Journal of Pedagogy and Education Science
Vol. 5, No. 03, pp. 1265-1277
journal.iistr.org/index.php/JPES
DOI: 10.56741/IISTR.jpes.002430

Students' Numeracy Literacy in Ethno-Inquiry-Based Interactive Multimedia Learning from a Gender Perspective

[1]Nurjumiati[*], [1]Syahriani Yulianci,[2]Nurhairunnisah, [1]Suriya Ningsyih, [1]Rizalul Fiqry, [1]Silviani Febira Putri
Corresponding Author: [*] nurjumiati100@gmail.com
[1] STKIP Taman Siswa Bima, Bima, Indonesia
[2] Universitas Samawa, Bima, Indonesia

ARTICLE INFO

Article history
Received 15 June 2026
Revised 04 September 2026
Accepted 13 September 2026

Keywords
Etno-Inquiry
Gender Differences
Interactive Multimedia
Numeracy Literacy

ABSTRACT

The low level of students' numeracy literacy, along with gender-based differences in ability, poses a challenge in physics learning that remains insufficiently contextualized. This study aims to analyze students' numeracy literacy in ethnoscience-based interactive multimedia learning from a gender perspective using a quantitative approach with a quasi-experimental design. Students were grouped by gender and assessed using a numeracy literacy test consisting of five indicators. The results show that female students achieved a mean score of 75.78, while male students scored 73.83. Based on the results of the Independent Sample t-test, a significance value of 0.788 (> 0.05) was obtained, indicating that there is no statistically significant difference between the two groups. This finding suggests that students' numeracy literacy in etno-inquiry-based interactive multimedia learning is relatively balanced across genders. Therefore, no gender demonstrates dominance in numeracy ability, although each group exhibits specific strengths across certain indicators.

This is an open-access article under the CC–BY-SA license.

Introduction

The development of students' numeracy literacy has become a major priority in contemporary education, particularly in physics learning, which requires the integration of mathematical reasoning and contextual problem-solving [1], [2]. Ideally, physics instruction

should facilitate students in interpreting data, analyzing quantitative relationships, and making evidence-based decisions within meaningful contexts [3], [4]. However, in practice, the learning process remains predominantly dominated by abstract and less contextual approaches, thereby limiting students' ability to relate concepts to real-life phenomena. This condition is consistent with the results of the 2022 Programme for International Student Assessment (PISA), which revealed that Indonesian students' mathematical literacy performance remains below the OECD average, with a score of approximately 366 compared to the OECD average of 472 [5]. These findings indicate that the majority of students are still categorized at the basic proficiency level and are not yet capable of solving complex and contextual numeracy problems. Consequently, students' numeracy literacy tends to remain low, as reflected in their difficulties in applying mathematical concepts to solve contextual physics problems.

In addition to these issues, numerous empirical studies have demonstrated the existence of gender-based differences in numeracy literacy skills [6], [7], [8], [9]. Ideally, educational practices should provide equal opportunities for all students to develop cognitive abilities without bias. Nevertheless, variations in learning outcomes indicate that male and female students tend to excel in different aspects of numeracy, such as procedural skills, data interpretation, and analytical reasoning. These differences are often insufficiently accommodated within conventional instructional designs, potentially weakening learning outcomes and widening competency gaps among students.

The assertion that male students tend to outperform in procedural and quantitative aspects, while female students are generally more prominent in analytical and representational aspects, should be understood as a general tendency influenced by cognitive factors, learning experiences, and social constructions rather than as an absolute distinction [10], [11]. In procedural and quantitative domains, male students generally demonstrate stronger performance in solving algorithmic problems, such as mathematical calculations, formula application, and direct symbol manipulation [12], [13]. This tendency is associated with their preference for faster problem-solving strategies that are more outcome-oriented. Several studies have shown that males more frequently employ rule-based processing approaches, in which problems are solved based on previously learned procedures without extensive contextual exploration [14], [15].

Conversely, in analytical and representational domains, female students tend to demonstrate stronger abilities in understanding problem contexts, organizing information, and representing concepts in multiple forms, such as graphs, tables, and visual models [16], [17], [18]. They also tend to be more meticulous in interpreting information and systematically considering solution procedures. This reflects a tendency toward deep processing strategies,

in which students focus not only on obtaining results but also on understanding meanings and conceptual relationships [19], [20]. Furthermore, the PISA 2022 Results report indicated that although variations in mathematical literacy performance exist between male and female students, these differences are often not statistically significant overall. Nevertheless, a pattern emerges in which males tend to perform slightly better on tasks requiring direct quantitative reasoning, whereas females demonstrate better performance on tasks involving contextual interpretation and mathematical communication.

Given the discrepancy between the ideal conditions and the existing realities, innovation in instructional approaches is urgently needed. One promising alternative is the implementation of ethnoscience-based interactive multimedia integrated with inquiry learning (ethno-inquiry), which contextualizes physics concepts through local cultural practices while simultaneously encouraging active student engagement in the learning process. In this study, the physics topic employed is projectile motion, which is associated with the traditional game of Gopa, where concepts such as trajectory, launch angle, and range of motion are analyzed through gameplay activities and presented in the form of interactive multimedia. This approach is expected to enhance students' numeracy literacy through meaningful learning experiences that are culturally relevant and cognitively challenging.

Based on the foregoing discussion, this study aims to analyze students' numeracy literacy in ethnoscience inquiry-based interactive multimedia learning from a gender perspective. Specifically, this research seeks to identify differences in numeracy literacy between male and female students and to examine how each group demonstrates competencies across various numeracy literacy indicators within the context of contextualized physics learning.

Material and Methods

This study employed a quantitative approach using a quasi-experimental design with a one-group pretest–posttest design. The population of the study consisted of one class of eleventh-grade senior high school students, while the sample was selected using a purposive sampling technique and subsequently categorized based on gender, namely male and female students. The object of this study was students' numeracy literacy in physics learning through ethnoscience inquiry-based interactive multimedia on the topic of projectile motion contextualized through the traditional game of Gopa. Data collection was conducted through a numeracy literacy test developed based on five indicators, including the ability to understand contextual problems, represent problems mathematically, perform calculations, interpret data or graphs, and draw conclusions and make decisions. The research instrument consisted of test items that had been validated and tested for reliability. Data analysis techniques involved descriptive statistical analysis to examine the mean scores and score distributions, as well as

inferential statistical analysis in the form of an independent sample t-test to determine differences in numeracy literacy skills between male and female students.

Results

This study aimed to analyze the differences in numeracy literacy skills between male and female students after the implementation of ethnoscience inquiry-based interactive multimedia learning on the topic of projectile motion. Data were collected through a numeracy literacy test consisting of several competency indicators and were subsequently analyzed using descriptive and inferential statistical methods. To provide an initial overview of the differences in abilities between the two groups, the following graph presents a comparison of the average pretest and posttest scores of numeracy literacy among male and female students.

A. Comparison of the Average Pretest Scores of Numeracy Literacy Between Male and Female Students.

To identify the initial profile of students' numeracy literacy skills prior to the implementation of the treatment, a comparison of the average pretest scores between male and female students was conducted. This analysis aimed to examine the equivalence of the initial abilities of both groups as a basis for evaluating the effectiveness of the implemented learning approach. The results of the comparison are presented in graphical form in Figure 1 below to provide a clearer visualization of the differences in average scores between the two groups.

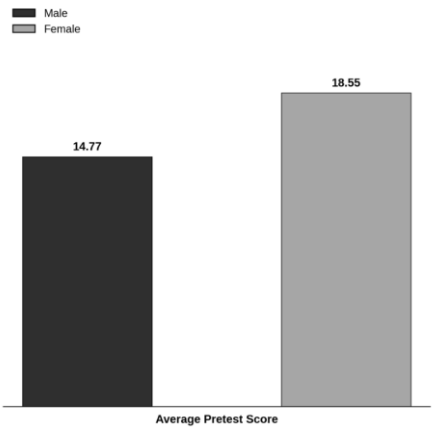

Fig 1. Comparison of the Average Pretest Scores of Numeracy Literacy Between Male and Female Students

Further analysis was conducted on the pretest scores for each numeracy literacy indicator to compare the abilities of male and female students more specifically prior to the implementation of the treatment in percentage form. This analysis aimed to identify the tendency of each group's performance across each aspect of numeracy literacy before the learning intervention was carried out. The results of the comparison are presented in Figure 2 below.

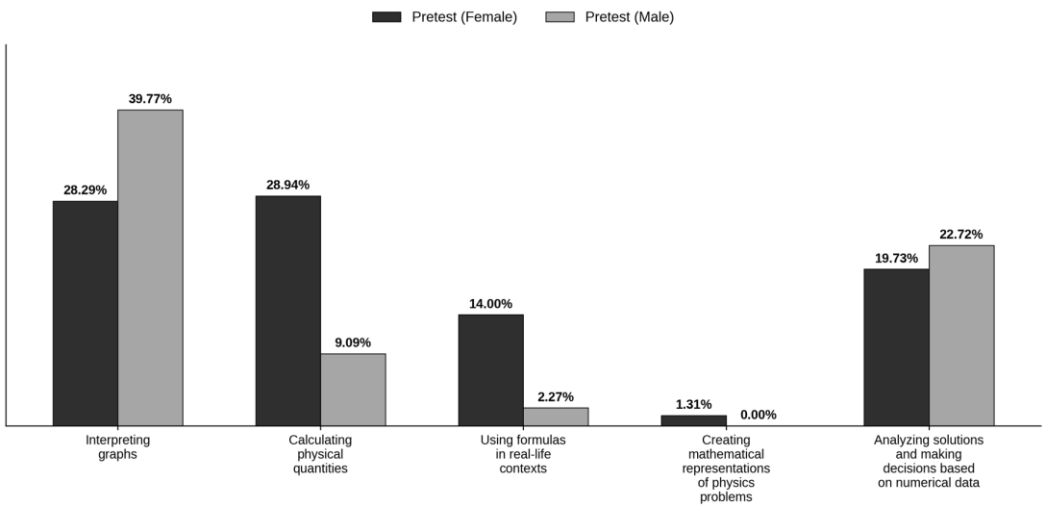

Fig 2. Comparison of the Pretest Percentage Scores for Each Numeracy Literacy Indicator

Based on the pretest results graph, differences in physics numeracy literacy skills between female and male students were observed across several indicators. In the indicator of interpreting graphs, male students obtained a higher percentage score of 39.77% compared to female students at 28.29%, indicating that male students demonstrated better abilities in understanding and interpreting visual information presented in graphical form. However, in the indicator of calculating physical quantities, female students showed substantially higher performance, achieving 28.94% compared to only 9.09% for male students. A similar trend was also identified in the ability to apply formulas in real-life contexts, where female students achieved 14%, while male students obtained only 2.27%. In the indicator of constructing mathematical representations of physics problems, both groups obtained the lowest results, with male students reaching 0%, indicating that the ability to transform physics problems into mathematical forms still requires considerable improvement. Meanwhile, in the indicator of analyzing solutions and making decisions based on numerical data, male students demonstrated slightly better performance, with a percentage of 22.72% compared to 19.73% for female students. Overall, these pretest findings indicate that students' abilities varied across each indicator, highlighting the need for more effective instructional strategies to improve conceptual understanding, numerical skills, and mathematical representation abilities in physics learning.

B. Comparison of the Average Posttest Scores of Numeracy Literacy Between Male and Female Students

Following the implementation of learning through ethnoscience inquiry-based interactive multimedia on the topic of projectile motion, an analysis of the average posttest scores of numeracy literacy was conducted to identify differences in abilities between male and female students. This analysis aimed to examine the numeracy literacy skills achieved by each group

after the implementation of the instructional approach. The results of the comparison of the average scores are presented in the following section.

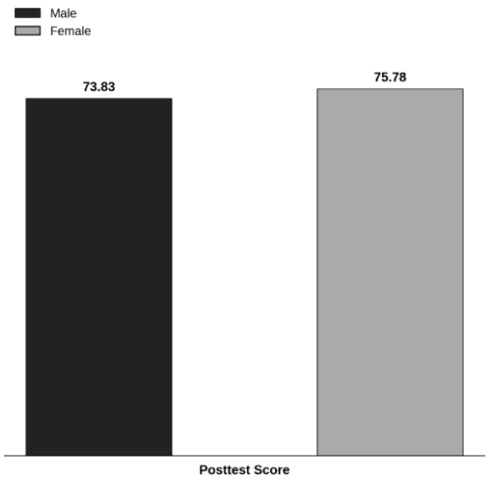

Fig 3. Comparison of the Average Posttest Scores of Numeracy Literacy

Further analysis was conducted on the posttest scores for each numeracy literacy indicator to compare the abilities of male and female students more specifically after the treatment was implemented in percentage form. The percentages for each numeracy literacy indicator are presented in Fig 4.

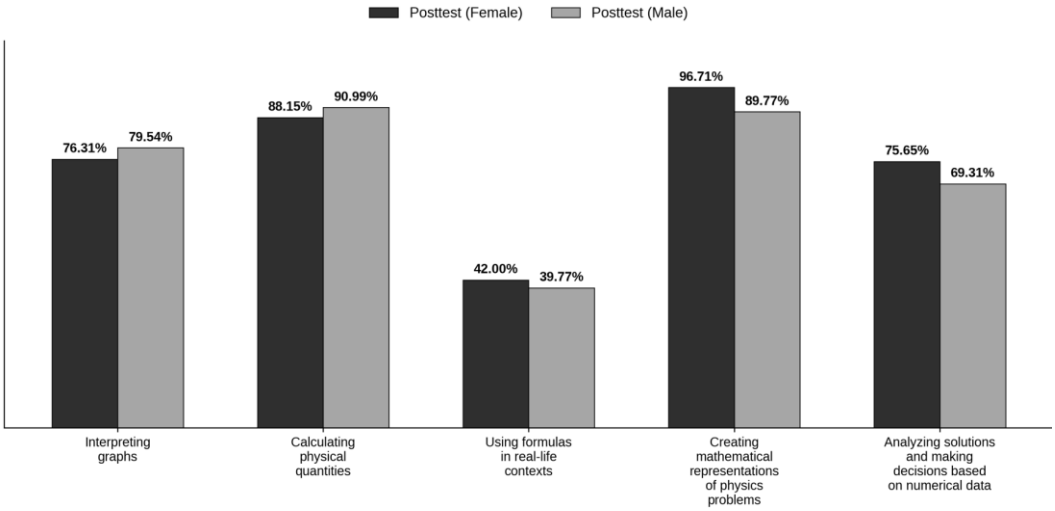

Fig 4. Comparison of the percentage scores for each numeracy literacy indicator between female and male students.

Based on the posttest results graph, an improvement in physics numeracy literacy skills was observed among both female and male students across all indicators compared to the previous pretest results. In the indicator of interpreting graphs, male students obtained a slightly higher percentage score of 79.54% compared to female students at 76.31%, indicating that the ability to understand visual information had developed well in both groups. In the indicator of calculating physical quantities, both groups achieved very high results, with male students reaching 90.99% and female students 88.15%, demonstrating a significant improvement in

calculation skills and the application of physics concepts. Meanwhile, in the indicator of applying formulas in real-life contexts, female students obtained higher results at 42% compared to male students at 39.77%. The most notable improvement was observed in the indicator of constructing mathematical representations of physics problems, where female students achieved 96.71% and male students 89.77%, indicating that the ability to transform physics problems into mathematical forms had developed very well. In the indicator of analyzing solutions and making decisions based on numerical data, female students also achieved higher results, with 75.65% compared to 69.31% for male students. Overall, the posttest results demonstrate that the implemented learning process successfully improved students' physics numeracy literacy skills across all indicators, for both female and male student groups.

C. Results of the Independent Samples t-Test

Table 1 presents the results of the prerequisite analyses and hypothesis testing conducted to examine differences in students' numeracy literacy skills based on gender. The normality assumption was assessed using the Shapiro–Wilk test to ensure that the data within each group were normally distributed. Subsequently, Levene's test for homogeneity of variance was performed to determine whether the variances of the male and female student groups were equivalent.

Table 1. Results of the Assumption Tests and Independent Samples t-Test

Test	Statistic	p-value	Result
Pretest Normality			
• Female	W = 0.917	0.101	Normally Distributed
• Male	W = 0.868	0.073	Normally Distributed
Posttest Normality			
• Female	W = 0.927	0.150	Normally Distributed
• Male	W = 0.955	0.712	Normally Distributed
Posttest Homogeneity of Variance	F = 0.024	0.878	Homogeneous

The analysis results revealed that the significance values obtained from the Shapiro–Wilk normality tests for both female and male students, at the pretest and posttest stages, exceeded the threshold of 0.05. These findings indicate that the data were normally distributed. In addition, Levene's test for homogeneity of variances produced a significance value of 0.878 (> 0.05), confirming the assumption of equal variances between the two groups. Given that both normality and homogeneity assumptions were met, the independent samples t-test was subsequently employed to investigate gender-based differences in students' numeracy literacy skills.

D. Independent Samples t-Test

The Independent Samples t-Test was conducted to determine whether there was a statistically significant difference in mean scores between two independent groups, namely

female and male students, after the intervention was implemented. The results of the Independent Samples t-Test are presented in Table 3.

Table 2. Results of the Independent Samples t-Test

Parameter	Value	Description
Degrees of freedom (df)	$n_(F_) + n_(M_) - 2 = 28$	Equal variance assumed
Significance level (α)	0.05	Two-tailed test
Critical t-value (df = 28, α/2 = 0.025)	2.048	Obtained from the t-distribution table
Calculated t-value	0.276	Computed result
p-value	0.785	Two-tailed
Decision	t_calculated < t_critical (0.276 < 2.048)	Fail to reject H_0
	p-value > α (0.785 > 0.05)	Fail to reject H_0

The calculated t-value (0.276) was lower than the critical t-value (2.048), and the p-value (0.785) exceeded the significance level of 0.05. Therefore, the null hypothesis (H_0) was retained. These findings indicate that there was no statistically significant difference in numeracy literacy skills between female students (M = 75.82) and male students (M = 73.86) following the implementation of the Ethno-Inquiry-based interactive multimedia. This result suggests that the multimedia intervention was equally effective for both genders.

E. Combined Scatter Plot of the Five Numeracy Literacy Indicators

The combined scatter plot illustrating the five numeracy literacy indicators for the pretest and posttest scores of both female and male student groups is presented in Fig. 5.

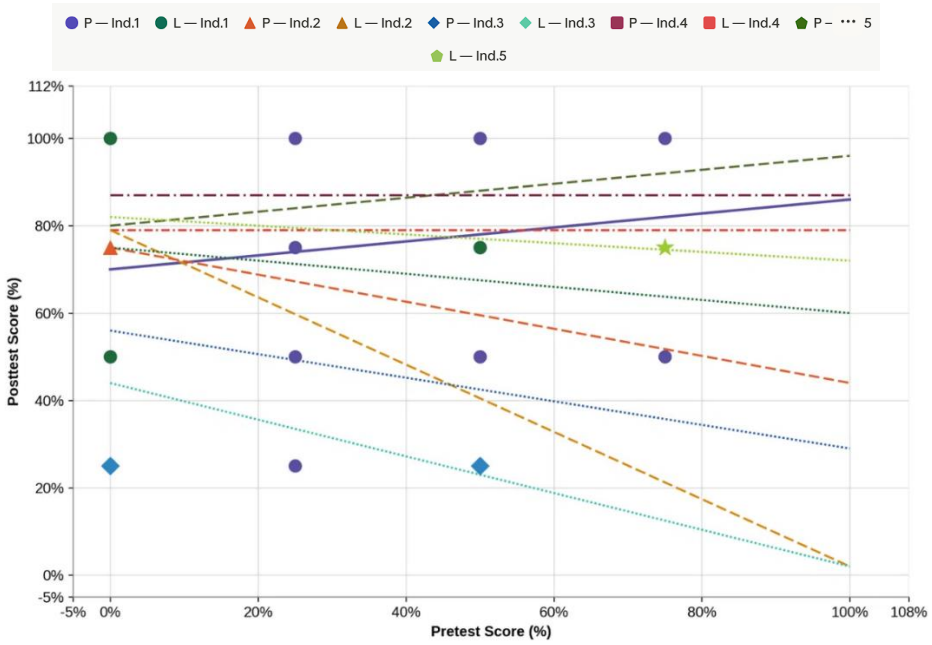

Fig. 5. Combined Scatter Plot of the Five Numeracy Literacy Indicators

Note: ● Circle: Indicator 1 – Graph Interpretation; ▲Triangle: Indicator 2 – Quantitative Calculation; ◆Diamond: Indicator 3 – Formula Application in Real-World Contexts; ■ Square: Indicator 4 – Mathematical Representation; ★ Star: Indicator 5 – Numerical Solution Analysis.

Based on the combined scatter plots of the five numeracy literacy indicators, both female and male students demonstrated substantial improvements from pretest to posttest across all

indicators following the implementation of the Ethno-Inquiry-based interactive multimedia. Indicator 4 (*mathematical representation of physics concepts*) exhibited the most pronounced pattern, with nearly all data points clustered near 0% in the pretest and widely distributed at higher posttest scores (75–100%). This finding suggests that the multimedia intervention significantly enhanced students' mathematical representation skills despite their initially low levels of competence. Indicators 1 (*graph interpretation*) and 2 (*quantitative calculation of physical quantities*) showed relatively positive trend lines with evenly distributed data points, indicating consistent improvement across students with varying levels of prior ability. In contrast, Indicator 3 (*application of formulas in real-world contexts*) displayed the lowest posttest distribution and the flattest trend line among all indicators for both female and male groups. This pattern suggests that applying mathematical formulas to contextual problems remains the most challenging aspect of students' numeracy literacy and may require further reinforcement through enhanced multimedia content design. Notably, from a gender perspective, the distribution patterns of data points for female students (represented by darker symbols) and male students (represented by lighter symbols) largely overlapped across all indicators. This visual evidence further supports the statistical findings, indicating that no significant gender differences existed in the improvement of numeracy literacy skills following the implementation of the Ethno-Inquiry-based interactive multimedia learning intervention.

Discussion

The findings of this study indicate that students' numeracy literacy skills improved after the implementation of ethnoscience inquiry-based interactive multimedia learning on the topic of projectile motion. Descriptively, differences in average scores were observed between male and female students, with female students obtaining slightly higher scores than male students. However, the inferential analysis using the Independent Sample t-test demonstrated that these differences were not statistically significant. These findings suggest that the implemented learning approach provided relatively equivalent impacts on both gender groups.

The absence of significant differences in numeracy literacy skills between male and female students is consistent with previous studies conducted [21], [22], [23]. More specifically, the indicator-based analysis revealed tendencies of differences in certain aspects. Male students tended to perform better in indicators related to procedural abilities, such as calculating physical quantities and interpreting graphs [24], [25]. In contrast, female students demonstrated stronger performance in indicators requiring analytical abilities, including mathematical representation, data analysis, and decision-making, which is in line with the findings reported [26]. These differences are consistent with cognitive style tendencies

indicating that males are generally more oriented toward direct problem-solving approaches, whereas females tend to be more systematic in understanding and processing information [27].

Nevertheless, the differences observed in each indicator were not sufficiently strong to produce statistically significant differences overall. This finding suggests that ethnoscience inquiry-based interactive multimedia learning was capable of accommodating diverse student learning styles, both procedural and analytical in nature. Furthermore, the integration of cultural contexts through the traditional game of *Gopa* within the projectile motion material provided more meaningful and contextual learning experiences, thereby assisting students in relating physics concepts to real-life situations.

Therefore, the results of this study reinforce the notion that instructional innovations integrating contextual approaches, local culture, and technology can serve as effective solutions for improving students' numeracy literacy, consistent with the findings Nurjumiati et al. [28], without creating gender-based disparities. The implication of this study highlights the importance of developing instructional designs that are responsive to the diversity of student characteristics in order to achieve inclusive and equitable learning objectives optimally.

Conclusion

This study concludes that ethnoscience inquiry-based interactive multimedia learning can support the development of students' physics numeracy literacy in projectile motion learning across gender groups. Although female students obtained a slightly higher average posttest score than male students, the Independent Sample t-test showed no statistically significant difference between the two groups ($p = 0.785 > 0.05$). This finding indicates that the learning approach provides relatively equitable learning opportunities for both female and male students. At the indicator level, male students showed relatively stronger performance in interpreting graphs and calculating physical quantities, whereas female students demonstrated higher performance in applying mathematical representations, contextual formula use, and analyzing numerical solutions. These findings highlight the contribution of integrating inquiry, interactive multimedia, and local cultural contexts through the Gopa game as an inclusive approach to strengthening numeracy literacy without creating gender-based disparities. The approach therefore has potential for broader implementation in contextualized physics learning.

Limitation and Suggestions

The research focuses on gender-based differences in numeracy literacy skills following instruction, whereas other factors potentially influencing learning outcomes such as prior knowledge, learning motivation, and individual learning characteristics have not yet been

examined in depth. Therefore, future research is advised to involve larger and more diverse samples, employ broader experimental designs, and expand the application of Ethno-Inquiry-based interactive multimedia across various physics topics and local cultural contexts.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] T. Sunarti *et al.*, "Analysis of Students' Physics Numeracy Literacy Ability and Its Learning Implementation: Case Study in Nganjuk City," *Stud. Learn. Teach.*, vol. 5, no. 3, pp. 770–790, 2024.

[2] S. A. Listianingrum, E. Istiyono, R. Zakwandi, and M. M. Chusni, "The assessment of student numeracy ability for sustainable learning in Indonesia: A study in a high school science class," *Momentum Phys. Educ. J.*, vol. 7, no. 1, pp. 136–144, 2023.

[3] S. Suryadi, I. K. Mahardika, S. Sudarti, and S. Supeno, "The Effect of Object-Oriented Physics Learning on Students' Abilities to Interpret and Make Reasoning about Data," *J. Penelit. Pendidik. IPA*, vol. 8, no. 3, pp. 1519–1523, 2022.

[4] B. Thacker, "Inquiry-based experimental physics: Twenty years of an evidence-based, laboratory-based physics course for algebra-based physics students," *Phys. Rev. Phys. Educ. Res.*, vol. 19, no. 2, p. 20116, 2023.

[5] R. R. Solihin, T. T. D. Susanto, E. P. Fauziyah, N. V. I. Yanti, and A. P. Ramadhania, "The efforts of Indonesian government in increasing teacher quality based on PISA result in 2022: A literature review," *Perspekt. Ilmu Pendidik.*, vol. 38, no. 1, pp. 57–65, 2024.

[6] G. Stoet and D. C. Geary, "Sex differences in mathematics and reading achievement are inversely related: Within-and across-nation assessment of 10 years of PISA data," *PLoS One*, vol. 8, no. 3, p. e57988, 2013.

[7] M. Balducci and W. Haider, "Beyond Mean Scores: Sex Differences in Literacy, Numeracy, and Problem-Solving as Intraindividual Strengths Across Age Groups," *J. Intell.*, vol. 14, no. 1, p. 12, 2026.

[8] F. Borgonovi, Á. Choi, and M. Paccagnella, "The evolution of gender gaps in numeracy and literacy between childhood and young adulthood," *Econ. Educ. Rev.*, vol. 82, p. 102119, 2021.

[9] N. Nurjumiati, S. Yulianci, R. Adawiyah, and M. R. N. Putri, "Analisis Diagnosis Awal Keterampilan Proses Sains Mahasiswa PGSD pada Mata Kuliah Konsep Dasar IPA," *Galaxy J. Pendidik. MIPA dan Teknol.*, vol. 2, no. 2, pp. 119–125, 2025.

[10] E. Suprapto, N. Suryani, S. Siswandari, and M. Mardiyana, "Students' mathematical literacy skill in term of gender differences: A comparative study," *Int. J. Eval. Res. Educ.*, vol. 12, no. 4, p. 2280, 2023.

[11] S. A. B. Astuti, R. N. Siregar, and R. K. Rangkuti, "Analysis of students' mathematical critical thinking in solving function derivative problems based on gender differences," *J. Innov. Math. Learn.*, vol. 8, no. 1, pp. 188–199, 2025.

[12] M. Syarifuddin, "Gender differences in mathematical proficiency: A review of mathematics performance," *J. Ris. Pendidik. dan Inov. Pembelajaran Mat.*, vol. 8, no. 2, pp. 167–181, 2025.

[13] F. S. Apata, "Students' Gender Proficiency in Multiple Representational Format and Mathematical Reasoning in Senior School Physics Problem-Solving," *Asian J. Sci. Educ.*, vol. 4, no. 1, pp. 25–39, 2022.

[14] W. A. Wardhani, "Proses berpikir siswa dalam menyelesaikan masalah matematika ditinjau dari gender," 2016, *Universitas Negeri Malang*.

[15] Nasruddin, D. Juniati, and J. T. Manoy, "Inductive and deductive reasoning of junior high school students to mathematical problem solving based on gender differences," in *AIP Conference Proceedings*, AIP Publishing LLC, 2024, p. 20063.

[16] I. A. Miyaqi, I. Wilujeng, D. Rosana, and N. Barokah, "Differences in high school students' mathematical representation ability in homogeneous classes: Which is better?," *Momentum Phys. Educ. J.*, vol. 8, no. 1, pp. 108–119, 2024.

[17] U. Umaroh and H. Pujiastuti, "Analisis kemampuan representasi matematis siswa dalam mengerjakan soal PISA ditinjau dari perbedaan gender," *J. Pendidik. Mat. Raflesia*, vol. 5, no. 2, pp. 40–53, 2020.

[18] G. Duffy, S. Sorby, and B. Bowe, "An investigation of the role of spatial ability in representing and

solving word problems among engineering students," *J. Eng. Educ.*, vol. 109, no. 3, pp. 424–442, 2020.
[19] R. J. Spiro, R. L. Coulson, P. J. Feltovich, and D. K. Anderson, "Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains," in *10th Annual Conference Cognitive Science Society Pod*, Psychology Press, 2019, pp. 375–383.
[20] J. D. Vermunt and V. Donche, "A learning patterns perspective on student learning in higher education: State of the art and moving forward," *Educ. Psychol. Rev.*, vol. 29, no. 2, pp. 269–299, 2017.
[21] H. Mangkuwibawa, D. F. Ramdhan, M. R. Mahmud, C. R. Siswanto, and E. Supriyadi, "The Effect of Math Anxiety on Students' Numeration Literacy Ability," *Mudarrisa J. Kaji. Pendidik. Islam*, vol. 16, no. 1, pp. 77–101, 2024.
[22] M. Jannah, E. Nuraeni, M. N. Kusumastuti, F. Murae, and I. Rachman, "Numeracy Literacy and Quantitative Literacy in Biology Education: A Systematic Literature Review," *J. Pendidik. Sains Indones.*, vol. 14, no. 2, pp. 390–402, 2026.
[23] S. Yulianci, N. Nurjumiati, and A. A. Adiansha, "The effect of interactive multimedia and learning styles on students' physics creative thinking skills," *J. Penelit. Pendidik. IPA*, vol. 7, no. 1, pp. 87–91, 2021.
[24] N. Kesaulya and E. Purwaningsih, "The Role of Metacognitive Scaffolding in Fostering Creative Thinking and Conceptual Mastery in Physics: A Comparative Study Across Educational Level," *J. Penelit. Pendidik. IPA*, vol. 11, no. 9, pp. 178–187, 2025.
[25] N. Nurjumiati, S. Yulianci, and A. Asriyadin, "Pengaruh Model Inquiry Berbasis Literasi Numerasi Terhadap kemampuan Pemodelan Matematis dan Bahasa Simbolik Fisika," *J. Pendidik. MIPA*, vol. 12, no. 3, pp. 945–948, Jan. 2022, doi: 10.37630/jpm.v12i3.714.
[26] A. O. Sabat and I. Pramudya, "Gender Difference: Students' Mathematical Literacy in Problem Solving," in *International Conference of Mathematics and Mathematics Education (I-CMME 2021)*, Atlantis Press, 2021, pp. 25–30.
[27] Pathuddin, I. Ketut Budayasa, and A. Lukito, "Metacognitive activity of male students: difference field independent-dependent cognitive style," in *Journal of Physics: Conference Series*, IOP Publishing, 2019, p. 12025.
[28] N. Nurjumiati, S. Yulianci, N. Nurhairunnisah, and S. Ningsyih, "Effectiveness of Ethno-Inquiry-Interactive Physics Multimedia Using the Gopa Game to Improving Students' Numeracy Literacy," *J. Pendidik. Fis. dan Teknol.*, vol. 12, no. 1, pp. 113–123, 2026.

Authors



Nurjumiati is affiliated with STKIP Taman Siswa Bima, Bima Regency, West Nusa Tenggara, Indonesia. She is a lecturer in the Elementary School Teacher Education Program. She received her Master's degree in Physics Education from Universitas Ahmad Dahlan, Yogyakarta, Indonesia. Her research interests include science education, ethnoscience, ethno-inquiry, science process skills, systematic thinking, and innovative learning models for elementary teacher education. (email: nurjumiati100@gmail.com).



Syahriani Yulianci is a lecturer and educator in the Elementary School Teacher Education Study Program at STKIP Taman Siswa Bima, Bima Regency, West Nusa Tenggara 84173, Indonesia. She completed her Bachelor's degree in Physics Education at the University of Mataram in 2013 and her Master's degree in Science Education at the University of Mataram in 2018. Her research interests include science education, inquiry-based learning, science process skills, metacognition, teaching material development, and learning innovations in elementary education. (email: yulianci.syah@gmail.com).



Nurhairunnisah is affiliated with Universitas Samawa, Sumbawa Regency, West Nusa Tenggara, Indonesia. She is currently pursuing a Master's degree in Learning Technology at Universitas Negeri Yogyakarta, Indonesia. Her academic interests focus on educational technology, instructional design, innovative learning media, technology-enhanced learning, and the development of technology-based learning resources. Her research interests include learning innovation, digital learning, instructional media development, and the integration of technology in educational practices. (email: nurhairunnisah@gmail.com).



Suriya Ningsyih is a lecturer in the Elementary School Teacher Education Study Program, STKIP Taman Siswa Bima, Bima Regency, West Nusa Tenggara 84173, Indonesia. Her research interests include ethnoscience-based science learning and science process skills in elementary schools. (email: suryaningsyih1993@gmail.com).



Rizalul Fiqry is affiliated with STKIP Taman Siswa Bima, Bima, West Nusa Tenggara, Indonesia. She is a lecturer in the Elementary School Teacher Education Program. He received her Master's degree in Physics Education from Universitas Ahmad Dahlan, Yogyakarta, Indonesia. Her research interests include Her research interests include science education, physics education, ethnoscience, ethno-inquiry, inquiry-based learning, science process skills, scientific literacy, metacognitive learning, and innovative learning models. (email: doudonggo@gmail.com).



Silviani Febira Putri is an undergraduate student in the Mathematics Education Study Program at STKIP Taman Siswa Bima, Bima Regency, West Nusa Tenggara 84173, Indonesia. She is currently in her third semester of study. Her research interests include mathematics education. (email: silvianifebiraputri@gmail.com).