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Mathematics Teaching Anxiety of Indonesian Elementary School Teachers in Online Learning during COVID-19 Outbreak

Aulia Kirana Hapsari & Deshinta Puspa Ayu Dwi Argaswari*

Mathematics Department, Sampoerna Univesity, Indonesia

Abstract: This study aims to identify the scale of mathematics teaching anxiety among Elementary teachers during online learning during the Covid-19 Pandemic at Pekayon district and determine the mathematics anxiety in teaching during the pandemic. The research method that used for this research is a mixed method. The study was conducted on 42 mathematics teachers who teach online learning. Data were collected through a 19-item Mathematics Teaching Anxiety Scale (MTAS) questionnaire. The results indicated that six people (14%) were classified as having high anxiety, twenty-eight people (67%) as having moderate anxiety, and eight people (19%) as having low anxiety. The factors that cause anxiety in teaching mathematics in general are the factors of Student-Directed Mathematics Teaching Anxiety. However, Teachers with high anxiety, teachers with low anxiety, and teachers with normal anxiety differ greatly in preparing materials and learning tools and delivering online learning materials.

Keywords: mathematics teaching anxiety, MTAS, online learning, Covid-19 pandemic

Abstrak: *Penelitian ini bertujuan untuk mengindentifikasi skala kecemasan mengajar matematika para guru tingkat sekolah dasar di Pekayon, Jakarta dalam pembelajaran daring selama pandemic Covid-19 dan menjabarkan bentuk kecemasan mengajar matematika selama pandemic. Metode penelitian yang digunakan adalah metode penelitian campuran kualitatif dan kuantitatif. Penelitian ini dilaksanakan dengan melibatkan 42 guru yang mengajar daring. Data dikumpulkan menggunakan 19-butir pertanyaan Mathematics Teaching Anxiety Scale (MTAS). Hasil menunjukkan bahwa 14% guru memiliki kecemasan tinggi, 67% guru memiliki kecemasan sedang, dan 19% guru memiliki kecemasan rendah. Faktor yang menyebabkan kecemasan mengajar matematika secara garis besar disebabkan oleh kecemasan yang berhubungan dengan siswa. Meskipun demikian, guru yang memiliki kecemasan tinggi, sedang, dan rendah memiliki perbedaan dalam persiapan materi, alat pembelajaran, dan materi pembelajaran online.*

Kata kunci: *kecemasan mengajar matematika, MTAS, pembelajaran online, pandemi Covid-19.*

▪ INTRODUCTION

Mathematics anxiety is a feeling of being nervous or afraid of mathematics. Mathematics anxiety as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations (Marbán et al., 2021). The study of mathematics anxiety is important because mathematics anxiety can effect the students performance, achievement and also teacher performance in class. Students who have mathematics anxiety may not be able to maximize their performance when studying mathematics or on math tests. According to Ruffins (2007), math anxiety has some symptoms including feeling nervous before a math class, flustering, feeling defenseless while

Deshinta Puspa Ayu Dwi Argaswari
*Email: deargaswari@gmail.com

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doing homework or going blank during a test. However, mathematics anxiety not only experienced by students but also teachers who teach mathematics.

Mathematics teaching anxiety can be defined as a teacher experiencing negative reactions to mathematics, feeling under pressure to teach mathematics, and being discouraged by a lack of progress in mathematics. Teacher who are nervous about teaching mathematics may be afraid of explaining concepts, formulae, and operations (Peker, 2009). It is crucial to investigate teacher mathematics anxiety because teachers can transmit their negative attitudes toward mathematics to their students. According to Beilock et al. (2011), teachers unknowingly transmit their attitudes toward mathematics to their students. This implication suggests that teachers who experience math anxiety can transmit it to their students. M athematical teaching anxiety is important for a teacher or prospective teacher to prepare for learning. This is consistent with what Wilson (2010) stated that mathematics anxiety in teacher and teachers candidate is an important issue because it affects their preparation to become a teacher later.

Teachers in primary schools have a higher level of mathematics anxiety than those people who do other jobs or are teachers who teach in other grades in school (Hembree, 1990; Malinsky et al., 2006). Hartatik and Fitriyah (2017) assert that elementary school teachers are the spearhead in the success of learning at the elementary school level. Referring to the duties of elementary school teachers as classroom teachers, they are required to master all fields of study, including mathematics in particular. In Indonesia educational systems, one teacher is in charge of teaching most of the subjects to their pupils in elementary school (grades 1 to 6). Mostly elementary school homeroom teachers are graduate from PGSD not spesificly from mathematics Education. In such systems, the content being taught does not necessarily fully overlap with the teacher's own interests. In fact, individuals deciding on a career as an elementary school teacher very rarely decide on it because they wish to teach mathematics (Porsch, 2017). So, children might face elementary school teachers who have negative attitudes towards math or even experience elevated math anxiety. If the teacher have a have a higher level of mathematics anxiety this can impact a learning process because teachers one of the factor that guides and influences students in the learning process.

There are some studies done on the mathematics teaching anxiety with the in-service teachers for example, Sari (2004) used an English version of the Mathematics Teaching Anxiety Scale to assess maths teaching anxiety in-service and in pre-service primary school teachers across the United Kingdom in her study. The findings suggested a different factor structure than that reported by Sari (2014), with fewer items. Self-directed mathematics teaching anxiety (12 items) and pupil/student-directed mathematics teaching anxiety (12 items) were identified as two different factors (7 items). These are anxiety about oneself, such as anxiety about one's own math knowledge, and anxiety about teaching others, such as worry about one's pupils/students failing assessments or not meeting targets; the latter factor is perhaps especially relevant in today's assessment-focused schools.

Due to Pandemic Covid-19, distance learning or the use of online platforms has created options for schools that are beginning to adopt the School from Home (SFH) system. SFH is a program that transfers the learning process from school to home (Rasmitadila et al, 2020). Since online learning is new to both students and lecturers, it takes a long time to adjust (Hakiman, 2020). Changes in teaching methods can have an

effect on a teacher's level of teaching anxiety while in the classroom, affecting both teacher preparation prior to class and the delivery of material during class. This condition necessitates teachers' proficiency in implementing a variety of strategies for effectively conducting online learning (Kaufmann and Vallade, 2020). This problem on how teachers adapting to the changing most probably effect to their mathematics teaching anxiety.

However, the majority of studies that investigated mathematics anxiety in conjunction with mathematics teaching anxiety focused on pre-service teachers. There has been little research on mathematics teaching anxiety in teachers, with only a small amount of work done in Indonesia, particularly in Jakarta. Also, not many researched about mathematics teaching anxiety during the Covid-19 pandemic for elementary school teachers in the Jakarta area. These circumstances demonstrate the need to determine the level of mathematics teaching anxiety among the elementary teachers in order to assist them in reducing or eliminating this anxiety.

This research will be conducted in Jakarta, precisely in the Pekayon sub-district because this area is still an area in Jakarta so the possibility of not being able to access the internet is smaller. In DKI Jakarta, of the 96.01% of the people who already use ICT tools, there are 82.63% who have accessed the internet (BPS, 2019). From the percentage of the population who can access the internet, more DKI Jakarta residents access the internet via smartphones/tablets, that is 98.55%, while those who access via laptops are only 36.23%, and those who use smartphones and laptops to access the internet are 34.78% . With this data, online learning in Jakarta should run more smoothly, because one of the most important media when learning online is internet access and ownership of media to access the internet such as cellphones or laptops. However, based on interviews conducted with teachers in the Pekayon area, almost half of the students at the school do not have a personal cellphone. Students usually learn to use their parents' cellphones, even some students use the same cellphone as their older siblings to study. Even though online learning facilities such as cellphones or laptops are important suggestions so that students can study comfortably.

As a result, the purpose of this study is to identify the scale of mathematics teaching anxiety among Elementary teachers during online learning in Covid-19 Pandemic at Pekayon district, also to determine What is the mathematics teaching anxiety of the elementary school teachers in Pekayon district. As a result, the researcher decided to examine the percentage of teachers having low, average, and high mathematics teaching anxiety during online learning in Covid-19 Pandemic.

▪ METHOD

The targeted population for this research is the elementary teacher from grade 1 until grade 6 in Pekayon district, East Jakarta. The total participants are 42 elementary school teacher. The sampling method used in this method is convenience sampling. So in this study, the researchers used a non-probability sampling technique carried out with a convenience sampling technique. This study is designed using the mixed method in order to answer the research questions about the level of teachers mathematics anxiety and determine what is the mathematics teaching anxiety of the elementary school teachers in Pekayon district. Mixed methods is defined as a procedure that combines quantitative and qualitative methods for the purpose of collecting and analyzing data,

integrating findings, and drawing conclusions in a single study (Tashakkori & Creswell, 2007). The rationale for combining two types of data is that quantitative or qualitative research alone is insufficient to understand the trends and specifics of situations (Creswell, 2011), such as teachers experiencing mathematics anxiety during instruction.

There are two phases that are used in this study as the research procedure. The first phases is used to answer the first research question: "What is the percentage of teachers having low, average, and high mathematics teaching anxiety during online learning in Covid-19 Pandemic?" The first phase is quantitative data were collected through questionnaire. The questioner is modifying from MTAS (Mathematics Teaching Anxiety) questioner. MTAS was used to measure the scale and percentage of the teachers' mathematics anxiety. The two-factor structure regarding Mathematic teaching Anxiety which are "Self-Directed Mathematics Teaching Anxiety" and "Pupil/Student-Directed Mathematics Teaching Anxiety". Analysed in the first phase to provide a broad picture of the research problem and to aid in the selection of participants.

For the second phase, while qualitative data were collected through interviews to help explain or elaborate on the quantitative results obtained in the first phase. The second phases is used to answer the second research question: What is the mathematics teaching anxiety of the elementary school teachers in Pekayon district in teaching online? Additionally, the data collected via interviews enabled participants to discuss and elaborate on their previous and current feelings and experiences with mathematics teaching anxiety during online learning. The two phases were integrated during the study's interpretation phase.

Instrument

In this research, the first phase the researcher modifying the question of "Mathematics Teaching Anxiety Scale (MTAS)" that developed by Sari (2014) was used to measure the scale and percentage of the teachers' mathematics anxiety. The second phase, the researcher will interview some of the teachers. The researcher will conduct the interview by asking some open-ended question to 12 teachers from 4 different schools.

The data collection method in this study used an online questionnaire using google forms online and collecting data by distributing online questionnaires containing questions to respondents to respond to these questions so that the data can be processed and analyzed. Questionnaire is a research instrument used to collect research data by containing questions and statements answered by respondents. As explained by Arikunto (2013) "The poll method is a method of collecting data by filling a list of questions so that it can be known data from knowledge, attitudes and opinions". In this research the researcher, modifying the question of "Mathematics Teaching Anxiety Scale (MTAS)" that developed by Sari (2014) was used to measure the scale and percentage of the teachers' mathematics anxiety. The Mathematics Teaching Anxiety Scale (MTAS) was originally developed with a sample of Turkish elementary (primary) schoolteachers. The 2014 edition of the MTAS contains 23 items. It has a high level of internal consistency ($\alpha = 0.89$) and initial analyses revealed a three-factor structure (Sari, 2014): (1) anxiety regarding maths teaching processes, (2) anxiety regarding maths content knowledge, and (3) anxiety related to maths self-efficacy. Because the scale was originally published in Turkish, a process of forward-backward translation involving

multiple academic colleagues was used to produce an English version. Because this research took place in Indonesia, this English questionnaire was translated into Indonesian. After that, it is validated again by the validator.

In the second phase, semi-structured interviews were conducted with 12 purposefully selected teachers from 4 different school who volunteered to participate in the interviews. Interviews were conducted by asking the research topic with an outline of a series of questions determined by the interviewer (Cohen et al., 2007). Initially, since the focus of this study is mainly on mathematics teaching anxiety, the researcher intended to select random teacher who get a high, normaL, and also slow-level scale of mathematics teaching anxiety (MTAS) in the survey. Interview questions that have been compiled are then validated by validators by conducting a content validation test. Content validation test is a validation test conducted by experts to find out whether the instruments arranged are in accordance with the research objectives. Content validation test can be done with the face validation test (Jogiyanto, 2008). Face validity test is done by asking the suitability of the instrument with the research objectives to the expert. Validators consists of two mathematics lecturers. Validator gave some inputs for the interview sheet especially to link the interview with the research objectives. After that, all experts validated the instrument.

Validity for this research is divided into validity for instrument and validity for collected data. Validity and reliability for instrument means that the instrument will be analyzed whether valid to use for this research. This study uses the MTAS questionnaire (Sari, 2014) which has been tested for validity and reliability. The internal reliability of the instrument was found as .89. As a proof of the validity of the scale, medium and high level positive correlations were observed between the total scores obtained from the top and bottom of the scale and sub factors (r= .93, .57 and .76). The model's coherence indexes related to confirmatory factor analysis were as follows: X^2/sd (389.72 / 224) = 1.74, RMSEA= 0.057, RMR= 0.062, GFI= 0.87, CFI= 0.95, NFI= 0.89, NNFI= 0.94 and AGFI= 0.84. Based on the results of the study, The Mathematics Teaching Anxiety Scale can be claimed as a valid and reliable scale.

The data analysis was performed using Microsoft Excel, and the research findings were summarized as high, low, or medium MTAS groups. The purpose of this grouping is to assign individuals to tiers based on the attributes being measured (Azwar, 2015). The grouping is based on the survey scores obtained by the teachers who have as high, low, or medium MTAS. In this research the researcher, modifying the question of "Mathematics Teaching Anxiety Scale (MTAS)" that developed by Sari (2014) was used to measure the scale and percentage of the teachers' mathematics anxiety. The Mathematics Teaching Anxiety Scale (MTAS) was originally developed with a sample of Turkish elementary (primary) schoolteachers. The 2014 edition of the MTAS contains 19 items. While, in this research, was use a modifying MTAS questioner and initial analyses revealed a two - factor structure: (1), "Self-Directed Mathematics Teaching Anxiety" and (2) "Pupil/Student-Directed Mathematics Teaching Anxiety". In this study, the questionnaire data items used a Likert scale format. In the Likert scale, the statements submitted are rated by respondents with strongly agree, agree, less agree, disagree, and strongly disagree. The questionnaire will be given with 19 statements

In the second phase of the study, the researcher transcribed the interviews recorded with each participant. The transcripts were analyzed using thematic analysis, which has been used by other researchers from many fields. Braun and Clarke (2006)

described thematic analysis as one that "provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex, account of data" (p. 78). Due to its flexibility, thematic analysis allows a researcher to determine themes in many ways as the researcher is cognisant of consistency in the way the data are being analyzed. The method of thematic analysis entails continually going back and forward between a) the entire set of data, b) the coded extracts of data that are being analysed, and c) the analysis of the data that are being produced (Braun & Clarke, 2006). By using this method, the researcher can identify the similarity and differences in participants responds.

▪ RESULT AND DISSCUSSION

The level of anxiety in teaching mathematics in online learning in this study was found as man y as 6 people (14%) in the high anxiety level category, as many as 28 people (67%) in the moderate anxiety level category and as many as 8 people (19%) in the low anxiety level category. In general, the level of anxiety of teachers teaching mathematics in online learning is at moderate level. From the description above, the factor that cause anxiety in teaching mathematics is Student-Directed Mathematics Teaching Anxiety.

Based on the answers to the questionnaire and the results of interviews with several teachers, several anxiety factors are commonly felt by teachers when teaching mathematics online during the covid-19 pandemic. These factors are media availability and internet network/quota constraints for each student, students' understanding of the material presented, and how to handle technical problems if there are problems while teaching. A visible difference between teachers with high anxiety, teachers with low anxiety, and teachers with normal anxiety is how teachers prepare materials and learning tools and how the teachers deliver learning materials online.

People who suffer from severe anxiety tend to become fixed on something specific and detailed, and they cannot think about anything else (Sitohang, 2013). The results of teacher interviews at this level are more likely to prepare learning tools to anticipate if there are obstacles in the middle of learning. They prepared several plans so that learning could still run smoothly even though there were obstacles. At this level, symptoms include insomnia (difficulty sleeping), dizziness, and inability to study effectively, narrowed perceptions, feelings of helplessness, and self-focus (Sitohang, 2013). However, different from the theory above, based on the interviews, some teachers only experienced sleep deprivation because they had to prepare materials and teach materials longer than usual. Because using online teaching media is a new thing, the teacher prepares more tools for teaching. The highest items that often make teachers anxious are worried when teaching online is the first question which is worrying about students not paying attention when the teacher was teaching. The teaching and learning process carried out in the classroom so far is often oneway, where students only listen to what the teacher says. Therefore, the interaction in the class, especially in online class is low. Interaction is also an important point in teaching and learning activities because not only students get the benefit, but also the teachers also get feedback (feedback) whether the material presented can be received by students well (Lockyer & Dawson, 2011). Because many students are not active and do not pay attention in this class, this causes teachers to worry about students' understanding of the material being taught.

According to Sitohang (2013) , the teacher who has moderate level of anxiety, the manifestations or symptoms include rapid fatigue, increased heart rate, rapid speaking at a high volume, decreased concentration, and a limited ability to learn. However, the facts in the field of teachers with moderate anxiety levels tend to be comfortable with the media they use. However, some teachers use different media when teaching according to the teaching material. Some teachers are familiar with online teaching media such as Edmodo, Zoom, and Google classroom. Teachers at this level usually often explore other online teaching media in accordance with the material to be taught. Although some teachers say it takes a lot of time to learn new media or new websites for teaching, they enjoy the process. Moderate level teaching anxiety is that teachers have used various media to carry out online learning and have attended several seminars related to the use of online media for learning, but teacher anxiety still arises about students' inability to understand math material delivered in online learning. According to (Alkan et al., 2019) mathematics teaching anxiety arises when teachers feel under pressure to teach and are frustrated with students' lack of progress in mathematics. The level of anxiety in teaching mathematics can decrease or increase along with knowledge about the use of technology and the level of computer literacy in teaching mathematics (Tatar et al., 2015). Therefore, online learning that requires the use of technology requires teachers to master technology in order to reduce anxiety in teaching mathematics.

Mild anxiety can usually motivate someone who have this lavel anxiety to learn and try new things, as well as spark creativity (Sitohang, 2013). However, in this current situation, teachers with low anxiety levels tend to be comfortable with the media and only use the media to teach. Teachers face anxiety only when students do not do the assignments given or when students get bad grades on exams. Based on the interviews, teachers who are at low anxiety levels only use the same method when teaching. Some teachers feel anxious when using new media in teaching. After all, they are worried that students will experience problems when using the new application because they have never used the media.

Meanwhile, teachers commonly feel anxiety when teaching mathematics online during the covid-19 pandemic are the availability of media and internet network constraints/quotas for each student and students' understanding of the material presented and how to handle technical obstacles if possible, there are obstacles while teaching. Based on a questionnaire and teacher interview, the availability of media and internet network/quota constraints for each student are factors that all teachers feel when teaching online during the covid-19 pandemic. According to the National Statistics Center, the use of the internet for learning activities for students aged 5-24 years continues to increase. In 2020, there are 59.33% of students will use the internet. This figure grew rapidly from 33.98% in 2016. According to education level, the increase in internet use occurred at all levels of education, especially among Elementary school students. Within two years, elementary school students accessing the internet increased to 35.97% in 2020 from the previous 16.64% in 2018. This fairly high increase explains that the internet is necessary for students to continue carrying out teaching and learning activities during the pandemic Covid -19.

Based on the interview and the result of the questioner, some of the teachers also feel worried towards the level of students' understanding of the material presented.

According to one interview, some students who did not understand the material being taught did not ask questions. This makes the teacher assume that students already understand the material that the teacher conveys. But when the teacher gives a daily test, some students do not pass or do not meet their drinking marks. This makes some teachers feel anxious about the progress of students' mathematical understanding progress. According to Alkan (2019), mathematics teaching anxiety arises when teachers feel under pressure to teach and are frustrated with students' lack of progress in mathematics. Mathematics teaching anxiety also can arise if learning cannot be carried out according to the designed scenario and there is anxiety if the expectations of the learning process goals are not achieved (Heru et al., 2020)

Another factor that makes teacher feel anxious during teaching online is the technology. Teacher quality is related to the ability of teachers to use information technology in the learning process which is still considered very low, influenced by age and laptop ownership (Anggianita et al., 2020). Some teachers who are not used to using laptops are one of the reasons teachers have concerns when teaching. The internet network also that can hinder the implementation of online learning. There is still a lack of supporting facilities and infrastructure such as android and quotas (Anggianita et al., 2020).

The level of anxiety in teaching mathematics for teacher in Pekayon district in moderate level. 6 people (14%) in the high anxiety level category, 28 people (67%) in the moderate anxiety level category and as many as 8 people (19%) in the low anxiety level category. In general, the factors that influence the anxiety felt by teachers when teaching mathematics online are the Student-Directed Mathematics Teaching Anxiety factors. Moreover, based on the answers to the questionnaire and the results of interviews with several teachers, several anxiety factors are commonly felt by teachers when teaching mathematics online during the covid-19 pandemic. These factors are media availability and internet network/quota constraints for each student, students' understanding of the material presented, and how to handle technical problems if there are problems while teaching. A very visible difference between teachers with high anxiety, teachers with low anxiety, and teachers with normal anxiety is how teachers prepare materials and learning tools and deliver learning materials online. Teachers with high levels of anxiety are very well prepared in planning learning so that the chances of obstacles occurring when teaching online are small. Meanwhile, teachers with moderate anxiety levels tend to be comfortable with the media they use, but some teachers use different media when teaching according to the material being taught. In contrast to teachers who have moderate anxiety, teachers with low anxiety levels tend to be comfortable with the media they use. However, they only use one medium to teach, and there is no variation in teaching.

▪ CONCLUSION

Based on the results of research and discussion, it can be concluded that the level of anxiety in teaching mathematics in online learning is generally at a moderate level. The level of anxiety in teaching mathematics in online learning in this study was found as many as 6 people (14%) in the high anxiety level category, as many as 28 people (67%) in the moderate anxiety level category and as many as 8 people (19%) in the low anxiety level category. Factors that greatly affect teacher anxiety when teaching

mathematics during this pandemic are Student-Directed Mathematics Teaching Anxiety.This factor relate to teachers' anxiety concerning their pupils,

Based on the results of the questionnaire, the thing that worries teachers the most when teaching mathematics is that students do not pay attention when the teacher is teaching in class and the teacher's concern about understanding students' mathematical concepts. Moreover, based on the results of interviews, things that make teachers feel worried when teaching mathematics online during a pandemic are technology, facilities owned by students, students not paying attention to the teacher, students' understanding of the material being taught. Teachers with high anxiety, teachers with low anxiety, and teachers with normal anxiety differ greatly in preparing materials and learning tools and delivering online learning materials. Teachers with high levels of anxiety are extremely well-prepared in lesson planning, so the likelihood of online teaching obstacles is low. In the meantime, teachers with moderate anxiety levels are typically comfortable with the media they employ, although some use different media depending on the subject matter being taught. Teachers with low anxiety levels are typically comfortable with the media they use instead of those with moderate anxiety. However, they only use a one media to teach, and there is no variation in their methods of instruction.

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