



Phenomenological Study about Mathematics Teaching Anxiety in the Context of Professional Identity

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ARTICLE INFO

Article History:

Received: 27, Jan. 2020

Received in revised form: 22, Feb. 2021

Accepted: 07, Apr. 2021

DOI: 10.14689/ejer.2021.93.14

Keywords

Anxiety,
Experience,
Perception,
Teacher identity.

ABSTRACT

Purpose: Drawing on semi-structured and focused-group interviews performed with various pre-service mathematics teachers and in-service mathematics teachers, the present study benefits from the frame of teacher identity to make the meaning of heterogeneity among their experiences and perceptions of mathematics teaching anxiety. The current study aims to reflect how the participants perceive and describe their experiences and perceptions about mathematics teaching anxiety through their teacher identity in this phenomenological research.

Method: This research was designed based on phenomenological research. The data collected through interviews and focused-group interviews were analyzed through two stages. Initially, the participants' teacher identity was identified by the manual developed by Beijaard, Verloop and Vermunt's (2000) identity framework through the deductive approach. Afterwards, the transcripts of the interviews were examined by content analysis. The data collected through interviews were analyzed through two stages.

Findings: The horizons and themes identified through the content analysis were represented through their characteristics of professional identity under three titles: the horizons experienced and perceived by IMTs and PMTs; the horizons experienced and perceived by only PMTs; the horizons experienced and perceived by only IMTs. Moreover, how the participants' experiences and perceptions about the phenomenon of mathematics teaching anxiety differentiated based on teacher identity characteristics were reported. Implications for Research and Practice: Interventions that may reduce the MTA of PMTs and IMTs can be designed more systematically and beneficially by considering the themes that emerged in the study and differences based on teacher identity.

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Introduction

Mathematics teaching anxiety (MTA) should be discussed through teaching and teaching practice. It can be described through the anxiety and tension on the problem-solving process and teaching mathematical concepts, and belief about deficits having inadequate mathematical knowledge and delivering them to the students (Peker, 2006). Because teachers' attitudes and beliefs can have the power of affecting student learning and teachers' enactment of teaching, this phenomenon can impact teaching mathematics effectively (Cross, 2009; Son & Crespo, 2009; Wilkins, 2008). The previous research shows that MTA can keep in-service mathematics teachers (IMTs) or pre-service mathematics teachers (PMTs) from focusing on, talking positively to the students, tolerating high sound or noise, hearing students' expressions and listening to them actively, organizing and timing teaching process, and identifying teaching strategies and learning activities (Ameen, Guffey & Jackson, 2002). Moreover, it has been observed that the pre-service teachers having a high level of MTA tend to learn teaching mathematics and designing materials insufficiently (Gresham, 2009; Levine, 1996; Peker, 2009). In other words, this phenomenon has the role of converting difficult abstract mathematical concepts into understandable concrete ones for students through teaching (Levine, 1996; Peker, 2006). MTA may result from various factors for pre-service or in-service teachers. For example, it may result from the nature of mathematics, such as abstract content, previous inadequate knowledge related to mathematical content, the knowledge and skills about teaching in mathematics and learning style (Levine, 1996; Peker, 2009). Moreover, the pre-service and in-service teachers' unpleasant experiences about these cases may be the reasons (Levine, 1996). Although these are the identified factors through the previous research, further research is still needed to explore and establish MTA in detail (Brown, Westenskow & Moyer-Packenham, 2011; Peker, 2009), especially in the pre-service and in-service teachers' perspectives who have experienced this phenomenon. Hence, this current phenomenological study was performed to reveal experiences and perceptions of pre-service and in-service teachers experienced MTA.

The pre-service and in-service teachers' perceptions and experiences can be explored through teacher identity since teacher identity refers to teachers' conceptualization of self and their roles. Teacher identity influences the way that the teachers or pre-service teachers explain the meaning of their experiences and construct their beliefs (Buchanan, 2015; Schultz & Ravitch, 2013). Moreover, teacher identity is related to their beliefs and experiences through their professionalism. It can help individuals whose profession is teaching by paying attention to "their past experiences and guiding beliefs and how they use them as filters through which to interpret" (Noonan, 2018, p. 1). Because anxiety and teacher identity as a kind of professional identity needed for professional development are in direct connection (Lin, Wang, Chen, Zu & Wang, 2017), the phenomenon of MTA can be explored in detail considering teacher identity. In previous research, it is stated that individuals' identities and roles may cause anxiety and stress (Holroyd & Lazarus, 1982). Also, individuals' anxiety may change based on their identity, and anxiety may have a function on the examination of the identity (Crocetti et al., 2009; Erikson, 1950).

Furthermore, previous research has shown that individuals' anxiety may differentiate from based on their identity (Crocetti et al., 2009; Dellas & Jernigan, 1990). Hence, it can be worth examining how anxiety differentiates based on identity in particular contexts. Hence, teacher identity can provide valuable insights into this phenomenological research examining the pre-service and in-service teachers' experiences and perceptions about MTA because teacher identity can propose a beneficial way to examine and justify their teaching experiences and practices connected to beliefs (Beijaard et al., 2004). Therefore, the research questions focused on the current study are as follows:

- How do in-service and pre-service mathematics teachers perceive and describe their experiences and beliefs about mathematics teaching anxiety?
- How do their perceptions and description of experiences and beliefs differentiate through their teacher identity?

Method

Research Design

The present study was designed based on phenomenological methodology providing the comprehension and expression of the phenomenon of MTA. Because phenomenological studies focus on the meaning of phenomenon based on the participants' views through their perceptions and experiences with the help of complex analysis processes, the phenomenological research is appropriate for the study's design.

Research Sample (Study Group)

The participants of this phenomenological study were 16 PMTs and 16 IMTs. They were selected based on criterion sampling strategy as suggested by Creswell (2012) to form a nearly almost homogenous group of participants experiencing the phenomenon being explored. The criteria for selecting the participants were to be experienced MTA before, willing and open to express their experiences and perceptions about MTA.

Data Collection and Data Analysis

The data were collected by semi-structured interviews (all questions in Appendix) and focused-group interviews (initial five questions in Appendix) in five weeks. Initially, the data collection process with semi-structured interviews was performed based on Seidman's (1998) phenomenological interview model. In this model, once a week through four weeks, semi-structured interviews were conducted with the participants. Each interview lasted approximately one hour. After completing the semi-structured interviews, focused group interviews were conducted to two groups of PMTs and two groups of IMTs (including eight participants). All data collection process was recorded via video cameras (with permissions). Then, the recordings were transcribed verbatim.

The qualitative data analysis process was performed through two stages. In the first stage, the transcriptions were analyzed using a deductive approach. Based on this approach, the frameworks produced in a previous research were used to perform the analysis of the recent study (Zhang & Wilemuth, 2009). To identify the PMTs and IMTs' teacher identity, the data collected through answering questions about the properties and characteristics of mathematics teachers (see initial three questions in Appendix) were examined by the manual developed by Beijaard, Verloop and Vermunt's (2000) identity framework. This framework explains teacher identity focusing on three characteristics as follows:

A subject matter expert is a teacher who bases his/her profession on subject matter knowledge and skills; a didactical expert is a teacher who bases his/her profession on knowledge and skills regarding the planning, execution, and evaluation of teaching and learning processes; a pedagogical expert is a teacher who bases his/her profession on knowledge and skills to support students' social, emotional, and moral development (Beijaard, Verloop & Vermunt, 2000, p. 754).

In the second stage of the data analysis process, the transcriptions of the recordings related to the answers to the questions about their experiences and beliefs (see last five questions in Appendix) were analyzed using content analysis. The content analysis was progressed through six steps explained by Marshall and Rossman (2006) and Epoche process proposed by Husserl (1931). In the first step, all of the data were organized. In the second step, the researcher and an academician who holds a PhD in mathematics education analyzed the data independently. They explored the codes and the patterns on data, and then they identified and highlighted particular expressions and quotes providing evidence to understand the phenomenon of MTA. This process is called "Horizontalization" (Moustakas, 1994). In the third step, the researcher and the academician discussed the codes/horizons that they had identified independently to form the list of common codes/horizons through meetings. This list was produced based on a 90% consistency level. The fourth step performed content analysis using this list of codes/horizons through an iterative process. In the fifth step, the related codes/horizons were placed under the titles referring to themes. Hence, "reduction of experiences to the invariant constituents" was performed, and "the core themes of the experience" were identified (Moustakas, 1994, p. 121). In the last step, the analysis report was produced.

To provide trustworthiness, by data triangulation, the data were collected through semi-structured and focused-group interviews. Moreover, a different academician who did not take a role in the coding list analyzed and evaluated the process considering coherence and consistency of the content analysis process. Besides, the member checking strategy was benefited by discussing the interpretations acquired through data analysis (Creswell, 2012). Researcher bias referring to the effects of the researcher's lens on analysis and interpretation of data is a limitation that can be observed in phenomenological research (Koch, Niesz & McCarthy, 2013). To minimize the effects of this bias, the interview protocol was used in interviews. Direct quotations

were used to represent horizons and themes that emerged through data analysis in reporting them.

Findings

The Horizons Experienced and Perceived by both PMTs and IMTs

The horizons and the themes for both PMTs and IMTs are illustrated through characteristics of teacher identity in Table 1.

Table 1

The Horizons and Themes Experienced and Perceived by PMTs and IMTs

Themes	Horizons	Identity
Physical signs	Sweating, increase in heart rate, nausea, dizziness, sleeplessness, qualm	Subject matter Didactical Pedagogical
Emotions	Feelings of inadequacy in knowledge and skills for mathematics teaching, inadequacy in mathematical content knowledge, failure, alone, embarrassed, being overwhelmed, lack of self-confidence	Subject matter Didactical Pedagogical
Identification and usage of multiple representations	Identifying related and useful manipulative, technological tools and software, representations, mathematical modelling, tables and graphs; placing them on the appropriate stage on the lesson plan; use them in the lesson by enhancing interaction and learning	Subject matter Pedagogical
Memories	Unpleasant/pleasant memories from primary school to university, outside of school The enactment of performance better than they experienced, reaching excellence	Subject matter Didactical Pedagogical
Students' needs and motivation	Inadequacy in determining students' learning styles, related previous knowledge, misconceptions, developmental levels, readiness, interest, attitudes and teaching considering them	Subject matter

The PMTs & IMTs expressed their experiences of MTA with physical symptoms. Although all of the participants made expressions related to physical symptoms, they talked about this theme from different views. While talking about this horizon, the

PMTs mostly focus on teaching practice experiences. The IMTs mostly pay attention to helping students reach the teachers' expectation of their students' effective learning.

Almost all of the participants stated the feeling of inadequacy. The PMTs mostly emphasized inadequacy in the knowledge and skills related to subject matter knowledge and pedagogical content knowledge. On the other hand, IMTs mostly expressed their feelings of inadequacy, lack of self-confidence and inadequacy in pedagogical content knowledge based on mathematics curriculum and students' achievement on tests.

Both the PMTs and IMTs explained their anxiety by talking about the theme of identification and usage of multiple representations. The participants who were identified as subject matter experts emphasized their anxiety about the inadequacy of knowing useful technological tools, how to use them, and how to integrate them into lessons for the teaching concept. In this respect, it can be stated that their inadequacy was usually likely to be in knowledge types of technological knowledge, technological pedagogical knowledge and technological pedagogical content knowledge. They mostly emphasized these knowledge types because of the significance and role of technology in real life. On the other hand, the subject matter expert PMTs explained this theme by insisting on placing these materials and tools on the lesson plan. Moreover, the participants classified as pedagogical experts emphasized their difficulty with mathematical modelling, giving weight to tables and graphs. For example, A PMT in this group explained, "I can use materials, technology and games in an enjoyable way but connecting them to a mathematical subject with the aim of teaching rather than making drill is a stressor for me."

All IMTs and PMTs classified in the groups of didactical, subject matter and pedagogical experts explained the phenomenon of MTA based on their memories about their pleasant and unpleasant experiences. For example, a PMT classified as a didactical expert explained, "...my mathematics teacher in the 6th grade could not solve problems. I thought that this mathematics teacher was not knowledgeable. How did he become a math teacher? Now, I am anxious about a math teacher like him..." It was observed that the PMT in the group of didactical experts explained his mathematics anxiety by stating the properties of the characteristic of the subject matter expert. On the other hand, the participants classified in the particular characteristic groups explained their pleasant experiences and reached excellence, causing MTA based on their characteristics. For example, an IMT classified as pedagogical expert stated her pleasant experience causing mathematics anxiety based on the properties of a pedagogical expert as follows:

...in primary school, I did not like mathematics and I was not successful in it since my teacher did not like it. In middle school, my mathematics teacher was wonderful. She motivated and made me love mathematics... Now, I am a mathematics teacher with the help of her. Hence, I am anxious about not being a teacher like her...

The IMTs and PMTs explained the phenomenon of MTA through inadequacy in determining students' learning styles, related previous knowledge, misconceptions,

developmental levels, readiness, interest, attitudes and teaching considering them. For example, a PMT explained, "I am expected to identify how students learn, what their characteristics affecting learning math and what their misconceptions are. Also, I am responsible for removing their fear of mathematics. I am anxious if I am not able to do..." All IMTs and PMTs classified as subject matter experts explained the phenomenon of MTA based on determining and meeting students' needs and encouraging their motivation to learn mathematics. For example, a PMT expressed, "I am anxious when I think about the students having different personalities affecting their learning. Also, they can have a misconception. If I cannot identify their personalities and misconceptions and organize the teaching process, how can I be a math teacher?" On the other hand, the IMTs explained MTA about this theme, mostly talking about identifying gifted and disabled students, enhancing their learning, and overcoming their mathematics learning problems.

The Horizons Experienced and Perceived by only PMTs

The analysis of experiences and perceptions of the PMTs through teacher identity is represented in Table 2.

Table 2

The Horizons and Themes Experienced and Perceived by PMTs

Themes	Horizons	Identity
Personality traits	Liking laziness, getting angry easily, inability in using tone of voice, getting into panic easily	Subject matter
Organisation and preparation of lesson	Devotion to preparation, not arranging related knowledge and skills (e.g., conceptual, pedagogical, pedagogical content)	Subject matter Didactical Pedagogical
The inability of being flexible and responding to students	Inadequacy in establishing norms in mathematics lessons, providing responses to the students' questions, guiding them to participate in the activities, direct them learning actively, helping them realize their responsibilities in the tasks	Subject matter Pedagogical Didactical
Classroom management problems	Responding to events and student behaviours unrelated to context, preventing them from breaking the teaching process, warning them kindly and effectively, estimating these problems before their occurrence, taking precautions for them	Subject matter Pedagogical Didactical
Being assessed and evaluated	Assessment and evaluation made by supervisor and teacher; their attitudes	Subject matter Pedagogical Didactical

Because the PMTs classified as subject matter experts stated that their personality could cause the ineffective performance of teaching mathematics and solving

problems, and encouraging classroom management problems and students' mathematics anxiety, they emphasized the effects and results of personality by explaining the phenomenon of MTA. For example, a PMT "I usually become angry easily. In the classroom, this personality may lessen my tolerance for problems and make me shout and behave rudely in the classroom. Hence, this may cause students' mathematics anxiety and fear."

All of the PMTs usually talked about MTA focusing on preparing and designing lessons by organising knowledge and skills benefiting from the properties of other groups of the characteristics of teacher identity. For example, in the lesson design and preparing the lesson plan, subject matter expert PMTs explained their MTA about the characteristics of pedagogical and didactical experts. More specifically, a PMT classified as a subject matter expert explained her MTA based on the characteristic of the pedagogical expert as follows:

I am anxious that I think too much about how to begin a lesson, how to behave the students, how to teach the context and how to end the lesson. Also, after determining the context, I am anxious about what strategies I can teach the context. I am stressful about progressing the teaching process by addressing the understanding of students at different achievement levels.

The PMTs explained MTA by detailing the cases of arrangement of students' behaviours, responding to their questions and behaving flexibly through teaching mathematical concepts to them. The PMTs explained their MTA with the properties of other groups of the characteristics of teacher identity. For example, A PMT classified as a pedagogical expert explained "...through solving problems, I am expected to give accurate weight to a mathematical context in an appropriate order. Also, I must explain the solution considering their previous knowledge. If necessary, I need to use representations, materials or games." In this explanation, this PMT stated his MTA by detailing the properties of the characteristics of didactical and subject experts.

The PMTs explained the MTA with the cases of general classroom management problems and overcoming them. They explained their anxiety in facing with classroom management problems, not responding and overcoming these problems effectively considering their teaching practice experiences. For example, a PMT identified as a subject matter expert stated:

...while teaching math, no matter how much prepared and knowledgeable I am, I would experience distracting events such as asking questions that are not related to the context. They will do this to pass the duration without learning. In this case, I may not end this talk and decide how to direct the students' interest to the context again.

At this explanation, this subject matter expert PMT explained her MTA with the properties of characteristics of the pedagogical expert. As it was observed in this explanation, the PMT classified in a particular characteristic stated the MTA by detailing the properties of other characteristics of teacher identity. Moreover, the PMTs

expressed their MTA with being assessed and evaluated by supervisor and teacher who observed them through the course of Teaching Practice and their attitudes towards them through assessment and evaluation. The PMTs classified in different groups of the characteristics of teacher identity made similar explanations.

The Horizons Experienced and Perceived by only IMTs

The horizons and themes identified based on MTA's experiences and perceptions through their characteristics of teacher identity are illustrated in Table 3.

Table 3

The Horizons and Themes Experienced and Perceived by only IMTs

Themes	Horizons	Identity
Techniques for assessment and evaluation	Avoiding using tests or authentic assessment strategies, giving priority to some concepts, avoiding preparing questions and problems about some concepts	Subject matter
		Didactical
Equity	Enhancing the success of all students, encouraging all students' achievement	Pedagogical
		Subject matter
Handling troublesome	Managing unexpected events and student behaviours, interaction with parents and administration in case of troublesome cases	Subject matter
		Subject matter
Timing and workload	Engaging in paper works much, facing with parents' anxieties about their children's achievement on standard tests, failure in performing curriculum on time	Subject matter
		Didactical
The usage of student-centred approaches	Not using student-centred teaching strategies (e.g., questioning, discussions, exploration), tending to use direct instruction, minimizing student-student and student-teacher interaction	Pedagogical
		Subject matter

All of the IMTs of MTA talked about using techniques of assessment and evaluation in the mathematics teaching process. The IMTs having different characteristics of teacher identity explained this theme from different points of view. For example, a subject matter expert IMT explained her MTA by talking about authentic assessment strategies and stress in the identification of them, integrating them into the teaching process by being connected to a mathematical context. Moreover, a didactical expert IMT explained his MTA under this theme by stating, "...the concepts and its parts asked in the questions on the test are valuable ones for the students. I cannot prepare the tests, including all necessary contexts and skills" related to the characteristic of subject matter expert.

The IMTs classified as subject matter experts explained MTA's phenomenon by providing and performing the necessities of the principle of equity in the classrooms

through the teaching process. A subject matter expert IMT explained this theme by expressing, "I need to focus on all students' learning based on their needs, personalities, and so on. I must design and enact the lessons based on them" by detailing pedagogical experts' characteristic.

The subject matter expert IMTs expressed their MTA by talking about handling troublesome inside and outside the classroom. They talked about their anxiety about managing unexpected events and student behaviours and interaction with parents and administration in case of trouble. For example, a subject matter expert IMT accounted for with the characteristic of a pedagogical expert as follows:

...there can be students having mathematics fear that I can help them with the help of their parents. This is stressful for me since I need to persuade these students' parents about their children's failure and mathematics fear. Also, after persuading them, I need to manage the duration that we help these students by keeping in contact effectively.

All of the IMTs talked about MTA related to timing and workload such as engaging in works given by administration and not related to mathematics teaching, performing the tasks on the curriculum on time. These IMTs in different groups of the characteristic of teacher identity made similar explanations related to this theme. Moreover, about the last theme experienced and perceived by only subject matter expert IMTs, they explained MTA by talking about their experiences and perceptions about enacting the mathematics lessons using student-centred approaches and encouraging their interaction and exploration.

Discussion, Conclusion, Recommendations

In the present study, 15 themes referring to the phenomenon of MTA have been identified. Among the themes identified related to both IMTs and PMTs' explanations about MTA, the themes of physical symptoms and feelings are the most commonly observed themes in the studies examining anxiety and anxiety related to mathematics (McMillan, Till & Roses, 2016; Muller-Pinzler, Gazzola, & Keyzers, 2015). All participants talked about their pleasant and unpleasant memories related to their MTA as the other most commonly observed horizon. This finding can be supported by the results of the studies explaining that anxiety of adults or young adults tend to be in connection with the anxiety that emerged in childhood or experienced in elementary school classrooms (Miller & Shifflet, 2016; Ramirez, Gunderson & Levine, 2012). Also, it is in line with the studies of Rollins (2016) stating that teachers having memories about ineffective teachers tended to be willing to become a teacher different from they had experienced and Trigwell (2012) emphasizing the role of a highly effective teacher and ineffective teacher in determining and maintaining a career path in teaching. Furthermore, these three themes were observed on all participants' explanations having the properties of different characteristics of teacher identity. The theme about multiple representations was also explained by subject matter and pedagogic experts, and the theme of students' needs and motivation was made by subject matter experts.

In the themes related to only PMTs, it was observed that these horizons differentiated based on their characteristics of teacher identity. These themes could result from the cases in which the PMTs gained experiences and perceptions, and necessitated to use of related knowledge and skills by practice. Hence, knowledge and skills can be important factors causing anxiety. The findings of previous research (Iyer & Wang, 2013; Yurekli, Isiksal & Cakiroglu, 2015) are in line with this result. Moreover, the theme of being assessed and evaluated on MTA can be expressed by the previous research of Williams (2010) and Malik (2015) stating the effects of instructor's explanations, criticism and attitudes.

Moreover, the subject matter expert PMTs expressed their MTA related to not using personal characteristics accurately and effectively. Hence, they talked about MTA in case that they might misuse verbal and non-verbal signals that could affect students' learning negatively and their potential of teaching. This explanation is in line with previous research (Baluran & Yap, 2013; Lumby, 2013). By this study, these themes were explained in detail by teacher identity.

The themes of using assessment and evaluation techniques, and timing and workload emerged based on the experiences and perceptions of only IMTs. These themes were talked about all IMTs from the groups of different characteristics. Besides, the themes of the usage of student-centered approaches, equity, and handling with troublesome were stated by a subject matter expert IMTs. These themes are significant to affect teaching process by performing classroom management and directing the students' behaviours effectively (Girmen, Anılan, Sentürk, & Öztürk, 2006) so they can cause anxiety through teaching the particular contexts. The role of the theme of handling troublesome can be encouraged by the previous research (Oral, 2016). Moreover, the IMTs explained their MTA about the usage of student-centred approaches. This finding is consistent with the previous research stating the teachers' difficulty managing teacher-student conflicts (Rothschild, Morris, & Brassard, 2006). Differently, these themes were detailed by teacher identity.

The findings showed that the PMTs and IMTs expressed the phenomenon of MTA through their experiences and perceptions from different points of views related to teacher identity. Because teacher identity is constructed and interpreted based on the individuals' beliefs and experiences (Buchanan, 2015; Noonan, 2018), their explanations differentiated from each other's expressions based on teacher identity. In the separation of the participants' perceptions and experiences about MTA, teacher identity could provide insight to comprehension and illustration of the phenomenon of MTA. This separation can be supported by the study of Beijaard, Verloop and Vermunt (2000), emphasizing the role of teacher identity on the individuals' interpretation of experiences and perceptions. Moreover, since the professional identity is a factor impacting anxiety and used to make estimations about the individuals' professional identity (Lin et al., 2017), clear and detailed information could be acquired through the exploration of the phenomenon of MTA with the help of teacher identity in the present study. In the study, it was observed that the participants explained their MTA based on the properties of other characteristics. For example, subject matter experts talked about their perceptions and experiences of

MTA about didactic and pedagogic experts' characteristics. Hence, teacher identity could contribute the IMTs and PMTs' MTA.

The previous research shows that anxiety may be an important factor that can affect performing teaching supporting student learning. The need for further research has been emphasized (Newton, Leonard, Evans, & Eastburn, 2012). In this respect, this study was performed by examining the phenomenon of mathematics teaching anxiety (MTA). By the current study, it could be possible to make a contribution to the need for more discussion and normalization of MTA. Based on the findings, it was observed that although there were similarities among PMTs and IMTs' MTA, there were also some differences between them. The teachers and teacher educators should also be aware of these themes and take precautions against the cases or events related to these themes.

The findings also showed that MTA differentiated based on the characteristics of teacher identity in addition to the groups of PMTs and IMTs. In this respect, interventions that can lessen the MTA of PMTs and IMTs can be designed more systematically and beneficially by considering the explained differences based on teacher identity. For example, the PMTs can be separated into groups based on teacher identity and interventions or courses detailed and organized based on teacher identity to reduce their MTA can be enacted separately to these different groups. Moreover, in-service training program can be designed and performed similarly. Furthermore, through these interventions, professional learning communities formed through grouping as in the current study can be formed through learning, enacting, assessment and evaluation of teaching by providing support as suggested by Rigelman and Ruben (2012). Hence, MTA can be lessened. Moreover, this research's findings can contribute to the preparation and usage of the tools for determining, examining, assessing and evaluating MTA by considering the similarities and differences among the groups that emerged in the study. This current study is limited to exploration and explanation of the phenomenon of MTA considering teacher identity. In further research, the role of MTA in teacher identity formation can be explored with the help of a longitudinal study.

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Appendix

1. What are the characteristics of an effective mathematics teacher?
2. What are the essential aspects of effective mathematics teaching?
3. How do you feel about your role as a teacher in teaching mathematics?
4. What does anxiety mean?
5. What does mathematics teaching anxiety mean? (Probing question: What does the case that mathematics teachers have anxiety in teaching mathematics mean?)
6. Have you ever experienced stress or anxiety while teaching mathematics? What were the reasons for your stress or anxiety?
7. What was your experience? Can you elaborate on that experience?
8. How did this experience affect you in your teaching profession?

Mesleki Kimlik Bağlamında Matematik Öğretimi Kaygısı Üzerine Olgu Bilim Çalışması

Atıf

Uygun-Eryurt, T. (2021). Phenomenological study about mathematics teaching anxiety in the context of professional identity. *Eurasian Journal of Educational Research*, 93, 301-318, DOI: 10.14689/ejer.2021.93.14

Özet

Problem Durumu: Matematik öğretme kaygısı (MÖK) problem çözme veya matematiksel kavramları öğretme sürecinde yaşanan kaygı ve gerginlik olarak tanımlanabilir (Peker, 2006). Öğretmenlerin tutumları ve inançları öğrencilerin öğrenmelerini ve öğretmenlerin öğretme sürecini etkileme gücüne sahip olabileceğinden, bu olgu matematik öğretimini etkin bir şekilde etkileyebilir (Cross, 2009; Son ve Crespo, 2009; Wilkins, 2008). Önceki araştırmalar MÖK'nun matematik öğretmen adaylarının (MÖA) veya matematik öğretmenlerinin (MÖ) odaklanmasını, öğrencilere olumlu yaklaşmasını, yüksek ses veya gürültüyü tolere etmesini, öğrencilerin ifadelerini aktif olarak dinlemelerini, öğretme sürecini organize etmelerini ve zamanlamalarını engelleyebileceğini göstermektedir. Ayrıca öğretim süreci, öğretim stratejilerinin uygulanmasını ve öğrenme etkinliklerinin belirlenmesini de etkileyebilir (Ameen, Guffey ve Jackson, 2002). Ek olarak, yüksek MÖK düzeyine sahip öğretmen adaylarının matematik öğretimini ve materyal tasarlamayı yetersiz bir şekilde gerçekleştirmelerindeki eğilimlerinin düşük düzeyde olduğu gözlemlenmiştir (Gresham, 2009; Levine, 1996; Peker, 2009). Başka bir deyişle, bu olgu, öğrenilmesi zor soyut matematiksel kavramları öğretim yoluyla öğrenciler için anlaşılabilir somut kavramlara dönüştürme sürecinde önemli bir role sahiptir (Levine, 1996; Peker, 2006).

Öğretmen ve öğretmen adaylarının algıları ve deneyimleri, öğretmen kimliği yoluyla araştırılabilir, çünkü öğretmen kimliği öğretmenlerin benliği ve rollerini kavramsallaştırmasına işaret eder. Öğretmen kimliği öğretmenlerin veya öğretmen adaylarının deneyimlerinin anlamını açıklama ve inançlarını oluşturma yollarını etkilemektedir (Buchanan, 2015; Schultz ve Ravitch, 2013). Ayrıca, öğretmen kimliği profesyonellik konusundaki inançları ve deneyimleriyle ilişkilidir (Noonan, 2018 s. 1). Mesleki gelişim için gerekli olan bir tür profesyonel kimlik olarak anksiyete ve öğretmen kimliği doğrudan bağlantıda olduğu için (Lin, Wang, Chen, Zu ve Wang, 2017), MÖK olgusu öğretmen kimliği göz önüne alınarak ayrıntılı olarak araştırılabilir. Önceki araştırmalarda, bireylerin kimliklerinin ve rollerinin kaygı ve strese neden olabileceği belirtilmiştir (Holroyd ve Lazarus, 1982). Ayrıca, bireylerin kaygısı kimliklerine göre değişebilir ve kaygının kimliğin incelenmesinde bir işlevi olabilir (Crocetti ve diğerleri, 2009; Erikson, 1950). Önceki araştırmalar bireylerin kaygılarının kimliklerine göre farklılaşabileceğini göstermektedir (Crocetti ve ark., 2009; Dellas ve Jernigan, 1990). Bu nedenle, kaygının belirli bağlamlarda kimliğe göre nasıl farklılaştığının incelenmesi literatüre önemli katkı sağlayabilir. Bu nedenle, öğretmen kimliği öğretmen adaylarının MÖK ile ilgili deneyimlerini ve algılarını incelemek için bu fenomenolojik araştırmanın temelini oluşturmaktadır.

Araştırmanın Amacı: Öğretmen kimliği öğretmen ve öğretmen adaylarının inançlarıyla bağlantılı olarak öğretme deneyimlerini ve uygulamalarını incelemek ve gerekçelendirmek için yararlı bir yol olarak önerilebilir (Beijaard ve ark. 2004). Bu nedenle, mevcut çalışmaya odaklanan araştırma soruları aşağıdaki gibidir:

- Matematik öğretmenleri ve öğretmen adayları matematik öğretme kaygıları ile ilgili deneyimlerini ve inançlarını nasıl algılamakta ve tanımlamaktadırlar?
- Matematik öğretmenleri ve öğretmen adaylarının matematik öğretme kaygısına ilişkin algıları, deneyimleri ve bunları tanımları öğretmen kimlikleri göz önünde bulundurulduğunda nasıl farklılaşmaktadır?

Araştırmanın Yöntemi: Çeşitli matematik öğretmen adayı ve matematik öğretmeni ile yapılan yarı yapılandırılmış görüşme ve odak grup görüşmelerinden yararlanılan bu çalışmada, matematik öğretme kaygısı deneyimleri ve algıları arasındaki farklılığın anlaşılması amacıyla öğretmen kimliği modelinden faydalanılmıştır. Amaç, bu fenomenolojik çalışmada katılımcıların matematik öğretme kaygısı ile ilgili deneyimlerini ve algılarını öğretmen kimlikleri yoluyla nasıl algıladıklarını ve tanımladıklarını farklılaşmaları da göz önünde bulundurularak araştırmaktır. Bu nedenle, bu fenomenolojik araştırma yapılmıştır.

Veriler beş haftada yarı yapılandırılmış görüşmeler ve odak grup görüşmeleri ile toplanmıştır. Başlangıçta, Seidman'ın (1998) fenomenolojik görüşme modeline dayanarak yarı yapılandırılmış görüşmelerle veri toplama süreci gerçekleştirilmiştir. Bu modelde, haftada bir olmak üzere dört haftalık süreçte katılımcılarla yarı yapılandırılmış görüşmeler yapılmıştır. Her görüşme yaklaşık bir saat sürmüştür. Yarı yapılandırılmış görüşmelerin tamamlanmasından sonra, iki grup MÖA ve iki grup MÖ ile (her grupta sekiz katılımcı bulunmaktadır) odak grup görüşmeleri yapılmıştır. Bütün veri toplama süreci katılımcılardan izin alınarak video kameralar aracılığıyla kaydedilmiştir. Ardından, kayıtlar doküman haline getirilmiştir.

Yarı yapılandırılmış görüşmeler ve odak grup görüşmeleri yoluyla toplanan veriler iki aşamada analiz edilmiştir. Başlangıçta, veriler Beijaard, Verloop ve Vermunt'un (2000) tarafından geliştirilen öğretmen kimliği modeli kullanılarak katılımcıların hangi karakteristik özelliğe sahip oldukları belirlenmiştir. Daha sonra görüşmelerin transkriptleri içerik analizi ile incelenmiştir. Böylece, görüşmeler yoluyla toplanan veriler iki aşamada analiz edilmiştir.

Araştırmanın Bulguları: Bu çalışmada, MÖK olgusuna ilişkin toplamda 15 tema tanımlanmıştır. İçerik analizi ile belirlenen temalar, katılımcıların mesleki kimlik özellikleri göz önünde bulundurularak üç başlık altında direk alıntılmalardan yararlanılarak bulgularda sunulmuştur: *hem MÖA hem de MÖ tarafından deneyimlenen ve algılanan temalar; MÖA tarafından deneyimlenen ve algılanan temalar; MÖ tarafından algılanan ve deneyimlenen temalar.*

Bulgular, matematik öğretmen adaylarının ve matematik öğretmenlerinin MÖK olgusuna ilişkin edindikleri deneyimler ve algılamalarını öğretmen kimlikleri yoluyla ifade ettiklerini göstermiştir. Öğretmen kimliği, bireylerin inanç ve deneyimlerine (Buchanan, 2015; Noonan, 2018) dayalı olarak kurulduğundan ve yorumlandığından, katılımcıların açıklamaları öğretmen kimliğine bağlı olarak birbirinden farklılaşmıştır. Katılımcıların MÖK olgusu hakkındaki algılarının ve deneyimlerinin farklılaşmasında

öğretmen kimliğinin, MÖK olgusunun anlaşılması ve gösterilmesine ilişkin bir pencere sunduğu belirtilebilir. Bu farklılık Beijaard, Verloop ve Vermunt'un (2000) çalışmasıyla öğretmen kimliğinin bireylerin deneyimlerini ve algılarını yorumlamalarındaki rolünü açıklayan çalışmanın bulgularıyla desteklenebilir. Ayrıca, mesleki kimlik kaygıyı etkileyen bir faktör olduğundan ve bireylerin mesleki kimliği hakkında tahminlerde bulunmak için kullanıldığından (Lin ve ark., 2017) MÖK olgusunun araştırılmasıyla net ve ayrıntılı bilgi edinilebilir.

Araştırmanın Sonuçları ve Öneriler: Çalışmada, katılımcıların MÖK'larını öğretmen kimliklerine ilişkin karakteristik özelliklerine göre açıkladıkları gözlemlenmiştir. Bu nedenle, öğretmen kimliği karakteristik özellikleri göz önünde bulundurularak matematik öğretmen adaylarının veya matematik öğretmenlerinin MÖK'larını gidermek amacıyla çeşitli fırsatlar, deneyimler ve eğitimler tasarlanıp sunulabilir.

Anahtar Sözcükler: algı, deneyim, kaygı, öğretmen kimliği.