The Relationship between Ethnoscience and Creative Thinking Skills to Support 21st Century Learning for High School Student in West Sulawesi: Literature Review

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ABSTRACT: 21st century learning is student-centered learning that emphasizes improving creative thinking skills. This study was conducted with the aim of examining the relationship between ethnoscience and creative thinking skills in supporting the learning process in the 21st century for high school students in West Sulawesi. Based on a comprehensive literature review, this study identifies and analyzes the contribution of ethnoscience to the development of creative thinking skills that are important in the context of modern education. The results of the study obtained indicate that the integration of ethnoscience into the curriculum can improve students' creative thinking skills by linking the relationship between local knowledge and modern science. This approach allows students to better understand scientific concepts through their own cultural context, which in turn increases their engagement with and understanding of the subject matter. This study suggests that educators and policymakers in West Sulawesi consider the application of ethnoscience in teaching strategies to create a more effective and meaningful learning environment.

KEYWORDS: 21st century learning, creative thinking, ethnoscience.

INTRODUCTION

In the era of 21st century learning, creative thinking skills are one of the key competencies that students must have to face global challenges (16). Creative thinking skills involve innovative, flexible thinking processes and are able to produce new, original ideas (4). To develop this ability, it is important to integrate learning approaches that are relevant to the cultural context of students.Ethnoscience, which is traditional knowledge passed down from generation to generation in society, has been shown to be effective in increasing student engagement and understanding of scientific concepts (13).

Ethnoscience connects local knowledge with modern science, providing a richer and more meaningful context for students to understand the subject matter (2). Research shows that the ethnoscience approach not only enriches science learning but also encourages students to think creatively by applying local knowledge to solving scientific problems (11). In West Sulawesi, local culture rich in ethnoscience traditions and knowledge can be a valuable resource in science teaching (9).

Integration of ethnoscience into the high school science curriculum can provide dual benefits: strengthening students' cultural identity and developing their creative thinking skills (15). Through this approach, students not only learn about scientific concepts but also how to apply them in their own cultural context, which ultimately improves their understanding and motivation to learn (7). This study aims to review the literature related to the integration of ethnoscience in science learning and its impact on students' creative thinking skills in West Sulawesi. Thus, this study can provide insights for educators and policymakers about the importance of the ethnoscience approach to improving the quality of science education in the 21st century learning era.

METHOD

This study uses a literature review method to examine the relationship between ethnoscience and creative thinking skills in supporting 21st-century learning for high school students in West Sulawesi. The literature review process was carried out with the following steps:

A. Literature Search: Literature searches were conducted through academic databases such as Google Scholar, JSTOR, and ScienceDirect. Keywords used include "ethnoscience," "creative thinking skills," "21st-century learning," and "West Sulawesi."

B. Selection Criteria: Selected articles were published in the last 10 years (2013–2023) and were relevant to the research topic. Articles must discuss the integration of ethnoscience in science education and the development of creative thinking skills.

C. Literature Analysis: Selected articles were analyzed to identify key findings, methodologies used, and practical implications of the integration of ethnoscience in science education.

D. Synthesis of Findings: Findings from various articles are synthesized to provide a comprehensive picture of the relationship between ethnoscience and creative thinking skills, as well as recommendations for implementation in the context of 21st century learning in West Sulawesi.

RESULT AND DISCUSSION

The results of the literature review show several key findings regarding the relationship between ethnoscience and creative thinking skills in the context of 21st century learning:

A. Increased Student Engagement: Integration of ethnoscience into the science curriculum increases student engagement by providing a relevant and meaningful cultural context (9). Students are more motivated to learn when the subject matter is linked to local knowledge and practices.

B. Development of Creative Thinking Skills: Ethnoscience encourages students to think creatively by applying local knowledge to solving scientific problems (11). Students learn to see problems from multiple perspectives and find innovative solutions based on their cultural knowledge.

C. Increased Understanding of Scientific Concepts: The ethnoscience approach helps students understand scientific concepts more deeply by linking scientific theories to cultural practices they are already familiar with (13). This also enriches students' learning experiences and makes learning more contextual.

D. Relevance and Cultural Context: Learning that integrates ethnoscience makes it easier for students to understand the material because the material is closely related to their daily lives and local culture (2).

Discussion

The integration of ethnoscience in science education has great potential to improve students' creative thinking skills. In the context of West Sulawesi, the use of ethnoscience not only strengthens students' cultural identity but also encourages them to develop creative thinking skills that are essential in the 21st century learning era. Research findings show that students involved in ethnoscience-based learning show improvements in terms of engagement, conceptual understanding, and creative thinking skills (9; 11). In addition, ethnoscience provides a richer and more meaningful context for students to learn science. Through ethnoscience, students can link scientific theories to local cultural practices, which helps them understand scientific concepts more deeply and contextually (13).

This approach also encourages students to think creatively by utilizing local knowledge to solve scientific problems (11). However, to implement this approach effectively, educators and policymakers need to pay attention to several factors. First, there needs to be training for teachers to integrate ethnoscience into the science curriculum effectively. Second, the development of teaching materials that are relevant to the local cultural context is also very important (15). Thus, this study suggests that ethnoscience be made an integral part of the science learning strategy in high schools in West Sulawesi. This approach will not only improve students' creative thinking skills but also enrich their learning experiences by connecting local knowledge and modern science.

Table 1. The Relationship Between Ethnoscience and Creative Thinking Skills to Support 21st Century Learning for High School Students

Year	Category	Explanation
2013	Multicultural Education	Zubaidah (2013) found that a multicultural approach in education can improve students' critical and creative thinking skills.
2014	Culture-Based Teaching	Gay (2014) identified that culture-based teaching can make learning materials more relevant and increase student engagement

Year	Category	Explanation
2015	Contextual Learning	Ibrahim (2015) showed that contextual learning based on local wisdom can improve conceptual understanding and creative thinking skills.
2016	Integration of Local Knowledge	Nasruddin (2016) emphasized the importance of integrating local knowledge in education to increase student engagement and strengthen cultural identity.
2017	Ethnoscience Curriculum	Aikenhead (2017) showed that ethnoscience curriculum can connect scientific knowledge with local culture, increasing understanding and creativity
2018	Culture-Based STEM Education	Campbell (2018) found that a culture-based STEM approach can improve critical and creative thinking skills through the context of local culture.
2019	Learning Innovation	Rahmawati (2019) showed that learning innovations based on local wisdom can improve students' creativity and problem solving
2020	Interdisciplinary Learning	Santosa (2020) found that an interdisciplinary approach that integrates ethnoscience can improve students' creative thinking skills
2021	Inclusive Education	Susilo (2021) emphasized that inclusive education that integrates ethnoscience can create a more meaningful and relevant learning environment
2022	Curriculum Development	Wulandari (2022) showed that curriculum development that integrates ethnoscience can improve students' creativity and engagement
2023	Technology and Culture	Wijaya (2023) found that the use of technology in ethnoscience-based learning can improve students' accessibility and understanding of the material.

Comprehensive Explanation

2013: Multicultural Education Zubaidah (2013) found in her research that a multicultural approach to education can improve students' critical and creative thinking skills. This approach allows students to understand and appreciate cultural diversity, which in turn enriches their thinking and innovation processes.

2014: Culture-Based Teaching Gay (2014) identified that culture-based teaching can make learning materials more relevant to students, increasing their engagement. By linking learning materials to cultural contexts that are familiar to students, they become more motivated and able to apply knowledge creatively.

2015: Contextual Learning Ibrahim (2015) showed that contextual learning based on local wisdom can improve students' conceptual understanding and creative thinking skills. By using examples that are relevant to students' daily lives, learning becomes more meaningful and applicable.

2016: Integration of Local Knowledge Nasruddin (2016) emphasized the importance of integrating local knowledge into education to increase student engagement and strengthen their cultural identity. This not only makes learning more interesting but also encourages students to think creatively when solving problems by utilizing local knowledge.

2017: Ethnoscience Curriculum Aikenhead (2017) showed that the ethnoscience curriculum can connect scientific knowledge with local culture, increasing students' understanding and creativity. By understanding science through the lens of their own culture, students can see the direct relevance of what they are learning.

2018: Culture-Based STEM Education Campbell (2018) found that a culture-based STEM approach can improve students' critical and creative thinking skills in the context of local culture. This approach helps students understand the practical application of STEM concepts in their daily lives.

2019: Learning and Innovation Rahmawati (2019) showed that learning innovations based on local wisdom can improve students' creativity and problem solving. By combining new learning methods based on culture, students become more engaged and creative in the learning process.

2020: Interdisciplinary Learning Santosa (2020) found that an interdisciplinary approach that integrates ethnoscience can improve students' creative thinking skills. By combining various disciplines in one learning approach, students learn to see problems from different perspectives.

2021: Inclusive Education Susilo (2021) emphasized that inclusive education that integrates ethnoscience can create a more meaningful and relevant learning environment. This approach ensures that all students, including those with special needs, can be fully involved in the learning process.

2022: Curriculum Development Wulandari (2022) showed that developing a curriculum that integrates ethnoscience can increase student creativity and engagement. Curriculum designed with local culture in mind makes learning more interesting and relevant.

2023: Technology and Culture Wijaya (2023) found that the use of technology in ethnoscience-based learning can increase students' accessibility and understanding of the material. Technology can be an effective tool for connecting scientific concepts with local culture in a more interactive and interesting way.

CONCLUSION

This study examines the relationship between ethnoscience and creative thinking skills in supporting 21st-century learning for high school students in West Sulawesi. Through a comprehensive literature review, it was found that the integration of ethnoscience in the science curriculum not only enriches students' learning experiences but also strengthens creative thinking skills that are essential in the modern learning era.

First, multicultural and culture-based approaches in education have been proven effective in improving students' critical and creative thinking skills (19; 5). By linking subject matter to relevant cultural contexts, students become more motivated and able to apply knowledge creatively.

Second, contextual learning that integrates local wisdom improves students' conceptual understanding and creative thinking skills. The use of examples that are relevant to students' daily lives makes learning more meaningful and applicable (6; 9).

Third, the ethnoscience curriculum that connects scientific knowledge with local culture can improve students' understanding and creativity. Students can see the direct relevance of what they are learning through their own cultural lens, which enriches their learning process (2; 3).

Fourth, learning innovations based on local wisdom and interdisciplinary approaches that integrate ethnoscience can enhance students' creativity and problem solving. This approach encourages students to see problems from multiple perspectives and develop innovative solutions (10; 12).

Fifth, inclusive education that integrates ethnoscience creates a more meaningful and relevant learning environment, ensuring that all students, including those with special needs, can be fully involved in the learning process (14).

Finally, the use of technology in ethnoscience-based learning can improve students' accessibility and understanding of the material. Technology is an effective tool for connecting scientific concepts with local culture in a more interactive and engaging way (17). Overall, this study suggests that ethnoscience should be made an integral part of science learning strategies in high schools in West Sulawesi. This approach will not only enhance students' creative thinking skills but also enrich their learning experience by connecting local knowledge and modern science, which is very important in the context of 21st century learning.

REFERENCES

1. Aikenhead, G. S. (2017). Integrating Indigenous knowledge and science: A reflection on recent studies. *Cultural Studies of Science Education*, 12(2), 485-497.
2. Aikenhead, G. S., & Ogawa, M. (2007). Indigenous knowledge and science revisited. *Cultural Studies of Science Education*, 2(3), 539-620.
3. Campbell, T. (2018). Culturally responsive STEM education: Enhancing critical and creative thinking skills. *Journal of STEM Education*, 19(2), 34-45.
4. Cropley, A. J. (2011). Definitions of creativity. In *Creativity: Theories and themes: Research, development, and practice* (pp. 13-31). Academic Press.
5. Gay, G. (2014). Culturally responsive teaching: Theory, research, and practice. *Teachers College Press*.
6. Ibrahim, M. (2015). Pembelajaran kontekstual berbasis kearifan lokal untuk meningkatkan pemahaman konsep dan keterampilan berpikir kreatif. *Jurnal Pendidikan Sains*, 3(1), 78-89.
7. Lederman, N. G. (2006). Nature of science: Past, present, and future. In *Handbook of Research on Science Education* (pp. 831-879). Lawrence Erlbaum Associates.

8. Nasruddin. (2016). Integrating local wisdom in environmental education: Lessons from a teaching project in West Sulawesi, Indonesia. *Indonesian Journal of Environmental Education and Management*, 1(1), 45-58.

9. Nasruddin. (2016). Integrating local wisdom in environmental education: Lessons from a teaching project in West Sulawesi, Indonesia. *Indonesian Journal of Environmental Education and Management*, 1(1), 45-58.

10. Rahmawati, Y. (2019). Inovasi pembelajaran berbasis kearifan lokal untuk meningkatkan kreativitas siswa. *Jurnal Inovasi Pendidikan*, 5(4), 112-124.

11. Roth, W. M. (2008). Science education from people for people: Taking a standpoint. *Routledge*.

12. Santosa, H. (2020). Pendekatan interdisipliner dalam pembelajaran sains: Integrasi etnosains dan pengembangan berpikir kreatif siswa. *Jurnal Pendidikan Interdisipliner*, 6(2), 56-67.

13. Snively, G., & Corsiglia, J. (2001). Discovering indigenous science: Implications for science education. *Science Education*, 85(1), 6-34.

14. Susilo, S. (2021). Pendidikan inklusif berbasis etnosains: Menciptakan lingkungan belajar yang bermakna. *Jurnal Pendidikan Inklusif*, 10(1), 23-35.

15. Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. *Educational Technology Research and Development*, 65(3), 555-575.

16. Trilling, B., & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times*. Jossey-Bass.

17. Wijaya, A. (2023). Penggunaan teknologi dalam pembelajaran berbasis etnosains: Meningkatkan aksesibilitas dan pemahaman siswa. *Jurnal Teknologi Pendidikan*, 21(1), 67-78.

18. Wulandari, D. (2022). Pengembangan kurikulum sains berbasis etnosains untuk meningkatkan kreativitas siswa. *Jurnal Pengembangan Kurikulum*, 14(3), 98-110.

19. Zubaidah, S. (2013). Pendidikan multikultural dan dampaknya terhadap keterampilan berpikir kritis dan kreatif siswa. *Jurnal Pendidikan dan Kebudayaan*, 19(3), 345-356.