



Literature Review: Ethnomathematics of the Angkola Batak Tribe in Mathematics Learning

Nurhasanah Siregar^{1*}, Syawal Gultom², and Mangaratua. M. Simanjong³

^{1,2,3}Universitas Negeri Medan, Medan, Indonesia



DOI: <https://doi.org/10.46245/ijorer.v5i2.554>

Sections Info

Article history:

Submitted: December 26, 2023
Final Revised: February 27, 2024
Accepted: February 28, 2024
Published: March 7, 2024

Keywords:

Angkola Batak Tribe;
Ethnomathematics;
Mathematic Learning.



ABSTRACT

Objective: This research is to find out whether ethnomathematics in the Angkola Batak culture can be used in mathematics learning, and it seeks to know which cultural artifact or philosophy of ethnomathematics is more widely used in learning. **Method:** This research is a literature review by collecting metadata through the PRISMA model. Articles from Google Scholar from 2018 to 2023 were collected with the help of Publish and Perish. This methodology consists of well-defined review stages, eligibility criteria developed and explained from information sources, a literature search strategy, a literature selection process, and data synthesis based on the literature. **Results:** Of the 14 articles used as research samples, there were four articles each for elementary school (ES) and junior high school (JHS), meaning ethnomathematics is more suitable for use at elementary and middle school levels. Using cultural artifacts as a learning medium is more common than using philosophy from that culture. **Novelty:** This research produces information that learning using ethnomathematics is more suitable for children with a semi-concrete learning level.

INTRODUCTION

Education and culture are two elements that cannot be separated in everyday life because culture is a complete and comprehensive unity that occurs in a society. Education is a basic need for every individual in society. One thing taught in education is mathematics. Mathematics influences human character, such as religion, social life, language, economics, and so on (Hibatillah, 2020; Intania & Sutama, 2020; Ismail et al., 2022; Isro'iyah & Herminingsih, 2023; Jaelani et al., 2020). Humans try to develop this process using mathematics to fulfill basic life needs such as measuring, understanding modeling, and solving everyday problems (Juhaevah, 2022). Each place has different processes and characteristics according to the social culture of each region. Many scientists say that mathematics is integrated with culture.

Mathematics and culture are an interrelated unity. It is necessary to note the historical forms of mathematical ideas that occurred in various places in cultural contexts before traditions originating from past cultures were lost. D'Ambrosio (1985) said that mathematics practiced among cultural groups, such as ethnic groups that inhabit certain areas, labor groups, children of specific age groups, and professional classes, is called Ethnomathematics (Mania & Alam, 2021). Ethnomathematics is a science that is used to understand how mathematics is adapted from culture and functions to express the relationship between culture and mathematics (Hartati, 2022; Mania & Alam, 2021; Munthahana et al., 2023; Putra & Mahmudah, 2021; Sari et al., 2023). It can also be described as an art or technique developed by various people to explain, understand, and overcome problems in their environment. Ethnomathematics is a program that seeks to study how students understand, articulate, process, and ultimately use mathematical

ideas, concepts, procedures, and practices and can solve problems related to daily activities (Ervi & Ambrita, 2022). Ethnomathematics is not new but has existed since the introduction of mathematics. Through ethnomathematics, mathematical concepts can be studied in cultural practices (Moriolkosu et al., 2020; Nurjanah et al., 2021; Prahmana & D'Ambrosio, 2020; Sari et al., 2022; Umbara et al., 2021).

Ethnomathematics aligns with constructivism theory, which helps students improve their understanding and knowledge of mathematics by connecting school subjects with their previous experiences and knowledge. Students at school come from different cultural backgrounds, and a teacher must respect these differences (Darling-Hammond, 2021; Joram et al., 2020; Karlberg & Bezzina, 2022; Lee et al., 2020; Rowan et al., 2020). When teachers respect differences in ways of learning that are influenced by culture, this will foster self-confidence (Alaei & Ameri, 2021; Cutri et al., 2021; Pishghadam et al., 2023; Suri & Chandra, 2021; Tuhuteru, 2023; Ulfa et al., 2021). Education is a process of transfer of knowledge as an interactive activity in learning which is carried out interactively (Ariani & Tawali, 2021; Rivadeneira & Inga, 2023; Sardi et al., 2022; Uzumcu & Acilmis, 2023; Wahyuddin et al., 2022). Culture-based learning can be divided into three types: learning about culture, learning with culture, and learning through culture. Four things must be considered in culture-based learning, namely substance and competency in the field of study, meaningfulness, and learning process, assessment of learning outcomes, and the role of culture (Adlis et al., 2022; Bina et al., 2023; Faidah & Maarif, 2022; Fuad et al., 2020; Mustakim & Hasan, 2020). Culture-based learning emphasizes achieving integrated understanding rather than just in-depth understanding.

Indonesia is an archipelagic country; each island has different ethnic groups and cultures. Simple examples on the island of Sumatra consist of Acehnese, Minangkabau, Mandailing, Malay, and other cultures. Mandailing is the name of a tribe and region in the Mandailing Natal district, North Sumatra (Pane et al., 2022). The Mandailing tribe has similarities with other ethnic groups, such as the existence of a clan system and respect for customs. Mandailing culture has customs, heritage, or traditions that must be maintained and preserved by the current generation. Because Mandailing culture has characteristics that differentiate it from other regional cultures, Mandailing culture must be preserved as a national culture. Some of the Mandailing cultures are the Bagas Godang and Sopo Godang traditional houses (Siregar & Malau, 2021), the Gordang Sembilan musical instrument (Grace et al., 2022), the Mandailing script writing system, traditional woven cloth, Ulos/Abit Godang, and Traditional Speech Markobar (Ardian, 2023). The research question in this article is how can Batak Angkola culture be used in learning? Can the Batak Angkola culture philosophy be used in the learning model?

RESEARCH METHOD

To provide a concrete and comprehensive understanding of how Batak Angkola culture is used in learning and the philosophy of Batak Angkola culture that data is used in learning, researchers conducted library research using the SLR (Systematic Literature Review) method. SLR uses systematic and specific methods to identify, select, and collect all research materials relevant to a particular research question (Prahani et al., 2020; Rizki et al., 2022; Saphira, 2022; Saphira et al., 2023; Suliyanah et al., 2021). SLR is a prevalent review method, so it is widely used in various research fields. The methodology used in this research is the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) model. This methodology consists of well-defined review stages, eligibility

criteria developed and explained from information sources, a literature search strategy, a literature selection process, and data synthesis based on the literature selected.

In searching for related articles, the keywords used for metadata are ethnomathematics OR ethnomathematics) AND (Batak Angkola Culture OR Batak Angkola Culture) AND (Mathematics learning or Mathematics learning). Metadata search using Google Scholar via the Publish or Perish program on November 13, 2023. The search was limited to the last six years, from 2018 to 2023. The Mendeley Reference Manager program assisted in the metadata selection process based on exclusion and inclusion criteria. Figure 1. Shows the flow of the methodology used to select metadata based on predetermined criteria. Figure 1 shows the methodology flow used to select metadata based on predetermined criteria.

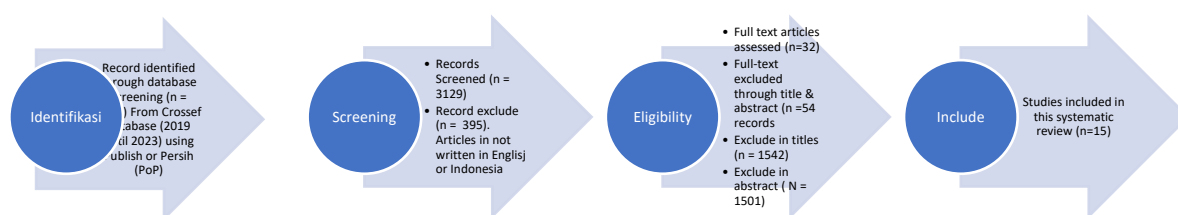


Figure 1. Research methodology flow for data selection using the PRISMA model.

Data Extraction and Analysis

Researchers obtained 14 articles from 3524 metadata, as seen in Table 1. Articles were further analyzed to provide data findings regarding the research questions. Initially, a comprehensive review and analysis of the ethnomathematics of the Angkola Batak tribe, level of education, and context in learning mathematics.

RESULTS AND DISCUSSION

Results

Before analyzing the main research objectives, researchers filtered three keywords in the 14 study articles to observe the main themes that will be discussed and analyzed. The three keywords are ethnomathematics, Batak Angkola culture, and mathematics learning. These initial findings indicate that the primary concern of the ethnomathematics of the Angkola Batak culture in mathematics learning is its relationship with aspects of mathematics learning outcomes.

Methodology and Assessment

This section looks at the methodological approaches used in the 14 articles in the systematic review and assessment used to collect the data. Researchers found the development method to be the most dominant method compared to other methods, such as mixed method experiments and descriptive methods. Illustrates data collection techniques in all research from various instruments. The most commonly used instruments are questionnaires, tests and assessments, surveys, and interviews (Some studies use not only one data collection instrument but also mixed instruments or several instruments).

Table 1. Articles that have been selected using the PRISMA model.

Years	Level of education	Mathematics Material	Cultural Context	References
2018	Junior high school	Geometry	Gordang Sambilan musical instrument	(Lubis et al., 2018)

Years	Level of education	Mathematics Material	Cultural Context	References
2019	Junior high school	Geometry	Dengklek Game	(Fauzi & Lu'luilmaknun, 2019)
2019	College	-----	Angkola Batak traditional assembly	(Susilowati & Nasoichah, 2019)
2020	Elementary school	-----	Batak script	(Lubis et al., 2020)
2022	General	The concept of number and measurement	The language used by the Angkola Batak	(Rhamayanti et al., 2022)
2022	College	Development of learning models	Angkola cultural experience in the learning model	(Azizan et al., 2022)
2022	Junior high school	-----	Makobar Boru	(Putra, 2020)
2022	Junior high school	Geometry	Ulos woven fabric	(Panjaitan et al., 2022)
2022	Senior High School	Building Design via Android	Encyclopedia of the Batak tribe	(Akhir et al., 2022)
2022	General	Number	Batak Script	(Ardian, 2023)
2023	Elementary school	Geometry	Angkola Batak Woven Cloth	(Marta & Tanjung, 2019)
2023	Senior High School	Number series	Ulos Abit Godang woven cloth	(Salamah, 2023)
2023	Elementary school	----	Marsitekka Game	
2023	Elementary school	Geometry	Tutup Ari	(Harahap et al., 2023)

Discussion

Education Level, Cultural Content, and Educational Context

The 14 research articles that have been collected are divided into four school levels, namely Elementary School (ES), Middle School (JHS), High School (SHS), and General. What general means here is that researchers conduct helpful research for the general public. Ethnomathematics is more widely used in elementary and middle school, likely in Figure 2.

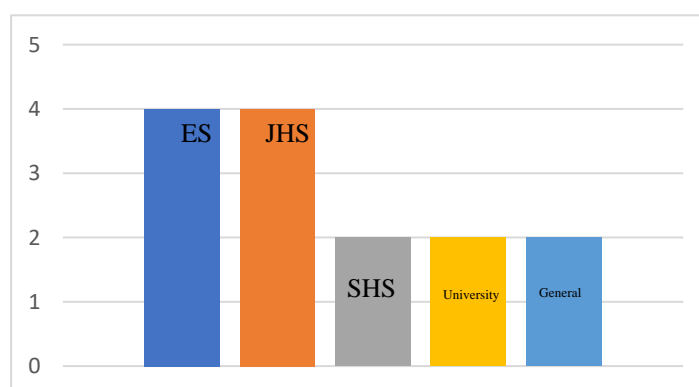


Figure 2. Ethnomathematical research on Angkola Batak culture from 14 articles from 2018 to 2023.

There are four articles each for elementary and middle school levels; this shows that the use of ethnomathematics for learning mathematics can be applied more to concrete development. Piaget stated that knowledge is easily obtained from elaborative exploration, construction, and manipulation activities. Cognitive development has a significant impact on children (Amodia-Bidakowska et al., 2020; Arfé et al., 2020; Cooper & Stewart, 2021; Neece et al., 2020; Vanbecelaere et al., 2020). Elementary school-age children experience concrete operational development; children can think logically but must be assisted with natural objects (Arslanoğlu et al., 2023; Hayun & Hutami, 2024; Permana & Utomo, 2021; Rasmita & Hodijah, 2022; Rohmah et al., 2022). Teachers must be able to guide children in forming particularly relevant concepts. By presenting culture in learning, it creates a concrete learning environment. For example, the Dengklek game can be a medium for children in the elementary school stage to learn geometry. Dengklek has essential geometric elements such as rectangles, squares, and semicircles (Juhaevah, 2022). This media teaches elementary school students the formulas for squares, rectangles, and circles. This can be seen in Figure 3.



Figure 3. Dengklek game.

Source: Engklek Game: History, How to Play, Benefits and Tools Used Page all - Kompas.com.

Meanwhile, in terms of cultural content, the first is classified into artifacts, namely cultural objects used, for example, traditional houses, mats, and traditional food. The second is philosophy, namely the meaning of life in that culture (Nur et al., 2020; Sunzuma et al., 2021; Umbara et al., 2021). For example, some meanings can be used in traditional ceremonies as learning. In the 14 articles studied, 64.29% of researchers used artifacts as learning media. Geometry dominates ethnomathematics (Trisnani et al., 2021; Usodo, 2023). The researchers lifted artifacts such as traditional houses, musical instruments, and food to show geometric symbols. The reason is simple: these artifacts are close to the student's environment. However, students still need to understand that these artifacts contain mathematical elements.

For the philosophy of life, only 28.57% is used in learning. This means there still needs to be more meaning to life in mathematics learning. One that uses it is research producing a learning model from the acronym ANGKOLA. The Angkola acronym used is not just an acronym but combines the customs and norms that apply to the Angkola community.

At the tertiary level, the source of learning from the ethnomathematics of the Angkola Batak culture is the philosophy of life in traditional siding activities. Some people must be elders who become policymakers or can be called Dalihan Na Tolu. Many life philosophies can be applied in everyday life in the series of religious activities. However, a few still use it as a learning model. Many studies have proven that using cultural artifacts as learning media can improve learning outcomes and student motivation (Agusdianita & Karjiyati, 2021).

CONCLUSION

Fundamental Finding: This research shows that learning using culture can improve student learning outcomes. Learning that can be used using ethnomathematics is at the elementary school and junior high school levels. By Piaget's theory, at this level, students faced with problems require tools to solve them. The use of philosophy produced from culture still needs to be improved. The ethnomathematics used is still an artifact.

Implication: This research aims to determine whether ethnomathematics can be used in learning. From research results by reading journals, ethnomathematics can improve student learning outcomes. **The limitation** of this article is that it only examines 14 journals, which still needs to be improved to detail whether philosophy can be made a part of learning. The following research examines how the philosophy of the Angkola Batak culture can be raised in learning. **Future Research:** The following research examines how philosophy in the Angkola Batak culture can be raised in learning.

REFERENCES

- Adlis, Y., Soma, R., & Sufri, S. (2022). Improving students reading skills in understanding english texts using culture-based text teaching materials. *Jurnal Basicedu*, 6(3), 3665–3673. <https://doi.org/10.31004/basicedu.v6i3.2695>
- Agusdianita, N., & Karjiyati, V. (2021). The use of ethnomathematics learning devices based on realistic mathematics education models on mathematics literacy mastery. *Proceedings of the International Conference on Educational Sciences and Teacher Profession*, 1-9. <https://doi.org/10.2991/assehr.k.210227.054>
- Akhir, M., Bungsu, P., Haryanto, E. V., Elisabeth, N., Lazuli, I., & Akbar, M. B. (2022). Rancang bangun aplikasi ensiklopedia suku batak berbasis android. *Jurnal Sistem Informasi dan Teknologi Informasi*, 11(2), 1-14.
- Alaei, M. M., & Ameri, A. F. (2021). Research into Teachers' (Dis)Respect for learners: A cross-cultural study of english language teachers' and learners' perceptions. *Education Research International*, 1-10. <https://doi.org/10.1155/2021/2435376>
- Amodia-Bidakowska, A., Lavery, C., & Ramchandani, P. G. (2020). Father-child play: A systematic review of its frequency, characteristics and potential impact on children's development. *Developmental Review*, 57, 1-23. <https://doi.org/10.1016/j.dr.2020.100924>
- Ardian, R. (2023). Eksplorasi etnomatematika pada aksara batak. *SEPREN: Jurnal of Mathematics Education and Applied*, 2(1), 354-362. <https://doi.org/10.36655/sepren.v2i1.354>
- Arfé, B., Vardanega, T., & Ronconi, L. (2020). The effects of coding on children's planning and inhibition skills. *Computers & Education*, 148, 1-20. <https://doi.org/10.1016/j.compedu.2020.103807>
- Ariani, S., & Tawali, T. (2021). Problems of online learning during COVID-19 pandemic in speaking for professional context class. *Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP*, 8(1), 32-42. <https://doi.org/10.33394/jo-elt.v8i1.3783>

- Arslanoğlu, İ. I., Kert, S. B., & Tonbuluğlu, İ. (2023). Think together, design together, code together: the effect of augmented reality activity designed by children on the computational thinking skills. *Education and Information Technologies*, 1-15. <https://doi.org/10.1007/s10639-023-12153-1>
- Azizan, N., Surya, E., & Arafat Lubis, M. (2022). Model experience berbasis budaya angkola untuk mengembangkan keterampilan mengajar mahasiswa di abad 21. *Forum Paedagogik*, 13(1), 75-88. <http://dx.doi.org/10.24952/paedagogik.v13i1.5177>
- Bina, N., Armanto, D., & Rajagukguk, W. (2023). Development of digital mathematics comic learning media "webtoon" based karo culture. *Proceedings of the 8th Annual International Seminar on Transformative Education and Educational Leadership*, 1-8. <https://doi.org/10.4108/eai.19-9-2023.2340427>
- Cooper, K., & Stewart, K. (2021). Does household income affect children's outcomes? A systematic review of the evidence. *Child Indicators Research*, 14(3), 981-1005. <https://doi.org/10.1007/s12187-020-09782-0>
- Cutri, J., Freya, A., Karlina, Y., Patel, S. V., Moharami, M., Zeng, S., Manzari, E., & Pretorius, L. (2021). Academic integrity at doctoral level: The influence of the imposter phenomenon and cultural differences on academic writing. *International Journal for Educational Integrity*, 17(1), 8-22. <https://doi.org/10.1007/s40979-021-00074-w>
- D'Ambrosio, U., & Rosa, M. (2017). *Ethnomathematics and its pedagogical action in mathematics education*. Springer, Cham. https://doi.org/10.1007/978-3-319-59220-6_12
- Darling-Hammond, L. (2021). Defining teaching quality around the world. *European Journal of Teacher Education*, 44(3), 295-308. <https://doi.org/10.1080/02619768.2021.1919080>
- Ervi Ladona, E., & Ambrita, A. (2022). Development of local wisdom realistic mathematics education based students activity sheet on students' mathematics problem solving ability. *Numerical: Jurnal Matematika dan Pendidikan Matematika*, 6(1), 1-15. <https://doi.org/10.25217/numerical.v6i1>
- Faidah, N., & Maarif, M. A. (2022). Literacy-based islamic cultural history learning at islamic elementary school. *Jurnal Pendidikan Islam Indonesia*, 6(2), 345-351. <https://doi.org/10.35316/jpii.v6i2.345>
- Fauzi, A., & Lu'luilmaknun, U. (2019). Etnomatematika pada permainan dengklag sebagai media pembelajaran matematika. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 8(3), 408-422. <https://doi.org/10.24127/ajpm.v8i3.2303>
- Fuad, D. R. S. M., Musa, K., & Hashim, Z. (2020). Innovation culture in education: A systematic review of the literature. *Management in Education*, 36(3), 135-149. <https://doi.org/10.1177/0892020620959760>
- Grace, S., Harahap, E., & Sinulingga, J. (2022). Tradisi upacara saur matua etnik batak angkola/mandailing: kajian semiotika social. *Kompetensi*, 15(2), 182-186. <https://doi.org/10.36277/kompetensi.v15i2.77>
- Harahap, R., Pulungan, N. A., Adinda, A., Nasution, M., Ahmad, A., & Rangkuti, N. (2023). Ethnomathematics on the tutup ari of the south tapanuli regent's office building. *Jurnal Ilmu-ilmu Pendidikan dan Sains*, 11(1), 1-16. <https://doi.org/10.24952/logaritma.v11i1.6771>
- Hartati, C. D. A. (2022). The impact of ethnomathematics on contextual mathematics learning in elementary school. *EDUPEDIKA: Jurnal Studi Pendidikan dan Pembelajaran*, 1(2), 53-61.
- Hayun, M., & Hutami, Y. (2024). Realistic mathematic education (RME) approach assisted by time board displays on the mathematical cognitive abilities of elementary school students. *International Journal of Business, Law, and Education*, 5(1), 466-472. <https://doi.org/10.56442/ijble.v5i1.408>
- Hibatillah, H. M. (2020). The concept of akhlaq in islamic educational curriculum. *Educational Review: International Journal*, 19(3), 7-17.
- Intania, E. V., & Utama, S. (2020). The role of character education in learning during the COVID-19 pandemic. *Jurnal Penelitian Ilmu Pendidikan*, 13(2), 129-136. <https://doi.org/10.21831/jpipfip.v13i2.32979>

- Ismail, I., Ali, H., & Anwar Us, K. (2022). Factors affecting critical and holistic thinking in islamic education in indonesia: Self-concept, system, tradition, culture. (Literature review of islamic education management). *Dinasti International Journal of Management Science*, 3(3), 407–437. <https://doi.org/10.31933/dijms.v3i3.1088>
- Isro'iyah, L., & Herminingsih, D. I. (2023). Teaching culture of others through english literature : English. *International Journal of Language and Literary Studies*, 5(2), 136–146. <https://doi.org/10.36892/ijlls.v5i2.1248>
- Jaelani, A., Mansur, A. S, Zaqiyah, Q. (2020). Building morality and ethics through islamic religious education in schools. *International Journal of Graduate of Islamic Education*, 13–24. <https://doi.org/10.37567/ijgie.v5i1.2685>
- Joram, E., Gabriele, A. J., & Walton, K. (2020). What influences teachers' "buy-in" of research? Teachers' beliefs about the applicability of educational research to their practice. *Teaching and Teacher Education*, 88, 1-23. <https://doi.org/10.1016/j.tate.2019.102980>
- Juhaevah, F. (2022). Developing mathematics problems using local wisdom context of Maluku to improve students' numeracy. *Jurnal Elemen*, 8(1), 323–339. <https://doi.org/10.29408/jel.v8i1.4524>
- Karlberg, M., & Bezzina, C. (2022). The professional development needs of beginning and experienced teachers in four municipalities in Sweden. *Professional Development in Education*, 48(4), 624–641. <https://doi.org/10.1080/19415257.2020.1712451>
- Lee, H., Lee, H., & Zeidler, D. L. (2020). Examining tensions in the socioscientific issues classroom: Students' border crossings into a new culture of science. *Journal of Research in Science Teaching*, 57(5), 672–694. <https://doi.org/10.1002/tea.21600>
- Lubis, B. O., Ghofar, T., Salim, A., & Santoso, B. (2020). Penerapan model iteratif pada animasi edukatif pengenalan aksara mandailing sebagai pelestarian warisan budaya bangsa. *SATIN - Sains Dan Teknologi Informasi*, 6(2), 34–45. <https://doi.org/10.33372/stn.v6i2.665>
- Lubis, S. I., Mujib, A., & Siregar, H. (2018). Eksplorasi etnomatematika pada alat musik gordang sambilan. *Edumatika : Jurnal Riset Pendidikan Matematika*, 1(2), 1–10. <https://doi.org/10.32939/ejrpm.v1i2.246>
- Mania, S., & Alam, S. (2021). Teachers' perception toward the use of ethnomathematics approach in teaching math. *International Journal of Education in Mathematics, Science and Technology*, 9(2), 282–298. <https://doi.org/10.46328/IJEMST.1551>
- Mania, S., & Alam, S. (2021). Teachers' perception toward the use of ethnomathematics approach in teaching math. *International Journal of Education in Mathematics, Science and Technology*, 9(2), 282–298. <https://doi.org/10.46328/IJEMST.1551>
- Marta A. S. F., & Tanjung, T. (2019). Analisis pelaksanaan pembelajaran tematik dengan pendekatan multiple intelligences berbasis budaya batak angkola untuk siswa kelas IV sekolah dasar. *Jurnal Education and Development*, 7(4), 302–322. <https://doi.org/10.37081/ed.v7i4.1427>
- Moriolkosu, A., Handayani, S. S. D., & Sunarso, A. (2020). Ethnomathematics and ethnosience analysis of aru culture related to mathematics and science concepts at elementary school. *Educational Management*, 9(2), 163–171.
- Munthahana, J., Teguh, B. M., & Wintarti, A. (2023). The application of ethnomathematics in numeracy literacy perspective: A literature review. *Indonesian Journal of Science and Mathematics Education*, 6, 177–191. <https://doi.org/10.24042/ijsme.v5i1.17546>
- Mustakim, M., & Hasan, H. (2020). The application of local culture-based character education at SMAN 4 enrekang. *Edumaspul: Jurnal Pendidikan*, 4(2), 140–149. <https://doi.org/10.33487/edumaspul.v4i2.642>
- Neece, C., McIntyre, L. L., & Fenning, R. (2020). Examining the impact of COVID-19 in ethnically diverse families with young children with intellectual and developmental disabilities. *Journal of Intellectual Disability Research*, 64(10), 739–749. <https://doi.org/https://doi.org/10.1111/jir.12769>

- Nur, A. S., Waluya, S. B., Rochmad, R., & Wardono, W. (2020). Contextual learning with Ethnomathematics in enhancing the problem solving based on thinking levels. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, 5(3), 331-344. <https://doi.org/10.23917/jramathedu.v5i3.11679>
- Nurjanah, N., Mardia, I., & Turmudi, T. (2021). Ethnomathematics study of minangkabau tribe: formulation of mathematical representation in the marosok traditional trading. *Ethnography and Education*, 16(4), 437-456. <https://doi.org/10.1080/17457823.2021.1952636>
- Pane, S. M., Priyono, C. D., & Sormin, S. A. (2022). Studi eksplorasi muatan pendidikan karakter dalam tradisi makkobar boru pada masyarakat batak angkola. *EDUKATIF: Jurnal Ilmu Pendidikan*, 4(2), 1914-1922. <https://doi.org/10.31004/edukatif.v4i2.2380>
- Panjaitan, A. M., Etnomatematika, D.-S., Datar, B., Motif, P., Seni, K., Kain, K., Panjaitan¹, A. M., Pulungan², R., & Ambarawati, M. (202). Studi etnomatematika: Bangun datar pada motif karya seni kriya kain ulos, Sumatera utara. *Prosiding Seminar Nasional IKIP Budi Utomo*, 1-10. <https://doi.org/10.33503/prosiding.v3i01.2452>
- Permana, D., & Utomo, U. (2021). Learning needs analysis: Thematic teaching book based on HOTS assisted with 3D stereoscopic images to improve critical thinking ability of elementary school students. *International Journal for Educational and Vocational Studies*, 3(2), 116-129. <https://doi.org/10.29103/ijevs.v3i2.3294>
- Pishghadam, R., Derakhshan, A., Zhaleh, K., & Al-Obaydi, L. H. (2023). Students' willingness to attend EFL classes with respect to teachers' credibility, stroke, and success: A cross-cultural study of Iranian and Iraqi students' perceptions. *Current Psychology*, 42(5), 4065-4079. <https://doi.org/10.1007/s12144-021-01738-z>
- Prahani, B. K., Jatmiko, B., Hariadi, B., Sunarto, D., Sagirani, T., Amelia, T., & Lemantara, J. (2020). Blended web mobile learning (BWML) model to improve students' higher order thinking skills. *International Journal of Emerging Technologies in Learning*, 15(11), 42-55. <https://doi.org/10.3991/IJET.V15I11.12853>
- Prahmana, R. C. I., & D'Ambrosio, U. (2020). Learning geometry and values from patterns: Ethnomathematics on the batik patterns of Yogyakarta, Indonesia. *Journal on Mathematics Education*, 11(3), 439-456. <https://doi.org/10.22342/jme.11.3.12949.439-456>
- Putra, D. (2020). Tradisi markobar dalam pernikahan adat mandailing dalam perspektif hukum Islam. *El-Ahli : Jurnal Hukum Keluarga Islam*, 1(2), 18-34. <https://doi.org/10.56874/el-ahli.v1i2.311>
- Putra, E. C. S., & Mahmudah, F. N. (2021). The implementation of ethnomathematics based-learning for students. *SJME (Supremum Journal of Mathematics Education)*, 5(2), 1-20. <https://doi.org/10.35706/sjme.v5i2.4827>
- Rasmita, R., & Hodijah, H. (2022). The efforts to improve student learning outcomes through RME approach to mathematics subtraction operation in 4th grade SDN Sukasari 2. *JPSd (Jurnal Pendidikan Sekolah Dasar)*, 8(1), 134-147. <http://dx.doi.org/10.30870/jpsd.v8i1.14044>
- Rhamayanti, Y., Harahap, H. H., Lubis, N. A., Graha, U., Padangsidempuan, N., & Selatan, A. T. (2022). Bahasa matematis masyarakat Batak Tapanuli Selatan (TAPSEL). *Mathematic Education Journal MathEdu*, 5(2), 64-70. <https://doi.org/10.37081/mathedu.v5i2.4071>
- Rivadeneira, J., & Inga, E. (2023). Interactive peer instruction method applied to classroom environments considering a learning engineering approach to innovate the teaching-learning process. *Education Sciences*, 13(3), 1-14. <https://doi.org/10.3390/educsci13030301>
- Rizki, I. A., Suprpto, N., & Admoko, S. (2022). Exploration of physics concepts with traditional Engklek (hopscotch) game: Is it potential in physics ethno-STEM learning? *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 11(1), 19-33. <https://doi.org/10.24042/jipf%20al-biruni.v11i1.10900>
- Rohmah, N. S., Wilandari, M., & Darsinah, D. (2022). Teori perkembangan Jean Piaget dan implikasinya dalam perkembangan anak sekolah dasar. *Jurnal Ilmiah Wahana Pendidikan*, 8(12), 1-10. <https://doi.org/10.5281/zenodo.6944543>

- Rowan, L., Bourke, T., L'Estrange, L., Lunn, B. J., Ryan, M., Walker, S., & Churchward, P. (2020). How does initial teacher education research frame the challenge of preparing future teachers for student diversity in schools? A systematic review of literature. *Review of Educational Research*, 91(1), 112–158. <https://doi.org/10.3102/0034654320979171>
- Salamah, B. G. S. (2023). Ethnomathematics in ulos abit godang of south tapanuli, north sumatra. *Indonesian Journal of Science and Mathematics Education*, 1-16. <https://doi.org/10.24042/ij sme.v5i1.19334>
- Saphira, H. V. (2022). Integrating local wisdom-based learning to preparing the pancasila students' profile, yes or no? *International Journal of Current Educational Research*, 1(1), 18–35. <https://doi.org/10.53621/ijocer.v1i1.136>
- Saphira, H. V., Prahani, B. K., Jatmiko, B., & Amelia, T. (2023). The emerging of digital revolution : A literature review study of mobile and android based e-pocket book in physics learning. *Advances in Mobile Learning Educational Research*, 3(1), 718–726. <https://doi.org/10.25082/AMLER.2023.01.020>
- Sardi, A., Firmansyah J. N. M., Walid, A., & Ahmad, A. K. (2022). An analysis of difficulties in online english learning experienced by the EFL teacher. *Inspiring: English Education Journal*, 5(2), 144–154. <https://doi.org/10.35905/inspiring.v5i2.2806>
- Sari, A. K., Budiarto, M. T., & Ekawati, R. (2022). Ethnomathematics study: Cultural values and geometric concepts in the traditional “tanean-lanjang” house in madura – indonesia. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, 7(1), 46–54. <https://doi.org/10.23917/jramathedu.v7i1.15660>
- Sari, N., Saragih, S., Napitupulu, E. E., Rakiyah, S., Sari, D. N., Sirait, S., & Anim, A. (2023). Applying ethnomathematics in learning mathematics for middle school students. *Acta Scientiae*, 25(5), 250–274. <https://doi.org/10.17648/acta.scientiae.7690>
- Siregar, M. R., & Malau, W. (2021). Indahan tukkus jagar-jagar pasae robu in the marriage custom of the angkola bataknese in tanobato village, north padangsidimpunan district. *Jurnal Antropologi Sumatera*, 19(1), 52–61.
- Suliyannah, S., Deta, U. A., Kurniawan, F. K., Lestari, N. A., Yantidewi, M., Jauhariyah, M. N. R., & Prahani, B. K. (2021). Literature review on the use of educational physics games in improving learning outcomes. *Journal of Physics: Conference Series*, 1805(1), 1-8. <https://doi.org/10.1088/1742-6596/1805/1/012038>
- Sunzuma, G., Zezekwa, N., Gwizangwe, I., & Zinyeka, G. (2021). A comparison of the effectiveness of ethnomathematics and traditional lecture approaches in teaching consumer arithmetic: Learners' achievement and teachers' views. *Pedagogical Research*, 6(4), 20-31. <https://doi.org/10.29333/pr/11215>
- Suri, D., & Chandra, D. (2021). Teacher's strategy for implementing multiculturalism education based on local cultural values and character building for early childhood education. *Journal of Ethnic and Cultural Studies*, 8(4), 271–285. <https://doi.org/10.29333/ejecs/937>
- Susilowati, N., & Nasoichah, C. (2019). Makna keruangan dalam sidang adat, wujud kearifan lokal subetnis batak angkola-mandailing. *PURBAWIDYA: Jurnal Penelitian dan Pengembangan Arkeologi*, 8(2), 165–180. <https://doi.org/10.24164/pw.v8i2.309>
- Trisnani, N., Tri, W., & Utami, P. (2021). Education ethnomathematics-based learning tools. *International Journal of Elementary Education*, 5(4), 593–600. <https://doi.org/10.23887/ijee.v5i4.40574>
- Tuhuteru, L. (2023). The role of citizenship education in efforts to instill democratic values. *International Journal Of Humanities Education and Social Sciences*, 2(4), 1-25. <https://doi.org/10.55227/ijhess.v2i4.361>
- Ulfa, E., Djubaedi, D., Sumarna, C., Fatimah, S., Suklani, S., & Hidayat, A. (2021). The role of teachers in fostering religious multiculturalism. *International Journal of Multicultural and Multireligious Understanding*, 8(10), 349-362. <https://doi.org/10.18415/ijmmu.v8i10.3065>
- Umbara, U., Wahyudin, W., & Prabawanto, S. (2021). Exploring ethnomathematics with ethnomodeling methodological approach: How does cigugur indigenous people using

- calculations to determine good day to build houses. *Eurasia Journal of Mathematics, Science and Technology Education*, 17(2), 1–19. <https://doi.org/10.29333/EJMSTE/9673>
- Umbara, U., Wahyudin, W., & Prabawanto, S. (2021). How to predict good days in farming: ethnomathematics study with an ethnomodelling approach. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, 6(1), 71–85. <https://doi.org/10.23917/jramathedu.v6i1.12065>
- Usodo, B. (2023). The New Way Improve mathematical literacy in elementary school: Ethnomathematics module with realistic mathematics education. *Jurnal Pendidikan*, 15(1), 33–44. <https://doi.org/10.2591/alishlah.v15i1.2591>
- Uzumcu, O., & Acilmis, H. (2023). Do innovative teachers use AI-powered tools more interactively? a study in the context of diffusion of innovation theory. *Technology, Knowledge and Learning*, 1–22. <https://doi.org/10.1007/s10758-023-09687-1>
- Vanbecelaere, S., Van den Berghe, K., Cornillie, F., Sasanguie, D., Reynvoet, B., & Depaepe, F. (2020). The effects of two digital educational games on cognitive and non-cognitive math and reading outcomes. *Computers & Education*, 143, 1–15. <https://doi.org/https://doi.org/10.1016/j.compedu.2019.103680>
- Wahyuddin, W., Ernawati, E., Satriani, S., & Nursakiah, N. (2022). The application of collaborative learning model to improve student's 4Cs skills. *Anatolian Journal of Education*, 7(1), 93–102. <https://doi.org/10.29333/aje.2022.718a>

***Nurhasanah Siregar (Corresponding Author)**

Department of Mathematics Education Faculty of Mathematic and Natural Science
Universitas Negeri Medan
Jl. Williem Iskandar Pasar V, Medan, Indonesia
Email: nurhasanahsiregar@unimed.ac.id

Syawal Gultom

Department of Mathematics Education Faculty of Mathematic and Natural Science
Universitas Negeri Medan
Jl. Williem Iskandar Pasar V, Medan, Indonesia
Email: syawalgultom@unimed.ac.id

Mangaratau Marianus Simanjorang

Department of Mathematics Education Faculty of Mathematic and Natural Science
Universitas Negeri Medan
Jl. Williem Iskandar Pasar V, Medan, Indonesia
Email: m.simanjorang@unimed.ac.id
