

ETHNOMATHEMATICS INTEGRATION IN MATHEMATICS CLASSROOM: IMPACTS AND INSIGHTS ASSISTED BY ATLAS.TI 23

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Abstract

This study investigates the incorporation of West Javanese ethnomathematics into the region's mathematics curriculum, aiming to discern its influence on student engagement and mathematical reasoning, alongside the associated educational challenges, particularly during the shift to remote learning. Employing a case study approach, in-depth interviews with junior high and vocational school teachers were conducted and analysed using Atlas.ti 2023 to extract and code thematic patterns. The exploration revealed an innovative pedagogical approach that intertwines traditional cultural elements with mathematics education, leveraging local culinary and batik motifs to enhance student interest and cognitive skills. Despite initial challenges such as creating resonant educational materials and acclimatizing students to culturally rich problem-solving, a gradual integration strategy and a supportive communication network for students and parents were developed. The study concludes that while the integration of ethnomathematics presents initial hurdles, it ultimately strengthens students' cultural understanding and engagement. The findings advocate for a deeper incorporation of ethnomathematics resources in the curriculum and suggest a potential for broader application in different educational contexts, encouraging further research into long-term impacts and pedagogical refinement. The implications suggest that ethnomathematics not only promotes academic prowess but also fosters a harmonious blend of cultural identity and mathematical literacy.

Keywords: Atlas.ti, Covid-19, Cultural, Ethnomathematics, Mathematics.

1. Introduction

Integrating ethnomathematics in the classroom blends culture with arithmetic. Ethnomathematics studies mathematical practices and conceptions across cultures [1]. It acknowledges student ethnic diversity and incorporates cultural components into the curriculum to make mathematics more meaningful. Ethnomathematics can help teachers create a more inclusive and engaging learning environment that fosters critical thinking, problem-solving, and cultural appreciation [2].

Research has demonstrated introducing ethnomathematics in math classes has many benefits. It enhances math comprehension and performance [3]. It boosts pupils' self-esteem and maths research enthusiasm [2]. Student access to and understanding of mathematics can be enhanced by ethnomathematics, reflecting classroom cultural variety [4]. It can also improve students' mathematics communication and problem-solving [5].

To include ethnomathematics into the mathematics curriculum, teachers must recognize its relevance and make room for it [6]. They can teach math ideas using culturally sensitive methods that respect students' cultural diversity and ordinary mathematical practises [7]. To make math more entertaining and accessible, teachers can use ethnomathematics folklore games and artifacts from diverse cultures [8]. However, integrating ethnomathematics into geometry instruction might be difficult. Proper syllabus, curriculum design, and teacher training and support are these problems [9]. This study evaluates the influence of incorporating West Javanese ethnomathematics into mathematics education.

2. Methods

The case study method involves in-depth interviews with math professors who have integrated ethnomathematics. Teacher backgrounds include junior high and vocational school. Ethnomathematics integration problems and benefits for instructors are examined in the interviews. Furthermore, the study examines how these teachers incorporate culturally appropriate examples and practices into their lessons. This study will show how ethnomathematics improves students' cultural knowledge and math participation. We analyzed interview results using atlas.ti 2023.

The software's ability to facilitate qualitative and mixed-methods research aligns with the broader trend of incorporating diverse data analysis techniques in engineering research, including machine learning, data mining, and information visualization [10]. To extract and code interview results into themes. Our analysis and interpretation of these themes revealed patterns and trends in students' cultural awareness and mathematics engagement [11-13].

3. Results and Discussion

Analysis of interview data yielded five codes. We networked these codes using Atlas.ti 2023. Cultural, educational, exploration, learning problems, and math codes were gathered. We networked these codes to find their linkages. The network of concepts and themes was complex (Figs. 1-5).

3.1. Cultural

In seventh-grade social arithmetic, West Javanese food and batik motifs merge beautifully. This innovative method makes learning fun and engaging.

Ethnomathematics helps students' cognitive and mathematical reasoning while conserving their region's rich cultural history (Fig. 1).

However, integrating ethnomathematics is difficult. Creating teaching materials that reflect this theme is difficult due of students' unfamiliarity with culturally-infused story problems. To solve these challenges, we deepen our ethnomathematics research while remaining committed to educational enrichment. By gradually adapting students to this novel pedagogical approach and providing a supportive network through consistent guidance and open communication with students and parents, the learning experience is redefined, enabling a smoother transition and deeper absorption of this culturally rich educational venture [14, 15].

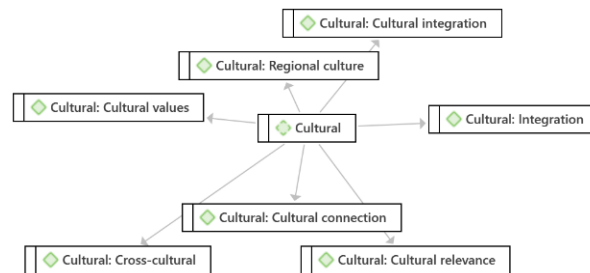


Fig. 1. Coding network of cultural.

3.2. Education

Problem-based learning and a mixed-method approach, especially an embedded design, integrate ethnomathematics into mathematics education. A rich tapestry of internet resources, a careful study of earlier studies [15, 16], and insightful contacts with Purwakarta cultural authority underpin this integration. The technique adds Purwakarta's culinary and artisanal traditions to the curriculum, incorporating cultural knowledge with math (Fig. 2).

Ethnomathematics was hard to learn, and teaching this revolutionary technique required new tools. We covered the knowledge gap by carefully searching ethnomathematics materials. Ethnomathematics' complex story problems require strong mathematical reasoning; therefore, students faced a new hurdle. To develop students' cognitive and reasoning skills and ease them into this new style of thinking, teachers introduced these hard ideas gradually. Due to the COVID-19 pandemic's high pace of distance education, children and their parents were supported in homeroom sessions to promote learning autonomy [17-21].

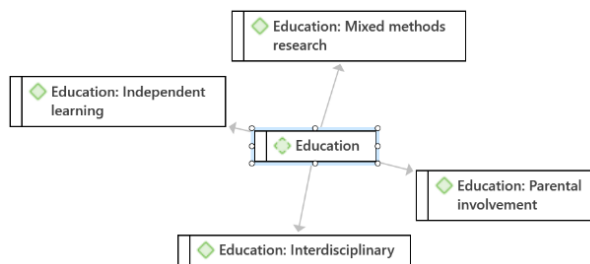


Fig. 2. Coding network of education.

3.3. Exploration

Mathematics and culture are used in ethnomathematics to explain how communities use math. To bypass textbook limits, math education uses ethnomathematics. In addition to academic content, these tools use engaging images and language to simplify complex concepts. Reflecting Purwakarta's rich culinary and craft traditions, social arithmetic problems are carefully designed. Culture lovers have promoted Purwakarta's legacy despite material difficulties (Fig. 3).

Project-Based Learning (PjBL) began ethnomathematics teaching using West Javanese batik motif conundrums. Creative math instruction through cultural narrative excites students. Ethnomathematics challenges engage students and improve their math skills. Students didn't comprehend ethnomathematics, and creating teaching aids was hard. The unexpected switch to remote learning during the epidemic exposed students to culturally relevant story problems. To overcome these challenges [22-26], educators had to diligently search for ethnomathematics references, gradually introduce students to culturally rich problem-solving, and build a supportive network that extends communication beyond the virtual classroom to engage students and their families in fostering a home-based learning environment.

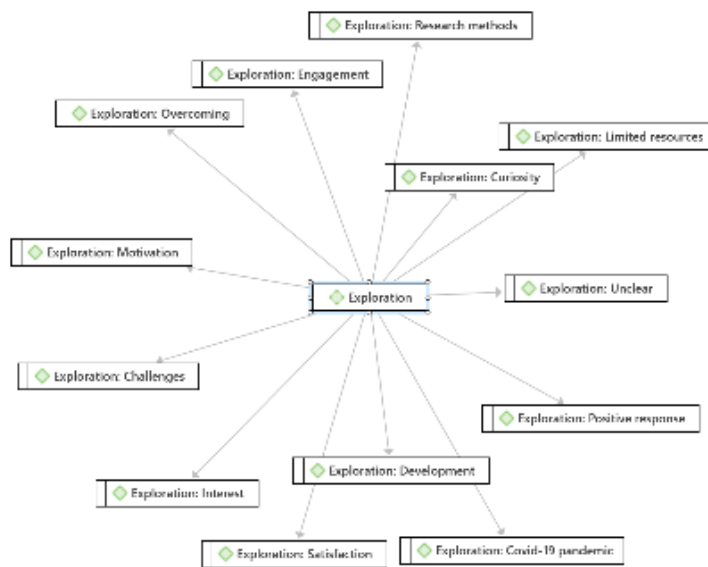


Fig. 3. Coding network of exploration.

3.4. Learning challenges

Navigating ethnomathematics in mathematical education is difficult. Mathematical concepts are woven with cultural narratives, making comprehension difficult and time-consuming. To understand ethnomathematics' cultural significance, educators and students must read vast amounts of research and scholarship. Students, notably, may struggle with ethnomathematics story problems, which require more mathematical thinking than algorithms and equations (Fig. 4).

Learning has been disrupted by the COVID-19 pandemic, which has made independent study strange, especially at home. In these turbulent waters, students

must regularly tackle ethnomathematics questions to strengthen their cognitive talents and difficult mathematical reasoning. Education must also involve mentoring and helping outside the classroom. By staying in touch with parents, they can increase kids' learning autonomy and resilience to the pandemic's remote learning tidal wave [27-31].

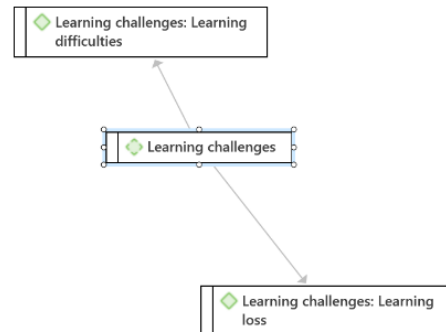


Fig. 4. Coding network of learning challenges.

3.5. Mathematics

Recently, scholarly research has focused on incorporating West Javanese culture into mathematical teaching. In a middle school classroom, ethnomathematics and social arithmetic are combined. Bright pictures and language reflect the region's rich legacy in traditional teaching materials. There are challenges to this pedagogical alchemy. Ethnomathematics is a complex subject, and students must deal with story problems that combine cultural tales and mathematical problems (Fig. 5).

Following these pedagogical problems, a thorough literary and academic examination has led to a better-grounded knowledge of ethnomathematics [4]. This foundational practice nurtures students' problem-solving skills in a culturally relevant environment as they gradually introduce ethnomathematics' complicated story problems. The mixed-method, problem-based learning model in the educational strategy promotes mathematical skills and regional cultural identity. This initiative aims to create a generation of mathematically literate, culturally aware students [32-34].

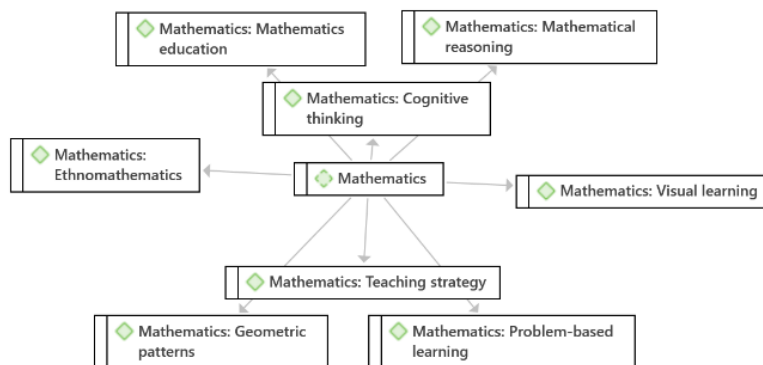


Fig. 5. Coding network of cultural.

4. Conclusions

Ethnomathematics uses West Javanese culture to engage and improve students' reasoning skills in mathematics. Teachers must acquire ethnomathematics and students must adjust to culturally infused problem-solving, making this educational innovation essential, especially during the pandemic-induced remote learning transition. Long-term effects, transferability across educational settings, and pedagogical refinement should be examined in future studies. Not simply academic performance is affected by this study. It implies that ethnomathematics can benefit cultural identity and mathematical literacy. This supports a full educational strategy that grows pupils into critical thinkers with cultural awareness.

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