mathematical assimilation is a lesson that is often considered difficult by students (Hartoyo, 2013). There are some learning difficulties experienced by students in understanding mathematics learning. According to (Samrin et al., 2023) There are two factors that influence a child experiencing learning difficulties, namely internal factors and external factors. Students are less motivated in learning mathematics. This is allegedly because the learning carried out in the classroom is still conventional and less attractive to students. Therefore, students do not have the encouragement and enthusiasm to learn.

Traditional games are simple games played with basic tools to help players become more familiar with nature and the surrounding environment (Fatir Atfal, 2022). Traditional games are closely associated with the 90s, a time when children grew and developed without technological interference (Munajiyah et al., 2023). According to

Anggrayni et al., (2023) traditional games can stimulate children to develop cooperation, assist them in adapting, interact positively, condition them to self-control, cultivate empathy towards friends, adhere to rules, and respect others.

It cannot be denied that technological advancements in the era of globalization have directly or indirectly shifted the behaviors of children, whether in games, behavior, lifestyle, or learning methods. Children have abandoned traditional games considered old-fashioned and no longer enjoyable, even though there are many benefits that can be derived from various traditional games (Febriyanti et al., 2018).

Indonesia is known as a country with diverse cultures, ethnicities, and regional languages. It also boasts a variety of traditional games that incorporate mathematical elements, one of which is the traditional game of "engklek" (Fauzi & Lu'luilmaknun, 2019). Engklek is one of the traditional games played by Indonesian children in the past. This game is particularly favored by girls, but it is also enjoyable when played with boys. Hence, engklek is not exclusive to girls. Even in modern times, this traditional game remains popular among children (Fatir Atfal, 2022). According to various sources, the traditional game of engklek originally hails from England. This is supported by numerous findings indicating its origin in that country (Herdayanti & Watini, 2021).

Multiplication of integers is one of the subjects taught in elementary school. The material on multiplication operations is crucial to master as it serves as the foundation for more complex topics in the future (Yuda, 2020). In this topic, students will be taught multiplication concepts through various methods and approaches. Every teacher hopes that the material taught to students will be embedded in their memory and hold more significance. As educators, teachers should enhance their skills to address this issue by providing students with opportunities to actively engage and fully commit to the learning process (Adi et al., 2020). Therefore, the researcher aims to bring innovation to mathematics education by introducing the traditional game of "engklek."

Based on traditional games and the cultural phenomenon in Indonesia, this research is a qualitative descriptive study utilizing an

ethnographic approach. By comprehensively collecting data, qualitative research aims to provide in-depth explanations of the phenomenon. Even a very small population is not prioritized in this research. Additional sampling is unnecessary if the collected data is sufficiently deep to explain the studied phenomenon (Febriyanti et al., 2018).

In an effort to increase interest in conventional games and mathematics, the researcher tries to include both into the learning process. Establishing a learning environment for mathematics is the aim. The researcher also expects that kids will be able to comprehend plane geometry ideas in the future when they play this version of "engklek," as the game incorporates plane geometry into its design. May the generation that comes after us be able to appropriately maintain our culture. Let us remember our cultural history even as technology and times change.

METHOD

This research method utilizes an ethnographic approach within the framework of qualitative descriptive research, driven by the cultural phenomenon in Indonesia related to traditional games. The traditional game under investigation is "engklek," which is played by both males and females. The research objectives include gaining a deeper understanding of the relationship between mathematics and the traditional game of "engklek." To describe qualitative data analysis, a series of words is employed to elaborate on it.

RESULT AND DISCUSSION

Mathematics is one of the many crucial subjects in education that significantly contributes to the advancement of technology and science (Maulida, 2020). According to Sari et al (2019), mathematical activities involve the process of abstraction from daily experiences into mathematics or vice versa. This includes grouping, counting, measuring, designing structures or tools, creating patterns, tallying, determining locations, playing, explaining, and various other activities. (Hartoyo, 2013) suggests that the teaching of mathematics should commence by exploring the informal knowledge absorbed by students from their surrounding communities. Thus, it can be concluded that mathematics education

consists of a series of subjects covering counting activities and other related materials.

In 1977, Brazilian mathematician D'Ambrosio provided a definition of ethnomathematics: "Today, the term 'ethno' (as a prefix) is commonly used to denote the socio-cultural framework, including language, jargon, behavioral norms, myths, and symbols. Mathema has a complex definition, but generally, it signifies understanding, comprehending, and performing tasks such as modeling, ciphering, measuring, categorizing, and inferring. The suffix 'tics' shares its origin with the term technique and is derived from the word techné" (Maulida, 2020). The prefix "ethno" can be interpreted as a very broad term, referring to the social-cultural context, including language, jargon, behavior, myths, and symbols. The fundamental concept of the word "mathema" can be understood as the ability to explain, know, understand, and engage in activities such as coding, measuring, classifying, drawing conclusions, and modeling (Yuniar & Pujiastuti, 2020). The word "tics" comes from the Greek word "techne," which means "technique." "I have been using the word ethnomathematics as modes, styles, and techniques (tics) of explanation, of understanding, and of coping with the natural and cultural environment (mathema) in distinct cultural systems (ethno)" (D'Ambrosio, 1999, 146) is how this term is adapted in (Febriyanti et al., 2018).

Education and culture are inseparable elements in our daily lives. Education is considered a fundamental need for individuals in society, while culture is a comprehensive unity that prevails within a community (Maulida, 2020). Ethno mathematics is the mathematics used by ethnic groups, cultural communities, or children from specific social classes (Safitri et al., 2015). Ethnomathematics reflects the cultural influence on the use of mathematics in its applications in a complex and ever-changing manner (Febriyanti et al., 2018).

Wahyudin (2018) defines ethnomathematics as the study of mathematics in relation to culture. This is due to the root term "mathematics" and the prefix "ethno," which is derived from "ethnography." According to Rusliah (2016), ethnomathematics is a sophisticated and dynamic depiction of how culture affects how mathematics is used. At the

moment, "ethnomathematics culture" describes particular approaches taken by certain communities or cultural groups in a variety of mathematical contexts (Hasan & Budiarto, 2022). Therefore, a type of mathematics instruction that integrates cultural components is called ethnomathematics. Moreover, ethnomathematics may use mathematical ideas to solve problems in the natural world and function within preexisting cultural frameworks.

From generation to generation, traditional games are passed down (Kurniawati, 2015). For pupils, playing traditional games is a natural way to engage socially, claims (Artobatama, 2019). As members of the community, students' lives are infused with the local cultural legacy of traditional games (Rianto & Yuliananingsih, 2021). Traditional games are included in Javanese society's cultural activities, claim (Risdiyanti & Prahmana, 2018). These considerations lead to the conclusion that traditional games are firmly ingrained in Javanese society and are a component of Indonesia's native cultural history, including spontaneous social interactions.

Traditional Game "Engklek"

Among the games that involves learning mathematics is the classic game of "engklek". Febriyanti et al (2018) claim that "engklek" is a well-known traditional game in Indonesia, particularly among those who live in rural areas. Fitriyah and Khaerunisa (2018) state that "engklek" is a customary game that kids play in which they have to hop from one square to another using just one leg. From this, it may be inferred that youngsters play the game "engklek" often, which involves leaping from one square to another. The squares, also known as quadrilaterals, are a component of mathematics training.

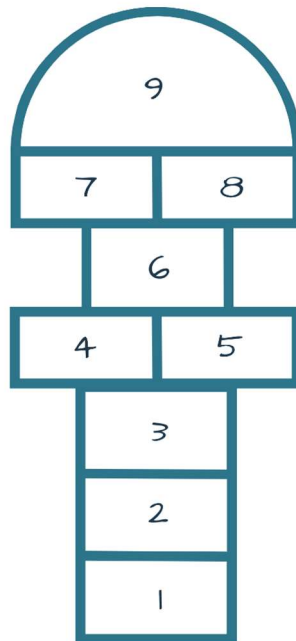


Figure 1 Traditional Game "Engklek"

To create an "engklek" diagram, children can use chalk or wood. Chalk and wood have a cylindrical shape, which also falls under the category of mathematical elements. In the game, children will throw a small object into the squares they've drawn. The object used, typically called "gacu," is usually a small stone, a piece of tile, or a fragment of other building materials. The stones are usually circular in shape, but if using tile fragments or other building materials, they can be square or triangular.

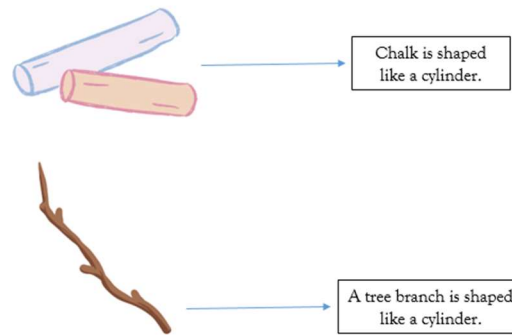


Figure 2 Chalk and tree branches are tools used to create "engklek" in the form of cylinders



Figure 3 "Gacu" made from fragments of building materials for the game medium in the form of a rectangle or triangle.

In accordance with figure 1, the game of "engklek" can be integrated with mathematics learning on the subject of multiplying integers. Students can be given questions before they engage in the game. The questions are provided based on the location of the students' "gacu." If a student's "gacu" lands on the number 2, for example, the student will be asked a question related to the multiplication of the number 2, and so on.

Additionally, probability learning is included into the game "engklek". Unconsciously, players use probability when they hop or even when they choose where to place themselves in order to select their sequence. If more research is done, the classic game of "engklek" may be

used to teach mathematics. because probability, geometry, and comparison are all involved in this game. The data or research findings, research data analysis, research question responses, and the analyst's reaction to the findings are all included in this part.

CONCLUSION

Based on the explanation above, it can be concluded that traditional games are starting to be abandoned by society; in fact, 3 out of 6 children are no longer interested in traditional games. Many people are unaware that traditional games contain values that can be applied in school learning. In the game of "engklek," it not only involves elements of plane geometry but also includes concepts of multiplication, comparison, and probability that can be applied in elementary school learning. Through this research, it can be demonstrated that the traditional game of "engklek" can be implemented in school learning with mathematics as a form of innovative teaching, allowing students to gain new experiences in the learning process.

REFERENCES

- Adi, B. S., Sudaryanti, S., & Muthmainah, M. (2020). Implementasi permainan tradisional dalam pembelajaran anak usia dini sebagai pembentuk karakter bangsa. *Jurnal Pendidikan Anak*, 9(1), 33–39. <https://doi.org/10.21831/jpa.v9i1.31375>
- Anggrayni, R., Lenny, L., Risman, V., & ... (2023). Implementasi Model Atik Dalam Meningkatkan Motorik Kasar Melalui Permainan Engklek di TKIT Bunga Mufiidah. *Aksara: Jurnal Ilmu ...*, 09(January), 761–768. <https://ejurnal.pps.ung.ac.id/index.php/Aksara/article/view/1713%0Ahttps://ejurnal.pps.ung.ac.id/index.php/Aksara/article/download/1713/1250>
- Artobatama, I. (2019). Pembelajaran Stem Berbasis Outbound Permainan Tradisional. *Indonesian Journal of Primary Education*, 2(2), 40. <https://doi.org/10.17509/ijpe.v2i2.15099>
- Fatir Atfal, M., & Samarinda Jalan Wahid Hasyim Samarinda, U. K. (2022). Penerapan Permainan Tradisional Engklek Dalam Meningkatkan Hasil

- Belajar Di Sd Negeri 024 Samarinda Utara Tahun 2022. *Jurnal Pendas Mahakam*, 7(2), 183–191.
- Fauzi, A., & Lu'luilmaknun, U. (2019). Etnomatematika Pada Permainan Dengklaq Sebagai Media Pembelajaran Matematika. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 8(3), 408. <https://doi.org/10.24127/ajpm.v8i3.2303>
- Febriyanti, C., Prasetya, R., & Irawan, A. (2018). Etnomatematika Pada Permainan Tradisional Engklek Dan Gasing Khas Kebudayaan Sunda. *Barekeng: Jurnal Ilmu Matematika Dan Terapan*, 12(1), 1. <https://doi.org/10.30598/vol12iss1pp1-6ar358>
- Fitriyah, A., & Khaerunisa, I. (2018). Pengaruh Penggunaan Metode Drill Berbantuan Permainan Engklek Termodifikasi terhadap Kemampuan Pemecahan Masalah Siswa Kelas VII. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, 2(2), 267. <https://doi.org/10.31331/medives.v2i2.653>
- Hartoyo, A. (2013). Etnomatematika Pada Budaya Masyarakat Dayak Perbatasan Indonesia-Malaysia. *Jurnal Pendidikan Matematika Dan IPA*, 2(1). <https://doi.org/10.26418/jpmipa.v2i1.2180>
- Hasan, M. A., & Budiarto, M. T. (2022). Eksplorasi Etnomatematika Budaya Masyarakat Sidoarjo. *MATHEdunesa*, 11(2), 562–573. <https://doi.org/10.26740/mathedunesa.v11n2.p562-573>
- Herdayanti, H., & Watini, S. (2021). Penerapan Permainan Tradisional Engklek dalam Mengembangkan Kecerdasan Majemuk Pada Anak Usia Dini. *Jurnal Pendidikan Tambusai*, 5(3), 6222–6227.
- Kurniawati, A. (2015). *Pengaruh Permainan Tradisional Bandaran Modifikasi Terhadap Hasil Belajar Matematika Pada Anak Autis Kelas 2 Di Slb Autis Mutiara Hati Sidoarjo*. 1–7.
- Maulida, S. H. (2020). Pembelajaran Matematika Berbasis Etnomatematika Melalui Permainan Tradisional Engklek. *LEMMA: Letters of Mathematics Education*, 7(01), 35–44. <http://ojs.semdikjar.fkip.unpkediri.ac.id/index.php/SEMDIKJAR/article/view/67%0Ahttp://ojs.unpkediri.ac.id/index.php/matematika/article/view/12810>
- Munajiyah, N., Supriadi, I., & Suardi, D. (2023). *Sosialisasi Permainan*

Tradisional Bakiak Pada Usia Kanak-Kanak 7-8 Tahun Di Desa Teluk Lada Socialization Of Traditional Bakiak Games For Children 7-8 Years Old In Teluklada Village. 1(4).

- Rianto, H., & Yuliananingsih, Y. (2021). Menggali Nilai-Nilai Karakter Dalam Permainan Tradisional. *Edukasi: Jurnal Pendidikan, 19(1)*, 120. <https://doi.org/10.31571/edukasi.v19i1.2440>
- Risdiyanti, I., & Prahmana, R. C. I. (2018). Etnomatematika: Eksplorasi dalam Permainan Tradisional Jawa. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang, 2(1)*, 1. <https://doi.org/10.31331/medives.v2i1.562>
- Rudyanto, H. E. (2019). Etnomatematika Budaya Jawa : Inovasi Pembelajaran Matematika Di Sekolah Dasar. *Jurnal Bidang Pendidikan Dasar, 3(2)*, 25–32. <https://doi.org/10.21067/jbpd.v3i2.3348>
- Rusliah, N. (2016). Pendekatan Etnomatematika dalam Permainan Tradisional Anak di Wilayah Kerapatan Adat Koto Tengah Kota Sungai Penuh Propinsi Jambi. *Proceedings of The International Conference on University-Community Engagement, 715–726*. [http://digilib.uinsby.ac.id/7435/1/Nur Rusliah.pdf](http://digilib.uinsby.ac.id/7435/1/Nur%20Rusliah.pdf)
- Safitri, D. W. I., Studi, P., Matematika, P., Pmipa, J., Keguruan, F., Ilmu, D. A. N., & Tanjungpura, U. (2015). *Eksplorasi konsep matematika pada permainan masyarakat melayu sambas*.
- Samrin, S., Riansyah, F., Patih, T., Tarty, I. P., & Nastiti, D. K. (2023). Enhancing Mathematical Interest and Learning Outcomes: The Lift-the-flap Book Incorporating Tolaki Local Wisdom and Islamic Values. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah, 8(1)*, 33–47. <https://doi.org/10.24042/tadris.v8i1.14206>
- Sari, C. K., Muslihatun, A., Cahyaningtyas, L., Khaimudin, R. N. L. H., Fijatullah, R. N., & Nisa', E. U. (2019). Pemanfaatan permainan tradisional untuk media pembelajaran: Congklak bilangan sebagai inovasi pembelajaran matematika sekolah dasar. *Transformasi: Jurnal Pengabdian Masyarakat, 15(1)*, 14–22. <https://doi.org/10.20414/transformasi.v15i1.915>

UNDANG UNDANG REPUBLIK INDONESIA NOMOR 20 TAHUN 2003

TENTANG SISTEM PENDIDIKAN NASIONAL. (2003). No 主観的健康感を中心とした在宅高齢者における健康関連指標に関する共分散構造分析Title. *Demographic Research*, 49(0), 1-33 : 29 pag texts + end notes, appendix, referen.

Wahyudin. (2018). Etnomatematika Dan Pendidikan Matematika Multikultural. *Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia*, 1–19.

Yuda, E. K. (2020). Sifat-Sifat Operasi Hitung Perkalian Bilangan Bulat dalam Pembelajaran Matematika di Sekolah Dasar. *Seminar Nasional Pendidikan Dasar*, 5(1), 294–301.

Yuniar, R. I., & Pujiastuti, H. (2020). , Heni Pujiastuti. *JUMLAHKU: Jurnal Matematika Ilmiah STKIP Muhammadiyah*, 6(1), 66–77.