



Exploring Sociomathematical Norms Based on Students' Interest in Mathematics Learning: A Qualitative Study at the Junior High School Level

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ABSTRACT

Purpose of the study: This study aims to explore sociomathematical norms based on students' interest in mathematics learning at the junior high school level, and to identify how different levels of learning interest influence students' interaction, participation, and communication during mathematics learning activities.

Methodology: This study used a descriptive qualitative approach with purposive sampling involving six students. Instruments included Likert-scale questionnaires, observation sheets, and semi-structured interview guidelines. Data were collected through observation, interviews, and questionnaires, and analyzed using the Miles and Huberman model with triangulation techniques.

Main Findings: Students mostly show good sociomathematical norms, with the majority categorized at a moderate level of learning interest. Students with high interest demonstrate very good participation and communication, while those with moderate interest show consistent but less optimal interaction. Students with low interest tend to be passive and have difficulty expressing mathematical ideas clearly.

Novelty/Originality of this study: This study integrates sociomathematical norms and learning interest in a single qualitative analysis, focusing on students' real classroom behavior. It provides a deeper understanding of how different levels of interest shape interaction and communication, offering a more comprehensive perspective compared to previous studies that examined these aspects separately.

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1. INTRODUCTION

The development of human potential is closely linked to the quality of learning processes experienced by students. In the context of formal education, mathematics is recognized as a core subject that supports logical thinking, reasoning, and problem-solving skills [1], [2]. Mathematics learning is not only oriented toward mastering concepts but also toward building students' ability to interact, communicate, and construct knowledge socially [3]. One important aspect that emerges in mathematics classrooms is sociomathematical norms, which regulate how students justify, argue, and evaluate mathematical ideas. Therefore, understanding sociomathematical norms becomes essential in improving the quality of mathematics learning.

However, in practice, students' participation and engagement in mathematics learning are often still limited. Many students tend to be passive, reluctant to express opinions, and less confident in presenting mathematical arguments. This condition is closely related to students' low interest in learning mathematics [3], [4], [5]. A lack of interest can reduce attention, motivation, and active involvement during the learning process. As a result, classroom interactions that should support the formation of sociomathematical norms do not develop optimally.

Previous studies have highlighted the importance of sociomathematical norms in fostering meaningful mathematical discussions and improving students' conceptual understanding. Research has shown that effective classroom interactions can support students in constructing mathematical reasoning and developing critical thinking skills. In addition, learning interest has been widely recognized as a key factor influencing students' engagement and achievement [6]. However, most existing studies tend to examine sociomathematical norms and learning interest separately [7]. Limited research has explored the relationship between these two aspects in an integrated manner.

This gap indicates that there is still insufficient understanding of how sociomathematical norms are formed in relation to students' learning interest. Many studies focus more on instructional strategies rather than analyzing students' actual behavior and interaction patterns in the classroom [8]. As a result, the role of learning interest in shaping sociomathematical norms remains underexplored. This lack of comprehensive analysis leads to an incomplete picture of students' learning processes [9]. Therefore, further investigation is needed to examine sociomathematical norms from the perspective of students' learning interest [10].

Understanding the relationship between sociomathematical norms and learning interest is crucial for improving mathematics learning practices. By identifying how students' interest influences their participation and interaction, teachers can design more effective and engaging learning environments [11], [12]. This understanding can also help teachers foster positive classroom norms that encourage discussion, argumentation, and collaboration. In addition, it enables students to become more active and confident in expressing mathematical ideas [13], [14]. Consequently, strengthening both sociomathematical norms and learning interest can enhance students' overall learning outcomes.

The novelty of this study lies in its focus on exploring sociomathematical norms based on students' interest in mathematics learning using a qualitative descriptive approach. Unlike previous studies that examine these aspects separately, this study integrates both perspectives to provide a more comprehensive understanding [15], [16]. It analyzes how students with different levels of learning interest demonstrate sociomathematical norms in classroom interactions. This approach allows for deeper insights into students' behavior, communication, and reasoning processes. Therefore, this study contributes to advancing knowledge in mathematics education, particularly in understanding the interaction between social and cognitive aspects of learning.

2. RESEARCH METHOD

2.1 Research Design and Setting

This study employed a descriptive qualitative approach to explore sociomathematical norms based on students' interest in mathematics learning at the junior high school level. The research was conducted at SMP Negeri 24 Bandar Lampung during the 2018/2019 academic year. The focus of the study was to describe students' sociomathematical norms in relation to their level of learning interest. A qualitative design was selected to gain an in-depth understanding of students' interactions and learning behaviors in a natural classroom setting [17], [18]. This approach enabled a comprehensive interpretation of the phenomena based on real conditions in the learning process.

2.2 Participants and Instruments

The participants of this study were six eighth-grade students selected through purposive sampling based on their levels of interest in mathematics learning, categorized as high, moderate, and low. The selection emphasized representation of diverse characteristics rather than the number of participants. The instruments used in this study included the researcher as the primary instrument, supported by questionnaires, observation sheets, and interview guidelines. The questionnaire was designed using a Likert scale to measure students' interest levels, while the observation sheet focused on sociomathematical norm indicators. Interviews were conducted with selected students and the mathematics teacher to obtain deeper and more comprehensive data.

Table 1. Summary of Research Methodology

Aspect	Description
Research Design	Descriptive qualitative approach
Research Focus	Exploring sociomathematical norms based on students' interest in mathematics learning

Aspect	Description
Research Setting	SMP Negeri 24 Bandar Lampung, 2018/2019 academic year
Participants	Six eighth-grade students selected through purposive sampling
Sampling Technique	Non-probability sampling (purposive sampling)
Instruments	Researcher, questionnaire, observation sheet, and interview guide
Data Collection	Observation, semi-structured interviews, and questionnaire
Data Analysis	Miles and Huberman model (data reduction, data display, conclusion drawing)
Data Validity	Triangulation of sources and techniques

2.3 Data Collection and Analysis

Data were collected through observation, semi-structured interviews, and questionnaires to ensure comprehensive and valid findings [19], [20]. Observation was conducted to examine students' interactions and behaviors during mathematics learning activities. Interviews were used to explore students' reasoning and clarify the data obtained from observations and questionnaires. Data analysis followed the Miles and Huberman model, including data reduction, data display, and conclusion drawing [21]. To ensure data validity, triangulation techniques were applied by comparing data from different sources and methods.

Table 2. Classification of Students' Interest in Mathematics Learning

Category	Criteria
High	Score \geq Mean + Standard Deviation
Moderate	Mean – Standard Deviation \leq Score $<$ Mean + Standard Deviation
Low	Score $<$ Mean – Standard Deviation

3. RESULTS AND DISCUSSION

3.1 Students' Sociomathematical Norms

The results of classroom observations reveal that students demonstrate varying levels of sociomathematical norms during mathematics learning. In general, most students exhibit good sociomathematical behavior, particularly in expressing ideas, responding to peers, and participating in classroom discussions. However, differences in the quality of these interactions are still evident among students. The distribution of sociomathematical norms is presented in Table 1.

Table 1. Distribution of Sociomathematical Norms

Category	Criteria (%)	Frequency
Very Good	$75\% < \rho \leq 100\%$	7
Good	$50\% < \rho \leq 75\%$	18
Fair	$25\% < \rho \leq 50\%$	5
Poor	$\rho \leq 25\%$	0
Total		30

As shown in Table 1, the majority of students (18 out of 30) fall into the "good" category. This indicates that students generally have the ability to engage in mathematical communication and social interaction in the classroom. Nevertheless, only a limited number of students reach the "very good" category, suggesting that the quality of sociomathematical norms still requires further development.

3.2 Students' Interest in Mathematics Learning

The questionnaire results indicate that students' interest in mathematics learning varies across three levels: high, moderate, and low. Most students demonstrate a moderate level of interest, reflecting a sufficient level of engagement in learning activities, although not yet optimal. The distribution of students' learning interest is shown in Table 2.

Table 2. Distribution of Students' Interest in Mathematics Learning

Category	Criteria	Frequency
High	Score $\geq X + SD$	6
Moderate	$X - SD \leq \text{Score} < X + SD$	20
Low	Score $< X - SD$	4
Total		30

Based on Table 2, most students (20 students) are categorized as having moderate interest in mathematics. Only a small proportion of students demonstrate high interest, while a few students show low interest. This finding suggests that although students are involved in the learning process, there is still a need to enhance their motivation and enthusiasm toward mathematics learning.

3.3 Relationship Between Sociomathematical Norms and Learning Interest

Further analysis based on observations and interviews with selected subjects reveals a consistent relationship between students' interest in learning mathematics and their sociomathematical norms. Students with higher levels of interest tend to demonstrate better sociomathematical norms, particularly in terms of active participation, clarity in expressing ideas, and engagement in mathematical discussions. A summary of this relationship is presented in Table 3.

Table 3. Relationship Between Learning Interest and Sociomathematical Norms

Subject	Learning Interest	Sociomathematical Norms
T1	High	Very Good
T2	High	Very Good
S1	Moderate	Good
S2	Moderate	Good
R1	Low	Fair
R2	Low	Fair

As presented in Table 3, students with high learning interest (T1 and T2) demonstrate very good sociomathematical norms, characterized by active engagement, clear communication, and strong participation in classroom interactions. Meanwhile, students with moderate interest (S1 and S2) show good sociomathematical norms but tend to be less consistent in expressing ideas. In contrast, students with low interest (R1 and R2) exhibit more passive behavior and encounter difficulties in communicating mathematical ideas.

These findings highlight that learning interest plays a significant role in shaping students' sociomathematical norms. In other words, higher levels of interest are associated with more effective participation and interaction in mathematics learning. This result reinforces the importance of fostering students' interest as a key factor in improving the quality of classroom mathematical discourse.

The findings of this study show that students generally demonstrate sociomathematical norms at a good level, although differences still appear among individuals. Most students are able to participate in classroom discussions, express mathematical ideas, and respond to peers in appropriate ways. However, only a small number of students reach the very good category, which indicates that the quality of interaction is not yet optimal. This means that classroom norms have started to develop but still need to be strengthened. Improving the consistency and depth of student participation remains an important aspect in mathematics learning.

In terms of learning interest, results indicate that most students are in the moderate category. This shows that students are involved in learning activities, but their enthusiasm toward mathematics is not fully developed. Students with higher interest tend to be more active, confident, and engaged in discussions. On the other hand, students with lower interest are more passive and less willing to express ideas. This difference clearly influences how students interact and build their understanding during learning.

The relationship found in this study is in line with previous research highlighting the importance of student engagement in mathematics learning. Active participation and strong interest can support students in developing reasoning and communication skills [22], [23]. However, many previous studies discuss sociomathematical norms and learning interest separately. This creates a gap in understanding how both aspects work together in real classroom situations [24]. Therefore, this study not only supports earlier findings but also provides a more integrated view.

This study offers a new perspective by examining sociomathematical norms based on students' learning interest using a qualitative approach. Instead of focusing mainly on teaching strategies, this research explores students' real behavior, interaction, and communication patterns. Grouping students based on their level of interest helps show how differences in motivation affect classroom participation [25], [26]. This provides a clearer picture of how social interaction and individual factors are connected [27], [28]. As a result, this study adds valuable insight to mathematics education research.

The findings also have important implications for teaching practice. Teachers need to pay more attention to students' learning interest as it strongly affects classroom interaction [29]. Creating engaging learning environments can encourage students to be more active and confident. Teachers can also support positive sociomathematical norms by promoting discussion, collaboration, and argumentation [30], [31]. Giving students space to express ideas freely can help improve their communication skills and participation.

This study still has some limitations that need to be considered. The number of participants is relatively small, so it may not fully represent all student characteristics [32]. The research was conducted in one school, which may limit the wider application of the results. In addition, qualitative analysis depends on interpretation, which may lead to subjectivity [33]. Future research is suggested to involve more participants and different contexts. Combining qualitative and quantitative approaches may also provide more comprehensive results.

4. CONCLUSION

This study concludes that students' sociomathematical norms are closely related to their level of interest in mathematics learning, as initially highlighted in the introduction and confirmed through the findings and discussion. Students with higher learning interest tend to demonstrate stronger participation, clearer mathematical communication, and more active engagement in classroom interactions, while those with lower interest show more passive behavior and limited expression of ideas. These results indicate that learning interest plays an important role in shaping how students interact, construct knowledge, and develop sociomathematical norms during the learning process. The findings also emphasize that improving classroom interaction cannot be separated from efforts to enhance students' motivation and enthusiasm toward mathematics. Therefore, creating engaging and supportive learning environments is essential to foster both positive sociomathematical norms and active student participation. Future research is expected to expand the scope of participants and explore various instructional strategies to further strengthen the integration between learning interest and sociomathematical development in mathematics education.

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