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INVESTIGATION OF PRIMARY SCHOOL TEACHERS' VIEWS ON ETHNOMATHEMATICS-BASED MATHEMATICS INSTRUCTION

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Abstract

The study aims to examine primary school teachers' awareness, views, classroom practices, and challenges regarding ethnomathematics-based mathematics instruction. The research was carried out with 15 primary school teachers working in the Aegean Region using maximum variation sampling and was designed as a case study, one of the qualitative research methods. Qualitative content analysis was performed on the data collected through the semi-structured interview form. The research data showed that most participants had never heard of the term “ethnomathematics.” Most of them, however, used carpet/rug patterns, local dishes, historical sites, etc. as cultural codes in mathematics lessons. Most of the teachers involved in the research stated that the implementation of ethnomathematics-based practices could enhance children’s interest in and motivation for the lesson. Moreover, based on the interviews about the textbooks used by the teachers, the teachers stated that the existing textbooks were not sufficient to reflect local culture. In addition, according to the teachers, systemic factors such as curriculum density, time constraints, and a lack of materials were the main impediments to implementation. The study found that although the teachers lacked theoretical knowledge of ethnomathematics, they incorporated cultural elements through their pedagogical intuition. In this context, the study suggests that practical workshops should be organized for teachers and that digital and printed materials specific to local culture should be provided.

Keywords: Ethnomathematics, primary school teachers, mathematics education, teacher views.

INTRODUCTION

Throughout history, mathematics has often been considered a universal and abstract system of logic, free from culture and human values; nonetheless, as a human activity, mathematics is essentially shaped by the values of individuals and their cultures (Bishop, 1994; D’Ambrosio, 2001; Ergene, Çaylan-Ergene, & Yazıcı, 2020). The fact that traditional mathematics teaching is trapped in theoretical patterns and disconnected from concrete life experiences causes students to struggle with making sense of mathematical concepts (Abiam et al., 2016; Permatasari, 2021; Pound, 2014; Zhang & Zhang, 2010). In this context, the "ethnomathematics" approach, which argues that culture plays a vital role in the emergence and development of mathematics, offers a significant shift in perspective for mathematics education (Kabuye Batiibwe, 2024). Budiarto et al. (2019) state that ethnomathematics not only helps in understanding local cultures but also serves as an important bridge between these cultural practices and school mathematics.

Ethnomathematics, first conceptualized by D'Ambrosio (1985), is defined as the methods and techniques (tics) used by different natural, social, political, or cultural (ethno) environments to learn, understand, explain, and manage reality (mathema). Drawing parallels with Vygotsky's socio-cultural learning theory, this approach is based on relating learning environments to the values, norms, and practices of the culture to which students belong (Hariastuti et al., 2022). A review of the literature

reveals that ethnomathematics-based practices provide multi-dimensional contributions to educational processes. Studies have shown that this approach increases students' mathematical achievement and is particularly effective in concretizing subjects such as geometry and fractions (Ninawati et al., 2025; Sulistyowati, 2023; Wulandari et al., 2024).

The integration of cultural elements into mathematics supports students' motivation and cognitive processes. For instance, the use of traditional games such as "Endog-endogan" and "Engklek" (hopscotch) has been found to develop students' creative and algebraic thinking skills (Ariani & Suswandari, 2024; Supriadi & Arisetyawan, 2020). Furthermore, a recent systematic review by Batiibwe (2025) indicates that utilizing the ethnomathematics program as a learning tool provides significant opportunities to augment students' conceptual understanding and enhance their overall mathematics achievement. Similarly, cultural elements such as local arts or local weaving patterns have been found to enhance geometric thinking (Motseki et al., 2026; Kusuma & Stanley, 2017). Additionally, relating local culture to mathematical problems has been found to positively affect students' critical thinking skills (Lidinillah et al., 2022; Mulyasari et al., 2021).

The current vision of mathematics education in Türkiye supports the inclusion of cultural elements in lessons. The "Century of Türkiye Education Model" (TYMM) curricula, in line with the "From Roots to the Future" vision and the principle of "Temporal Integrity," emphasize that the educational process should encompass the historical experience of society (MEB, 2024a). The objective of relating "Mathematical Representation" skills to daily life and culture within the Primary School Mathematics Curriculum is of critical importance for students to realize that mathematics is a part of life (MEB, 2024b). Accordingly, "Culture and Mathematics" courses have begun to be included in primary school mathematics teacher training programs at universities in Türkiye. Despite all this theoretical grounding and curricular support, the success of the ethnomathematics approach in classroom practices largely depends on the competence, awareness, and beliefs of the teachers who act as implementers (Astuti et al., 2024; Mania & Alam, 2021). However, many teachers struggle to reflect the relationship between culture and mathematics in the classroom environment due to a lack of materials, inexperience, or insufficient pedagogical content knowledge (Ergene et al., 2020; Khalil, 2023).

A large portion of the national and international literature on ethnomathematics (Adam, 2004; Aktekin, 2017; Bahadır, 2021; Baştürk, 2025; Budiarto et al., 2019; Dumlu & Ulusoy, 2025; Günay & Takunyacı, 2023; Kara, 2009; Kaya & Yavuz, 2025; Nuraini et al., 2022; Özbebek, 2024; Yazıcı, 2021) focuses directly on student outcomes, material development, or literature reviews. There are international studies revealing the views of students and teachers—the main elements of the process—regarding ethnomathematics (Khalil, 2023; Mania & Alam, 2021; Mosimege & Egara, 2022; Sunzuma & Maharaj, 2021a; Sunzuma & Maharaj, 2021b; Thakur, 2019). While there are studies in the specific context of Türkiye addressing the views of mathematics teachers and preservice teachers (Çenberci & Horzum, 2023; Mutlu, 2025; Özcan & Bahadır, 2023), there is no study examining the views of primary school teachers at the elementary level, where basic mathematical concepts are constructed. Given this importance, this study examines primary school teachers' views, awareness, and status of integrating cultural elements into mathematics lessons. The findings obtained from the study are aimed at contributing to the determination of teachers' professional development needs and the strengthening of mathematics teaching with cultural foundations. Increasing primary school teachers' awareness of ethnomathematics may help students realize that mathematics is not just a lesson learned at school, but a functional tool used in their families and surroundings. This will provide a concrete answer to the question "How will these topics be useful in real life?"—a question frequently asked by primary school children. Furthermore, it is thought that through mathematics course content carrying traces of their own culture, students will be supported in recognizing their cultural heritage, engaging in an interdisciplinary learning process (Mathematics and Life Studies/Social Studies), increasing their learning motivation, and reducing their anxiety about the lesson. In this direction, the study sought answers to the following questions:

1. What are the awareness levels and conceptual definitions of primary school teachers regarding the concept of "ethnomathematics"?

2. What is the status of primary school teachers' use of local cultural codes (motifs, games, architecture, etc.) in mathematics lessons?

3. According to primary school teachers, what is the effect of the ethnomathematics approach on making sense of the functionality of mathematics in daily life (the answer to the "What will this math be useful for?" question)?

4. What are the views of primary school teachers regarding the adequacy of the "From Roots to the Future" vision of the Century of Türkiye Education Model and the current mathematics curriculum in supporting ethnomathematics practices?

5. To what extent are current mathematics textbooks sufficient in reflecting the local cultural fabric and regional differences, according to primary school teachers?

6. Which specific local cultural elements (e.g., for Uşak province: tarhana, kilim, jereed) do primary school teachers utilize in their mathematics teaching processes?

7. According to primary school teachers, what are the effects of ethnomathematics-based practices on students' interest, motivation, and affective development?

8. How do primary school teachers evaluate the applicability of the ethnomathematics approach in classroom environments with students from different cultural backgrounds (multicultural settings)?

9. What are the systemic, pedagogical, and material-related difficulties encountered by primary school teachers during ethnomathematics-based teaching practices?

METHOD

Research Design

In this study, which aims to examine primary school teachers' views on ethnomathematics-based mathematics instruction, the case study design—one of the qualitative research approaches—was utilized. A case study is a research design that investigates a phenomenon within its real-life context, especially when there are multiple sources of evidence or data (Yin, 2013). This design was selected to present the teachers' current practices regarding ethnomathematics in a holistic manner.

Participants

The study included 15 primary school teachers working in the Aegean Region, selected through maximum variation sampling, one of the purposeful sampling methods. The primary goal of choosing this sampling method is to reflect the diversity of the population and to reveal the common or divergent views of teachers with different characteristics, such as gender, professional seniority, and the socio-economic environment of the school (Grix, 2010). In the study, primary school teachers were included by considering variables that might show diversity, such as gender, school location, grade level taught, years of service, graduation status, and the presence of students from different cultures in their classrooms. Furthermore, in qualitative research, 12 to 15 interviews are generally considered sufficient for data saturation (Guest et al., 2006). Data collection was concluded after interviewing 15 teachers, as it was observed that the data had become repetitive. Personal information regarding the participants is presented in Table 1.

Table 1. Personal information of primary school teachers.

Participant	Gender	School Location	Grade Level Taught	Years of Service	Graduation Status	Students from Different Cultures
P1	Female	Town/Village	3rd grade	30	Undergraduate	Yes
P2	Female	Town/Village	3rd grade	25	Undergraduate	Yes

Table 1 (Continued). Personal information of primary school teachers.

Participant	Gender	School Location	Grade Level Taught	Years of Service	Graduation Status	Students from Different Cultures
P3	Male	District center	4th grade	15	Graduate (MA/PhD)	No
P4	Male	Town/Village	1st grade	15	Graduate (MA/PhD)	No
P5	Male	District center	2nd grade	14	Undergraduate	Yes
P6	Female	Provincial center	2nd grade	23	Undergraduate	Yes
P7	Female	Provincial center	3rd grade	8	Undergraduate	Yes
P8	Female	Provincial center	2nd grade	18	Undergraduate	No
P9	Male	Provincial center	4th grade	23	Undergraduate	No
P10	Female	Provincial center	4th grade	13	Graduate (MA/PhD)	Yes
P11	Female	District center	1st grade	8	Undergraduate	No
P12	Female	Provincial center	3rd grade	13	Graduate (MA/PhD)	Yes
P13	Male	Town/Village	4th grade	12	Graduate (MA/PhD)	Yes
P14	Male	District center	4th grade	20	Undergraduate	No
P15	Female	Provincial center	4th grade	31	Undergraduate	Yes

As shown in Table 1, the participants consisted of 9 female and 6 male teachers. The years of service ranged from 8 to 31 years, reflecting a broad range of professional experience. In terms of educational background, 10 teachers held undergraduate degrees and 5 held postgraduate degrees. Teachers worked in diverse school settings, including provincial centers, district centers, and town/village schools, ensuring maximum variation in the sample. Eight of the 15 teachers reported having students from different cultural backgrounds in their classrooms.

Data Collection Tools

A semi-structured interview tool developed by the researchers was used as the data collection instrument. During the preparation of the tool, draft questions were first created by reviewing the relevant literature. To ensure the content validity and clarity of the draft questions, the opinions of three experts in the fields of primary education and primary mathematics education were sought. The interview tool was finalized based on expert feedback. Finally, a pilot interview was conducted with three primary school teachers not included in the study to check the functionality of the questions. The tool consists of a personal information form (gender, school location, grade level, seniority, graduation status, and presence of multicultural students) and 10 open-ended questions focusing on ethnomathematics perceptions, classroom practices, and challenges.

The questions in the semi-structured interview tool are as follows:

• Have you heard of the concept of "ethnomathematics" before? What does it mean to you? (If the teacher is unfamiliar, it is explained as: "The reflection of mathematics in different cultures, daily life practices, and local traditions.")

• Do you utilize students' daily lives or cultural codes (local games, rug patterns, recipes, etc.) in mathematics lessons? What is your general opinion on this?

• Do you think ethnomathematics practices are an effective tool for answering students' questions, "How will math be useful for me?" Why?

• The Century of Türkiye Education Model (TYMM) adopts the "From Roots to the Future" philosophy. Do you find the curriculum sufficient in this context? Why? Do you think more space should be given to this subject in the curriculum? (If yes, what; if no, why?)

• Do you think the examples in textbooks are compatible with the cultural fabric of the region where your students live? Should they be? Why?

• Do you use local elements (e.g., rug patterns, local folk dances, regional recipes, or historical structures) while teaching a math topic? Why? Can you give examples?

• When you relate mathematics topics to cultural contexts (ethnomathematics), what do you observe in students' behavior during the lesson?

• If you have students from different cultural backgrounds (different provinces, refugees, or different native languages), do you include these differences in math problems? (If yes, how; if no, why?)

• In your opinion, are there obstacles that make it difficult to conduct mathematics lessons based on ethnomathematics? What are they?

• Are there any other views or suggestions you would like to add?

Data Collection and Analysis

The study data were collected in the second semester of the 2025–2026 academic year. Prior to the study, ethics committee approval was obtained. Subsequently, semi-structured interviews were held with volunteer teachers working in various schools. Interviews were held in quiet spaces during lesson breaks, lunch hours, or after school. The sessions were recorded using an audio recording device, with each interview lasting an average of 8–10 minutes. The total time taken for data collection was approximately 120–150 minutes. Qualitative data analysis software was used to transcribe the audio recordings. In case of software errors, each transcript was checked manually. Once the errors were corrected, the transcripts were returned to the teachers for member checking, allowing them to add or remove statements.

Once the transcripts were approved by the teachers, the data were analyzed through content analysis aided by qualitative data analysis software. Content analysis is a systematic analytical procedure in which data are examined in depth to develop codes, and similar codes are grouped under categories and themes (Ekiz, 2009). The analysis occurred in four stages. First, the researchers became familiar with the data by reading the interview transcripts repeatedly. Second, meaningful units were open-coded. Third, these codes were grouped into categories. Finally, these categories were used to identify themes. All codes, categories, and themes were recorded in the qualitative data analysis software. This helped ensure systematic management and increased the traceability of the data analysis process.

The data were analyzed independently by each researcher, and inter-rater reliability was calculated using the formula proposed by Miles and Huberman (1994): Reliability = Agreement / (Agreement + Disagreement) × 100. Data analysis can be considered reliable if the agreement rate is at least 70%. The study's inter-rater agreement was 95%, indicating a high level of agreement between the two coders. Discrepancies were discussed until agreement was reached.

To enhance the credibility of the findings, direct quotations from participant interviews were included below each figure in the findings section to support the identified themes and codes. Thick description of the study context, participants, and data collection procedures supported transferability. To ensure dependability, an audit trail of analytical decisions was maintained during coding. The credibility of the research was also supported through member checking, whereby participants reviewed and confirmed the accuracy of their transcripts.

RESULTS

In this section, primary school teachers' views on ethnomathematics-based mathematics instruction are analyzed in line with the nine research questions. It should be noted that the frequencies may exceed the total number of participants, as a single teacher could express multiple views or provide more than one response for a specific category.

Primary School Teachers' Awareness of the Concept of Ethnomathematics

Teachers' views on the concept of ethnomathematics are presented in Figure 1.

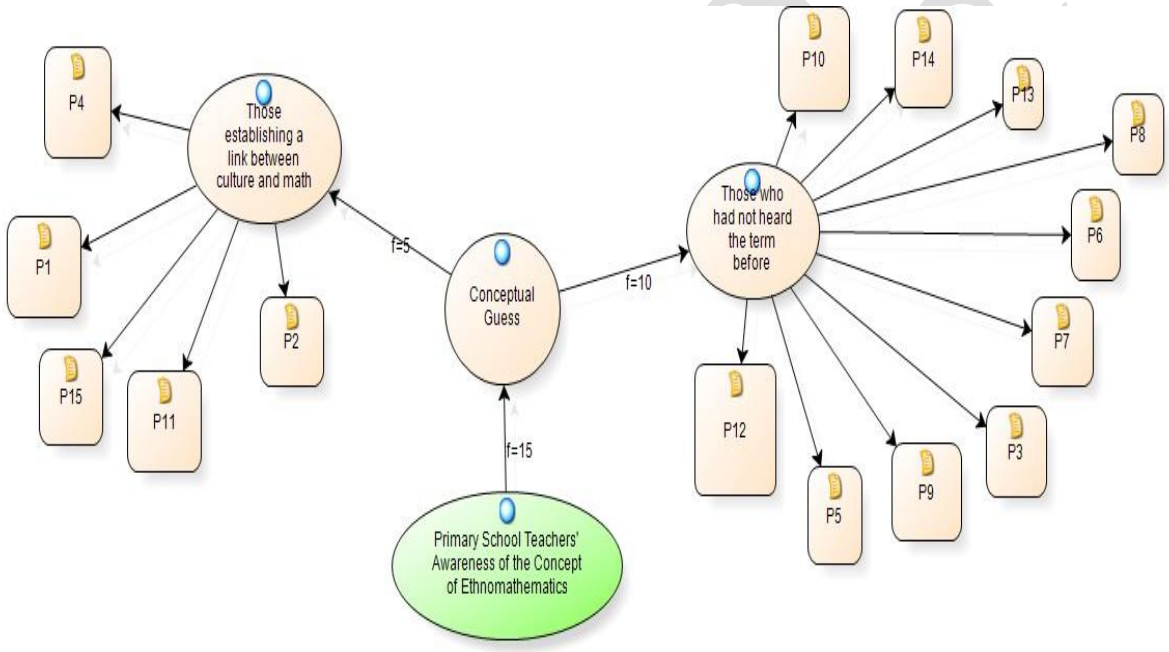

Figure 1. Awareness and definitions of the concept of ethnomathematics.

It was determined that 10 participants had not heard the term "ethnomathematics" before, while five believed it was related to ethnicity and culture. Regarding this:

P4: "I haven't heard it before, but I think it's something related to mathematics and cultural artifacts."

P12: "Ethno already means cultural. Then ethnomathematics must be the combination of 'ethno' and 'math'—an approach that utilizes these codes."

P3: "I have never heard this concept before, so I don't know."

Use of Daily Life and Cultural Codes in Mathematics Lessons

The views of primary school teachers regarding the effectiveness of ethnomathematics-based instruction in relating mathematics to students' daily lives are presented in Figure 2.

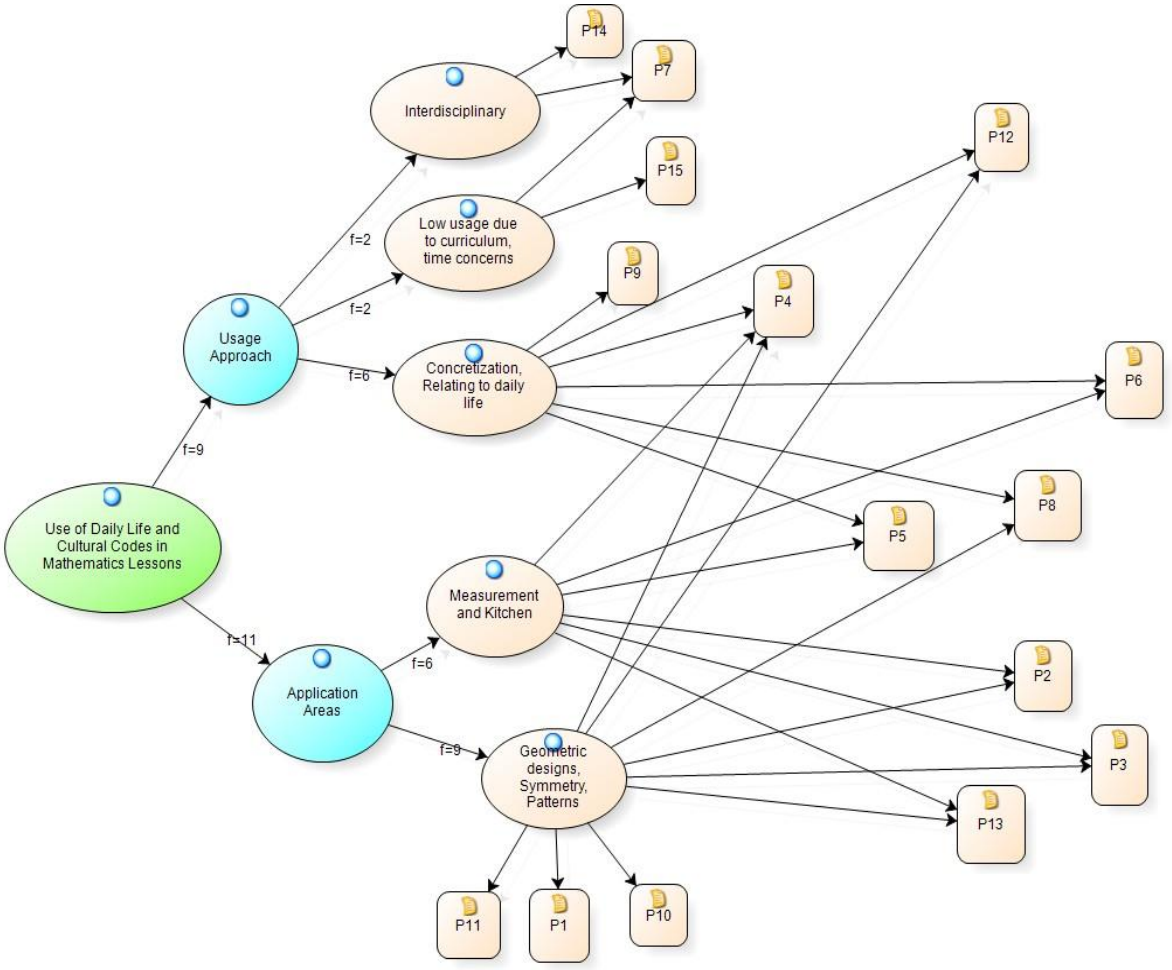

Figure 2. Views on the use of cultural codes.

Eleven teachers stated that they utilize ethnomathematics-based teaching to relate mathematics to daily life. Carpet and rug patterns were emphasized as indispensable tools for teaching patterns and symmetry.

P10: "Yes. For instance, this year we had a unit on patterns. The kilim pattern—Uşak's kilim and carpet weaving is very important and renowned. We touched on that; I don't know the academic term for it, but I can see that I actually incorporate it in my lessons. We created kilim patterns and emphasized how significant Uşak is in this regard."

P6: "First, you give examples from the market, or you start with liquids. You give examples from the liquids in our home—cooking oil, cough syrup. Then you connect that to mass. This is how we teach standard and non-standard measurements. Of course, we always start with examples from our immediate surroundings."

P15: "We use cakes and pizzas a lot when teaching fractions... I don't use elements specifically belonging to our culture."

Impact on Answering the Question: "What Will Math Be Useful For?"

Views on the role of ethnomathematics in explaining the functionality of mathematics are presented in Figure 3.

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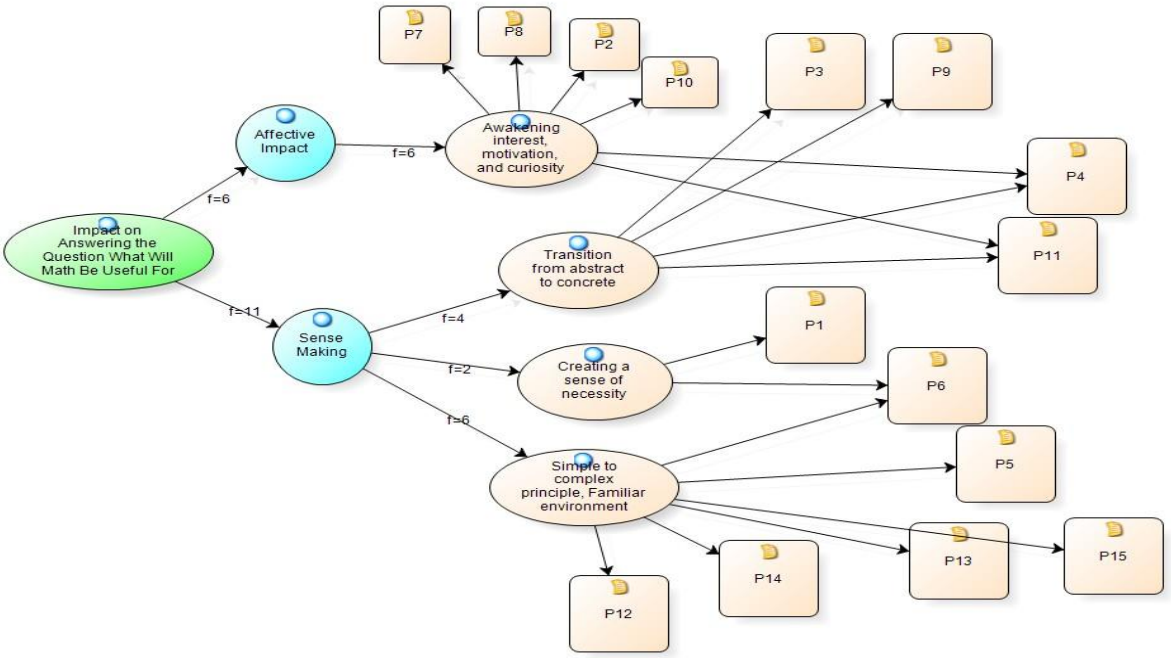

Figure 3. Impact of ethnomathematics on the functionality of mathematics.

Most teachers (f = 11) stated that ethnomathematics helps students make sense of math by moving from abstract to concrete and following the "near-to-far" principle. Six teachers emphasized its role in supporting affective development.

P13: "Since the child starts from what is familiar, they will be more successful in making sense of it."

P4: "It brings math from abstract to concrete. When the child asks, 'Where will I use this?' you give a natural answer."

Reflection of the "Maarif Model" and the "From Roots to the Future" Philosophy

Teachers' views on how well the curriculum reflects this philosophy are presented in Figure 4.

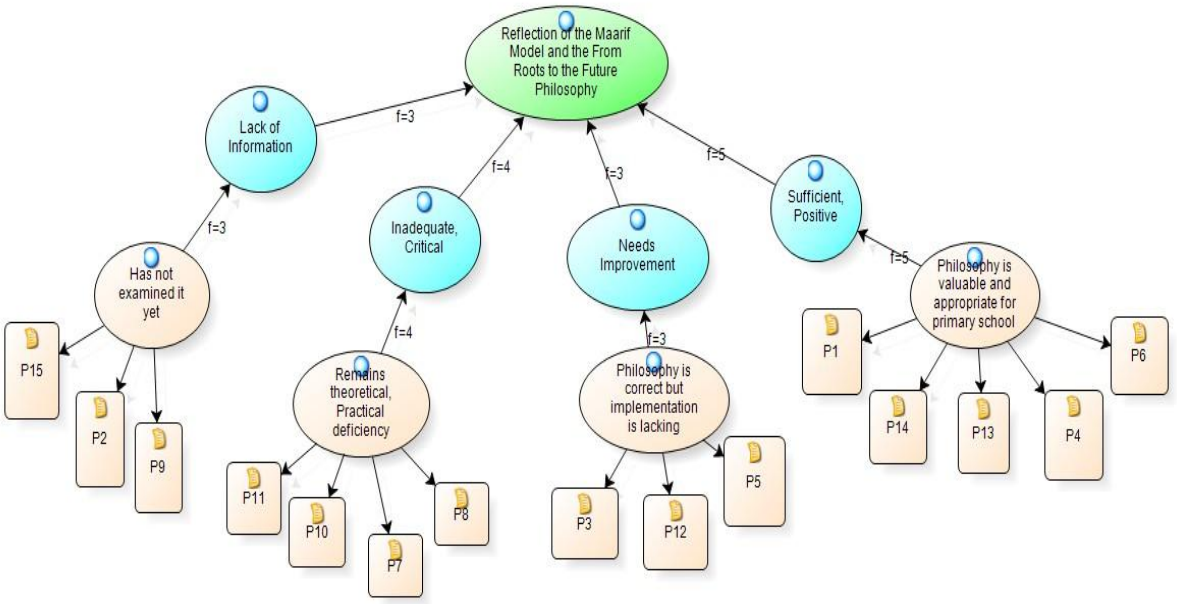

Figure 4. Views on curriculum adequacy.

An analysis of the primary school teachers' views showed that 5 teachers found the curriculum sufficient and positive, while 4 teachers found the program too theoretical and insufficient in practice, and 3 teachers believed that the implementation needed to be improved. While some teachers found the TYMM (Century of Türkiye Education Model) mathematics curriculum simplified and fit for purpose, others argued that the implementation remained theoretical.

P1: "I started with the curriculum this year—I am one of the teachers who began last year. I was honestly prejudiced at first. But as I worked through it, I now think the topics are very well prepared, and the purpose is exactly right. I find the curriculum very well designed. If it is implemented fully and completely, it works well."

P11: "Honestly, I don't find it sufficient at the moment. Because when we say 'from roots to the future,' the child needs to be able to put what they've learned into practice a bit more. They need to be able to conduct experiments. They need to be able to do more research. But since the Maarif Model is new and perhaps still being developed, there may not be enough time for that. I don't think it's sufficient because they haven't yet been able to reduce the theoretical components enough."

Suitability of Textbooks to Cultural Fabric

The views of primary school teachers regarding the compatibility of textbook examples with the cultural fabric of the region where students live are presented in Figure 5.

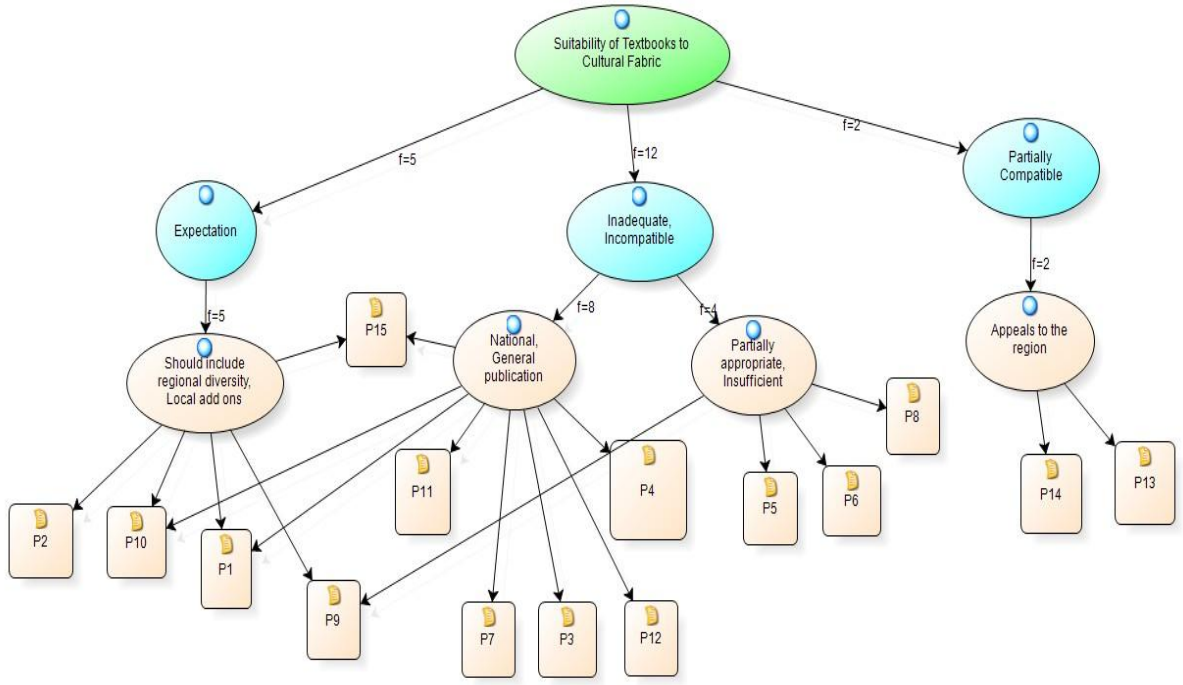

Figure 5. Cultural compatibility of textbooks.

While 12 of the primary school teachers found the textbooks insufficient in reflecting the local cultural fabric because they are published nationally and are general in scope, only 2 teachers stated that the books were partially compatible. A significant portion of the primary school teachers (6 teachers) expected greater regional diversity in the books.

P11: "Since textbooks are printed to be sent nationwide... they may not be prepared to suit the culture of every student in the region."

P14: "It absolutely, definitely should be. [The student] must know their own environment first. After all, one of the principles we apply is the 'near-to-far' principle. In this sense, the textbooks are only partially compatible with the region."

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Local Elements and Examples Used

The distribution of local elements used by primary school teachers in mathematics instruction is presented in Figure 6.

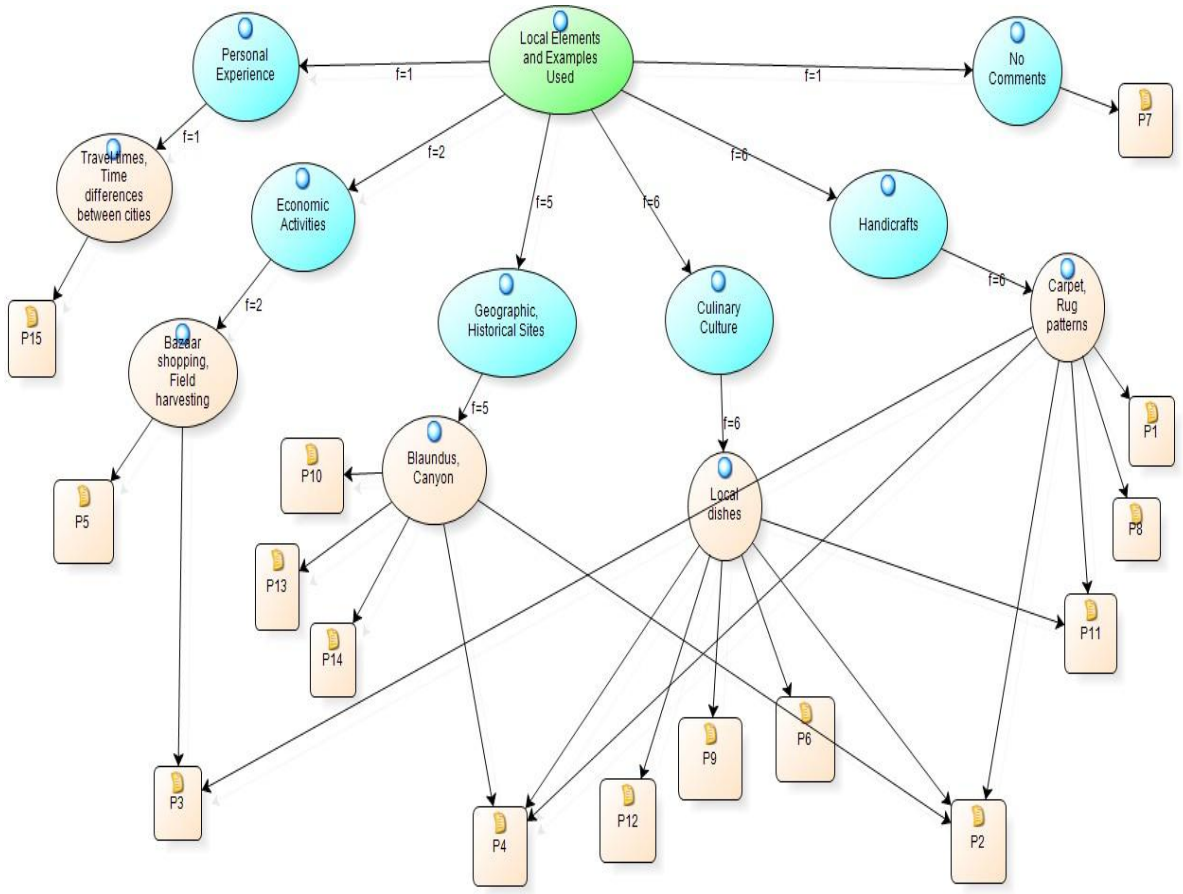

Figure 6. Local elements used in mathematics lessons.

The most commonly used local elements were handicrafts (carpets/kilims), culinary culture (tarhana, local dishes), and geographic/historical sites. While 11 of the primary school teachers used local cultural elements with some frequency, only 2 teachers stated that their use was limited.

P5: "Of course, I use them frequently. For instance, in geometry, I teach symmetry and patterns using kilim and carpet designs. When students see the motifs from their own region, they grasp geometric transformations more easily."

P6: "When posing problems, for example, we ask, 'What is Uşak famous for?' It's tarhana soup, or Ulubey's döndürme (a local pastry). When teaching geometric solids, we might say, 'Imagine a tray of döndürme has arrived—let's divide it into equal parts.' The child knows it; they see it at home."

P10: "For instance, there is the Blaundus Ancient City. We work on it with the children."

Reflections on Student Behavior

Teachers' views on how relating mathematics to cultural contexts affects student behavior are presented in Figure 7.

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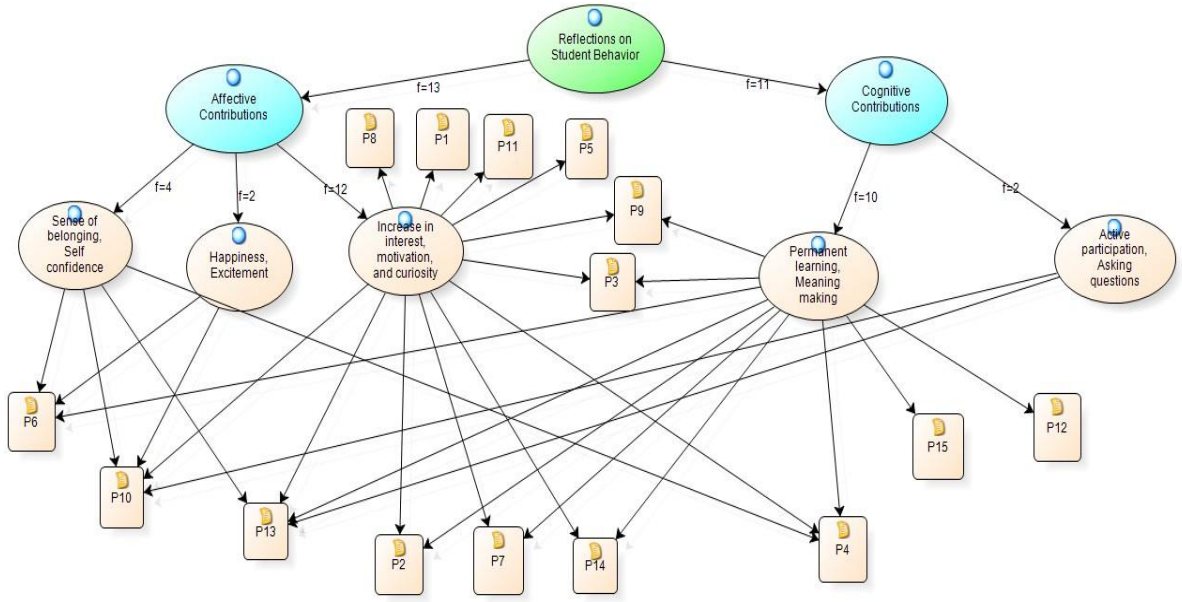

Figure 7. Changes in student behavior.

Nearly all of the primary school teachers stated that ethnomathematics-based instruction creates positive effects on students. While 13 teachers pointed out the affective contributions of ethnomathematics-based teaching, such as interest, motivation, and a sense of belonging, 11 teachers emphasized its cognitive contributions, such as lasting learning and active participation in the lesson.

P10: "I can see their eyes light up like glass. They listen to the lesson so carefully that it really captures the child's attention."

P4: "When they see a piece of their own culture, a feeling of 'I am also part of this lesson' arises in the child."

Inclusion of Students from Different Cultural Backgrounds

Practices for integrating students from diverse backgrounds into mathematics instruction are presented in Figure 8.

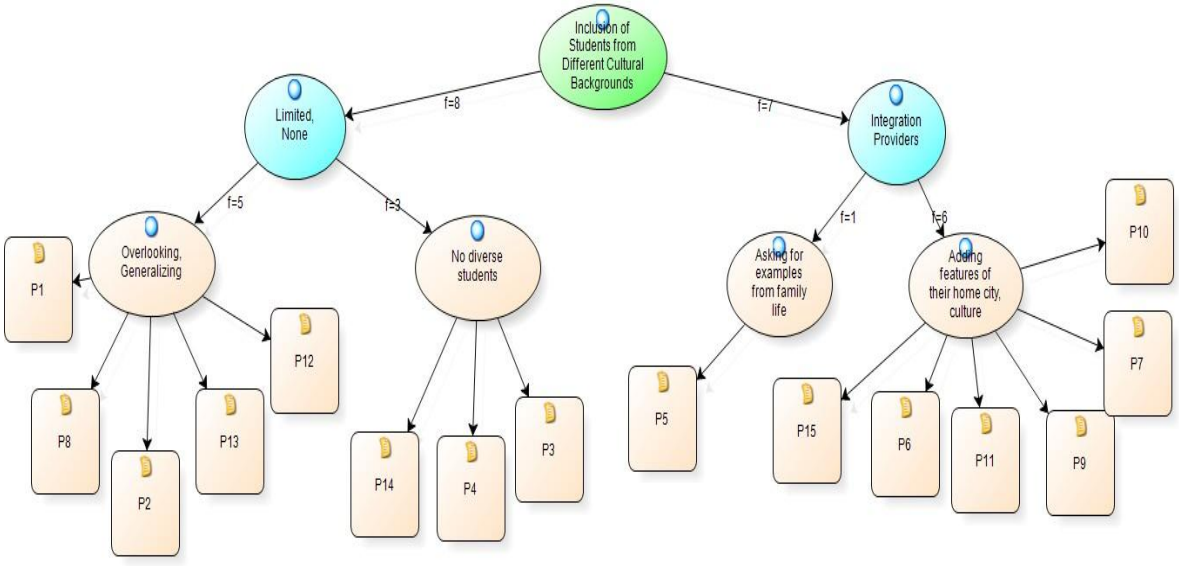

Figure 8. Practices in multicultural classroom environments.

While 7 of the primary school teachers stated that they try to integrate elements from the cities or cultures of students from different backgrounds into their lessons, 8 teachers expressed that they either do not have students from diverse cultural backgrounds in their classrooms or overlook those who are present due to time or language constraints.

P10: "I have a student from Van... I mentioned Akdamar Church. When I said that I loved that place very much, the children began to view it more warmly."

P13: "Seasonal workers come. To be honest, it doesn't happen very often, teacher. Well, rarely, sometimes we overlook them. We act as if the majority is from Uşak."

Obstacles to Ethnomathematics-Oriented Instruction

Barriers to implementing ethnomathematics-oriented lessons are presented in Figure 9.

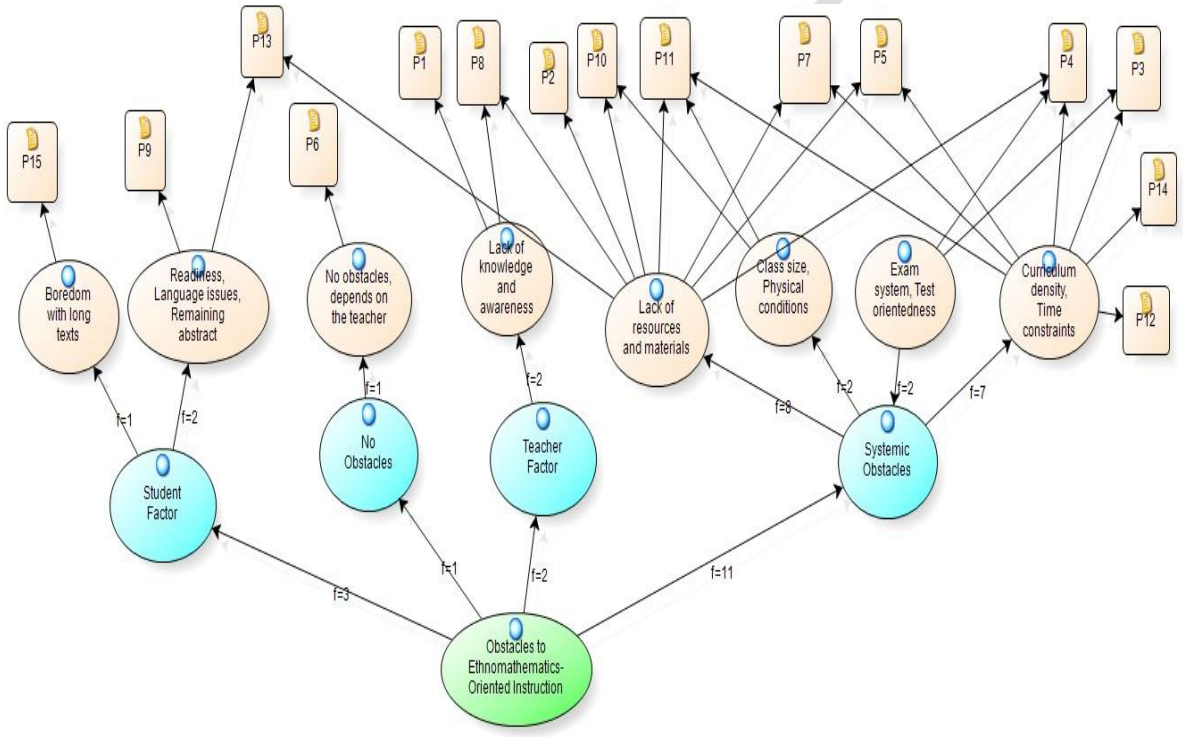

Figure 9. Obstacles to implementation

The vast majority of primary school teachers stated that the greatest obstacles to implementing ethnomathematics-based mathematics instruction were systemic factors. While 11 of the teachers emphasized systemic barriers such as curriculum density, time constraints, and insufficiency of materials, a small number of participants mentioned student- and teacher-related factors.

P7: "Lack of resources. Yes, teacher. In the resources, for example, questions and activities are kept very short, and time is limited."

P3: "Yes, there are. First of all, because we have to keep up with the curriculum, we sometimes have to conduct limited studies. But actually, rather than the curriculum, there are problems stemming from the system in our country. As you know, children take practice exams at a young age and encounter out-of-curriculum questions that shouldn't be in school. In this case, the teacher may have to explain topics that are not in the curriculum to the children, and time goes by. If lessons could be conducted without getting into this race, at least in primary schools, I think there would be no obstacles, and it would be perfectly sufficient."

DISCUSSION, CONCLUSION, and RECOMMENDATIONS

This research aimed to examine primary school teachers' views, awareness, classroom practices, and the obstacles they encounter regarding ethnomathematics-based mathematics instruction from a holistic perspective. The findings are discussed below in line with the research questions.

Regarding the first sub-problem, it was observed that the vast majority of primary school teachers had not previously heard the term "ethnomathematics," yet they possessed an intuitive awareness of its content. Upon hearing the concept, teachers defined it in terms of the relationship between "ethnicity," "culture," and "mathematics." This indicates that teachers hold an experiential understanding rather than conceptual knowledge. This finding aligns with studies in the literature by Sunzuma and Maharaj (2021a, 2021b) and Mania and Alam (2021), which state that teachers possess awareness of ethnomathematical approaches but lack theoretical knowledge. On the other hand, in a study conducted by Çenberci and Horzum (2023) in the Turkish context, it was found that preservice mathematics teachers recognized the culture-mathematics relationship but had low awareness regarding transforming this into a pedagogical tool. The fact that primary school teachers define the concept as "utilizing cultural codes" suggests that their pedagogical intuitions are strong, even if they have not received theoretical training.

In the second sub-problem, it was determined that nearly all teachers used cultural codes in their mathematics lessons. Teachers view carpet and rug patterns as indispensable tools, especially for topics like patterns and symmetry. This result serves as proof that ethnomathematics is not merely a theoretical approach but finds a natural area of application within the classroom. Baştürk (2025) emphasizes that the integration of artifacts such as carpets, rugs, and traditional units of measurement from rural Anatolia into mathematics teaching is critical for enriching the curriculum in a cultural context. Similarly, Dumlu and Ulusoy (2025) revealed that using rug motifs in teaching transformational geometry facilitates students' discovery of mathematical concepts. The fact that teachers turn to local motifs alongside universal examples like "pizza/cake" shows that the process of transforming cultural practices into mathematical models—defined by Arı and Demir (2022) as "ethnomodeling"—is being carried out in classrooms.

The findings for the third sub-problem revealed that teachers view ethnomathematics as a tool that moves mathematics from abstract to concrete and provides the most natural answer to the question, "What will this be useful for?" Participants stated that this approach facilitates the students' process of making sense of the subject. This view is directly supported by the findings of the systematic review study conducted by Batiibwe (2025), which indicates that ethnomathematics-based instruction has a moderate to strong positive effect on students' critical thinking skills and conceptual understanding. Furthermore, Ninawati et al. (2025) and Wulandari et al. (2024) reported that instruction supported by local materials increases students' academic achievement and deepens conceptual understanding. The "sense-making" emphasis by teachers in the field is consistent with the "academic achievement" and "critical thinking" outcomes in the literature.

In the fourth sub-problem, it was observed that teachers' views were divided regarding how the "From Roots to the Future" vision of the Century of Türkiye Education Model was reflected in the curriculum. While some teachers found the curriculum sufficient in this regard, others argued that the approach remained theoretical and could not be put into practice. Although the MEB (2024a) curricula aim to promote "Temporal Integrity" and the transfer of cultural values, teachers' reservations about "putting it into practice" point to a gap between the curriculum and classroom reality. This situation aligns with the activity development challenges noted in Kaya and Yavuz's (2025) study; although preservice teachers have the skills to design creative activities, the complex process of developing them highlights why in-service teachers require ready-made implementation examples.

In the fifth sub-problem, the vast majority of teachers found the textbooks insufficient and too general in reflecting the local cultural fabric. Teachers expressed that the books should be organized to

encompass regional diversity. This finding parallels the results of studies by Supriadi (2019) and Fitrianawati and Setiyawati (2021), which found that student success increases when ethnomathematics-based teaching materials and books are customized according to the local context (e.g., Sundanese culture). The teachers' criticism that "one cannot learn the distant without knowing their own environment" (the near-to-far principle) shows that centralized material design remains limited in meeting local pedagogical needs.

Regarding the sixth sub-problem, it was determined that handicrafts (carpets/kilims) and culinary culture (tarhana, local dishes) were the local elements most frequently used by teachers. Furthermore, the inclusion of specific historical sites such as the "Blaundus Ancient City" in mathematics lessons is consistent with Mutlu's (2025) study on the use of Islamic geometric patterns and Nugraha, Maulana, and Mutiasih's (2020) studies on locally-contextualized mathematics teaching. As Lidinillah et al. (2022) stated, teachers' inclusion of historical and geographical sites in mathematical problem-posing processes (e.g., travel problems, ancient city measurements) strengthens the perception that mathematics exists not only in the classroom but in every area of life.

In the seventh sub-problem, nearly all teachers stated that ethnomathematics-based practices increased students' interest, motivation, and sense of belonging ("Their eyes light up"). This finding is consistent with the literature regarding the affective domain. Khalil (2023) stated that teachers' positive attitudes toward integrating ethnomathematics directly affect student motivation, while Ariani and Suswandari (2024) found that the use of cultural games increased students' participation in the lesson and their positive attitudes toward mathematics. Teachers' observations that a feeling of "I am also a part of this lesson" is created indicate that ethnomathematics contributes to the development of students' mathematical motivation.

In the eighth sub-problem, it was observed that in classrooms with students from different cultural backgrounds, some teachers tried to use cultural differences as an asset, but half of the teachers did not incorporate these differences into their instruction because of time and language constraints. This situation theoretically overlaps with Özcan and Bahadır's (2023) finding that teachers see cultural diversity as a wealth, but practical obstacles (language, curriculum density) limit the reflection of this wealth in the lesson. Similarly, Mallqui and Chávez (2021) state that despite teachers' desire to integrate indigenous cultures into mathematics, they experience difficulties in achieving a compromise between traditional mathematics and ethnomathematics.

In the final sub-problem, teachers emphasized that the biggest obstacles to ethnomathematics applications are systemic factors (curriculum density, time constraints, and lack of materials). This finding is consistent with the lack of materials and time-management problems reported in the studies of Mania and Alam (2021) and Sunzuma and Maharaj (2021b), as well as in the specific context of Türkiye (Mutlu, 2025). Teachers' views that the exam-oriented system constitutes an obstacle to cultural and in-depth learning reveal the fundamental mismatch between education policies and classroom practices. While studies like Kaya and Yavuz (2025) show that preservice teachers can successfully design creative ethnomathematics activities, the findings of the current study reveal that teachers in the field do not have sufficient time or ready-to-use resources to implement them. This constitutes one of the greatest obstacles to the wider implementation of ethnomathematics.

The following recommendations have been developed based on the findings obtained from the research:

- Development of Regional Digital Content: It was found that primary school teachers find textbooks insufficient and too general in reflecting the local cultural fabric (e.g., Uşak rugs, local architecture). Since it is difficult to customize textbooks published for nationwide use for every region, "Mathematics by Region" modules should be created on the Education Information Network (EBA), and teachers should be provided with access to culturally relevant mathematics content (digital fascicles, regional problems) specific to their own regions.

- Flexible Curriculum and Ready-to-Use Activities: Although teachers find the "From Roots to the Future" vision of the Century of Türkiye Education Model philosophically valuable, they stated that they struggle with implementation due to the dense curriculum and the exam-oriented system. Flexible time slots for "cultural mathematics activities" should be created in the program's implementation schedule, or learning outcomes should be presented with ready-made activity examples (in teacher guidebooks) directly linked to cultural contexts.
- Material Support for Intangible Cultural Heritage: The findings identified a lack of materials as one of the most significant obstacles. Materials containing mathematical models of intangible cultural heritage (e.g., Mangala and weaving loom models) should be added to the mathematics equipment sets sent to schools by the Ministry of National Education (MEB).
- Applied Workshops and Seminars: It was observed that the vast majority of teachers had not previously encountered the term "ethnomathematics" but intuitively recognized the relationship between culture and mathematics. In seminars to be organized through the cooperation of universities and Directorates of National Education, practical workshops demonstrating how to use local museums, historical structures, and handicrafts in mathematics lessons should be offered rather than sessions limited to theoretical definitions.
- Inclusive Education Strategies for Multiculturalism: The findings indicated that some teachers with students from different cultural backgrounds in their classrooms did not incorporate these differences into instruction because of language and time constraints. Inclusive education strategies should be taught to both preservice and in-service teachers so they can utilize cultural diversity in the classroom as a mathematical asset (e.g., different measurement methods and different number systems).

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Ethics and Conflict of Interest
This study was approved by the Ethics Committee of Uşak University. The ethics approval was granted on 15.01.2026 under the protocol number 2026-13. All procedures involving human participants were conducted in accordance with institutional and national ethical standards, the Helsinki Declaration, and applicable regulations. Informed consent was obtained from all participants. The authors used Gemini solely for language refinement and grammar correction during the revision process. No AI tool was used to generate research ideas, theoretical content, data, analysis, or interpretations. All substantive intellectual contributions were made by the authors. The authors declare no conflict of interest.

Author Contribution
All authors contributed equally to the research. All authors read and approved of the final manuscript.

Data Availability
The data that support the findings of this study are available on request from the corresponding author.

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