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Effectiveness of Ethnoscience Learning Based on Sasaknese Traditional Games: Preservice Teacher's Perception

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Abstract: This study aims to explore the perceptions of preservice teachers on the effectiveness of ethnoscience learning based on Sasaknese traditional games. This exploratory research was conducted at the Mandalika University of Education with a subject pool of 294 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 quantitative descriptive statistics. The results of this study are (1) preservice teachers' perceptions of the effectiveness of ethnoscience learning based on Sasaknese traditional games in each item of the statement, namely item 1 scored 3.41, categorized as Very High; item 2 scored 3.19, categorized as Very High; item 3 scored 3.28, categorized as Very High; item 4 scored 3.13, categorized as Tall; item 5 scored 3.38, categorized as Very High; item 6 scored 3.37, categorized as Very High; and item 7 scored 3.47, categorized as Very High; (2) preservice teachers hold highly favorable perceptions regarding the effectiveness of ethnoscience learning based on Sasaknese traditional games have an average score of 3.32, categorized as Very High.

Keywords: Ethnoscience learning; Perception; Sasaknese traditional games

Introduction

Indonesia is a country with extraordinary cultural diversity, reflected in its numerous ethnic groups, languages, customs, and traditions (Dazrullisa, 2018). This diversity is not merely a background but a fundamental aspect of Indonesia's identity, shaping its social structure and influencing various aspects of life, from governance to education and community interactions (Setiawan et al., 2017). Culture reflects the rich historical values embedded in the indigenous knowledge of communities, often referred to as indigenous science (Battiste, 2005). As Toharudin & Kurniawan (2017) assert, local culture contains indigenous science derived from noble traditional values passed down through generations. This unique indigenous science is an inseparable part of the social and cultural activities of local communities (Arlianovita et al., 2015). Mardianti et al. (2020) emphasize that these noble values manifest as local wisdom applied in daily life.

Indigenous science, rooted in local culture and traditions, plays a crucial role in shaping the character and identity of a community (Prasetiyo et al., 2022). This concept is often linked to local wisdom, which refers to knowledge systems developed within specific cultural contexts. For instance, the Sasak community possesses unique ethnoscience knowledge reflecting their environmental adaptation and cultural practices, handed down across generations (Ningrat et al., 2024). This local wisdom embodies a comprehensive understanding of ecological relationships, resource utilization, and sustainable practices essential for community survival and resilience (Handayani et al., 2018).

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Local wisdom in each region is a cultural heritage that must be preserved and developed to uphold civilizational values (Sholahuddin & Admoko, 2021). As part of the national identity, local wisdom is not only a source of pride but also a guide to life, reflecting profound wisdom (Asra et al., 2021). According to Bahtiar (2016), local wisdom reflects how communities live their daily lives within their cultural context, encompassing a deep understanding of nature and traditions integral to community life (Asra et al., 2021).

One aspect of local wisdom containing indigenous science is traditional games. These games are not merely entertainment but also embody indigenous science values reflecting the social and cultural life of communities (Hariastuti, Retno & Laili, 2020). Traditional games serve as a medium for instilling character education, fostering social skills, and preserving local wisdom among children (Hidayati, 2020; Karina et al., 2021). These games encapsulate various aspects of indigenous science, including understanding physical coordination, social interaction, and environmental awareness (Melati & Suparno, 2020).

Traditional games also play a significant role in character development and socialization (Hadi et al., 2019). Research indicates that involving children in traditional games enhances their perceptual-motor skills and social competencies (Kusmiati & Sumarno, 2018). Traditional games provide a platform for children to learn essential social skills such as cooperation, teamwork, and conflict resolution (Hadi et al., 2019; Amrullah et al., 2023). The communal aspect of playing traditional games fosters peer interaction, cultivating a sense of belonging and community (Trajkovik et al., 2018). This social dimension is critical in an era where digital distractions often overshadow face-to-face interactions, highlighting the importance of preserving traditional games to maintain social cohesion (Rustan & Munawir, 2020a).

In Lombok, the Sasak community has various traditional games that are part of their cultural heritage (Ikawati et al., 2018). Games like *peresean*, *selodor*, *gansing*, *maen kaleng*, *cungklik*, and *maen jingklak* are still played by children today (Safitri et al., 2022; Ikawati et al., 2018). These games not only reflect local culture but also embody wise and noble ideas (Dani et al., 2022). Arlianovita et al. (2015) affirm that every Sasak tradition contains elements of indigenous science. Hence, traditional games from the Sasak community can be integrated into learning processes.

Muliadi & Asyari (2024) emphasizes that traditional Sasak games contain educational values that can help in the learning process. This is in line with research by Nabie (2015) which shows that cultural games serve as a platform for social interaction and learning, where children, teachers and community members can share ideas and values. Furthermore, Hikmawati et al. (2020) identified ethnoscience potential in traditional games that can be used to develop learning models. This shows that traditional games not only contain cultural aspects, but can also be integrated into the learning process to improve students' understanding of indigenous science and local values.

The intersection of play and learning highlights the role of traditional games as a tool for cognitive development, where children learn mathematical and scientific concepts through hands-on engagement rather than abstract instruction (Sulistyaningtyas & Fauziah, 2019). Rustan & Munawir (2020) emphasizes that traditional games, unique to each region, are passed down through generations and contain educational values relevant to modern learning concepts. Thus, traditional games become a cultural treasure that must be preserved and utilized as a source of science learning (Fitriana et al., 2020).

Integrating traditional games into ethnoscience learning offers an innovative and effective approach to connecting local cultural values with education. In this context, ethnoscience plays a vital role in understanding how local knowledge and cultural practices can be integrated into learning processes (Indriyani et al., 2021; Putri & Nugrahanta, 2021). The integration of Sasak traditional games into ethnoscience learning not only enhances students' science learning experiences but also contributes to protecting cultural heritage (Hidayati, 2020; Sulistyaningtyas & Fauziah, 2019; Abu Bakar et al., 2018). This type of learning strengthens intergenerational relationships and fosters the sharing of cultural narratives (Gul, 2023; Adnan et al., 2020). Adnan et al. (2020) emphasize that traditional game-based learning can facilitate students' collaboration and learning, reinforcing the importance of indigenous science in contemporary society.

Incorporating indigenous science into traditional game-based science education is a relevant step in introducing scientific concepts contextually (Khoiri & Sunarno, 2018). Traditional games can be used as media to understand mathematical, scientific, and local language concepts (Rumiati et al., 2021). This strengthens the idea that indigenous science can be scientifically elaborated through an ethnoscience learning approach (Hadi & Ahied, 2017). According to Sarini & Selamet (2019), ethnoscience explores indigenous science within traditions and culture using a scientific approach. As science studies natural phenomena in community life, integrating indigenous science into science education becomes relevant (Khoiri & Sunarno, 2018).

Ethnoscience learning not only introduces students to science but also builds a deeper understanding of the relationship between natural phenomena and

community culture (Parmin et al., 2017). This approach allows prospective teachers to think scientifically while appreciating local culture (Seroto, 2012). Using traditional games in science learning has been shown to effectively enhance learning outcomes and motivation (Andriani, 2011). Furthermore, this approach also trains science process skills, such as observation, analysis, and problem-solving (Rumiati et al., 2021).

In the context of developmental theory, Vygotsky emphasizes the importance of social, cultural, and historical interactions in learning (Wahyu, 2017). Through the mediation of traditional games, students' learning processes become more meaningful and result in significant cognitive changes (Schunk, 2012). Research findings suggest that traditional games train students' concentration, knowledge, attitudes, and skills (Andriani, 2011). Thus, ethnoscience learning based on Sasak traditional games has great potential to be developed in teacher education (Kartono et al., 2012).

Ethnoscience learning enhances respect for cultural and knowledge diversity, creating an inclusive learning atmosphere (Aikenhead, 2001). This approach enables students to understand science contextually while increasing their engagement in the learning process (Cirkony et al., 2023). Additionally, it encourages students to be more attentive to local culture while developing their science and cultural literacy (Chow-Garcia et al., 2022).

According to Eidin et al. (2024), ethnoscience learning allows prospective teachers to understand natural phenomena through a deep cultural perspective. Therefore, it is crucial for Universitas Pendidikan Mandalika to integrate traditional and local cultural values into education. The effectiveness of ethnoscience learning depends on collaboration between lecturers and students in creating an active and enjoyable learning environment (Hmelo-Silver, 2004).

Students' perceptions of ethnoscience learning are also an important indicator of the method's effectiveness (A. Muliadi et al., 2021). Positive perceptions can increase students' interest and focus in learning, thus supporting effective learning processes (Marlina & Sumaryoto, 2023). Therefore, it is essential to examine prospective teachers' perceptions of the effectiveness of ethnoscience learning based on Sasaknese traditional games.

Method

This study is an exploratory descriptive research (Kerlinger & Lee, 2011; Fraenkel et al., 2012), aimed at describing the perceptions of preservice teachers regarding the effectiveness of ethnoscience learning based on Sasaknese traditional games (A. Muliadi et al., 2021). The study employs an ex post facto approach because the researchers only examined and measured existing attitudinal data without any manipulation or intervention (Cohen et al., 2021; Takona, 2024). The respondents were 294 preservice education students at the Mandalika University of Education, selected through convenience sampling based on accessibility and willingness to participate in an online-distributed questionnaire (Fink, 2011).

This research employed a closed questionnaire as its instrument, featuring responses based on a Likert scale (Muliadi et al., 2021). The scale included degrees of agreement: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) (Joshi et al., 2015) and was administered via Google Forms (Alfiah et al., 2020). The questionnaire comprised 7 items, each aligned with indicators of preservice teachers' perceptions of ethnoscience, as developed by Soemardiawan, Wardhani & Muliadi (2023). The questionnaire was validated by experts and confirmed as valid.

The research data were analyzed using descriptive statistics, which included calculating the frequencies, means, and standard deviations of the responses. This method was selected to provide a clear and straightforward interpretation of the data, reflecting the main trends and variability within the responses. The average data on student perceptions were interpreted using the assessment criteria developed by Nugroho et al. (2023), as presented in Table 1.

Table 1. Criteria for conversion of average student perception scores

Average score ($\bar{p}$)	Category
$3.25 < X \leq 4.00$	Very High
$2.50 < X \leq 3.25$	Tall
$1.75 < X \leq 2.50$	Low
$1.00 < X \leq 1.75$	Very Low

Result and Discussion

The description of the data measuring the perceptions of preservice teachers regarding the effectiveness of ethnoscience learning based on Sasaknese traditional games is presented in Table 2.

Based on the data analysis presented in Table 2, it is observed that the preservice teachers' perceptions of the effectiveness of ethnoscience learning based on Sasaknese traditional games scored highly across several items. Specifically, item 1 scored 3.41, categorized as Very High; item 2 scored 3.19, categorized as Very High; item 3 scored 3.28, categorized as Very High; item 4 scored 3.13, categorized as Tall; item 5 scored 3.38, categorized as Very High; item 6 scored 3.37, categorized as Very High; and item 7 scored 3.47, categorized as Very High. A detailed representation of the data is provided in Figure 1.

Table 2. Preservice Teachers' Perceptions

Statement Items	Answer				Σ Score	Mean
	SA	A	D	SD		
Traditional games contain distinctive indigenous science	136	146	10	2	1004	3.41
Indigenous science in traditional games is relevant to science education materials	90	172	30	2	938	3.19
Traditional games can be developed as a resource for science learning (ethnoscience learning)	104	170	18	2	964	3.28
Ethnoscience learning based on traditional games can enhance understanding of science	79	175	38	2	919	3.13
Ethnoscience learning based on traditional games can improve understanding of local wisdom	121	166	5	2	994	3.38
Ethnoscience learning based on traditional games can enhance understanding of the diversity of traditions and cultures	119	165	9	1	990	3.37
Ethnoscience learning based on traditional games can foster an attitude of cultural preservation	144	146	3	1	1021	3.47

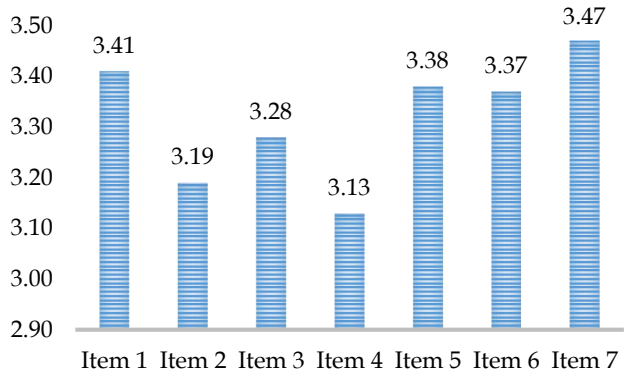

Figure 1. Preservice Teachers' Perceptions

The perceptions of preservice teachers on the effectiveness of ethnoscience learning based on Sasaknese traditional games were analyzed using quantitative descriptive statistics as presented in Table 3.

Table 3. Results of student perception data analysis

Variable	N	Σ Score	Mean	Category
Perception	294	975.71	3.32	Very High

Based on the data analysis presented in Table 3, it can be explained that the perceptions of preservice teachers regarding the effectiveness of ethnoscience learning based on Sasaknese traditional games have an average score of 3.32, categorized as Very High.

The research results indicate that preservice teachers hold highly favorable perceptions regarding the effectiveness of ethnoscience learning based on Sasaknese traditional games. These findings confirm that preservice teachers possess a positive outlook on the significance of integrating sasaknese traditional games into ethnoscience learning. This demonstrates that the students have a robust understanding of ethnoscience and its application in science education (Ningrat et al., 2024). Students with a deeper comprehension of ethnoscience are more likely to hold positive views concerning the importance of incorporating local cultural values into ethnoscience learning (Freeman et al., 2014; Hacieminoglu, 2016).

The overwhelmingly positive perceptions among students indicate a strong interest in ethnoscience education among preservice teachers (Fulmer et al., 2019; McDonald et al., 2021). This suggests that ethnoscience plays a pivotal role in enhancing students' knowledge and understanding by blending local wisdom and cultural experiences into formal education. Such an approach facilitates not only a deeper comprehension of scientific concepts but also connects classroom learning with real-world experiences (Khoiri & Sunarno, 2018). Integrating ethnoscience into teaching practices encourages students to explore and reinterpret indigenous knowledge through a scientific lens, fostering critical thinking and problem-solving skills (Parmin et al., 2017; (Budiarti et al., 2022).

Preservice teacher students recognize the value of incorporating traditional games into ethnoscience learning as a means to deepen their understanding of science and local wisdom while promoting cultural preservation. Nurhasnah et al. (2022) emphasize that traditional games integrated into ethnoscience education are essential for preserving local culture and developing students' skills, values, and environmental attitudes. This approach enables students to connect their pre-existing knowledge with scientific concepts, leading to a more comprehensive understanding of various topics (Sholahuddin & Admoko, 2021). Additionally, research shows that ethnoscience learning materials positively influence students' scientific literacy, critical thinking, and academic achievement in science (Verawati et al., 2023; Fasasi, 2017). Traditional games serve a vital function in ethnoscience education by integrating cultural heritage and experiential knowledge into the learning process. They not only help students engage with their cultural heritage but also

contribute to their overall development across multiple domains (Gultom et al., 2022).

The positive perceptions of prospective teacher students affirm their belief in the effectiveness of integrating traditional games into ethnoscience learning. This approach is effective because ethnoscience education based on traditional games not only enhances students' understanding of scientific concepts but also strengthens their cultural identity. Previous studies have shown that ethnoscience-based learning can improve students' critical thinking skills, scientific literacy, and provide more contextual and relevant learning experiences (Putri et al., 2022; (Idul & Fajardo, 2023). According to (Pamudiah & Setiawan, 2023), one of the key aspects of ethnoscience learning is its ability to connect scientific knowledge with local cultural practices. For example, traditional games like *Engklek* can serve not only as tools to teach scientific concepts (such as physics) but also as a medium to introduce cultural and social values to students (Hariyono et al., 2023; Kasi et al., 2022). This indicates that integrating traditional games into learning can create an engaging and effective learning experience (Hariyono et al., 2023).

These findings are supported by previous research by Rahmawati et al. 2019), which revealed that ethnoscience learning based on traditional games can increase students' interest and engagement in the learning process. This approach not only makes learning materials more engaging but also provides students with a broader context for understanding scientific concepts. Consequently, ethnoscience learning based on traditional games can serve as a bridge between scientific knowledge and local culture, fostering a more holistic learning experience (Putri & Nugrahanta, 2021). Chiang & Lee 2015) demonstrated that ethnoscience learning effectively improves students' learning outcomes. Additionally, a meta-analysis by (Putri et al., 2022) highlighted the significant positive impact of integrating indigenous science into science education on students' academic performance. (Idul & Fajardo, 2023)also emphasized that ethnoscience learning enhances student motivation and engagement, which, in turn, contributes to better academic outcomes.

Research by Rahayu & Ismawati (2022) further confirmed the effectiveness of ethnoscience learning based on traditional games in developing students' scientific process skills. Ethnoscience learning also contributes to the development of students' character and scientific attitudes. Sudarmin et al. (2019) found that ethnoscience-based learning improves students' conservation-oriented character and entrepreneurial skills. These findings, reinforced by previous research, underscore that ethnoscience learning based on traditional games focuses not only on academic aspects but also on developing essential social and cultural values. Therefore, ethnoscience learning based on traditional games serves as a tool to shape students into more responsible individuals who are mindful of their environment and communities. On a broader scale, this approach also supports the preservation of local culture.

The positive perceptions of these prospective teacher students highlight their support for preserving local culture through ethnoscience education. This aligns with the broader educational goal of cultivating a generation that is not only academically proficient but also culturally aware and appreciative of their heritage (Irdalisa et al., 2023; Asiyah et al., 2023). Ethnoscience learning is believed to be effective as it facilitates the learning process by connecting scientific knowledge with local culture, enhancing critical thinking skills, improving students' scientific literacy, and fostering positive character and scientific attitudes (Haulia et al., 2022). Thus, this approach is highly relevant and significant in the context of education in Indonesia, particularly in efforts to create more contextual, engaging, and meaningful learning experiences for students (Sulistyaningtyas & Fauziah, 2019; Pamudiah & Setiawan, 2023).

Conclusion

Based on the research results above, it can be concluded that (1) preservice teachers' perceptions of the effectiveness of ethnoscience learning based on Sasaknese traditional games in each item of the statement, namely item 1 scored 3.41, categorized as Very High; item 2 scored 3.19, categorized as Very High; item 3 scored 3.28, categorized as Very High; item 4 scored 3.13, categorized as Tall; item 5 scored 3.38, categorized as Very High; item 6 scored 3.37, categorized as Very High; and item 7 scored 3.47, categorized as Very High; (2) preservice teachers hold highly favorable perceptions regarding the effectiveness of ethnoscience learning based on Sasaknese traditional games have an average score of 3.32, categorized as Very High.

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Author Contributions

Agus Muliadi: developing literature study topics and defining literature analysis methodology, analyzing literature related to literature study topics, writing draft articles, revising, and editing final articles.

M. Khairul Wazni, Suhirman, Dadang Warta Chandra Wira Kusuma: browsing and mapping literature related to the topic of literature study.

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Conflicts of Interest
The authors declare no conflict of interest.

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