Faculty Members' Perspectives on Teaching Mathematics Online: Does Prior Online Learning Experience Count?

Öğretim Üyelerinin Çevrimiçi Matematik Öğretimine Bakışları: Çevrimiçi Öğrenme Deneyimi Bakış Açısını Değiştiriyor Mu?

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Abstract

Ongoing developments in information and communication technologies have not only led to the emergence of completely online higher education institutions, but it has also impelled many traditional universities to open fully online degree programmes. The aim of this study is a qualitative review of the perspectives of faculty members teaching mathematics about teaching mathematics online. The study was conducted during the 2013-2014 spring semester, with the participation of eight faculty members from different online learning backgrounds, with individual semi-structured interviews conducted with each participant. The data analysis procedure started with the themes embedded into interview questions, and then re-constructed during the data gathering process. The themes set forth the general framework for the study, and then the codes were specified to identify differences and similarities between and among the participants with respect to teaching mathematics online. Data analysis showed that the most important concern for mathematicians in teaching mathematics online was the nature of mathematics as a discipline, while for mathematics educators it was the nature of the methodology in teaching mathematics. Both groups agreed on the efficiency of a blended approach for teaching mathematics, where the face-to-face classroom environment and online technologies were used complementarily. Participants with prior online learning experience were considered to have more a positive perspective about using online technologies for teaching mathematics.

Keywords: *Online education; online mathematics education; mathematics educators; professional development*

Öz

Bilgi ve iletişim teknolojilerinde yaşanan hızlı değişim, yalnızca açık ve uzaktan eğitim veren yükseköğretim kurumlarının sayılarının artmasına neden olmakla kalmamış, geleneksel yüz yüze eğitim veren yükseköğretim kurumlarının da çevrimiçi uzaktan eğitim programları açmalarına neden olmuştur. Bu çalışma, matematik ve matematik eğitimi alanında görev yapan öğretim üyelerinin çevrimiçi matematik öğretimi konusuna bakışlarını nitel bir yaklaşımla ele almayı amaçlamaktadır. Çalışma, 2013-2014 bahar döneminde, farklı çevrimiçi öğrenme deneyimlerine sahip olan sekiz öğretim üyesinin katılımıyla gerçekleştirilmiştir. Katılımcıların her biriyle, bireysel, yarı yapılandırılmış görüşmeler yapılmıştır. Veri analizi temaların görüşme sorularına eklenmesiyle başlamış, veri toplama sürecinde temalar yeniden yapılandırılmıştır. Temalar çalışmanın genel çerçevesini ortaya koymuş, katılımcıların çevrimiçi matematik öğretimine ilişkin görüşleri arasındaki benzerlik ve farklılıkların belirlenmesi amacıyla kodlar belirlenmiştir. Veri analizi, matematikçiler için çevrimiçi matematik öğretimine dair en önemli kaygının bir disiplin olarak matematiğin doğası olduğunu, matematik eğitimcileri için ise matematik öğretimi yönteminin doğası olduğunu göstermiştir. Her iki grup da, yüz yüze sınıf ortamı ile çevrimiçi teknolojilerin birbirlerini tamamlayıcı olarak kullanıldığı karma bir yaklaşımın matematik öğretimi için daha etkin olacağı konusunda hemfikirdir. Daha önceden çevrimiçi öğrenme deneyimine sahip katılımcıların matematik öğretiminde çevrimiçi teknolojilerin kullanımına ilişkin daha olumlu bir bakışa sahip oldukları görülmüştür.

Anahtar Kelimeler: *Çevrimiçi öğrenme; çevrimiçi matematik öğretimi; matematik eğitimcileri; mesleki gelişim*

Introduction

Ongoing developments in information and communication technologies have almost become fully integrated into learning and teaching environments. They have changed the way in which education is delivered, particularly through the use of internet technologies which have had a noteworthy impact right across the board in higher education. This progress has not only led to the emergence of completely online higher education institutions, but has also impelled many traditional universities to open fully online degree programmes in addition to existing face-to-face programmes. It is also being exploited to support on-campus courses through web-based educational technologies; either through a course management system or in the form of blended learning.

As put forward by Ally (2004), different terminologies have been used for this experience, ranging from online learning to e-learning, distance learning, and web-based learning etc. Despite the fact that all of these terms suggest a learning environment where the learner is distanced remotely from the instructor, interaction still takes place with the instructor, or with

other learners, accessing learning materials through the application of internet technologies. For the purposes of this paper, the authors will just use the term "online learning". Ally (2004) defines online learning as

> *"…the use of the Internet to access learning materials; to interact with the content, instructor and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience (p.5)…"*

The extent to which, or the way that, online technologies are used depends on the content to be taught. This research paper will discuss the perspectives of mathematicians and mathematics educators about the teaching of mathematics online, and compare these perspectives based on the instructors' prior online learning or teaching experience. Mathematics is considered a rather complex discipline, and as stated by Elena Barbera (Juan, Huertas, Trenholm, & Steegmann, 2011), "teaching mathematics is not mathematics itself; it is a completely different issue". In the preface of the same book, Juan et al. (2011) mentions mathematics e-learning as referring "to the use of computer hardware, software and/or the Internet to deliver and facilitate mathematics instruction". In parallel with the aforementioned, as in other disciplines, evolving online technologies have had a significant impact on the delivery of mathematics within higher education; either as fully online, blended or hybrid, or as a supplement to on-campus courses.

The National Council of Teachers of Mathematics (2000) underlined that using technology in mathematics classrooms is important as a means for students to solve problems. Using technology in the mathematics classroom is helpful for developing higher order thinking skills and understanding mathematical concepts. Maschietto and Trouche (2010) make reference to the construction of circumstances of a mathematical laboratory inside an "ordinary" classroom owing to the use of technological tools. Among others, Webb (2005) claims that educational technologies can support mathematics to make it more exciting, relevant and challenging for learners. Yet despite this, many educators are still reluctant to use educational technologies, either due to limited technological proficiency, or non-belief in the efficiency of using technology, particularly online technologies, for teaching mathematics (Lin, Singer, & Ha, 2010).

Despite this hesitancy or fear of technology by some, the flexible learning opportunity created by advances in online technologies has been considered as a promising delivery method for higher education institutions (Allen et al., 2010). Nevertheless, this flexibility requires faculty members to adapt their traditional roles and conventional teaching skills into this new and rather challenging environment as change agents within their organisations. In order to help faculty members in this endeavour, it is the universities' responsibility to offer support and appropriate faculty development programmes due to the faculty members' critical role in the development and delivery of quality online courses.

At present, many higher education institutions offer training and support to faculty members, either in the form of informal learning environments, or through mentoring, in-service training programmes, or structured certificate programmes (Bremer, 2010; Deshmukh & Deshmukh, 2013; Kelz, 2011; Sitckler & Hampel, 2007; Vaill & Testori, 2012). These training activities both serve as orientation programmes to introduce faculty members to the "online world", and to help them design, develop and deliver online courses in order to improve the quality of online instruction.

Muğla Sıtkı Koçman University (MSKU), a state university in southwest Turkey, is a young but rapidly developing university with over 30,000 students. Following preliminary studies to establish web-based distance learning both to improve the quality of on-campus learning and to offer fully online courses/programmes, the university started a pilot implementation in 2011. Currently the university has four online programmes with 420 students, and delivers several on-campus courses online to more than 7,000 students. Based on a research study conducted by the Distance Education Centre (MSKU-UZEM) to examine faculty members' attitudes towards online learning practices (Adnan, 2012), the Centre focused on providing a structured online professional development programme for potential online tutors due to strong belief in the teachers' pivotal role in this transformational period.

As an innovative move for a higher education institution in Turkey, the university management took the decision to require all online tutors to successfully undertake this programme before being authorised to teach online courses. The programme combined synchronous and asynchronous technologies in order to train participants on various subjects for online learning including the background of technology in education, learning management systems, virtual classroom systems, copyright and e-learning ethics, open

courseware and MOOCs, e-assessment, social media in education, and multimedia applications in learning. The programme also attracted attention of faculty members from different departments, and the number of voluntary participants exceeded the number of potential online tutors who were obliged to complete the programme.

This research paper aims to review the perspectives of faculty members, who are mathematicians and mathematics educators working in MSKU, regarding online mathematics teaching on the basis of their prior experience as an online learner in the professional development programme and/or as e-tutors of online degree programmes at MSKU.

Methodology

Qualitative approach was followed for this study through semi-structured interviews in order to capture and describe the individual experiences and perspectives of participants teaching mathematics through online technologies, with the aim of providing insights into other similar cases (Bogdan & Biklen, 1982; Cohen, Manion, & Morrison, 2000; Merriam, 2001). Qualitative research methodology was preferred for this study because it is crucial to have a deeper insight into the views, opinions and experiences of the participants regarding teaching online in order to reach a descriptive account of this practice.

The study was conducted during the 2013-2014 spring semester with the participation of eight faculty members from different online learning backgrounds. The participants were selected through a purposive sampling method, and comprised of eight faculty members teaching mathematics in the departments of Mathematics, Mathematics Education, or Business Administration. Four of the participants are mathematicians (three males and one female), and the other four are mathematics educators (two males and two females).

Two of the four mathematicians (M1 and M2) had participated in an online teaching certificate programme, one (M3) had no prior online learning experience at all, and the other mathematician (M4) had both prior online learning experience and actively teaches mathematics online. For the mathematics educators, two (MEd1 and MEd2) had no prior online learning experience, one (MEd3) participated in an online teaching certificate programme, and one (MEd4) had both prior online learning experience and actively teaches mathematics online.

Three mathematicians (M1, M2, and M4) and two mathematics educators (MEd3, MEd4) had participated in an online teaching certificate programme. Among them, M4 and MEd4 were actively teaching mathematics online following their certification. Perspectives of the participants with prior experience, either as an online learner or as online faculty members, are mentioned separately. Table 1 illustrates participants' demographic information and prior online experience.

Table 1
Participant Information

Participants	M1	M2	M3	M4	MEd1	MEd2	MEd3	MEd4
Gender	M	M	F	M	F	M	F	M
Age	33	33	35	49	35	36	34	44
Years of Service	2	2	3	19	4	4	6	11
Online Teaching Experience	-	-	-	X	-	-	-	X
Online Learning Experience	X	X	-	X	-	-	X	X
Online Teaching Certificate	X	X	-	X	-	-	X	X

Semi-structured interviewing was preferred by the researchers in order to provide flexibility in the reordering of interview questions, in adjusting the language or terminology and for providing clarifications by the interviewer as and when necessary during the interview (Berg, 2004). The interview questions were prepared by the researchers and then reviewed by two other academicians working in the same field. No changes to the interview questions were made by the reviewers.

The researchers conducted eight semi-structured participant interviews. Appointments were made with the participants, and based on their schedule, the interviews were held in participants' offices using an audio recorder. The average interview duration was approximately 30 minutes. The following questions were solicited:

1. Do you use any technology for teaching mathematics? If yes, please elaborate.
2. Do you have any prior online learning experience (either as a teacher or as a student)? If yes, please explain.
3. What is your opinion about teaching mathematics online?

4. What kinds of instructional activities or topics in mathematics do you think can/cannot be effectively adapted to the online learning environment?
5. Do you think the certain (so-called) advantages of online learning (e.g. interactivity, enriched environment, technological tools and methods) can increase the effectiveness of teaching mathematics? If yes, how?

Following the interviews, the audio recordings were transcribed using word processing software, and the printed version of each interview sent to the corresponding participant for their review and confirmation. Seeking participant confirmation and the aforementioned expert opinions during the construction of interview questions was aimed at improving the quality and overall trustworthiness of the study.

Themes were embedded into the interview questions; therefore, at the beginning of the study, the themes were constructed as follows:

1. Familiarity with technology in education (Q1-Q2);
2. Perspectives about online mathematics teaching (Q3-Q4-Q5).

During the data gathering process, two more additional themes emerged owing to the probing style of the questions:

3. Interaction between learner-instructor;
4. Assessment after course completion.

The data analysis procedure started with the constructed themes. The themes set the initial general framework for the study, and then the codes were specified to identify differences and similarities between and among the participants (see Table 2).

Table 2
Themes and Codes

Themes	Codes
Familiarity with technology in education	PowerPoint, statistical packages, computer programming / writing code
Perspectives about online mathematics teaching	Nature of mathematics, theoretical mathematics, mathematical symbols, distant nature of online teaching, blended learning
Interaction between learner-instructor	Classroom management, eye contact, isolated instructor, real-time chat
Assessment after course completion	Workload, easy grading, fair assessment

Findings

The results of the study are presented under the four themes. Where deemed appropriate, findings have been supported by direct quotations from the participants.

Familiarity With Technology in Education

Among the eight participants, more than half of them (five participants) were familiar with the technology used in their classes. However, they are using technology mainly for two reasons; the first being in the form of presenting PowerPoint slides, and the second is the nature of some courses that force them to use technology (e.g. in Statistics classes or for writing code).

Perspectives About Online Mathematics Teaching

Mathematicians' perspectives. Among the mathematicians, M3 (who had no prior online learning experience) and M2 (who did have prior online learning experience) both have negative opinions about online learning. When the researchers asked whether the nature of mathematics had an effect on the use of technology in mathematics, M3 said that it did not affect it at all, and she added: *"I don't believe that you can do any concrete representation for abstract mathematics using technology, either through online education or face-to-face. Therefore, for mathematics it really does not affect whether you are teaching online or face-to-face."* She concluded her interview by saying that some of her courses were indeed quite open to technology use, and *"it is meaningful to use technology for these courses; but for some courses it is just not required at all, and I even think that it is harmful to use technology in such courses."*

M2 has a similar perspective, but he put forward his ideas through another argument. He has some preconceived prejudicial concerns about the online teaching of pure theoretical mathematics (e.g. abstract concepts). He said that in such courses, students should physically be in the classroom with their lecturer and that there should be interaction between the students and the lecturer. He then added that in virtual classes *"I will not be able to see the students' works when I ask a question. Also I cannot advise them and give them hints when they are solving the problems. Plus, the students may not draw graphs or write mathematical symbols in a virtual environment."*

On the other hand, the other mathematicians (M1 and M4) were very positive about using online technologies in their classes. M1 had prior online learning experience and he is willing to deliver online classes in the next semester. M4 had both prior online learning and teaching experience, and is actively giving online courses in the current semester. They both believed that everything can be achieved using the technology, even mathematical symbols or graphs can be easily produced by students in the virtual learning environment when using the appropriate tools.

Based on their prior experience, both mathematicians underlined that teaching mathematics online might be easier because students could repeatedly listen to and watch the classes over and over should they experience difficulties with a certain topic.

Mathematics educators' perspectives. The mathematics educators' thoughts about teaching and learning mathematics or mathematics education classes were different than the mathematicians. All four participants had a positive attitude about using online technologies either for mathematics or for mathematics education courses; however, they had different concerns about this teaching process among themselves. For example, MEd1 thought that every course could be given by using technology, but said that *"fully online classes should only be used for students who cannot come to the classroom, or who live in another city"*, emphasising the distant nature of online learning. On the other hand, according to MEd2, pure mathematics classes could be easily given by using online technologies, but certain method courses (for example, how to teach mathematics courses for pre-service teachers) involving practical activities and interaction among students cannot be achieved fully online.

MEd3 had similar perspectives with MEd2, but she believed that in mathematics education classes, online teaching though technology had some strong advantages over to face-to-face education. The advantages mentioned were sharing videos or short movies related with various classroom environments, or giving an opportunity to timid students to express their ideas in discussion groups.

MEd4, with prior online experience both as a learner and as an online faculty member, expressed his concern about teaching mathematics online before his participation in the professional development programme. However, he stated that his concerns had waned after the programme:

> *"I now claim that any subject matter can be taught online, because I am doing this currently. Which subject matter cannot be taught? I have a smart board, and on a smart board you can do anything just like with a normal whiteboard - and it has more features. If your materials are ready, you can install them on the board. If you want to measure angles, you can put the protractor on the board and measure. You can even teach psychomotor skills… the only problem is that you cannot experience certain moments with students as in a classroom. For instance, you cannot administer group work, but you can give a group project and give feedback online"*.

Interaction and classroom environment were the two most important topics for all mathematics educators in terms of online learning. All participants emphasised the significance of social dynamics in a classroom, and underlined that social learning was very important for any level of education, although using the advantages of online teaching technologies could not be ignored in this regard. Having said that, they stood closer to a well-balanced combination of online and face-to-face learning environments, commonly referred as blended or hybrid learning.

Interaction Between Learner-Instructor

The most critical issue in online mathematics teaching were said, by most of the participants, to be the interaction between instructors and learners. Six out of the eight participants argued that it was relatively difficult or even not possible to check whether or not students were "really" learning in an online environment. M3 stated that the lack of interaction between students and the instructor may be the most important negative aspect of online learning. She said: *"I think that not being able to receive a response to a question posed in class is one of the most important challenges of online education."*

Similarly, M2 stated that it would not be possible to keep *"eye contact"* with students as well as to create a friendly environment in online learning. He further stated that *"learners would not be able to give feedback to you [lecturer] if it is not online"*, possible meaning being an asynchronous learning environment.

Nonetheless for M4, who was actively teaching online, interaction with learners was not a major issue since he ensured continuous communication and interaction with learners through posing questions and receiving answers or making conversations in the virtual classroom

using the real-time chat feature of the system. He also mentioned having his students make presentations to the class in the virtual classroom, and having discussions about a presentation using two-way audio/video conferencing.

Despite M4 feeling quite *"comfortable"* in the studios used for virtual classes, MEd4 gave another perspective of online teaching and emphasised that he felt *"isolated"* in studios while teaching online.

Assessment After Course Completion

E-assessment was an additional theme that emerged during the data collection process, particularly from two participants who emphasised the fairness and practicality of online exams. MEd4, actively teaching online, stated that *"Since exam questions can be served in random order for each student in online exams, it is quite difficult for students to cheat. Moreover, the reliability of the questions is very high in online exams."* MEd1, with no prior online experience, said that online exams were very helpful both for instructors and for students because grading was much easier for instructors and students could learn their score immediately. On the other hand, the other mathematics educators assumed that online exams were not so different than paper-pencil exams since they demanded written papers in exams which they still had to read, whether it was online or paper-pencil; and therefore, according to them there is no huge advantage to online exams over traditional ones.

The mathematicians had different opinions about online exams; some thought that the nature of mathematics (e.g. the symbolic language) made it difficult to have online exams since neither the lecturer nor students were able to write symbols and formulae online. Yet others, particularly those who had prior experience with online learning or technology in general, disagreed and considered online exams being quite practical both for the lecturer and the students if they knew the right tools to use.

Discussion and Conclusion

The purpose of this study is to describe the perspectives of mathematicians and mathematics educators about online mathematics education. Four themes were constructed based on the data gathered from eight interviews. Findings were summarised under these themes, and

focused on certain similarities and differences in the perspective of the participants regarding online mathematics education in view of their prior experience as online learners or online faculty members.

Most of the participants use technology in their courses, yet in different but limited ways. Some only use PowerPoint presentations to support lecturing, whilst some use statistical packages and programmes or programming languages.

Three of the participants had no prior experience with or training about online learning. Despite that, two of them have quite positive opinions regarding teaching mathematics online. Nonetheless, both mathematicians and mathematics educators have some concerns about teaching mathematics online. The nature of mathematics as a discipline comes first among these concerns since some believe that pure mathematics topics cannot be delivered via online technologies. Mathematics educators also indicate similar concerns about certain courses targeted to preservice mathematics teachers about how to teach mathematics equipped with several hands-on activities. This is aligned with Trenholm's (2013, p.272) findings about online mathematics courses' role in 'hindering the development of students' understanding of mathematics', which he paralleled with a meta-analytical study suggesting that the mathematics instruction appears 'best suited to the classroom' (Bernard et al., 2004, cited in Trenholm, 2013).

On the other hand, none of the participants have ignored the opportunities provided by online technologies; thus the most popular opinion among the mathematics educators has been for the blended approach, where face-to-face classroom environment and online technologies are used complementarily.

The supposed lack of interaction between lecturer and student is considered as the most important restriction of online learning, particularly for those participants with no prior online experience. Those participants who are actively teaching online, on the other hand, emphasised the possibility of creating an interactive environment with learners in the virtual classroom where the correct technological tools are brought into play such as real-time chats, question/answers, or two-way audio tools. Trenholm (2013) also suggests the need for including virtual synchronous interactions to enrich teaching and learning mathematics online.

Assessment after courses has been a hot topic for faculty members actively teaching online since they have first-hand experience about the advantages and disadvantages of online learning. However, they have different perspectives about online exams since the mathematics educator considered online exams as fair assessments, but the mathematician as an extra workload in terms of preparing the question bank. Nonetheless, both instructors agreed on the easiness of the grading process for online exams.

As a result, there are clearly different perspectives among mathematicians and mathematics educators with respect to teaching mathematics online, since their focal points are diverse with mathematicians mostly concerned about the nature of mathematics as a pure scientific discipline and mathematics educators mostly concerned about classroom applications of teaching mathematics as methodology. Trenholm (2013) also emphasizes the importance of the 'complex dynamic in mathematics instruction and assessment practices' in his research study.

These differences are more noticeable when prior online learning experience is concerned. Both mathematicians and mathematics educators are significantly positive about teaching mathematics online where they have participated in a professional development programme about online learning and teaching. This difference is much more obvious if they are experienced as online faculty members.

Finally, it can be stated that providing faculty members with professional development programmes about online learning and educational use of internet technologies is imperative in order for them to understand how an online course works. Nonetheless, in light of the participants' concerns about the nature of mathematics, it may be interesting to study whether or not these findings vary according to disciplines such as natural or social sciences.

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Genişletilmiş Öz

Önlenemez bir hızla gelişen bilgi ve iletişim teknolojilerinin, özellikle de internetin eğitim üzerindeki etkisi yadsınamaz. Bu teknolojiler yalnızca açık ve uzaktan eğitim veren yükseköğretim kurumlarının sayılarının artmasına neden olmakla kalmamış, geleneksel yüz yüze eğitim veren yükseköğretim kurumlarının da çevrimiçi uzaktan eğitim programları açmalarına ve bazı kampüs derslerini öğrenme yönetim sistemleri ile destekleyerek çevrimiçi öğrenme veya harmanlanmış eğitim yöntemini kullanmalarına neden olmuştur. Söz konusu teknolojilerin eğitimde kullanımını ifade etmek için kullanılan farklı terminolojiler arasından, Ally (2004) tarafından "öğretim materyallerine erişim sağlamak, içerik, eğitmen ve öğrenciler arasındaki etkileşimi sağlamak ve öğrenme sürecinde destek almak için internet teknolojilerini kullanmak" olarak tanımlanan çevrimiçi öğrenme terimi bu çalışmada esas alınmıştır. Hangi çevrimiçi öğrenme teknolojilerinin nasıl kullanıldığı, öğrenilecek konunun tabiatı ile doğrudan ilişkilidir. Bu çalışma, göreceli olarak zor bir alan olarak tanımlanan matematik alanına odaklanmaktadır.

Matematik öğretiminde teknoloji kullanımına ilişkin farklı görüşler bulunmaktadır. Matematik sınıflarında problem çözme esnasında teknolojinin kullanılmasının matematiksel kavramların anlaşılmasında ve ileri düzey matematiksel düşünme becerilerinin geliştirilmesinde yardımcı olduğu, matematiği öğrenenler için daha eğlenceli hale getirebildiği gibi pozitif görüşlerin yanı sıra, birçok eğitimci matematik öğretiminde teknoloji kullanımına değişik nedenlerle kaygılı ve korkuyla yaklaşmaktadır. Bu kaygı ve teknoloji kullanmaya dair korkuya rağmen, yükseköğretimde teknoloji destekli öğrenme ortamlarının giderek yaygınlaşması öğretim elemanlarının sahip olduğu geleneksel öğretim becerilerinin değişen ve gelişen ortamlara uyumlaştırılması gereksinimini beraberinde getirmektedir. Bu süreci kolaylaştırmak için kurumların, çevrimiçi öğrenme ortamlarını kullanacak öğretim elemanlarını mentörlük sistemi, eğitim, sertifika programları ve benzeri etkinlikler yoluyla desteklemeleri önem arz etmektedir. Web tabanlı uzaktan eğitim çalışmalarına 2011 yılında başlayan Muğla Sıtkı Koçman Üniversitesi (MSKÜ), gerek web tabanlı uzaktan eğitim programlarında gerek çevrimiçi öğretim yöntemleriyle desteklenen kampüs derslerinde görev yapacak öğretim elemanlarına yönelik bir çevrimiçi sertifika programı yürütmektedir. Bu araştırma çalışmasında, MSKÜ'nde matematik ve matematik eğitimi alanlarında görev yapan öğretim üyelerinin yukarıda bahsi geçen sertifika programını tamamlamış olma durumları ile

çevrimiçi öğretime ilişkin ön tecrübeleri temel alınarak, bu kişilerin çevrimiçi matematik öğretimine dair görüşleri incelenmiştir.

Katılımcıların konuya dair düşüncelerini anlamak, tanımlamak ve olguya dair derinlemesine bir inceleme yapabilmek için nitel bir yaklaşımla gerçekleştirilen bu araştırmada, matematiğin çevrimiçi öğretimine dair bireysel görüş ve düşünceleri öğrenmek amacıyla 2013-2014 Bahar döneminde öğrenmeye dair farklı ön deneyimlere sahip sekiz öğretim üyesi ile birebir yarı yapılandırılmış görüşmeler yapılmıştır. Veri analizinde dört tema kullanılmış ve araştırma bulguları bu temalar altında verilmiştir: Eğitimde teknoloji kullanımına dair aşinalık, matematik öğretimine dair görüşler, eğitmen-öğrenen etkileşimi, ders sonrası ölçme-değerlendirme işlemleri.

Katılımcıların yarıdan fazlası sınıfta teknoloji kullanıyor olsalar da, verdikleri dersin doğası gereği teknoloji kullanma zorunluluğu olduğunda bunu yapmaktadırlar. Matematikçiler arasındaki çevrimiçi öğrenmeye dair olumsuz görüşler, hem bir disiplin olarak matematiğin doğasından hem de teknoloji ve çevrimiçi öğrenmeye dair önyargılardan kaynaklanmaktadır. Önceden çevrimiçi öğretim deneyimi olan matematikçi katılımcıların görüşleri ise daha olumludur ve özellikle de çevrimiçi öğrenmenin dersi tekrar edebilme özelliğine vurgu yapılmaktadır. Matematik öğretimine dair derslerin matematik derslerinden farklı olduğunu savunan matematik eğitimciler, gerek matematik gerekse matematik eğitimi derslerinde teknoloji kullanılmasına oldukça pozitif bakarken, kendi aralarında farklı endişeler taşısalar da sınıf içi etkileşim hepsi için ortak bir endişe noktası olmuştur. Çevrimiçi öğrenme ortamlarında eğitmen ile öğrenen arasında var olduğu söylenen etkileşim eksikliği, özellikle de bu alanda deneyimi olmayan katılımcılar tarafından çevrimiçi öğrenme ortamlarının en önemli sınırlaması olarak ifade edilmiştir. Buna karşın, çevrimiçi öğrenme deneyimine sahip olan katılımcılar doğru teknolojik araçların kullanılmasıyla sanal sınıflarda etkileşimli bir öğrenme ortamının oluşturulmasının mümkün olduğunu belirtmişlerdir.

Çevrimiçi öğrenme ortamlarının avantajlarını vurgulayan matematik eğitimciler, yüz yüze sınıf ortamları ile çevrimiçi teknolojilerin etkin bir şekilde bir araya getirildiği harmanlanmış eğitim ortamlarının matematik öğretimine daha iyi olduğunu ifade etmişlerdir. Matematik eğitimciler, ayrıca, e-değerlendirmenin öneminden de bahsetmişlerdir.

Bulgular göstermiştir ki, matematikçilerin ve matematik eğitimcilerin çevrimiçi matematik öğretimine bakışları arasında bir farklılık vardır. Matematikçilerin çevrimiçi matematik öğretimine ilişkin kaygıları bir disiplin olarak matematiğin doğasını temel alırken, matematik eğitimciler sınıf içi uygulamalar ve öğretme yöntemleri konusunda kaygı duymaktadır. Matematik öğretiminin karmaşık dinamikleri farklı araştırmacılar tarafından da vurgulanmıştır.

Katılımcıların çevrimiçi öğrenmeye dair ön deneyimleri, farklılık yaratan faktörlerden bir diğeridir. Daha önceden çevrimiçi öğrenme ve öğretme deneyimine sahip olan katılımcılar, çalışma alanlarından bağımsız olarak, çevrimiçi öğrenme ortamlarına dair olumlu tutum ve görüş sergilerken, böyle bir deneyimi olmayan katılımcılar olumsuz görüş beyan etmişlerdir. Bu farklılık, aktif olarak çevrimiçi ders veren katılımcılarda daha belirgindir.

Sonuç olarak, yükseköğretim kurumlarının çevrimiçi öğrenme ve eğitimde teknoloji kullanımına ilişkin olarak kendi öğretim elemanlarına sağlayacakları mesleki gelişim programları, öğretim elemanlarının teknolojinin eğitim ortamlarında etkin olarak kullanımını aktif olarak deneyimleyebilmeleri açısından oldukça önemlidir. Çalışmaya katılan öğretim elemanlarının matematiğin doğasına bağlı olarak sahip oldukları kaygılar dikkate alındığında, bu çalışmadan elde edilen bulguların sosyal bilimler veya fen ve mühendislik bilimleri alanında değişiklik gösterip göstermediğinin incelenmesi önerilmektedir.