



Pre-service mathematics teachers' numeracy in *Acehnese* culture-based minimum competence assessment

Marhami *, Rohantizani, Iryana Muhammad, Samsidar, Intan Anggraini

Department of Mathematics Education, Malikussaleh University, North Aceh, Indonesia

* Correspondence: marhami@unimal.ac.id

© The Authors 2023

Abstract

Pre-service mathematics teachers must have good numeracy skills because this ability is needed in all aspects of life, home, work, and society. This study aims to identify the numeracy skills of pre-service teachers on the *Acehnese* culture-based Minimum Competency Assessment (MCA). A descriptive quantitative method was used in this study with 24 numeracy MCA questions based on *Acehnese* culture as an instrument. The subject was 158 mathematics education students from three Aceh universities in their fourth and sixth semesters. The data were analyzed quantitatively and categorized based on high, medium, and low levels. The results showed that the overall numeracy ability of pre-service mathematics teachers is 50.06% in the medium category. At the level of knowing and applying, they received 69.38% and 46.62%, which were in the medium category. Meanwhile, they only obtained 39.76% in the low category for reasoning level. It indicated the student's lack of ability in higher-order thinking. These results are expected to be input for educators to arrange learning that develops the numeracy skills of pre-service teachers.

Keywords: *Acehnese* culture; minimum competency assessment; numeracy

How to cite: Marhami, Rohantizani, Muhammad, I., Samsidar, & Anggraini, I. (2023). Pre-service mathematics teachers' numeracy in *Acehnese* culture-based minimum competence assessment. *Jurnal Elemen*, 9(1), 109-119. <https://doi.org/10.29408/jel.v9i1.6765>

Received: 19 October 2022 | Revised: 23 October 2022

Accepted: 29 November 2022 | Published: 2 January 2023



Introduction

Numeracy is the ability to understand, reason with, and apply simple numerical concepts daily. Organization of Economic Co-operation and Development (OECD, 2016) reveals that numeracy is the knowledge and skill to use a variety of numbers and symbols related to basic mathematics to solve practical problems in various contexts of everyday life and to analyze information presented in various forms. It can be concluded that numeracy is an ability and students' skills in applying knowledge of mathematics and interpreting quantitative information are essential to solving contextual problems.

Numeracy is one of the skills set by United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2006 as one of the determinants of the nation's progress (Kemendikbud, 2017). This literacy is critical for students to master because it is closely related to applying mathematics to everyday life (Marhami, Lukman, et al., 2020; Muliani et al., 2021; Novita et al., 2021). When we can apply sensitivity to numeracy, of course, we will be able to manage our natural resources, and our human resources will be able to compete with other countries to become strong nations. In other words, a country's progress is directly related to how well its people can do the math, so efforts need to be made to improve math skills (Basri et al., 2021).

Numeracy is one measure of the quality of education in a country (Kurniawati & Kurniasari, 2019). So this numeracy is included in implementing the Minimum Competency Assessment (MCA) in schools. MCA is an effort made by the government to improve the quality of education in Indonesia in the mirror of the results of international assessments such as the Program for International Student Assessment (PISA) and Trends International Mathematics and Science Study (TIMSS), which are concerning. Based on these two international assessments, Indonesia has always been in the bottom 10 with a score that has yet to be satisfactory. Even in 2018, PISA's latest score of 379 is far from the international average (OECD, 2019). It led the Ministry of Education and Culture to replace the National Examination and focus on numeracy in MCA to improve scores in PISA and TIMSS in the next period (Kemendikbud, 2020a).

The unfamiliarity of Indonesian students with solving characteristic math problems such as TIMSS and PISA questions is one of the causes of low numeracy literacy skills at the international level (Wardhani & Rumiati, 2011). It is supported by the learning climate in schools where teachers must effectively provide students with habituation in solving problems requiring high-level thinking (Hadi & Novaliyosi, 2019; Marhami, Dahlan, et al., 2022). Numeracy is the basis of higher thinking or reasoning skills, such as critical thinking and solving problems (Dinni, 2018). In addition to research on students' numeracy skills (Baharuddin et al., 2021; Perdana & Suswandari, 2021; Sari et al., 2021), the numeracy abilities of pre-service teachers also deserve further study (Anderha & Maskar, 2021; Nadjamuddin & Hulukati, 2022). It is because pre-service mathematics teachers, who will later become good facilitators for students, must have good numeracy skills to improve students' numeracy skills.

Nadjamuddin and Hulukati (2022) revealed that the pre-service mathematics teachers' numeracy skills still need to improve. Their research shows that most students need to correct

their writing numbers and symbols in solving math problems. Other studies, such as [LeFevre et al. \(2017\)](#) and [Leder et al. \(2015\)](#), have discussed the urgency of pre-service teachers' numeracy. They found that most students recognized the importance of mathematics and its application in everyday life. However, less than half considered there were mathematical demands on teachers outside their teaching domain. Moreover, the implementation of numeracy is also seen in one of the MCA contexts, socio-cultural besides personal and scientific contexts.

Numeracy is closely related to culture in everyday life. In general, research on numeracy related to the culture of a society is explicitly studied in ethnomathematics ([D'Ambrosio, 1985](#)). It is also defined as the research of specific cultural groups' local mathematical practices in dealing with their environmental problems and everyday activities ([Rubio, 2016](#)). For example, research exploring the ethnomathematical ideas embedded in basketry, clay works, and house painting in the cultural heritage of Tharu of Dang ([Pradhan & Sharma, 2021](#)).

One of the Indonesian cultures that can be applied in numeracy is Acehnese culture ([Marhami & Rohantizani, 2021](#)), such as the art of saman dance ([Maryati & Pratiwi, 2019](#)) and Acehnese peasant culture ([Aulia & Rista, 2019](#)). Cultures outside Aceh, such as Muna traditional house in Southeast Sulawesi ([Yanti & Muna, 2018](#)) and the Kowai language in Western Papua ([Hendrawati et al., 2019](#)). However, there still needs to be more research examining pre-service teachers' numeracy skills from cultural aspects. Culture is an essential context in MCA and also becomes the character of a nation. Based on this, this study aims to identify the numeracy skills of pre-service mathematics teachers in the Acehnese culture-based Minimum Competency Assessment (MCA).

Methods

In this study, researchers wanted to identify the numeracy of pre-service teachers using MCA questions based on Acehnese culture. Therefore, this research used a descriptive quantitative method. We used descriptive quantitative because the data was presented in numerical and descriptive form. The sample in this study consisted of 158 pre-service mathematics education (86 students in the 4th semester and 72 students in the 6th semester) from three major campuses in three cities in Aceh, Indonesia. They were Malikussaleh University in North Aceh, the Institute for Islamic Religion of Lhokseumawe in Lhokseumawe City, and Al Muslim University in Bireun. They have studied several math courses and already have a mathematical mindset.

Twenty-four questions with the Acehnese culture-based MCA were used in this study. The test items were taken from the book of [Marhami and Rohantizani \(2021\)](#), which experts have validated, tested on high school students, and tested for instruments such as validity, reliability, difficulty level, and differentiation. Question items were arranged based on three cognitive levels: knowing, applying, and reasoning. The aspects of these three levels were: (1) Knowing level: remembering, identifying, classifying, counting, retrieving/obtaining, and measuring; (2) Applying level: choosing strategies, stating/modeling, applying/executing, and interpreting; and (3) Reasoning level: reasoning analyzing, integrating, evaluating, inferring, and justifying ([Kemendikbud, 2017](#)).

The data were analyzed in three categories: high, medium, and low abilities based on cognitive levels. The grouping of numeracy abilities based on test results, as shown in Table 1.

Table 1. Interpretation of the percentage of numeric MCA test

Score Range (%)	Category
71 - 100	High
41 - 70	Medium
≤ 40	Low

Results

This research was conducted on students in the fourth and sixth semesters from three significant campuses in three districts or cities in Aceh. The data on the results of Acehese culture-based numeracy skills for pre-service mathematics teachers at three major campuses in Aceh can be seen in Table 2.

Table 2. Scores on MCA numeration questions based on Acehese culture

Students	Descriptive Statistics				Category
	n	\bar{x}	s	%	
4 th Semester	86	16.477	5.085	53.151	Medium
6 th Semester	72	14.375	5.680	46.371	Medium
Overall	158	15.519	5.449	50.061	Medium
Ideal Maximum Score = 31					

Table 2 above shows the MCA value or score for numeracy based on Acehese culture, which is 15.519, half of the ideal maximum score of 31, and with a percentage of 50.06%. It illustrates that the numeracy skills of pre-service mathematics teachers are still in the moderate category. In the fourth semester, students' numeracy skills on the Acehese culture-based MCA questions obtained a higher percentage value of 6.78% than the students' abilities in the sixth semester.

The Aceh culture-based MCA questions given to research subjects contained three cognitive levels of pre-service teachers: knowing, applying, and reasoning. The results of the scores or values of 158 pre-service mathematics teachers on the MCA numeracy questions based on the Acehese culture in terms of cognitive level can be seen in Figure 1 below.

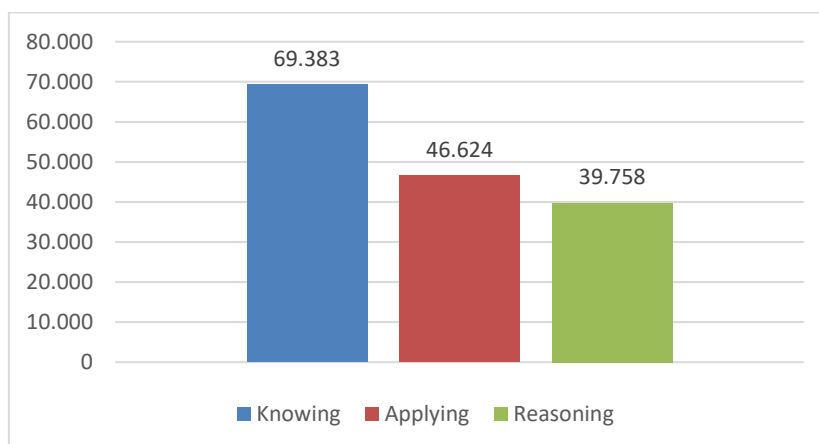


Figure 1. Percentage of cognitive MCA numeracy of pre-service mathematics teachers

Level of knowing aims to assess students' ability to recognize facts and concepts and identify processes and procedures for using mathematics in solving problems presented in the contextual form. At this level, students as pre-service mathematics teachers got 69.38% in the medium category. It means that most pre-service teachers can understand and solve the problem well. At the level they are applying, students are also in the medium category with a value of 46.624%, but the value is still below 50%. At the last level of reasoning, students still have difficulty solving problems that require reasoning ability, which is also one of the higher-order thinking skills (Dahlia et al., 2019; Marhami, Rohantizani, et al., 2020). It is shown in the average score obtained, which is a percentage of 39.76% in the low category.

The ability of pre-service mathematics teachers to MCA numeracy in this study based on *Acehnese* culture showed differences in students in the fourth and sixth semesters. It is shown in Table 3 below.

Table 3. Scores of numeracy MCA questions from the cognitive level in the fourth and sixth semester

Cognitive Level	4 th Semester					6 th Semester				
	n	\bar{x}	s	%	Category	n	\bar{x}	s	%	Category
Knowing	86	5.77	1.55	72.09	High	72	5.29	1.67	66.15	Medium
Applying	86	5.74	2.32	47.87	Medium	72	5.42	2.53	45.14	Medium
Reasoning	86	4.97	2.49	45.14	Medium	72	3.67	2.62	33.33	Low

In Table 3 above, almost all are in the medium category. The high category, with an average percentage of 72.09%, is shown by 4th-semester students at the knowing level. In contrast, the low category, with an average percentage of 33.33%, is at the reasoning in the sixth semester.

Discussion

This study aims to identify the numeracy skills of pre-service mathematics teachers for the *Acehnese* culture-based Minimum Competency Assessment (MCA). The instrument used in this study was 24 MCA numeracy questions based on *Acehnese* culture, distributed to 158 pre-service mathematics teachers. It showed that the numeracy skills of pre-service teachers on

MCA questions based on Acehese culture were moderate, with a percentage of 50.06%. Although classified as moderate, this value shows that students still do not have good numeracy skills, in line with research by [Basri et al. \(2021\)](#), [Nadjamuddin and Hulukati \(2022\)](#), and [\(Ayuningtyas & Sukriyah, 2020\)](#). At the same time, as future mathematics teacher candidates, students must have good numeracy skills to develop their students' numeracy in the future.

The subject, fourth semester and sixth semester of pre-service mathematics teachers, was chosen because students in that semester had taken numerous mathematics courses and thus had a mathematical mindset. So, based on these two student levels, it is discovered that pre-service teacher students in the 4th semester have a more extraordinary numeracy ability with a percentage of 53.15% compared to 6th-semester students with a value of 46.37%, and both are in the medium group.

Students must use various cognitive skills to answer existing issues in the Minimum Competency Assessment (MCA). The cognitive level of MCA numeracy is divided into three levels: knowing, applying, and reasoning. These three levels are linked together like the rungs of a ladder.

The first level is the level of knowledge. The goal of school mathematics is mentioned in Principles and Standards for School Mathematics ([NCTM, 2000](#)) that pupils study mathematics with knowledge. Deep understanding can assist students in developing new knowledge based on existing knowledge or experience ([Marhami, Hutabarat, et al., 2022](#); [Pangesti, 2018](#)). In this study, an average of 69.38% of pre-service mathematics teachers could identify facts, methods, concepts, and procedures for employing mathematics in problem-solving. This cognitive capacity reaches 72.09% in the high group among fourth-semester pupils.

Meanwhile, in the sixth semester, the score in the medium category was 66.15%. With this high level of understanding (more than 50%), it will be easier for students to use the ideas, facts, and processes they have learned to solve real-world problems. It is called level applying.

The next step after knowing is to apply what you have learned. Problems at the applying level aim to assess students' ability to apply mathematical concepts, facts, procedures, and processes in solving contextual problems, for example: perform arithmetic calculations, solve equations, make logical deductions from mathematical statements, perform mathematical manipulations, interpret information from tables and graphs, represent and manipulate form in space ([Marhami, Lukman, et al., 2020](#)). These 11 students out of 158 are applying in the high category. As a result, the average application rate in the medium category is 46.62%.

The third level is the reasoning level. Higher-order thinking skills, such as reasoning, are commonly referred to as higher-order thinking skills ([Brookhart, 2010](#)). The capacity will be examined in the PISA questions ([OECD, 2016](#)). The significance of this skill is inversely proportional to the outcomes of pre-service mathematics teachers' thinking ability, which is an average of 39.76% in the low category. This skill has the most significant level but the lowest score attained by pupils compared to other levels. Pre-service teacher students' inadequate reasoning ability demonstrates a lack of ability to examine information, synthesize, and draw conclusions in contextual difficulties ([Akuba et al., 2020](#); [Asdarina & Ridha, 2020](#); [Herizal et al., 2022](#)).

The Ministry of Education and Culture divides numeracy contexts into personal, sociocultural, and scientific (Kemendikbud, 2020b). Only one set is used in this study, the sociocultural context. Acehnese culture is used, with dances, costumes, and decorations incorporated into the MCA questions that assess pupils' numeracy skills. Because the culture exists around the student environment, incorporating Acehnese culture with MCA questions makes numeracy questions more contextual. On the other hand, students will be more interested in some long-forgotten Acehnese cultures (Rohantizani et al., 2022). As a result, students will be more interested in MCA numeracy problems based on Acehnese culture, which will indirectly boost students' understanding of Acehnese culture. As we know, cultural actors are not required to sustain a culture alone; any community can be a pioneer in conserving culture. As a result, incorporating Acehnese cultural elements into mathematics subject matter, particularly in Minimum Competency Assessment questions, can be an option for exposing Acehnese culture that incorporates arithmetic and numeracy skills.

Conclusion

Pre-service mathematics teachers' numeracy toward Aceh culture-based minimum competence assessment (MCA) is in the medium category. At the level of knowing and applying, their numeracy is also in the medium category. Meanwhile, they get a low category for the reasoning level. It shows the pre-service teachers' inability to perform higher-order thinking tasks such as processing information, synthesizing, and drawing conclusions in contextual circumstances.

This research is limited to the number of samples that could be more representative. There is a need for more comprehensive research on pre-service mathematics teachers at all Aceh universities. Then further research on learning that can improve the numeracy skills of pre-service math teachers can have implications for improving students' numeracy skills in Aceh and Indonesia.

Acknowledgment

The authors would like all participants to be involved in this research.

Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript.

Funding Statement

The Institute for Research and Community Service (LPPM) of Malikussaleh University supported this research under the non-tax state revenue budget (PNBP) in 2022, under the Expert Assistant Distributed Project [grand number 176/PPK-2/SPK-JL/2022]

Author Contributions

Marhami: Conceptualization, writing - original draft, methodology, and visualization; **Rohantizani:** Writing - review & editing, formal analysis; **Iryana Muhammad:** Editing and supervision. **Samsidar and Intan Anggraini:** Investigation.

References

- Akuba, S. F., Purnamasari, D., & Firdaus, R. (2020). Pengaruh kemampuan penalaran, efikasi diri dan kemampuan memecahkan masalah terhadap penguasaan konsep matematika [The effect of reasoning ability, self-efficacy and problem solving ability on mastery of mathematical concepts]. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 4(1), 44–60. <https://doi.org/10.33603/jnpm.v4i1.2827>
- Anderha, R. R., & Maskar, S. (2021). Pengaruh kemampuan numerasi dalam menyelesaikan masalah matematika terhadap prestasi belajar mahasiswa pendidikan matematika [The effect of numeracy ability in solving mathematical problems on the learning achievement of mathematics education students]. *Jurnal Ilmiah Matematika Realistik*, 2(1), 1–10. <https://doi.org/10.33365/ji-mr.v2i1.774>
- Asdarina, O., & Ridha, M. (2020). Analisis kemampuan penalaran matematis siswa dalam menyelesaikan soal setara PISA konten geometri [Analysis of students' mathematical reasoning ability in solving PISA-like problems on geometry content]. *Jurnal Numeracy*, 7(1), 35–48. <https://doi.org/10.46244/numeracy.v7i2.1167>
- Aulia, L., & Rista, L. (2019). Identifikasi konsep matematika melalui aktivitas etnomatematika petani sawah [Identification of mathematical concepts through ethnomathematical activities of rice farmers]. *Jurnal Pendidikan Matematika (JUDIKA EDUCATION)*, 2(2), 110–117. <https://doi.org/10.31539/judika.v2i2.857>
- Ayuningtyas, N., & Sukriyah, D. (2020). Analisis pengetahuan numerasi mahasiswa matematika calon guru [Analysis of numeracy knowledge of prospective mathematics students]. *Matematika dan Pendidikan Matematika*, 9(2), 237–247. <https://doi.org/10.33387/dpi.v9i2.2299>
- Baharuddin, M. R., Sukmawati, S., & Christy, C. (2021). Deskripsi kemampuan numerasi siswa dalam menyelesaikan operasi pecahan [Description of students' numeracy ability in solving fraction operations]. *Pedagogy: Jurnal Pendidikan Matematika*, 6(2), 90–101.
- Basri, H., Kurnadi, B., Syarifuddin, C. F. T., & Nugroho, P. B. (2021). Investigasi kemampuan numerasi mahasiswa calon guru matematika [Investigation of numeracy skills of mathematics teacher candidates]. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, 4(2), 72–79. <https://doi.org/10.30605/proximal.v4i2.1318>
- Brookhart, S. M. (2010). *How to assess higher-order thinking skills in your classroom*. ASCD Member Book.
- D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. *For the Learning of Mathematics*, 5(1), 44–48. <https://www.scinapse.io/papers/316331165>
- Dahlia, D., Marhami, M., & Mursalin, M. (2019). Improving students' mathematical critical thinking abilities through the problem solving method on the sequences and series course. *International Journal for Educational and Vocational Studies*, 1(7), 813–816. <https://doi.org/10.29103/ijevs.v1i7.2571>
- Dinni, H. N. (2018). HOTS (high order thinking skills) dan kaitannya dengan kemampuan literasi matematika [HOTS (high order thinking skills) and its relationship with mathematical literacy skills]. *Prosiding Prisma*, 1, 170–176. <https://journal.unnes.ac.id/sju/index.php/prisma/article/view/19597>

- Hadi, S., & Novaliyosi. (2019). TIMSS Indonesia (Trends In International Mathematics and Science Study). In. Tasikmalaya: National Conference & Call For Papers, Universitas Siliwangi.
- Hendrawati, N., Muttaqin, N., & Susanti, E. (2019). Etnomatematika: Literasi numerasi berdasarkan bahasa pada suku Kowai Kabupaten Kaimana [Ethnomathematics: Language-based numeracy literacy in Kowai Tribe of Kaimana Regency]. *Prosiding Seminar Nasional Integrasi Matematika dan Nilai Islami*, 3(1), 239–243.
- Herizal, H., Marhami, M., Fonna, M., & Rohantizani, R. (2022). Preservice mathematics teachers' reasoning. *Barekeng: Journal of Mathematics and Its Application*, 16(1), 1–6. <https://doi.org/10.30598/barekengvol16iss1pp001-006>
- Kemendikbud. (2017). Materi pendukung literasi numerasi: Gerakan literasi nasional [Numeracy literacy support materials: National literacy movement]. *Kementerian Pendidikan dan Kebudayaan*.
- Kemendikbud. (2020a). *AKM dan implikasinya dalam pembelajaran [AKM and its learning implications]*. Pusat Asesmen dan Pembelajaran, Badan Penelitian, Pengembangan, dan Perbukuan Kementerian Pendidikan dan Kebudayaan.
- Kemendikbud. (2020b). *Desain pengembangan soal AKM [AKM problem development design]*. Pusat Asesmen dan Pembelajaran, Badan Penelitian, Pengembangan, dan Perbukuan Kementerian Pendidikan dan Kebudayaan.
- Kurniawati, I., & Kurniasari, I. (2019). Literasi matematika siswa dalam menyelesaikan soal PISA konten space and shape ditinjau dari kecerdasan majemuk [Students' mathematical literacy in solving PISA questions on space and shape content based on multiple intelligences]. *Mathedunesa*, 8(2), 441–448.
- Leder, G. C., Forgasz, H. J., Kalkhoven, N., & Geiger, V. (2015, 2015). *Pre-service teachers and numeracy in and beyond the classroom [Paper presentation]*. *Mathematics education in the margins* Proceedings of the 38th Annual Conference of the Mathematics Education Research Group of Australasia (MERGA38,
- LeFevre, J. A., Douglas, H., & Wylie, J. (2017). Declines in numeracy skill among university students: Why does it matter? *Perspectives on Language and Literacy*, 43(1), 25–29. <https://dyslexiaida.org/perspectives>
- Marhami, M., Dahlan, J. A., & Subandar, J. (2022). Improving the mathematical relational understanding ability of junior high school students through cognitive conflict learning. *Theta: Jurnal Pendidikan Matematika*, 4(1), 1–9.
- Marhami, M., Hutabarat, F. S., & Muliana, M. (2022). Peningkatan kemampuan berpikir kritis matematis siswa SMA melalui pendekatan realistic mathematics education [Improving high school students' mathematical critical thinking skills through a realistic mathematics education approach]. *Jurnal Dedikasi Pendidikan*, 6(2), 453–462. <https://doi.org/10.56704/jirpm.v2i2.11668>
- Marhami, M., Lukman, I. R., & Muliani, M. (2020). *Pengantar literasi sains dan numerasi penunjang asesmen kompetensi minimum (AKM) [Introduction to scientific literacy and numeracy to support the minimum competency assessment]*. CV. AA Rizky.
- Marhami, M., & Rohantizani, R. (2021). *Asesmen kompetensi minimum numerasi berbasis budaya Aceh untuk SMA, SMK, MA & Se-derajat [Aceh culture-based numeracy minimum competency assessment for SMA, SMK, MA & equivalents]*. CV. AA Rizky.
- Marhami, M., Rohantizani, R., & Nuraina, N. (2020). Improving students' critical mathematical thinking skills through SAVI approach on number theory lectures at mathematics education Department of Malikussaleh University. *International Journal for Educational and Vocational Studies*, 2(1), 9–13. <https://doi.org/10.29103/ijevs.v2i1.2020>
- Maryati, M., & Pratiwi, W. (2019). Etnomatematika: Eksplorasi dalam tarian tradisional pada pembukaan Asian Games 2018 [Ethnomathematics: Explorations in traditional dance at

- the opening of the 2018 Asian Games]. *FIBONACCI: Jurnal Pendidikan Matematika dan Matematika*, 5(1), 23–28. <https://doi.org/10.24853/fbc.5.1.23-28>
- Muliani, M., Marhami, M., & Lukman, I. R. (2021). Persepsi mahasiswa calon guru tentang literasi sains [Prospective teacher students' perception of science literacy]. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, 5(1), 6–11. <https://doi.org/10.36312/jisip.v5i1.1575>
- Nadjamuddin, A., & Hulukati, E. (2022). Kemampuan literasi numerasi mahasiswa dalam menyelesaikan masalah matematika [Students' numeracy literacy skills in solving mathematical problems]. *Jurnal Basicedu*, 6(1), 987–996. <https://doi.org/10.31004/basicedu.v6i1.1999>
- NCTM. (2000). *Principles and standards for school mathematics*. The National Council of Teachers of Mathematics, Inc.
- Novita, N., Mellyzar, M., & Herizal, H. (2021). Asesmen nasional (AN): Pengetahuan dan persepsi calon guru [National assessment: Knowledge and perceptions of prospective teachers]. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, 5(1), 172–179. <https://doi.org/10.36312/jisip.v5i1.1568>
- OECD. (2016). *PISA 2015 Results in focus*. OECD Publishing.
- OECD. (2019). *PISA 2018 assessment and analytical framework*. OECD Publishing. <https://doi.org/10.1787/b25efab8-en>
- Pangesti, F. T. P. (2018). Menumbuhkembangkan literasi numerasi pada pembelajaran matematika dengan soal HOTS [Developing numeracy literacy in mathematics learning with HOTS questions]. *Indonesian Digital Journal of Mathematics and Education*, 5(9), 566–575. <http://idealmathedu.p4tkmatematika.org>
- Perdana, R., & Suswandari, M. (2021). Literasi numerasi dalam pembelajaran tematik siswa kelas atas sekolah dasar [Numeracy literacy in thematic learning for upper grade elementary students]. *Absis: Mathematics Education Journal*, 3(1), 9–15. <https://doi.org/10.32585/absis.v3i1.1385>
- Pradhan, J. B., & Sharma, T. (2021). *Ethnomathematics research practices and its pedagogical implications: A Nepalese perspective ethnomathematics research practices and its pedagogical implications* [Ph.D. Thesis, Tribhuvan University].
- Rohantizani, R., Marhami, M., Herizal, H., & Nuraina, N. (2022). Minat siswa sekolah menengah atas terhadap literasi numerasi berbasis budaya Aceh [High school students' interest in Aceh culture-based numeracy literacy]. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, 6(1), 1865–1872. <https://doi.org/10.36312/jisip.v6i1.2673>
- Rubio, J. S. (2016). The ethnomathematics of the Kabihug tribe in Jose Panganiban, Camarines Norte, Philippines. *Malaysian Journal of Mathematical Sciences*, 10(5), 211–231.
- Sari, P. N., Jumadi, & Ekayanti, A. (2021). Penerapan model pembelajaran STEAM (Science, Technology, Engineering, Art, and Math) untuk penguatan literasi-numerasi siswa [Application of STEAM (Science, Technology, Engineering, Art, and Math) learning model to strengthen students' numeracy literacy]. *Jurnal Abdimas Indonesia*, 1(2), 89–96. <https://doi.org/10.53769/jai.v1i2.90>
- Wardhani, S., & Rumiati, R. (2011). Instrumen penilaian hasil belajar matematika SMP: Belajar dari PISA dan TIMSS [Assessment instruments for junior high school mathematics learning outcomes: Learning from PISA and TIMSS]. *Kementerian Pendidikan Nasional, Badan Pengembangan Sumber Daya Manusia Pendidikan dan Penjaminan Mutu Pendidikan*.
- Yanti, N. R., & Muna, R. A. (2018). Konsep matematika pemasangan tiang penyokong rumah adat Muna [Mathematical concept of installing the support pole of a Muna traditional house]. *Jurnal Pembelajaran Berpikir Matematika*, 3(2), 65–72.