

Preservice Teachers' Perceptions of Science Literacy through Indigenous Science in Sasaknese Traditional Games: A Comparative Study Based on Gender and Semester

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Abstract: This study aims to investigate compare the perceptions of preservice teachers regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy based on gender and semester. This exploratory research was conducted at the Mandalika University of Education with a subject pool of 234 preservice teacher students. The research utilized a validated closed questionnaire instrument with responses gathered using a Likert scale. The data from this study were analyzed using t-test and Anova test. The results of this study are (1) There is no significant difference in the perceptions of male and female students regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy, as evidenced by a significance value of 0.899, which is greater than 0.05 (>0.05); (2) There is no significant difference in the perceptions of third, fifth, and seventh semester students regarding the use of indigenous science value of 0.899, which is greater than 0.05 (>0.05); (2) There is no significant difference in the perceptions of third, fifth, and seventh semester students regarding the use of indigenous science of 0.899, which is greater than 0.05 (>0.05); (2) There is no significant difference in the perceptions of third, fifth, and seventh semester students regarding the use of indigenous science sasaknese traditional games as a medium for strengthening science literacy, as indicated by a significance value of 0.114, which is greater than 0.05 (>0.05).

Keywords: Perceptions; science literacy; Sasaknese traditional games; gender; semester

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INTRODUCTION

Science literacy is a critical competency in the 21st century, equipping learners with the skills to engage with scientific concepts, evaluate information, and make evidence-based decisions in daily life (OECD, 2018). In a globally interconnected world, the ability to understand science not only supports academic achievement but also fosters responsible citizenship and environmental stewardship. Science literacy involves not only factual knowledge but also the capacity to interpret data, apply scientific reasoning, and recognize the relevance of science in cultural and societal contexts (Bybee, 1997; McDonald et al., 2021). In this regard, the integration of local cultural elements into science learning—particularly through ethnoscience—offers a promising strategy to contextualize learning while honoring indigenous wisdom.

Ethnoscience refers to the study and integration of traditional knowledge systems rooted in specific cultural practices, often passed down through generations and deeply intertwined with local environments (Battiste, 2005). This knowledge includes understandings of nature, health, agriculture, and environmental management that are encoded in everyday practices, languages, and beliefs. In Indonesia, a country known for its vast cultural diversity, ethnoscience has been increasingly recognized as a pedagogical approach that can enrich science education and improve science literacy (Khoiri & Sunarno, 2018; Arlianovita et al., 2015). Local wisdom—manifested in rituals, tools, language, and games—offers unique opportunities for culturally relevant

education that resonates with students' lived experiences (Bahtiar, 2016; Asra et al., 2021).

Traditional games are one form of local wisdom that encapsulate not only physical activities but also contain embedded scientific concepts, such as motion, balance, force, energy transformation, and biological processes (Fitriana et al., 2020; Rumiati et al., 2021). In many Indonesian communities, traditional games are not merely recreational; they serve as informal educational tools that convey moral values, problem-solving strategies, social norms, and survival skills (Hariastuti et al., 2020). Among the Sasak people of Lombok, games like peresean, selodor, gansing, and maen kaleng are deeply rooted in cultural identity and function as carriers of indigenous science (Ikawati et al., 2018; Safitri et al., 2022). These games have the potential to be incorporated into classroom learning, particularly in science subjects, to facilitate meaningful, engaging, and contextual learning experiences.

Ethnoscience-based learning has been found effective in improving students' motivation, science process skills, and understanding of scientific concepts when taught using traditional games (Ashar, 2017; Kusumaningsih & Suryanti, 2019). This approach also aligns with constructivist learning theories, such as those advanced by Vygotsky, which emphasize the role of social and cultural contexts in cognitive development (Schunk, 2012). The use of culturally grounded materials like traditional games can scaffold student learning by building on familiar experiences and providing accessible entry points to complex scientific ideas (Widyaparamita et al., 2020). Furthermore, this approach fosters cultural appreciation and identity preservation, particularly among younger generations who may be losing touch with traditional practices in the face of modernization and globalization (Sutama, 2021).

The success of ethnoscience integration in education depends significantly on the perceptions and readiness of future teachers. As agents of educational transformation, preservice teachers play a crucial role in determining whether and how local wisdom is brought into the classroom. Their perceptions shape their willingness to adopt innovative, culturally relevant pedagogies, and their understanding of science literacy influences how they interpret and implement curriculum (Fulmer et al., 2019; Muliadi et al., 2022). Positive perceptions toward the use of traditional games in science learning can encourage preservice teachers to view indigenous knowledge not as outdated or irrelevant, but as a valuable complement to modern scientific thinking (Hacieminoglu, 2016; Aikenhead, 2001).

However, individual differences among preservice teachers—such as gender and academic progression (semester level)—may influence how they perceive the role of traditional games in science education. Gender has been shown to affect attitudes toward science and teaching practices, with studies indicating that male and female students may hold different beliefs about science relevance, pedagogical strategies, and cultural content (Alfiah et al., 2020; Zhafira et al., 2020). Similarly, students at different stages of their academic journey may exhibit varying degrees of openness and confidence in integrating ethnoscience into teaching practice, with those in advanced semesters potentially having more exposure to curriculum development and pedagogical theory (Astalini et al., 2019). Exploring these variables is therefore essential to better understand how preservice teachers engage with ethnoscience-based science literacy efforts.

Although previous research has examined the general perceptions of preservice teachers regarding ethnoscience integration (Muliadi et al., 2022; Ningrat et al., 2024), few studies have specifically analyzed these perceptions in relation to demographic variables such as gender and semester. This gap is significant, as understanding

subgroup differences can inform the design of differentiated training programs, ensuring that all teacher candidates—regardless of background—are adequately prepared to implement culturally responsive science education. Comparative studies can also help identify structural or experiential barriers that may prevent certain groups from fully embracing ethnoscience approaches, thus enabling institutions to develop targeted interventions (Rahmawati et al., 2019; Hariyono et al., 2023).

Moreover, the focus on Sasaknese traditional games provides a rich context for this analysis, given the cultural depth and scientific relevance of these games. Integrating these games into science education is not only pedagogically sound but also supports cultural preservation and community engagement. Preservice teachers who develop strong positive perceptions of such practices are more likely to act as cultural stewards and innovative educators in their future classrooms (Wazni et al., 2023; Parmin et al., 2017). In light of these considerations, it becomes critical to examine how gender and academic semester influence the perceptions of preservice teachers toward the integration of Sasaknese traditional games in enhancing science literacy.

Based on this rationale, the present study aims to conduct a comparative analysis of preservice teachers' perceptions of science literacy through the lens of Sasaknese traditional games. Specifically, the study seeks to explore whether significant differences exist in perceptions based on gender and semester level. By identifying such patterns, this research contributes to the growing body of literature on ethnoscience pedagogy and provides practical insights for teacher education programs seeking to promote inclusive, culturally grounded science instruction. Thus, this study aims to investigate compare the perceptions of preservice teachers regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy based on gender and semester.

METHOD

This study employed a descriptive exploratory design (Kerlinger & Lee, 2011; Fraenkel et al., 2012) to investigate and compare the perceptions of preservice teachers regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy. The research specifically aimed to analyze differences in perceptions based on two key demographic variables: gender and semester level. To explore naturally occurring attitudes without researcher manipulation, an ex post facto approach was adopted, allowing the investigation of existing data without the application of experimental treatments (Cohen et al., 2021; Takona, 2024).

The research sample consisted of 234 preservice teacher education students enrolled at the Mandalika University of Education. Participants were selected using a convenience sampling technique, considering ease of access and voluntary participation in responding to an online survey (Fink, 2011).

Data collection was conducted using a closed-ended questionnaire, developed specifically to measure perceptions of ethnoscience integration. Responses were rated on a four-point Likert scale, comprising the following categories: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) (Joshi et al., 2015). The instrument was distributed electronically using Google Forms to maximize reach and efficiency (Alfiah et al., 2020).

The questionnaire included seven items, each aligned with validated indicators measuring preservice teachers' perceptions of ethnoscience-based science learning. The development of these items was guided by prior work from Soemardiawan,

Wardhani, & Muliadi (2023). Prior to deployment, the questionnaire underwent expert review and was confirmed to possess content validity through expert judgment.

Data analysis employed inferential statistics to examine differences in preservice teachers' perceptions of the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy, based on gender and semester level. An independent sample t-test was used to determine whether there were significant differences in perceptions between male and female students, while a one-way ANOVA was conducted to assess differences in perceptions among students across different semester levels.

RESULTS AND DISCUSSION

Perception data of perceptions of preservice teachers regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy based on gender and semester level were analyzed using parametric statistics, after fulfilling the prerequisite tests, namely the homogeneity test and normality test as presented in Table 1.

Variabel	Homogeneity		Normality		
	Levenes Statistical test scores	Sig.	Kolmogorov-Smirnov's test scores	Sig.	
Semester	1.330	0.267	4.907	0.000	
Gender	0.001	0.980	4.907	0.000	

The results of data analysis in Table 1, it is known that the results of the normality test on perception data based on gender and semester show a significance value of 0.000 which is smaller than 0.05 (<0.05), which means the data is not normally distributed. The results of the homogeneity test of perception data based on gender have a significance value of 0.267 and perception data based on semester has a significance value of 0.980 greater than 0.05 (>0.05), so that both data have homogeneous variances.

Analysis of differences in preservice teachers regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy based on gender was carried out using the independent sample t-test at a significance level of 5%. The results of the analysis as presented in Table 2.

Table 2.	t-test	results
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Varianaaa	t-test for Equality for Means				
Valiances	t	df	Sig.	Mean diff.	
Gender	-0.128	231	0.899	-0.01517	

The results of the t test in table 4 explain that the significance value of 0.899 is greater than 0.05 (>0.05), so H₁ is rejected and H₀ is accepted, which means that there is no significant difference in the perceptions of male and female students regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy.

Analysis of differences in preservice teachers regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy based on semester level was carried out using the Anova test was then conducted. The analysis results are presented in Table 3.

Table 3. Anova test results

	Sum of Squares	df	Mean Square	F	Sig.		
Between Groups	1.643	2	0.821	2.191	0.114		
Within Groups	86.228	230	0.375				
Total	87.871	232					

The Anova test results in Table 3 show a significance value of 0.114, which is greater than 0.05 (>0.05), indicating that H_1 is rejected and H_0 is accepted. This means there is no significant difference in the perceptions of third, fifth, seventh semester students regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy.

The findings of this study indicate that no significant differences exist in preservice teachers' perceptions regarding the use of indigenous science in Sasaknese traditional games as a medium to enhance science literacy, either by gender (p = 0.899) or by academic semester (p = 0.114). These results suggest a broadly shared and positive perception across demographic categories, reflecting an encouraging level of acceptance of ethnoscience-based pedagogical approaches among preservice teachers.

The absence of gender differences in perception aligns with Hacieminoglu (2016), who emphasized that culturally grounded learning strategies tend to bridge gender-based attitudinal gaps in science education. Traditional games such as those found in Sasaknese culture serve not only as pedagogical tools but also as cultural connectors that foster identity and relevance, thereby minimizing disparities between male and female students' engagement with the material.

Likewise, the uniformity of perceptions across semester levels indicates that appreciation for the integration of traditional games into science learning is fostered early in the teacher education program. This finding contradicts prior assumptions that students in higher semesters, with more exposure to educational theory and curriculum design, would demonstrate greater receptivity. Rather, it supports the conclusions of Fulmer et al. (2019) and Wazni et al. (2023), who highlighted the role of culturally relevant teaching in cultivating inclusive and consistent learning experiences, regardless of students' academic progression.

The concept of science literacy explored in this study encompasses more than factual knowledge; it involves the ability to connect scientific principles to everyday life and local phenomena. This aligns with the OECD (2018) and Bybee (1997), who argue that science literacy must include interpreting data, applying scientific reasoning, and understanding the role of science within cultural and societal contexts. In this regard, traditional games such as *peresean* and *gansing* provide tangible and culturally embedded illustrations of scientific concepts like force, motion, and rotational dynamics (Rumiati et al., 2021).

Furthermore, integrating traditional games into science education contributes to cultural preservation, positioning teachers not only as knowledge facilitators but also as cultural stewards. Battiste (2005) and Asra et al. (2021) note that indigenous knowledge, when effectively incorporated into the classroom, enriches science education and supports community identity. Muliadi et al. (2022) further found that preservice teachers who understand local wisdom tend to view it positively as an instructional asset.

The lack of statistically significant differences among gender and semester cohorts further underscores the inclusive nature of ethnoscience-based instruction, affirming its adaptability to diverse learner profiles. This supports Rahmawati et al.

(2019) and Parmin et al. (2017), who advocate for differentiated, culturally responsive science education as a means to promote equity and relevance in teacher training. Thus, this study's findings demonstrate that Sasaknese traditional games are widely accepted by preservice teachers as an effective, engaging, and culturally resonant medium for fostering science literacy. The integration of such games supports cognitive development, critical thinking, and identity formation—hallmarks of meaningful science learning in culturally diverse contexts.

CONCLUSION

Based on the research findings, it can be concluded that (1) There is no significant difference in the perceptions of male and female students regarding the use indigenous science in of Sasaknese traditional games as a medium for strengthening science literacy, as evidenced by a significance value of 0.899, which is greater than 0.05 (>0.05); (2) There is no significant difference in the perceptions of third, fifth, and seventh semester students regarding the use of indigenous science in Sasaknese traditional games as a medium for strengthening science literacy, as indicated by a significance value of 0.114, which is greater than 0.05 (>0.05).

RECOMMENDATION

Based on the findings of this study, future researchers are encouraged to explore a broader range of demographic factors, such as cultural background and teaching experience, to gain deeper insights into preservice teachers' perceptions. It is also recommended to use qualitative or mixed-methods approaches to uncover underlying reasons behind these perceptions. Additionally, future studies may develop and test instructional models that integrate traditional games into science learning, as well as examine their effectiveness in different cultural or regional contexts.

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