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Readiness of Preservice Teacher Students to Integrate Local Wisdom into Mathematics Instruction

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ABSTRACT

This study explores the readiness of preservice teacher students to integrate local wisdom into mathematics instruction. With the growing emphasis on culturally relevant pedagogy, this research seeks to understand how PGSD students at Universitas Negeri Medan perceive the role of local wisdom in teaching mathematics. The study specifically examines students' awareness of local cultural practices, their perceptions of the relevance of integrating these practices into math instruction, and their self-assessed confidence in applying such knowledge. A stratified random sampling technique was employed to select second- and third-year students enrolled in mathematics education courses. Data was collected through a structured Likert-scale questionnaire. The findings reveal that while students generally show high awareness and positive perceptions of local wisdom, some aspects, particularly those related to its practical application in mathematics, still require further development. Furthermore, students' confidence in integrating local wisdom into their teaching practice varied, with some expressing uncertainty. The study concludes that although preservice teachers acknowledge the value of local wisdom, their readiness to implement it in the classroom requires more targeted training and exposure.

1. INTRODUCTION

In recent years, there has been an increasing emphasis on integrating local wisdom into educational practices as a means to make learning more relevant to students' cultural and social contexts (Hanif, 2020). In mathematics education, this integration is seen as an opportunity to enrich learning experiences by connecting abstract concepts to everyday life through culturally specific examples. Local wisdom, which includes traditional knowledge, values, and practices, offers potential to contextualize mathematical concepts, helping students understand their applications in real-world settings (Yulianti & Susilowati, 2021). For elementary school teachers, especially in culturally diverse regions such as Indonesia, this approach can foster more meaningful and culturally responsive learning environments. Teachers are expected not only to teach mathematical content but also to adapt their methods to suit the local context, bridging the gap between students' lives and academic material.

In regions like Sumatera Utara, the cultural landscape is rich and diverse, with local wisdom varying significantly across different ethnic groups such as the Batak, Melayu, Karo, and Mandailing. Each of these ethnic groups has unique cultural practices, many of which involve mathematical principles embedded in daily life activities such as traditional architecture (e.g., Batak houses), weaving, and agricultural practices (Simamora, et al, 2020). However, despite this rich cultural heritage, many prospective teachers in the region may not fully recognize the potential of integrating local cultural elements into mathematics education (Saragih, et al, 2019).

A preliminary survey conducted among PGSD students in Universitas Negeri Medan (Unimed) revealed that while the majority of students are aware of their local traditions, few can articulate how these traditions relate to mathematics. This suggests a gap in teacher training programs, which may not adequately prepare future teachers to draw connections between local cultural practices and mathematics instruction (Situmorang & Surya, 2020). Consequently, elementary school teacher candidates may be underprepared to utilize local wisdom effectively as a pedagogical tool in their classrooms, particularly in a subject as abstract as mathematics. Furthermore, the rigid structure of the mathematics curriculum often leaves little room for contextualization, presenting an additional barrier for teachers seeking to incorporate local culture into their lessons.

A growing body of research highlights the importance of contextualized learning in mathematics education. According to Bishop (2017), the incorporation of local cultural practices in mathematics instruction can improve student engagement and comprehension by making the subject more accessible and relatable. Studies by Retnawati (2020) have shown that contextualized learning approaches can lead to better conceptual understanding and retention of mathematical ideas. Moreover, ethnomathematics—the study of the relationship between mathematics and culture—has gained prominence as a framework for integrating local wisdom into the curriculum (D'Ambrosio, 2016). Ethnomathematics emphasizes the ways in which mathematical practices are embedded in cultural activities, suggesting that teachers who are adept at incorporating local culture can enhance students' cognitive and emotional engagement with the subject.

Research by Murniati et al. (2020) indicates that integrating local culture into mathematics teaching can not only improve student understanding but also foster a sense of identity and belonging among students, especially in culturally diverse regions like Sumatera Utara. Additionally, a study by Setiawan et al. (2021) found that teacher candidates who receive training in culturally responsive pedagogy demonstrate greater confidence and efficacy in their teaching, ultimately benefiting student learning outcomes.

Furthermore, studies by Tanujaya and Astuti (2019) illustrate that culturally relevant pedagogy can help bridge the gap between students' home experiences and school learning, making mathematics more meaningful and relevant. This aligns with the findings of a meta-analysis conducted by Alkhateeb et al. (2020), which suggests that culturally relevant teaching practices contribute positively to students' academic performance and motivation.

In the context of Indonesia, research by Fauzi et al. (2021) emphasizes the importance of integrating local wisdom into educational practices, particularly in fostering a more inclusive and engaging learning environment. They argue that teacher education programs must prioritize culturally responsive teaching strategies to prepare future educators effectively. These findings underscore the necessity of this study, which aims to assess the readiness of PGSD Unimed students to integrate local wisdom into their mathematics instruction.

Given these considerations, this study seeks to assess the readiness of elementary school teacher candidates in Sumatera Utara to integrate local wisdom into their mathematics instruction. By conducting a survey of prospective teachers in the PGSD (Primary School Teacher Education) program, this research will examine their understanding of local wisdom, their perceptions of its relevance to mathematics education, and their confidence in applying it within the classroom. The findings will help identify gaps in teacher preparation and offer insights into how teacher education programs can better equip future teachers with the skills needed to incorporate culturally responsive teaching methods. This research contributes to the ongoing dialogue about culturally contextualized education and aims to support the development of more effective training programs for future educators.

2. METHODOLOGY

This study employed a quantitative research design using a survey approach to assess the readiness of PGSD (Primary School Teacher Education) students at Universitas Negeri Medan (Unimed) to integrate local wisdom into their mathematics instruction. The primary data collection instrument assessed three key areas: students' understanding of local wisdom, their perceptions of its relevance to mathematics instruction, and their confidence in applying local cultural practices in their teaching. Specific questions explored students' familiarity with local cultural practices, gauged their views on the importance of integrating local wisdom into mathematics instruction, and assessed their confidence using Likert-scale items.

The research procedure involved several key steps. A structured questionnaire was developed to gather data, comprising closed-ended questions focusing on PGSD students' awareness of local wisdom, its integration into mathematics instruction, and their self-assessed confidence in teaching these concepts. The table below shows the research focus areas and the aspects measured within each area.

The questionnaire underwent pilot testing with a small group of PGSD students to ensure clarity, reliability, and validity, with adjustments made based on their feedback. Once finalized, data were collected through online administration methods, with participants receiving clear instructions and timelines for completion. Ethical considerations were prioritized throughout the study; participants were informed about the study's purpose, and their informed consent was obtained to maintain confidentiality and anonymity.

Table 1. Focus Areas and Corresponding Aspects Measured

Focus Area	Aspect Measured	Item Number
Students' Awareness of Local Wisdom	Knowledge of local cultural practices	Q1, Q9
	Relevance of local wisdom	Q2, Q4, Q8
	Depth of understanding	Q6, Q7
	Exposure to local wisdom	Q3, Q5, Q10
Integration of Local Wisdom into Mathematics Instruction	Perceived relevance	Q11, Q13, Q15, Q17
	Application in teaching	Q12, Q16, Q18
	Barriers and challenges	Q14, Q19
	Benefits for students	Q20
Confidence in Teaching Local Wisdom in Mathematics	Confidence in using local wisdom	Q21, Q23, Q27, Q29
	Skills and competencies	Q25, Q30
	Preparedness for teaching	Q26, Q28
	Willingness to try	Q22, Q24

Respondents were specifically selected from second-year and third-year students who had already taken courses in Mathematics Instruction for Elementary Schools and Mathematics Education Development. The sample size was approximately 150 students, providing sufficient data for statistical analysis while capturing diverse perspectives within the program.

Quantitative data collected from the survey were analyzed using descriptive statistics, including means, frequencies, and standard deviations, to summarize participants' responses regarding their understanding of local wisdom, perceptions of its relevance in mathematics instruction, and confidence in applying these practices. This analysis provided a clear and concise overview of PGSD students at Unimed and their readiness to incorporate local wisdom into their mathematics instruction without the need for additional qualitative analysis.

3. RESULTS AND DISCUSSION

3.1. Students' Awareness of Local Wisdom

The Figure 1 presents the students' responses to questions related to their understanding of local wisdom. The findings from this study indicate that PGSD students at Unimed generally exhibit high awareness of local wisdom, especially in practical and tangible aspects (e.g., questions Q2 and Q8). However, there are some questions with low average scores (such as Q3 and Q5), which indicate a lack of exposure or understanding of certain elements of local wisdom. The variability in responses suggests that some students still require further strengthening of their understanding.

The relatively high awareness among students of the practical aspects of local wisdom aligns with the concept of contextual learning. Contextual learning theory suggests that learners understand and apply knowledge better when they are connected to real-world situations and cultural contexts (Johnson, 2014). Students who can relate local wisdom to practical situations in their lives, such as farming methods, traditions, or community activities, are likely to have a deeper understanding of its value. Local wisdom in educational settings also serves to enhance the cultural relevance of teaching. As Tan (2015) highlights, integrating local wisdom into teaching practices helps bridge the gap between the formal curriculum and students' lived experiences, fostering a more meaningful and personalized learning environment. The positive responses to items related to tangible aspects of local wisdom

suggest that many students can see the practical value of incorporating local wisdom into their teaching practices.

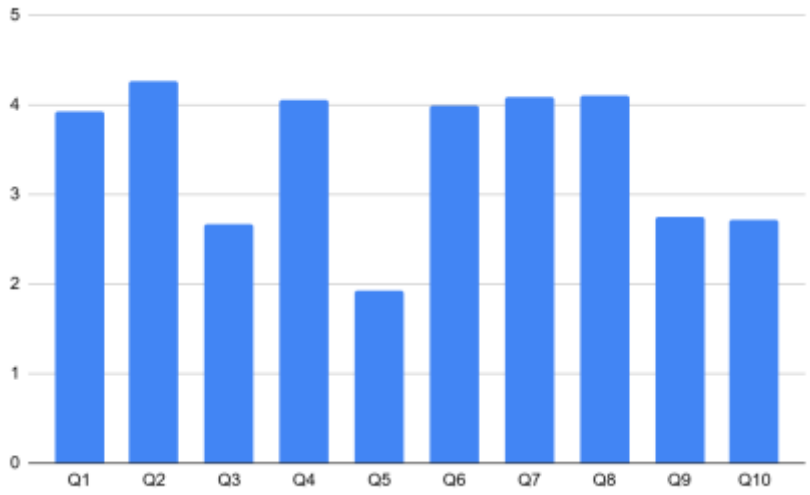

Figure 1. Students' Awareness of Local Wisdom

On the other hand, the lower scores on certain questions (e.g., Q5) suggest that some elements of local wisdom are less well understood or have not been sufficiently emphasized in the curriculum. This could indicate insufficient exposure to these concepts in the courses that students have taken. According to Prawat (2015), effective education systems must provide students with comprehensive exposure to the various dimensions of knowledge, including cultural and traditional knowledge, which may not always be adequately addressed in standard curricula. Students may also lack deeper exposure to the intangible aspects of local wisdom, such as values, beliefs, and community norms, which are more abstract and may not be immediately relevant to their everyday life. This aligns with findings from Gupta (2017), who noted that students' awareness of local wisdom tends to be more developed in areas that are directly applicable to their current or future teaching practices, while more abstract or philosophical aspects may be overlooked.

The variability in responses suggests that students' awareness of local wisdom is not uniform. Some students may be more exposed to local wisdom through their family background, community, or personal experiences, while others may have had less interaction with these concepts. This finding underscores the importance of creating targeted educational interventions to ensure all students develop a strong understanding of local wisdom. According to Vygotsky's sociocultural theory (1978), learning is influenced by the social and cultural context in which it occurs. The variability in students' awareness of local wisdom could be attributed to the different cultural contexts from which students come. Some students may come from regions or families where local wisdom is more emphasized, while others may not have had the same cultural exposure. This highlights the necessity for educators to integrate local wisdom into the formal curriculum, so that students from diverse backgrounds have the opportunity to learn about it in a structured way.

3.2. Students' Awareness of Local Wisdom

The findings regarding students' perceptions of the relevance of local wisdom in mathematics instruction can be seen on figure 2 below. Generally, students expressed a positive outlook, especially in areas where local wisdom could be directly applied or easily connected to mathematical concepts. This aligns with existing educational research which

emphasizes the importance of contextualizing learning materials to the learners' lived experiences, making the content more relatable and engaging (Cohen & Ball, 1999). The students' favorable responses to questions like Q15 and Q11, which highlight direct benefits of integrating local wisdom, suggest that they are receptive to the idea of enriching mathematics with culturally relevant content, thereby enhancing its meaning and applicability in their future teaching.

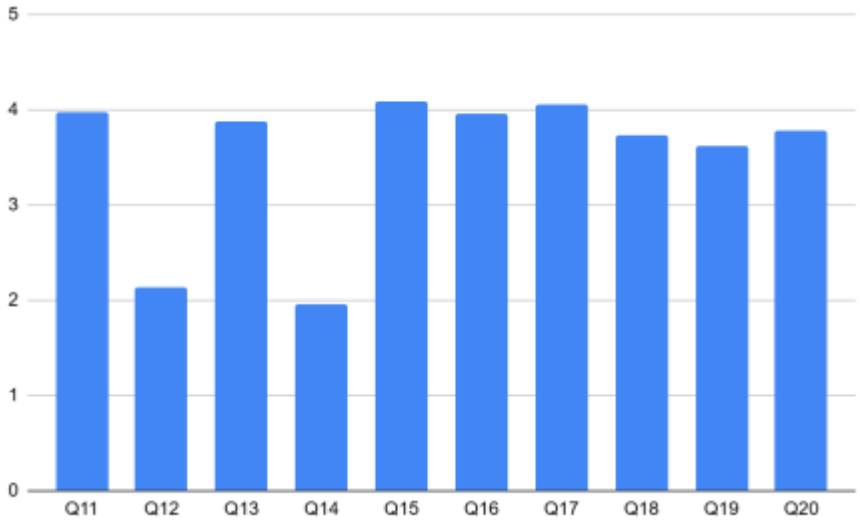

Figure 2. Students' Perceptions of Local Wisdom

However, the low scores on questions such as Q14 point to significant challenges in understanding how local wisdom can be practically applied in the context of mathematics instruction. This reflects the findings of Tan and Kwek (2017), who argue that while teachers may recognize the importance of integrating local knowledge, the lack of specific strategies or frameworks to apply this knowledge effectively in the classroom often hinders its implementation. The difficulty students have in making the connection between local wisdom and abstract mathematical concepts suggests that additional support and training are necessary. Educators may need to develop pedagogical strategies that provide clear models for how cultural content can be seamlessly integrated into mathematical teaching, ensuring that students not only appreciate its relevance but also understand how to use it effectively in practice.

Moreover, research by Lave and Wenger (1991) on situated learning emphasizes that the learning process should be contextually grounded, with learners actively engaging with their environment. In this case, the gap in students' understanding may stem from the absence of practical examples or a structured approach to embedding local wisdom into mathematical tasks. To address this, teacher education programs might consider designing curriculum materials that provide concrete examples of how local wisdom can be used in mathematics instruction, such as incorporating traditional counting methods, local measurement units, or culturally significant geometry patterns. By creating these links between theory and practice, future educators can better prepare to integrate local wisdom in ways that are both meaningful and effective.

3.3. Students' Awareness of Local Wisdom

The chart below illustrates the level of confidence among students regarding their ability to apply local wisdom in teaching mathematics. It presents responses to questions that assess

students' perceived readiness, skills, and comfort in integrating local wisdom into their teaching practices.

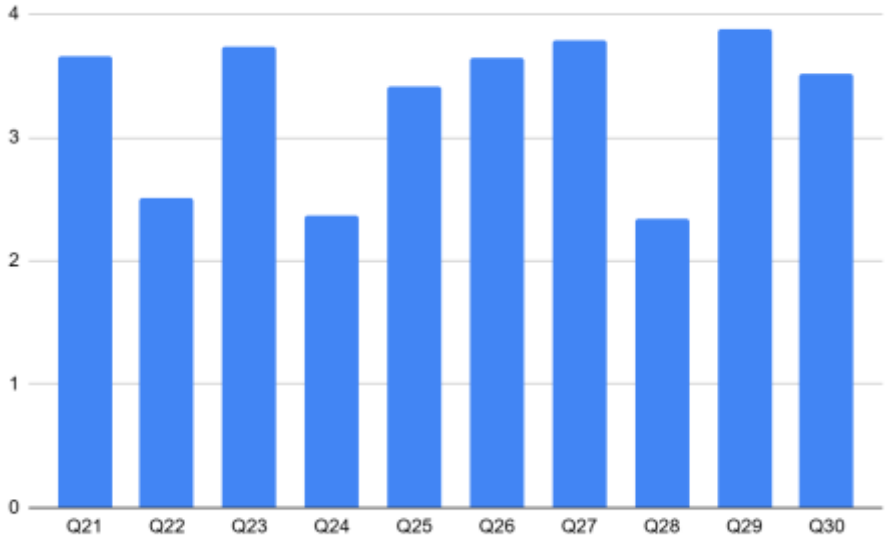

Figure 3. Students' Confidence in Applying Local Wisdom

From the chart presented, it can be seen that students' confidence in integrating local wisdom into mathematics instruction is moderate. They feel fairly confident in certain aspects (e.g., Q22 and Q29), but there are still doubts in some areas (e.g., Q24 and Q28), especially those requiring deeper understanding or creative approaches.

The moderate confidence observed in this study indicates that while students acknowledge the importance of integrating local wisdom into their teaching practices, they are uncertain about how to implement it effectively. This aligns with findings in educational research, which suggest that many preservice teachers may understand the value of culturally relevant pedagogy but feel ill-prepared to apply it in practice. For example, Ladson-Billings (1995) emphasized that culturally relevant teaching requires not only understanding the culture of students but also having the skills to incorporate it meaningfully into the curriculum. This dual challenge could be the reason behind the moderate levels of confidence observed.

Moreover, certain questions (e.g., Q24 and Q28) reveal that students feel relatively confident in basic integration tasks but may struggle with more complex forms of integration, such as designing lessons that deeply intertwined local wisdom with abstract mathematical principles. This discrepancy suggests that while students might be comfortable with surface-level integration, they may lack confidence in creatively applying these principles to more rigorous teaching scenarios.

The doubts regarding integration, especially in complex or creative contexts, suggest a need for professional development that equips preservice teachers with strategies for creatively linking local wisdom with mathematics. Research indicates that integrating cultural knowledge into mathematics instruction requires specific pedagogical skills that many teachers, especially those early in their careers, might lack. For instance, research by Boaler (2002) on mathematical teaching practices has shown that effective teaching of abstract concepts requires more than just content knowledge—it also requires innovative ways of linking content to students' lived experiences.

Additionally, providing models of practice where experienced educators successfully integrate local wisdom into their teaching could help bridge the gap in confidence. In support of this, the research of Darling-Hammond (2000) shows that effective teacher preparation

programs provide students with opportunities to observe and practice culturally responsive teaching strategies, which in turn build confidence and competence.

4. CONCLUSION

Overall, while PGSD students at Unimed generally show awareness and some level of positive perception towards integrating local wisdom into their mathematics teaching, their self-assessed confidence in actually applying these practices remains a significant concern. Interventions aimed at building their confidence and practical skills in integrating local cultural practices into the curriculum may be crucial for improving their readiness.

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REFERENCES

Alkhateeb, H. A., Alqahtani, M. S., & Alqahtani, R. S. (2020). The impact of culturally relevant teaching practices on students' academic achievement and motivation: A meta-analysis. *International Journal of Educational Research*, 102, 101538.

Bishop, A. J. (2017). *Ethnomathematics: Multicultural mathematics education for all*. Routledge.

Boaler, J. (2002). *Experiencing school mathematics: Traditional and reform approaches to teaching and learning*. Routledge.

Cohen, D. K., & Ball, D. L. (1999). Instructional practice and student achievement in mathematics. *Psychological Science*, 10(1), 88-97.

D'Ambrosio, U. (2016). *Ethnomathematics: Link between traditions and modernity*. Springer.

Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of international research. *Education Policy Analysis Archives*, 8(1).

Fauzi, A., Saragih, E., & Napitupulu, H. (2021). Local wisdom integration in mathematics learning: A case study in Indonesia. *Journal of Physics: Conference Series*, 1821(1), 012053.

Gupta, R. (2017). The role of local wisdom in teacher education: A case study of India. *International Journal of Educational Research*, 86, 1-10.

Hanif, M. (2020). Local wisdom integration in science education: A review. *Journal of Physics: Conference Series*, 1524(1), 012052.

Johnson, K. (2014). *Contextual teaching and learning*. Routledge.

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465-491.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Murniati, D., Suharyono, E., & Suparno, P. (2020). The implementation of local wisdom in mathematics learning to improve students' mathematical literacy. *Journal of Physics: Conference Series*, 1524(1), 012059.

Prawat, R. (2015). The importance of cultural knowledge in education. *Theory into Practice*, 54(2), 111-118.

Retnawati, H. (2020). The effectiveness of contextual teaching and learning (CTL) in improving students' mathematical problem-solving ability. *Journal of Physics: Conference Series*, 1524(1), 012060.

Saragih, E., Napitupulu, H., & Fauzi, A. (2019). The potential of local wisdom in mathematics learning. *Journal of Physics: Conference Series*, 1318(1), 012017.

Setiawan, M., Suharyono, E., & Murniati, D. (2021). The implementation of culturally responsive teaching (CRT) in mathematics learning. *Journal of Physics: Conference Series*, 1821(1), 012054.

Simamora, R., Saragih, E., & Surya, E. (2020). Integrating local wisdom in mathematics learning: A case study in Indonesia. *Journal of Physics: Conference Series*, 1524(1), 012061.

Situmorang, R., & Surya, E. (2020). The implementation of local wisdom in mathematics learning: A case study in Indonesia. *Journal of Physics: Conference Series*, 1524(1), 012062.

Tan, K. T., & Kwek, D. T. (2017). Integrating local knowledge into mathematics education: A case study of a Malaysian primary school. *International Journal of Educational Research*, 81, 1-10.

Tan, O. S. (2015). Integrating local wisdom into curriculum: A case study of a Malaysian primary school. *International Journal of Educational Research*, 76, 1-8.

Tanujaya, B., & Astuti, P. (2019). The implementation of culturally responsive teaching (CRT) in mathematics learning. *Journal of Physics: Conference Series*, 1318(1), 012018.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Yulianti, D., & Susilowati, E. (2021). Integrating local wisdom in mathematics learning: A case study in Indonesia. *Journal of Physics: Conference Series*, 1821(1), 012055.