International Journal of Evaluation and Research in Education (IJERE)
Vol. 11, No. 4, December 2022, pp. 1673~1686
ISSN: 2252-8822, DOI: 10.11591/ijere.v11i4.23046

Sociomathematical norms in online learning in the COVID-19 pandemic period

Samsul Maarif[1], Novia Oktarina[1], Andi Sessu[1], Fitria Sulistyowati[2], Wikan Budi Utami[3]
[1]Department of Mathematics Education, Universitas Muhammadiyah Prof. Dr. HAMKA, Jakarta, Indonesia
[2]Department of Mathematics Education, Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia
[3]Department of Education Technology, Universitas Negeri Malang, Malang, Indonesia

Article Info

Article history:

Received Oct 13, 2021
Revised Aug 10, 2022
Accepted Sep 2, 2022

Keywords:

Effectiveness of mathematics
Gender of student
Online learning
Sociomathematical norms

ABSTRACT

This case study analyzed students' sociomathematical norms for the formation of study groups conducted by teachers, the role of sociomathematical norms on students' social interactions when learning mathematics, gender differences that can affect students' sociomathematical norms, and sociomathematical norms on derived material in terms of gender aspects among students. The nine subjects of this study were selected purposively. Data collection techniques were observation, interviews, and documentation. The study concluded that among the four indicators of sociomathematical norms, three indicators of male students are superior to female students. Male students are superior in accepting explanations from teachers, accepting differences of opinion, and mathematical insight. Meanwhile, female student excels in only one indicator (the effectiveness of mathematics).

Corresponding Author:

Samsul Maarif
Department of Mathematics Education, Universitas Muhammadiyah Prof. Dr. HAMKA
South Jakarta, Jakarta Capital Special Region, Indonesia
Email: samsul_maarif@uhamka.ac.id

1. INTRODUCTION

The concept of norms stems from the broader idea of prescription which means behavior to which other behaviors must adhere [1]–[3]. The norm was first used to describe the communication or interaction between teachers and students or between students that occurred in the learning process [4]–[6]. Furthermore, sociomathematics is an analytical concept, which includes arithmetic, ethnomathematics, and workplace mathematics in a single term; a place where problems arise regarding the relationship between the individual, mathematics, and society, and a core field that combines mathematics, the individual, and society [7]–[9]; as found in ethnomathematics, individual mathematics, adult numeracy, and mathematics containing skills [7]–[9]. The norms contained in learning mathematics can be called sociomathematical norms [10]. Sociomathematical norms relate to how students believe and understand mathematical knowledge and place themselves in social interaction in building mathematical knowledge [11], [12]. Sociomathematical norms as being normative understandings of what counts as mathematically different, mathematically sophisticated, efficient, and elegant in a classroom [13]. The purpose of this statement is that sociomathematical norms are likened to a normative understanding of mathematical assumptions, mathematically sophisticated, efficient, and elegant in the classroom [11], [12]. The conclusion is that the application of sociomathematical norms in the classroom puts forward mathematical principles [14], in which all actions taken must be confident, efficient in finding mathematical concepts, as well as elegant and authoritative in expressing opinions on the mathematical topic being discussed.

Sociomathematical norms are formed as a result of individuals' beliefs, values, and opinions related to mathematics [6], [15], [16]. In other that sociomathematical norms are formed as a result of individual beliefs, values, and opinions related to mathematics lessons [17], [18]. This is also reinforced by the statement that sociomathematical norms are developed through the interaction of various components in the classroom to the mathematics learning activities presented by the teacher [13], [14], [19]. When the teacher starts learning mathematics in the classroom, the teacher forms a study group with a heterogeneous group, then the teacher gives a problem that must be solved in the group. Then the problems that have been solved in the group are discussed again in front of the class. At this time the teacher facilitates students by directing students to be able to represent the mathematical values that are in their minds while still applying the prevailing social values. These social values are that accuracy is more important than speed in determining answers, the need for efficiency, and writing down answers that are believed to be correct.

A sociomathematical norm is the consideration of a mathematically acceptable explanation in conjunction with an understanding of what has been mathematically different [13], [20], [21]. Sociomathematical norm is a thought from a group's mathematical discussion together with mathematical understanding [14], [22], [23]. The teacher presents a mathematics lesson by developing sociomathematical norms through the interaction of various components in the classroom [24]. These learning activities are developed through the provision of mathematical problems that must be solved through the formation of study groups. Where the formation of this study group is useful to unite all the thoughts of each group member involved in it. When uniting these thoughts, each member will know each other's thinking abilities.

In addition to sociomathematical norms, the success of a child's academic achievement can be caused by two types of factors, including external factors and internal factors [25], [26]. External factors include factors from the environment in which the child learns, the methods used by the teacher when teaching, his school friends, and the support of his parents both materially and psychologically. While internal factors can come from within the child, for example, there is an intention to want to learn, there is a sense of wanting to compete positively with his friends in class, self-confidence to dare to try, interests and talents that have been embedded in the child, and even other factors. gender differences can also affect the success of academic achievement.

In general, sociomathematical norms can be formed from social interactions both between students and students and teachers. Social interactions between students that are formed or often referred to as friendships, theoretically cause social norms in learning mathematics and in mathematics classes to develop. This is what causes sociomathematical norms to be considered by mathematics teachers. When socializing in class, including math class. It was found that there were many differences in the characteristics of each person, ranging from physical differences, intelligence, ethnicity, religion, race, habits, the concept of friendship, and even gender. All kinds of differences can be brought together by the teacher in the classroom through group learning. This is what causes mathematics learning to have relatively complex problems because teachers must pay attention to heterogeneous students. When we talk about gender, what comes to our mind is only about gender, namely: male and female. In reality, the gender difference does not only talk about physical matters, but the psychology of the two sexes is also different. Physical differences are gender differences that are more clearly visible, male students tend to have big, tall, strong bodies, but the puberty phase is a little slower than female students. Meanwhile, female students tend to be small, weak, not too tall, but the puberty phase is faster than male students.

The differences between male and female students in learning mathematics among them are: i) Men are superior in reasoning, women are superior in accuracy, thoroughness, and thoroughness of thought, and ii) Men have more mathematical and mechanical abilities than women, this difference is not visible at the elementary level but becomes more obvious at a higher level [27]–[30]. This is also supported by previous research, which results that the average percentage of male learning anxiety is 68% and female learning anxiety is 70.75% so that if you pay attention there is no significant difference in average [31]. This may occur because female students have a more open nature than boys, they can better admit their feelings of anxiety and are more critical in dealing with a problem. Female students are more careful in making decisions, they are afraid of making mistakes, therefore anxiety while studying will be easily seen in them.

Gender is related to human nature which by nature can change or be changed with human nature which is non-naturally immutable or permanent. As for the term gender, it can be interpreted as male and female which has become a decree. Gender equality simply distinguishes the definition of sex as biological sex from birth, namely male or female based on the genitals they have, while gender is social sex in the form of attributes masculine or feminine which is a socio-cultural construction [32], [33]. Gender, social, and cultural dimensions are very powerfully interacting in the conceptualization of mathematics education [34]–[36]. This was a previous study who explained that male students were more interested in mathematics than female students, so female students were more anxious in dealing with mathematics than male students [37]–[40], the women are generally better at memory and men are better at logical

thinking [41]. Other than that, the woman of the highest intelligence, but in essence, women have almost no more interest in theoretical questions such as men, women are more interested in practical things than theoretical, women are also closer to concrete practical life problems, while men are more interested in abstract aspects [42], [43].

Studies related to sociomathematical norms have been carried out several times by previous researchers and experts. For example, the previous study conducted a mathematical belief of elementary school teachers which was reflected in decision making for learning mathematics, as well as contributing to creating sociomathematical norms [13], the identification of nine norms, including three social norms and six sociomathematical norms [44], the relationship between sociomathematical norms and visual media in mathematics learning [15], improvement of sociomathematical norm in mathematics learning using the Team Accelerated Instruction [45], factors that influence sociomathematical norm [46], and the opinion that students can build social norms when learning in class, such as: daring to express disagreement when needed, students can share their solutions with others [17]. The several studies that discuss the sociomathematical norms, none of them focus on research on sociomathematical norms in terms of student gender. So that this research is important to do to see socio-mathematical norms from the perspective of students' gender.

Based on these problems, it is very interesting to study learning that can help students analyze sociomathematical norms based on students' gender during this pandemic, therefore the purpose of this study is to analyze students' sociomathematical norms towards the formation of learning groups conducted by teachers, analyze the role of sociomathematical norms on students' social interactions when learning mathematics, analyze gender differences that can affect students' sociomathematical norms, and analyze sociomathematical norms in derivative material that is viewed from the gender aspect of Senior High School 73 Jakarta students.

2. RESEARCH METHOD

2.1. Type of research

The type of approach used in this research is a qualitative approach. Meaning and understanding from within, reasoning, the definition of a certain situation, more research on things related to everyday life will be emphasized in qualitative research [47], [48]. While the type of research used in this research is descriptive with the case study method. Descriptive research is research consisting of a collection of information about the status of an existing symptom, namely the state of the symptoms according to what they were at the time the research was conducted [49]–[51]. The reason the researcher uses a qualitative approach is that the scope in revealing the facts that occurred during the research is relatively wider than other studies. The researchers analyzed sociomathematical norms with derived material in terms of gender aspects at Senior High School 73 Jakarta that is located in Jakarta, Indonesia.

2.2. Participants

The subjects used in this study used a purposive sampling technique. In this sampling technique, the researcher is given the freedom to determine the research subject according to the criteria or wishes of the researcher. As for determining the research subject, it begins with the observation process for two meetings. Based on the results of observations that have been made, nine students have been obtained consisting of five female students and four male students. The selection of nine students with five female students who were partiicpated as research subjects by considering the communication skills of students and researchers, was intended so that communication between subjects and researchers was not hampered. The next stage is to communicate with the teacher about the sociomathematical norms on the research subject. research subjects who appear to have sociomathematical norms can be used as research subjects, to help researchers analyze sociomathematical norms in terms of students' gender aspects. The flow of research subject selection is described in Figure 1.

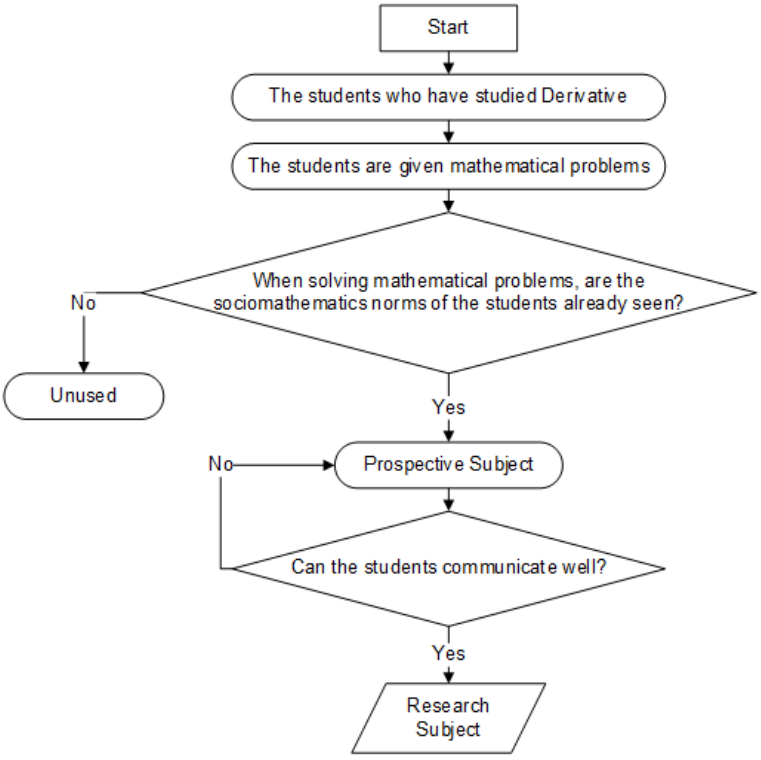

Figure 1. Research subject selection flow

2.3. Data collection technique

The data collection techniques used in this research are observation, interview, documentation, and triangulation. Observation with the help of observation will be filled in by the researcher during the process of observing mathematics learning between teachers and students. This observation sheet is to find out how big the sociomathematical norms that students have are by reviewing them based on the gender aspect of the derived material. This observation sheet only contains yes or no choices, according to the observations obtained. The interviews conducted in this study were semi-structured. Semi-structured interviews are interviews that are included in the in-depth interview category, whose implementation is freer than structured interviews [49]–[53]. Interviews were conducted by researchers to respondents through Google Meetings by activating the previous recording mode on the application, which is useful as an accurate and reliable research instrument. Documentation is used as evidence of classroom action research in the form of photos and videos taken by mathematics learning activities on derived material carried out at the time of the research. Documentation can also be used as data and information on research activities. Triangulation is a data collection technique that combines various data collection techniques and existing data sources [54]–[56]. When the researcher collects data by triangulation, then the researcher collects data which at the same time tests the credibility of the data, namely checking the credibility of the data with various data collection techniques and various data sources.

2.4. Technique of data analysis

Data analysis is the process of systematically searching and compiling data obtained from interviews, field notes, and other materials so that the results can be easily understood, and the findings can be informed to others [47], [48], [57]. Data analysis activities as used include three elements, namely: data reduction, data presentation, and concluding. On reduction data activities, all the data obtained were then selected based on the need to answer questions posed by researchers regarding socio-mathematical norms in terms of student gender. The researcher will write down the data obtained from the interviews by playing repeatedly the recordings that have been made during the interview process with the respondents. The next step is to present the data or data display. Presentation of data can make it easier for researchers to see the picture as a whole or part of the research. The presentation of the data in this study will describe in general the results of the study starting from the location and time of the study, how sociomathematical norms occur between male students and female students, as well as the results of interviews that have been conducted

through google meetings with respondents. The final activities in data analysis techniques are verification. This activity is carried out conclusion drawing and verification is the third part and is an important element in data analysis techniques in qualitative research, namely conducting continuous verification throughout the research process. The initial conclusions put forward are still temporary and will change if no strong and supporting evidence is found at the next stage of data collection [47], [58]. It is different if the conclusions that have been obtained are accompanied by valid evidence and consistent with the situation when the researcher returned to the field to collect data, then the conclusions put forward are reliable. Conclusions can be in the form of a description or description of an object that was previously still gray or even dark so that after the data is examined the results will become clear.

3. RESULT AND DISCUSSION

3.1. Results

3.1.1. Indicators of sociomathematics norms

Every norm that applies in society, must have a meaning that is not much different. However, there are still some differences between social norms and sociomathematical norms. Previous research confirms the difference between social norms and sociomathematical norms [15], [22], [46], [59]. Table 1 presents a difference between social norms and sociomathematical norms.

Table 1. Difference between social norms and sociomathematical norms

Social norms	Sociomathematical norms
Students ask each other about each other's thoughts	Students ask each other questions that emphasize mathematical reasoning, justification, and understanding.
Students explain how they think.	Students explain their solutions using mathematical arguments.
Students work together to solve problems.	Students reach an agreement using mathematical reasoning and proof.
Students solve problems using a variety of approaches.	Students compare their strategies to find mathematically important similarities and differences.
Students realize that making mistakes is part of learning.	Students use errors as opportunities to rethink concepts from mathematical ideas they have and test contradictions. Mistakes support new learning about math.

Social norms are general rules that we usually find in everyday life in social interaction in society [60], [61]. Meanwhile, sociomathematical norms are general rules in social interactions related to learning mathematics [15], [46]. Examples of the application of social norms, namely how to have a good opinion in public, how to respect the opinions of others, maintain peace when expressing opinions, and there is no element of coercion to support the opinions expressed. While examples of the application of sociomathematical norms, namely how to unite the concepts of mathematical thinking, how to decide on effective mathematical problem solving, and how to ensure the truth of the mathematical solutions that have been written. Sociomathematical norms are related to students' beliefs and beliefs about collaborative activities in learning mathematics [62]–[64]. The collaboration referred to here is that in sociomathematical norms it is closely related to the process of interaction between students which has two important indicators, namely communication skills and students' social skills to achieve an understanding. The National Council of Teachers of Mathematics (NCTM) through the Principles and Standards for School Mathematics, places communication as an important part of mathematics and mathematics education [65]–[67]. The role of communication in learning mathematics is very important because communication is the only way for students to unite all their understanding. However, not only being able to communicate, but students must also have good social skills, if they can communicate well but the delivery method is not good, the communication process also cannot go as planned. So that researchers can analyze the sociomathematical norms that students have when learning mathematics takes place.

The indicators of sociomathematical norms used in this study can be seen in Table 2. This indicator is obtained by inferring from the opinions that have been written in the previous section. Based on the indicators in Table 2, it can implicitly indicate the occurrence of social interaction. Sociomathematical norms possessed by students can be seen based on how students receive material delivered by the teacher, then how the attitudes shown by students when they see differences in mathematical thinking, followed by how to solve problems chosen by students, whether the more effective way or not. The normal way that is taught by the teacher, the last is how the insight of mathematical knowledge possessed by students.

Table 2. Indicator of sociomathematical norms

Indicator	Description
Acceptable Explanations (AE)	Cases where a teacher or student asks to make a reference, how a particular problem is considered acceptable
Mathematical Difference (MD)	Cases where a teacher or student questions or explains how another student's mathematical ideas differ from others
Mathematics Effectiveness (ME)	Cases where a teacher or student questions which problem-solving strategy (mostly proposed by teachers) is the most effective or easiest to implement for students
Mathematics Insight (MI)	Cases where higher-level mathematical justification is achieved through the interaction of insights as well as discussion of mathematical topics presented by teachers or students

3.1.2. Data Collection

The data collection was carried out through the observation process and continued with the interview process. The observation process was carried out to seven classes of students twice, through online learning with google meetings. After the observation process was completed, the researcher selected seven samples of students who would be interviewed related to sociomathematical norms. Presentation of data in this study using MAXQDA 2020 software. MAXQDA is software for analyzing combined and qualitative data. This software is a global program for analyzing unstructured data such as interviews, articles, media, surveys, tweets, and more. This MAXQDA software can assist researchers in analyzing the results of interviews that have been conducted with informants.

The first indicator in this study is Acceptable Explanation (AE). The purpose of this indicator is the case where a teacher or student asks to make a reference, how a particular problem is considered acceptable. The presentation of the data is presented in the form of a diagram which can be seen in Figure 2.

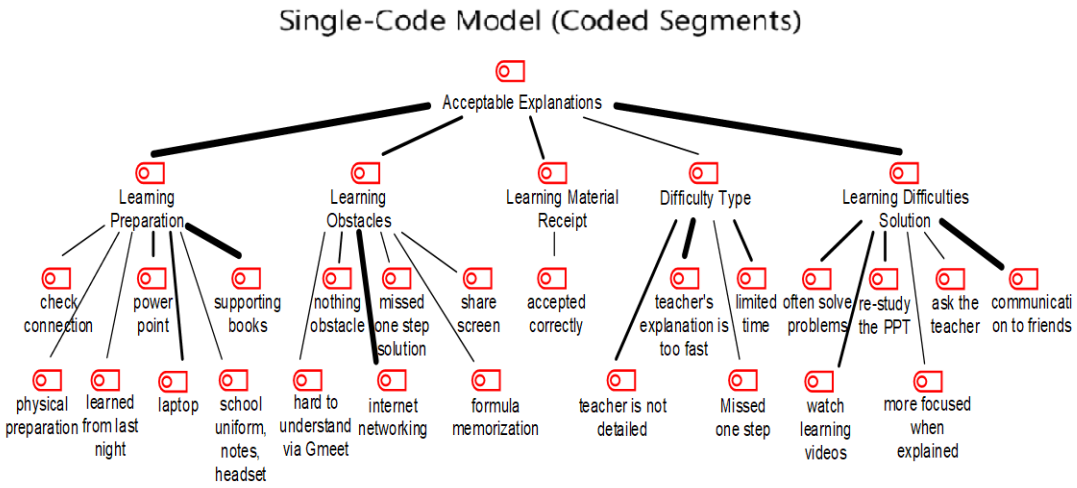

Figure 2. Interview Results on the First Indicator

Based on Figure 2, it can be seen that this indicator is given five questions with keywords: preparation for learning, learning obstacles, results of receiving material, types of difficulties when studying, and solutions made to deal with these difficulties. When the researcher questions about the preparation for learning, we can see that the thickest line shows that the learning support books, laptops, and power points that will be explained by the teacher on that day are the things they prepare before studying. For problems when learning, most of the resource persons answered problems on the internet network. Given that learning is still using the Distance Learning (*pembelajaran jarak jauh/PJJ*) system, the use of the internet may also be an obstacle when studying. Sometimes there are students who suddenly lose their network, leave the Google Meeting, or find it difficult to join the Google Meeting, not to mention there are students who are constrained by the internet quota. The transcript of the interview conducted with one of the subjects is as:

P : *Okay, so during the PJJ process, are there any obstacles that you face? Please state what kind of problem?*
S2 : *Sometimes the network is disrupted, ma'am, then the explanation from the teacher is not very clear*
P : *Oh, the explanation is too fast, isn't it?*
S2 : *Yes, right ma'am*

In the next question, regarding the results of receiving the material provided by the teacher, all resource persons can accept it easily, so that learning can run smoothly. For the next question related to the types of difficulties faced by the resource persons when studying, we can see for the thickest line, the informant said that the teacher's explanation was too fast, this was due to ineffective learning time. So, in the end, the teacher was too hasty in explaining, as a result, some of the informants felt uncomfortable with this way of learning. In the last question, which was about the solutions that were made to overcome the difficulties felt when learning mathematics, most of the informants thought that they should communicate with their friends. So, if there are resource persons who are left behind by a few steps of explanation from the teacher when in a google meeting, they act more to communicate with their friends who understand more, rather than having to ask the teacher directly. The second indicator in this study is a mathematical difference (MD), which is a case where a teacher or student questions or explains how other students' mathematical ideas differ from others. The presentation of the data is presented in the form of a diagram which can be seen in Figure 3.

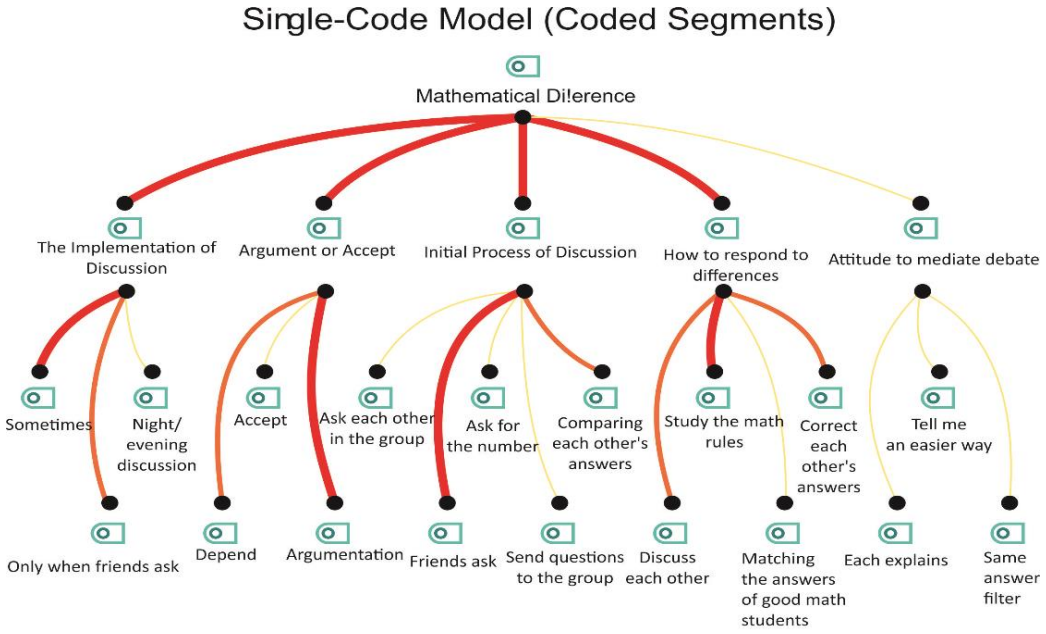

Figure 3. Interview results on the second indicator

Based on the results of interviews guided by the second indicator in sociomathematical norms, it can be seen that there are five questions posed to the informants with the keywords: implementation of discussion, argumentation or acceptance, the initial process of discussion, how to respond to differences, and attitude to mediate debates. When the researcher questions about the implementation of the discussion, based on the diagram shows the thickest line meaning that the implementation of the discussion is sometimes carried out by students, so it is not always scheduled to have a discussion. Only at certain moments when someone doesn't understand the material. Then in the next question, the researcher asked about the level of frequency of the informants while discussing it in arguing against the opinions of other friends or just accepting the opinions of other friends. Most of the interviewees argued that they often argued or acted against other opinions, rather than having to accept or be pro. This statement is supported by the following interview excerpt:

P : *Oh okay, so you are more often in the Whatsapp Group, huh. Then usually during the discussion, do you often argue with other friends? Or just accept other opinions?*
S8 : *I'm the type of person who doesn't accept it, so I keep arguing with others until I find a clear point*
P : *Good, I know how come you are hehe so you keep arguing until you find the right one, right?*
S8 : *Yes, that's right ma'am*

In the next question, regarding the initial process of discussion can occur. Based on the diagram, the thickest line is when a friend asks a question. So, the discussion that is usually carried out by the resource person often occurs when a friend asks the resource person about the material that has not been understood on that day, then the discussion process will occur. The next question is about how to respond to differences of opinion. Based on the diagram, most of the students indicated that the way to respond to differences of opinion that was often done by the resource persons was to examine each other's applicable mathematical rules. So, when the discussion process occurs and their answers are different, they will be guided by the applicable mathematical rules which in the end they will correct each other's answers. Then proceed with the last question on this second indicator, the question asked is related to the attitude taken by the resource person when mediating a debate. Based on the diagram, there are three alternative answers obtained. So, the attitude that is usually done by the resource person when mediating a debate is by allowing each of them to explain the answer he got, then some tell the easier way to solve the problem, and there is also an interesting answer obtained same.

The third indicator in this study is Mathematics Effectiveness (ME), which is a case where a teacher or student questions the problem-solving strategy (mostly proposed by the teacher) which is the most effective or easiest to implement for students. The presentation of the data is presented in the form of a diagram which can be seen in Figure 4. Based on the results of interviews based on the third indicator, it can be seen that there are five questions asked by the researcher, with the keywords: the use of effective methods, attitudes of judgmental errors, courage to argue, stages of refuting the assessment, and preferring the fast way or the normal way. Sourced from the first question asked regarding the use of a more effective method, it can be seen in the thicker line that students prefer to use a more effective method because its use can shorten the time, can minimize errors, and also does not need more paper much to write the answer. The next question posed by the researcher, which relates to the way students behave when the teacher makes a mistake in assigning value to the work done. Most students will explain to the teacher in a kind and polite manner that the method used is indeed different, but the result is the same as the method produced by the teacher.

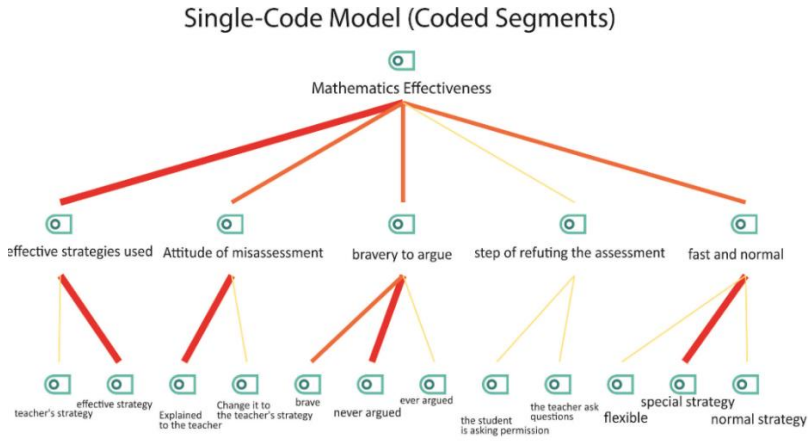

Figure 4. Interview results on the third indicator.

The next question is related to the courage of students in submitting opinions. When the informants were asked questions about whether or not they had an opinion when learning mathematics took place. Some students answered that they had never had an opinion because they were afraid of the teacher, afraid of having the wrong opinion, some even had not thought of a topic for their opinion. The last question is a question related to choosing the fast way or the normal way when solving a problem given by the teacher. There are three alternative answers given by the informants. Some of them are more flexible, some prefer the

fast way, and some even choose the normal way. Based on the thickest line in the diagram, showing the answer that was chosen the most by the interviewees is the quickest way. The reason the informants chose to use the fast method was that it shortened the time, minimized errors, and was shorter in writing the answers they received. This statement is supported by the following interview excerpt:

P : *Ah yes, that's good, so it's a comparison. Now, for example, the way you wrote is different from what Mrs. Lasma taught, the answer is also according to Mrs. Lasma, but your way is to blame. You dare not tell Mrs. Lasma about the truth?*
S4 : *I'm really brave, ma'am, as long as I speak politely and I can explain how.*
P : *The important thing is that you have proof, right?*
S4 : *Yes, ma'am, I have evidence. So, how do I reduce that risk, I wrote it in two ways, ma'am hehe.*

The fourth indicator which is the last indicator in this research is Mathematics Insight (MI), which is a case where higher-level mathematical justification is achieved through the interaction of insights and discussions on mathematical topics presented by the teacher or students. The presentation of the data is presented in the form of a diagram which can be seen in Figure 5. Based on the results of the interviews submitted, there were five questions asked regarding this fourth indicator, including derived concepts that have been studied, the application of derived concepts in everyday life, the application of mathematical material in everyday life, the application of mathematics in the field of science. Others, as well as cases that cannot be solved using mathematics. In the first question posed, namely regarding the concept of derivatives that have been studied, there are five alternative answers given by the resource persons, including chain rules, derivative questions, derivative properties, how to derive a function, and how to read mathematical language. We can see that the thickest line in the diagram shown is a derivative. When the researcher asked about the concept of derivatives that had been studied, most of the respondents answered that they had studied the properties of derivatives.

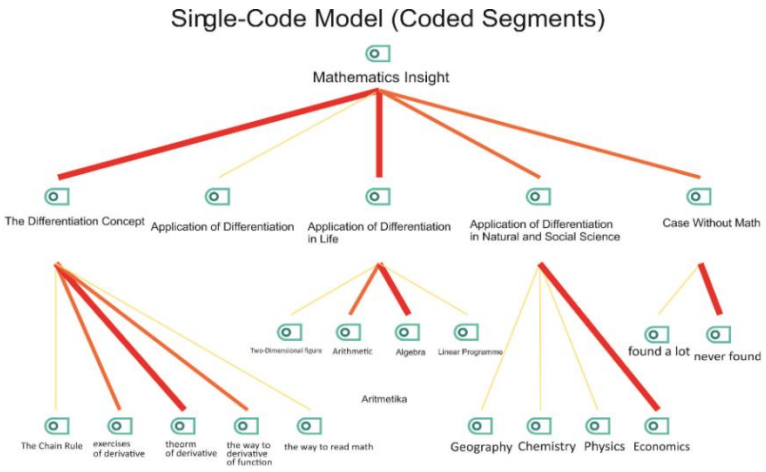

Figure 5. Interview results on the fourth indicator

In the next question posed by the researcher regarding the application of the concept of derivatives in everyday life. However, none of the informants could answer this question. It is estimated that teachers who teach are less informed about the application of derived concepts that have been learned in everyday life. For the third question posed by the researcher, namely regarding the application of mathematical material that has been learned from the beginning of school or since elementary school until now. There are four alternative answers given, including flat shapes, arithmetic, algebra, and linear programming. When viewed from the diagram, the thickest line is arithmetic, which is the material often used by humans in carrying out transactions or other basic calculations. This statement is supported by the following interview excerpt:

P : *So, while you have studied mathematics from elementary school until now, what mathematics material have you applied in your daily life?*

S7 : *Arithmetic is the best, ma'am because mathematics is the most important thing, it's the basic knowledge, ma'am, like adding, lacking, dividing, this time is really important in our daily application. Like, for example, if you want to go shopping, you need to use those basic operations.*

The next question posed by the researcher to the resource person was regarding the application of mathematics in other fields of science. There are four alternative answers given, including geography, chemistry, physics, and economics. Based on the diagram, the thickest line is economic. This means that more resource persons apply mathematics to the field of economics. The last question asked by the researcher to the informant was about finding cases in everyday life that could not be solved by mathematics. There are two alternative answers given by the resource persons, namely, there are no cases that cannot be solved without mathematics and there are cases that cannot be solved without mathematics. The two alternative answers, the thickest line shown is that there are no cases that cannot be solved without mathematics.

3.2. Discussion

In the first indicator, the third question is related to the results of receiving material during online learning, namely receiving well. Even though the network was constrained, the resource persons were still able to receive explanations from the teacher well and were easy to understand because when online learning took place, the teacher explained patiently. In the first indicator, the fourth question related to learning difficulties most frequently faced by resource persons is the teacher's explanation that is too fast. This learning difficulty is also supported by the results of previous research which states that students consider the use of PowerPoint media, learning videos in online learning to explain too quickly so that the material presented is poorly understood and poorly understood [68]–[70]. If the researcher pays attention when the research observation process takes place, actually the teacher is not too fast when explaining, but only limited time is a problem because each room meeting is only given 45 minutes for the teacher to explain.

In the first indicator, the fifth question related to solutions that were carried out to overcome the learning obstacles faced, the answer that was expressed the most by the resource persons was communication to friends. Regarding mathematical communication, this is considered as to how teachers and students can share the processes of learning, understanding, and doing mathematics [71], [72]. When resource persons are constrained or have difficulties during online learning, they immediately communicate with their friends, if their friends have not been able to solve the problem then they will ask the teacher about the material that has been missed or poorly understood. Based on the results of interviews from all sources related to the first indicator, it can be concluded that in this indicator male students are superior in sociomathematical norms.

In the second indicator, the first question is the code that is most interested in the resource persons regarding the intensity of the discussion, which is sometimes a discussion. Based on the statement of the informants, sometimes they do discussions when there is a material problem that they don't understand, so they don't always carry out discussions. In the next question related to arguing more often or just accepting friends' answers, the code that is most in demand is argumentation. This is by which states that in learning mathematics students need to be accustomed to providing arguments for each answer and responding to answers given by others so that what is learned becomes more meaningful for students [71], [72]. Some of the interviewees argued more often because they wanted to practice how to defend their opinions.

In the next question related to how to respond to differences of opinion, the code that was chosen by the speakers was the study of mathematical rules. Based on the results of interviews related to this question, some of the interviewees argued that when the interviewee was dealing with some of his friends who had different opinions about how to solve a problem, the attitude he showed was to examine the applicable mathematical rules to determine the right answer. This statement is in line with previous research which states that students must be able to combine all the concepts they already know and which are related to the problem, then form new concepts so that the given problem can be solved [65], [73]–[75].

In the first three indicators, the code that is most in demand by resource persons related to how to solve a problem is the use of the effective method (K2). Based on the results of interviews with informants, when researchers asked questions about their interest in solving a problem, some of them answered using a more effective way than the method taught by the teacher with reasons that were shorter in writing and could minimize errors. Following this, the selection of this strategy is generally adjusted to the problem posed, in other cases, this method cannot be used [76], [77]. In essence, a more effective way is good, but not all mathematical problems can use a more effective way.

In the next question related to the courage to have an opinion when online learning takes place, the code that is mostly expressed by the speakers is that they have never had an opinion. Based on the results of interviews that have been conducted, the majority of the interviewees have never expressed their opinion when online learning takes place, for reasons of fear of being wrong, afraid of just wasting time, and some

even think that they have never thought of expressing their opinion in front of everyone. This is following the statement in previous research which says that often teachers only use the lecture method interspersed with questions and answers, assignments, and discussions that are less directed in learning resulting in students being less active [76], [77]. The implementation of a lecture method like this will certainly make students lazy to express their opinions.

In the fourth indicator with the main code mathematics insight, the researcher asks questions about the application of the material in everyday life, there are four sub-codes proposed by the resource persons. The code most chosen by the resource person is Algebra material. Algebra was the most chosen by the resource persons because this material is a basic mathematical concept, which includes basic arithmetic operations such as addition, subtraction, multiplication, and division which are commonly used when transacting in everyday life. This intersects with the high school level the difficulties that are often encountered are in materials related to algebra and its application [78]. If traced back, in this study the material that is often applied in everyday life is algebra, so this material should not be so difficult in its daily application.

The next question is related to the application of mathematical material that can be used in other fields of science. Based on the results of interviews, there are four subcodes including physics, chemistry, geography, and economics. The sub-code that is most in demand by resource persons in the field of economics. The economic field is commonly used to calculate interest rates, per capita income, population, and even national income. This is in line with previous research which stated that many applications of Mathematics were developed into economics through logical reasoning, for example, the application of mathematics regarding linear functions on demand and supply functions and market equilibrium in economics [78]. This statement means that mathematics has a fairly close relationship with economics. The reason is that some of the material sub-chapters from economics use mathematical calculations.

4. CONCLUSION

The study revealed that the role of sociomathematical norms on students' social interactions is by applying sociomathematical norms students become more aware of the rules that apply during the mathematics learning process take place. Online learning using Google Meet affects the superiority of male students in sociomathematical norms, compared to female students. Of the four indicators of sociomathematical norms, three of them stated that male students were superior in their abilities in sociomathematical norms, only Mathematics Effectiveness was superior for female students. In this regard, gender differences, in general, can affect the sociomathematical norms that students have

Since this research is a case study in one high school in Jakarta, so the result cannot be generalized. In other words, it is very possible to obtain different research if the research is carried out on other subjects. However, the results of this study can be used to obtain an overview of sociomathematical norms based on gender. For this reason, it is hoped that: i) Students should be accustomed to having the courage to argue or argue when there are problems, but still, use good ethics and do not hurt the feelings of others. Dare to argue or argue can train students' thinking skills when speaking in public; ii) Parents should participate in supervising students learning from home so that they are enthusiastic about participating in every learning activity even though they are brave; iii) Mathematics learning during the COVID-19 pandemic should be well prepraed and interestingly.

REFERENCES

[1] N. R. Schultz, M. M. Silvestri, and C. J. Correia, "Diversion of prescription stimulants among college students: An initial investigation of injunctive norms," *Addictive Behaviors*, vol. 65, pp. 264–268, 2017.
[2] D. Papineau, "There are no norms of belief," in *The aim of belief*, Oxford University Press, 2013, pp. 64–79.
[3] S. Soro, S. Maarif, Y. Kurniawan, and A. Raditya, "Dienes AEM as an alternative mathematics teaching aid to enhance Indonesian students' understanding of algebra concept," *Journal of Physics: Conference Series*, vol. 948, no. 1, 2018, doi: 10.1088/1742-6596/948/1/012044.
[4] R. Cheung and D. Vogel, "Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning," *Computers & Education*, vol. 63, pp. 160–175, 2013.
[5] M. M. H. G. Hendrickx, M. T. Mainhard, H. J. Boor-Klip, A. H. M. Cillessen, and M. Brekelmans, "Social dynamics in the classroom: Teacher support and conflict and the peer ecology," *Teaching and Teacher Education*, vol. 53, pp. 30–40, 2016.
[6] R. I. I. Putri, M. Dolk, and Zulkardi, "Professional development of PMRI teachers for introducing social norms," *Journal on Mathematics Education*, vol. 6, no. 1, pp. 11–19, 2015, doi: 10.22342/jme.6.1.1900.11-19.
[7] A. Gagatsis and E. Nardi, "Developmental, Sociocultural, Semiotic, and Affect Approaches to the Study of Concepts and Conceptual Development," in *The Second Handbook of Research on the Psychology of Mathematics Education*, Brill Sense, 2016, pp. 187–233.
[8] T. Sundtjønn, "Opportunities and Challenges when Students Work with Vocationally Connected Mathematics Tasks," Doctoral Thesis, University of Agder 2021.

[9] M. C. Johansson, "Counting or Caring: Examining a Nursing Aide's Third Eye Using Bourdieu's Concept of Habitus," *Adults Learning Mathematics*, vol. 9, no. 1, pp. 69–84, 2014.
[10] A. Çakır and H. Akkoç, "Examining socio-mathematical norms related to problem posing: a case of a gifted and talented mathematics classroom," *Educational Studies in Mathematics*, vol. 105, no. 1, pp. 19–34, 2020.
[11] H. Straehler-Pohl, S. Fernández, U. Gellert, and L. Figueiras, "School mathematics registers in a context of low academic expectations," *Educational Studies in Mathematics*, vol. 85, no. 2, pp. 175–199, 2014.
[12] J. Skott, "Towards a participatory approach to 'beliefs' in mathematics education," in *From beliefs to dynamic affect systems in mathematics education*, Springer, 2015, pp. 3–23.
[13] S. M. Kang and M. K. Kim, "Sociomathematical norms and the teacher's mathematical belief: A case study from a Korean in-service elementary teacher," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 12, no. 10, pp. 2733–2751, 2016, doi: 10.12973/eurasia.2016.1308a.
[14] N. D. Güven and Y. Dede, "Examining social and sociomathematical norms in different classroom microcultures: Mathematics teacher education perspective," *Kuram ve Uygulamada Egitim Bilimleri*, vol. 17, no. 1, pp. 265–292, 2017, doi: 10.12738/estp.2017.1.0383.
[15] S. Adi Widodo, Turmudi, and J. Afgani Dahlan, "Can Sociomathematical Norms Be Developed with Learning Media?" *Journal of Physics: Conference Series*, vol. 1315, no. 1, 2019, doi: 10.1088/1742-6596/1315/1/012005.
[16] Ö. Özyurt, H. Özyurt, A. Baki, and B. Güven, "Integration into mathematics classrooms of an adaptive and intelligent individualized e-learning environment: Implementation and evaluation of UZWEBMAT," *Computers in Human Behavior*, vol. 29, no. 3, pp. 726–738, 2013, doi: 10.1016/j.chb.2012.11.013.
[17] D. Akyüz, "Çember özelliklerini öğretmeyi amaçlayan teknoloji ve sorgulama tabanlı bir sınıfta oluşan sosyomatematiksel normların incelenmesi," *Eğitim ve Bilim*, vol. 39, no. 175, 2014.
[18] G. Akin and D. Akyüz, "İlköğretim Matematik Öğretmen Adaylarının Sosyomatematiksel Norm Algıları," in *Iltercongress*, 2018, no. September, pp. 343–347.
[19] V. Sánchez and M. García, "Sociomathematical and mathematical norms related to definition in pre-service primary teachers' discourse," *Educational Studies in Mathematics*, vol. 85, no. 2, pp. 305–320, 2014, doi: 10.1007/s10649-013-9516-0.
[20] D. Sommerhoff and S. Ufer, "Acceptance criteria for validating mathematical proofs used by school students, university students, and mathematicians in the context of teaching," *ZDM*, vol. 51, no. 5, pp. 717–730, 2019.
[21] R. A. Apsari, S. Sripatmi, R. Ilma, I. Putri, L. Hayati, and S. Sariyasa, "From Less to More Sophisticated Solutions: A Sociomathematical Norms to Develop Students' Self-Efficacy," *Proceedings of the 1st Annual Conference on Education and Social Sciences (ACCESS 2019)*, 2020, doi: 10.2991/assehr.k.200827.072.
[22] A. M. Partanen and R. Kaasila, "Sociomathematical Norms Negotiated in the Discussions of Two Small Groups Investigating Calculus," *International Journal of Science and Mathematics Education*, vol. 13, no. 4, pp. 927–946, 2015, doi: 10.1007/s10763-014-9521-5.
[23] S. Maarif, W. Wahyudin, A. Raditya, and K. S. Perbowo, "Introducing geometry concept based on history of Islamic geometry," *Journal of Physics: Conference Series*, vol. 948, no. 1, 2018, doi: 10.1088/1742-6596/948/1/012040.
[24] Kadir, "Mathematical Communication Ability and Social Skills of Students in Mathematics Learning," (in Indonesia), in *Seminar Nasional Matematika dan Pendidikan Matematika*, 2008, pp. 339–350.
[25] G. T. L. Brown, E. R. Peterson, and E. S. Yao, "Student conceptions of feedback: Impact on self-regulation, self-efficacy, and academic achievement," *British Journal of Educational Psychology*, vol. 86, no. 4, pp. 606–629, 2016.
[26] S. Maarif, K. S. Perbowo, M. S. Noto, and Y. Harisman, "Obstacles in Constructing Geometrical Proofs of Mathematics-Teacher-Students Based on Boero's Proving Model," *Journal of Physics: Conference Series*, vol. 1315, p. 012043, 2019, doi: 10.1088/1742-6596/1315/1/012043.
[27] D. Sulfikawati, S. Suharto, and D. Kurniati, "Analysis of Sociomathematical Norms in Collaborative Learning on Triangles and Quadrilaterals in VII-C SMP Negeri 11 Jember," (in Indonesian), *Jurnal Edukasi*, vol. 3, no. 3, p. 1, 2016, doi: 10.19184/jukasi.v3i3.3513.
[28] B. Mainali, "Investigating the Relationships between Preferences, Gender, Task Difficulty, and High School Students' Geometry Performance," *International Journal of Research in Education and Science*, vol. 5, no. 1, pp. 224–236, 2019.
[29] A. A. Adeyemi and O. M. Adeniyi, "A study of gender differences in the attitude of mathematically gifted and non-gifted senior secondary school students in Nigeria," *Gender and Behaviour*, vol. 8, no. 2, pp. 3102–3116, 2010.
[30] M. T. Battista, "Spatial visualization and gender differences in high school geometry," *Journal for Research in Mathematics Education*, vol. 21, no. 1, pp. 47–60, 1990, doi: 10.2307/749456.
[31] S. Imro'ah, W. Winarso, and E. P. Baskoro, "Gender Analysis of Mathematics Anxiety and Students' Self Efficacy," (in Indonesian), *Kalamatika: Jurnal Pendidikan Matematika*, vol. 4, no. 1, pp. 23–36, 2019.
[32] P. G. Yanti and U. Qura, "Gender Inequalities and Emancipation Struggle In the Novel Isinga," in *Proceeding 12th ADRI 2017 International Multidisciplinary Conference*, 2017, p. 159.
[33] C. Mazzuca, A. Majid, L. Lugli, R. Nicoletti, and A. M. Borghi, "Gender is a multifaceted concept: evidence that specific life experiences differentially shape the concept of gender," *Language and Cognition*, vol. 12, no. 4, pp. 649–678, 2020.
[34] S. Rimbatmojo, T. A. Kusmayadi, and R. Riyadi, "Profile of visual-spatial intelligence in solving geometric of 11th grades viewed from gender differences," in *International Journal of Science and Applied Science: Conference Series*, 2017, vol. 2, no. 1, pp. 346–353.
[35] R. Ramadhani, H. Syamsul, and U. Rofiqul, "Problem-Based Learning, Its Usability and Critical View as Educational Learning Tools," *Journal of Gifted Education and Creativity*, vol. 6, no. 3, pp. 193–208, 2019.
[36] R. Purwasih, I. W. Anita, and M. Afrilianto, "Junior high school students' mathematical creative thinking ability based on gender differences in plane and solid geometry subjects," *Journal of Physics: Conference Series*, vol. 1315, no. 1, p. 12073, 2019.
[37] Z. Amir MZ, "Gender perspective in learning mathematics," (in Indonesian), *Marwah Jurnal Perempuan, Agama Dan Jender*, vol. 12, no. 1, pp. 15–31, 2013, doi: 10.24014/marwah.v12i1.511.
[38] J. S. Eccles and M.-T. Wang, "What motivates females and males to pursue careers in mathematics and science?" *International Journal of Behavioral Development*, vol. 40, no. 2, pp. 100–106, 2016.
[39] M. Puteh and S. Z. Khalin, "Mathematics anxiety and its relationship with the achievement of secondary students in Malaysia," *International Journal of Social Science and Humanity*, vol. 6, no. 2, p. 119, 2016.
[40] D. Putwain and A. L. Daly, "Test anxiety prevalence and gender differences in a sample of English secondary school students," *Educational Studies*, vol. 40, no. 5, pp. 554–570, 2014.
[41] S. Zubaidah, N. M. Fuad, S. Mahanal, and E. Suarsini, "Improving creative thinking skills of students through differentiated science inquiry integrated with mind map," *Journal of Turkish Science Education*, vol. 14, no. 4, pp. 77–91, 2017.

[42] R. Triyadi, "Mathematical ability in terms of gender differences," (in Indonesian), Universitas Pendidikan Indonesia, 2013.
[43] P. Firmanti, "Reasoning of Boys and Girls in the Mathematics Learning Process," (in Indonesian), *HUMANISMA: Journal of Gender Studies*, vol. 1, no. 2, pp. 73–85, 2018.
[44] K. Tatsis, "Investigating the influence of social and sociomathematical norms in collaborative problem solving," *Cerme 5*, vol. 5, pp. 1321–1330, 2007.
[45] S. A. Widodo and A. S. Purnami, "Developing Sociomathematical Norms With Team Accelerated Instruction," (in Indonesian), *NUMERICAL: Jurnal Matematika dan Pendidikan Matematika*, vol. 2, no. 1, p. 29, 2018, doi: 10.25217/numerical.v2i1.238.
[46] S. A. Widodo, Turmudi, J. A. Dahlan, E. Harini, and F. Sulistyowati, "Confirmatory factor analysis sosiomathematics norm among junior high school student," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 9, no. 2, pp. 448–455, 2020, doi: 10.11591/ijere.v9i2.20445.
[47] J. R. Fraenkel, N. E. Wallen, and H. H. Hyun, *How to Design and Evaluate Research in Education*. New York: McGraw-Hill Companies, 2012.
[48] J. W. Creswell, *Research Design Qualitative, Quantitative, and Mixed Second Edition*. Sage Publication, 2012.
[49] L. Doyle, C. McCabe, B. Keogh, A. Brady, and M. McCann, "An overview of the qualitative descriptive design within nursing research," *Journal of Research in Nursing*, vol. 25, no. 5, pp. 443–455, 2020.
[50] V. A. Lambert and C. E. Lambert, "Qualitative descriptive research: An acceptable design," *Pacific Rim International Journal of Nursing Research*, vol. 16, no. 4, pp. 255–256, 2012.
[51] H. Nassaji, *Qualitative and descriptive research: Data type versus data analysis*. Sage Publications: London, 2015.
[52] H. Kallio, A. Pietilä, M. Johnson, and M. Kangasniemi, "Systematic methodological review: developing a framework for a qualitative semi-structured interview guide," *Journal of Advanced Nursing*, vol. 72, no. 12, pp. 2954–2965, 2016.
[53] S. E. Rabionet, "How I learned to design and conduct semi-structured interviews: an ongoing and continuous journey," *Qualitative Report*, vol. 16, no. 2, pp. 563–566, 2011.
[54] N. Carter, D. Bryant-Lukosius, A. Dicenso, J. Blythe, and A. J. Neville, "The use of triangulation in qualitative research," in *Oncology Nursing ForumNurs Forum*, 2014, vol. 41, no. 5, pp. 545–547, doi: 10.1188/14.ONF.545-547.
[55] L. A. Guion, D. C. Diehl, and D. McDonald, "Triangulation: Establishing the validity of qualitative studies: FCS6014/FY394, Rev. 8/2011," *EDIS*, vol. 8, no. 3, 2011, doi: 10.32473/edis-fy394-2011.
[56] R. S. Natow, "The use of triangulation in qualitative studies employing elite interviews," *Qualitative Research*, vol. 20, no. 2, pp. 160–173, 2020.
[57] J. W. Creswell, *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*. London: Pearson, 2012.
[58] M. B. Miles, M. A. Huberman, and J. Saldaña, *Qualitative Data Analysis*. Los Angeles: Sage Publications, 2013.
[59] A. M. Partanen, "Challenging the School Mathematics Culture: Ethnographic Teacher Research on Social," University of Lapland, 2011.
[60] J. B. Bayer, N. B. Ellison, S. Y. Schoenebeck, and E. B. Falk, "Sharing the small moments: ephemeral social interaction on Snapchat," *Information, Communication & Society*, vol. 19, no. 7, pp. 956–977, 2016.
[61] C. Calhoun, "Indirect relationships and imagined communities: large-scale social integration and the transformation of everyday life," in *Social theory for a changing society*, Routledge, 2019, pp. 95–130.
[62] L. Chen, W. Van Dooren, and L. Verschaffel, "Enhancing the development of Chinese fifth-graders' problem-posing and problem-solving abilities, beliefs, and attitudes: A design experiment," in *Mathematical problem posing*, Springer, New York, 2015, pp. 309–329, doi: 10.1007/978-1-4614-6258-3_15.
[63] G. Leach, R. Hunter, and J. Hunter, "Teachers Repositioning Culturally Diverse Students as Doers and Thinkers of Mathematics," *Proceedings of the 37th Annual Conference of the Mathematics Education Research Group of Australasia*, 2014.
[64] M. C. E. Chan and D. Clarke, "Structured affordances in the use of open-ended tasks to facilitate collaborative problem solving," *ZDM*, vol. 49, no. 6, pp. 951–963, 2017.
[65] S. A. Widodo, Istiqomah, Leonard, A. Nayazik, and R. C. I. Prahmana, "Formal student thinking in mathematical problem-solving," *Journal of Physics: Conference Series*, vol. 1188, p. 012087, 2019, doi: 10.1088/1742-6596/1188/1/012087.
[66] S. A. Widodo, I. Ibrahim, W. Hidayat, S. Maarif, and F. Sulistyowati, "Development of Mathematical Problem Solving Tests on Geometry for Junior High School Students," *Jurnal Elemen*, vol. 7, no. 1, pp. 221–231, Jan. 2021, doi: 10.29408/jel.v7i1.2973.
[67] K. W. Kosko and Y. Gao, "Mathematical Communication in State Standards Before the Common Core," *Educational Policy*, 2017, doi: 10.1177/0895904815595723.
[68] M. Nordmark, "Writing roles: A model for understanding students' digital writing and the positions that they adopt as writers," *Computers and Composition*, vol. 46, pp. 56–71, 2017.
[69] S. Zheng, M. B. Rosson, P. C. Shih, and J. M. Carroll, "Understanding student motivation, behaviors and perceptions in MOOCs," in *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*, 2015, pp. 1882–1895.
[70] J. M. Lodge, G. Kennedy, L. Lockyer, A. Arguel, and M. Pachman, "Understanding difficulties and resulting confusion in learning: an integrative review," *Frontiers in Education*, vol. 3, p. 49, 2018.
[71] D. Kaya and H. Aydın, "Elementary mathematics teachers' perceptions and lived experiences on mathematical communication," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 12, no. 6, pp. 1619–1629, 2016.
[72] G. M. Tinungki, "The Role of Cooperative Learning Type Team Assisted Individualization to Improve the Students' Mathematics Communication Ability in the Subject of Probability Theory," *Journal of Education and Practice*, vol. 6, no. 32, pp. 27–31, 2015.
[73] S. A. Widodo *et al.*, "Process of algebra problem-solving in formal student," *Journal of Physics: Conference Series*, vol. 1657, no. 1, 2020, doi: 10.1088/1742-6596/1657/1/012092.
[74] S. A. Widodo, Turmudi, and J. A. Dahlan, "An Error Students in Mathematical Problems Solves Based On Cognitive Development," *International Journal Of Scientific & Technology Research*, vol. 8, no. 7, pp. 433–439, 2019.
[75] S. A. Widodo, Darhim, and T. Ikhwanudin, "Improving mathematical problem solving skills through visual media Improving mathematical problem solving skills through visual media," *Journal of Physics: Conference Series*, vol. 948, no. 1, pp. 1–6, 2018.
[76] J. L. Schonberger and J.-M. Frahm, "Structure-from-motion revisited," in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 2016, pp. 4104–4113.
[77] A. Althubaiti, "Information bias in health research: definition, pitfalls, and adjustment methods," *Journal of Multidisciplinary Healthcare*, vol. 9, p. 211, 2016.
[78] A. N. Arivina and H. Retnawati, "Constraints of high school mathematics teachers in teaching distance and angle material in three dimensions," in *Journal of Physics: Conference Series*, 2020, vol. 1511, no. 1, p. 12030.

BIOGRAPHIES OF AUTHORS

Samsul Maarif is an Associate Professor and lecture at the faculty of teacher training and education, Universitas Muhammadiyah Prof. Dr. HAMKA, Tanah Merdeka Road, No. 20, Rambutan, Ciracas, East Jakarta. Becoming a lecturer since 2009 and his research focuses on mathematics education. He can be contacted at email: samsul_maarif@uhamka.ac.id.

Novia Oktarina is a student in bachelor mathematics education at the Universitas Muhammadiyah Prof. DR. HAMKA Jakarta, Warung Jati Barat Street, Blok Darul Muslimin, Kalibata, Pancoran, South Jakarta. Her research focuses on mathematics education. She can be contacted at email: noviaoktarina14@gmail.com.

Andi Sessu is professor and lecture at the faculty of teacher training and education, Universitas Muhammadiyah Prof. Dr. HAMKA, Tanah Merdeka Road, No. 20, Rambutan, Ciracas, East Jakarta. Initially he did research on mathematics education, but for the past decade he has been doing more research in economics until he becomes a full professor in April 2022. He can be contacted at email: dr_andi_sessu@yahoo.com.

Fitria Sulistyowati is lecture at the department of mathematic education, faculty of teacher training and education, Universitas Sarjanawiyata Tamansiswa, Batikan Street UH III/20143, Yogyakarta. She researched more in the field of mathematics education. She can be contacted at email: fitria.sulistyowati@ustjogja.ac.id.

Wikan Budi Utami is a Ph.D Student at Department of Education Technology, Graduate School, Universitas Negeri Malang. She is lecturer at Department of Mathematics Education, Universitas PGRI Kanjuruhan Malang, Indonesia. Her research focuses on mathematic education. She can be contacted at: wikan.budi.2201219@students.um.ac.id.