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Araştırma Makalesi / Research Article

Analyse the Views of The Master's Degree Students at the Mathematics Teaching Department on the Use of Qualitative Research Methods

İlköğretim Matematik Öğretmenliği Yüksek Lisans Öğrencilerinin Nitel Araştırma Yöntemlerinin Kullanımına Yönelik Görüşlerinin İncelenmesi

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Abstract: Master's degree study is a career step at which individuals make efforts to specialize in a field and which allows them to make self-development. The biggest component that is important for a search and increases its scientific quality is the method used. The aim of this study is to examine the views of mathematics teaching master's degree students on the use of qualitative research methods. The current study employs the design of a case study, which has a qualitative research design. The study group was composed of 12 master's degree students of education at mathematics teaching department who were writing their theses at a university in the Mediterranean region of Turkey. The research data were collected through personal interview forms and focal group interview forms. The data were subjected to content analysis and descriptive analysis. The current study concludes that the articles and theses written in the qualitative study method are more difficult than the ones written in the quantitative study method, but that master's degree students think they can cope with the work due to their personal competence. Another finding obtained was that participants tended to fill the gaps in the conceptual framework of other studies, to use the existing framework, and they had personal competence.

Keywords: Higher education, qualitative research, teaching mathematics, master's degree student

Öz: Lisansüstü eğitim, bireylerin bir alanda uzmanlaşmak için çaba sarf ettikleri ve kendilerini geliştirmelerine olanak sağlayan bir kariyer basamağıdır. Bir araştırma için önemli olan ve bilimsel niteliğini artıran en büyük bileşen ise kullanılan yöntemdir. Bu çalışmanın amacı, matematik öğretmenliği yüksek lisans öğrencilerinin nitel araştırma yöntemlerinin kullanımına ilişkin görüşlerini incelemektir. Bu çalışmada nitel araştırma desenlerinden durum çalışması deseni kullanılmıştır. Çalışma grubunu, Türkiye'nin Akdeniz bölgesindeki bir üniversitede tezlerini yazmakta olan 12 ilköğretim matematik öğretmenliği yüksek lisans öğrencisi oluşturmaktadır. Araştırma verileri kişisel görüşme formları ve odak grup görüşme formlar aracılığıyla toplanmıştır. Veriler içerik analizi ve betimsel analize tabi tutulmuştur. Bu çalışma, nitel çalışma yöntemiyle yazılan makale ve tezlerin nicel çalışma yöntemiyle yazılanlara göre daha zor olduğu, ancak lisansüstü öğrencilerin kişisel yeterlilikleri nedeniyle işin üstesinden gelebileceklerini düşündükleri sonucuna varmıştır. Burada elde edilen bir diğer bulgu ise katılımcılar kavramsal çerçevedeki boşlukları doldurma eğilimindedir.

Anahtar Kelimeler: Yükseköğrenim, nitel araştırma, matematik öğrenimi, yükseköğrenim öğrencisi

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Introduction

Master's degree study is a career step at which individuals make efforts to specialise in a field and which allows them to make self-development. The board of higher education [YÖK, 1981] defines it in Law 2547 as education and instruction based on undergraduate education and as higher education, which aims to exhibit the results of research. There are various factors which enable individuals to make self-development in this process. One of them is to pursue the relevant publications in the country and abroad. What is expected of individuals in pursuing the relevant literature is to have comprehensible knowledge of the area and to make scientific publications so as to fill the gap or the deficiency that they notice in the area and thus to write a thesis.

What makes a study scientific is the method used (Erkuş, 2009). 228 theses, 57 of which were doctoral dissertations and 171 of which were master's theses, were produced in Türkiye in the period between 2003 and 2022 (Board of Higher Education Centre of Theses). A close look at them made it clear that they were produced by using various methods. Erkuş (2009) contends that the findings obtained in a study will not express anything, even if it has an innovative research problem, unless the method used is strong enough.

The methods used in studies performed in education can be said to be quantitative, qualitative, and mixed. They are based on different paradigms, and each method has properties specific to itself. Researchers (Cresswell & Poth, 2016; Hatch, 2002; LeCompte & Schensul, 1999; Marshall & Rossman, 2010). Cresswell (2016) lists the properties as obtaining the data in the natural environment of a study, confidence in researchers, using multiple methods, complex reasoning, participant subjectivity, context-participant relations, changeability of the pre-determined design, reflective and interpretative nature, and being holistic and complicated.

The broadest definition of qualitative study on the basis of the above-mentioned properties was offered by Denzin & Lincon (2018) as researchers' effort to make sense of andto interpret the things in their natural environment in terms of meanings humans attach to events.

Qualitative studies contain certain stages despite the fact that they are claimed to be "flexible" (Cresswell, 2016). These stages are shown in Figure 1. Beside Figure 1, Yıldırım and Şimşek (2016) also stress that the processes move in cycles. The movement in cycles is associated with the flexibility of such studies, and it differs according to the interaction between the research problem and the stages and according to the situations encountered in the process.The cycle is also related to the reliability, persuasiveness, and validity of the study. As evident from Figure 1, there is a cyclical process, and each stage is associated with the other.

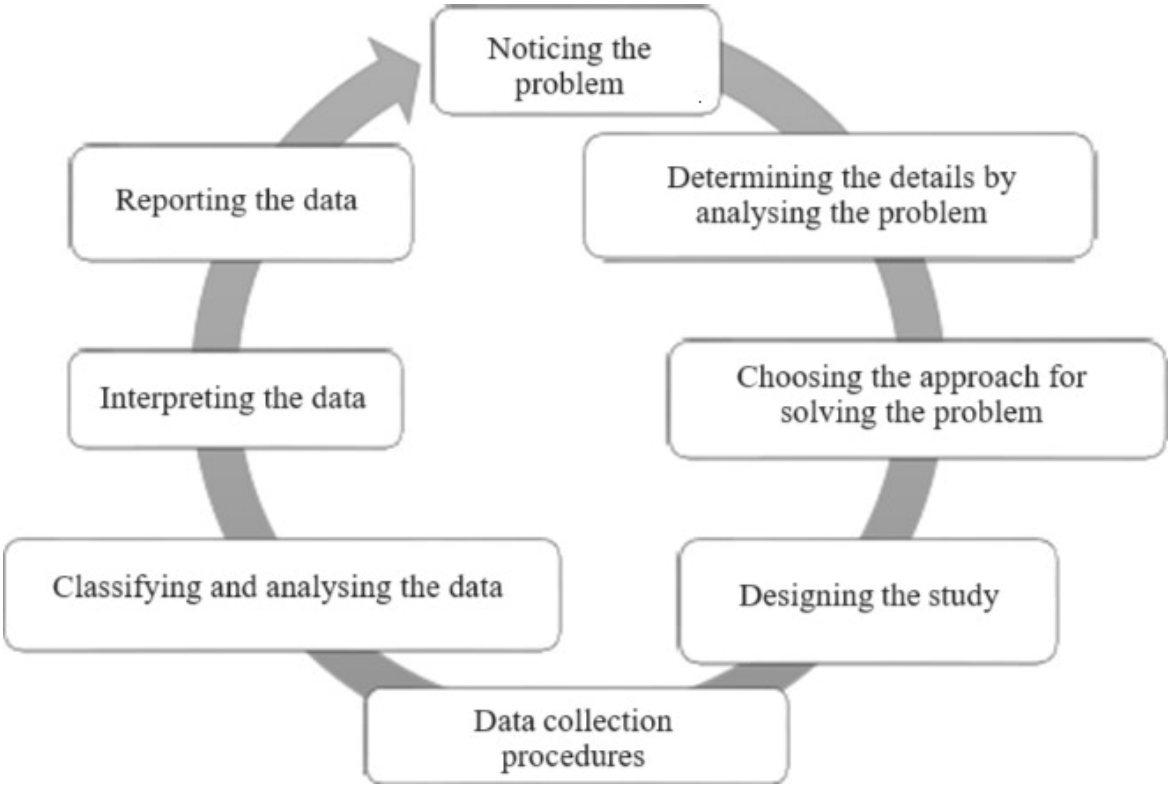

Figure 1. The stages of qualitative studies (Creswell, J. W. (2002). Educational research: Planning, conducting, and evaluating quantitative. Prentice Hall Upper Saddle River, NJ.)

According to Figure 1, the stages of the process include noticing the problem, analyzing it, choosing the approach for a solution, designing, collecting the data, classifying, analyzing, interpreting, and reporting the data.

In addition to that, Patton (2002) also emphasises that there are no formulas for performing qualitative studies in an accurate and appropriate way and draws attention to the fact that there is not one test for ensuring that a study is reliable and valid.

It is pointed out in the literature that the errors have increased in studies in parallel to theincrease in the number of qualitative studies (Yıldırım & Şimşek, 2016) and that the master's degree theses prepared in science education in qualitative research methods have lacks in terms of methods (Gürdal et al., 2010). Since there are studies on science education, but no studies on mathematics education in the same department (Department of Mathematics and Science Education), the study was conducted with master's degree students in mathematics education. In addition, it is thought that the study will contribute to the literature by determining the thoughts of the students who conduct qualitative studies in the field of mathematics education and comparing them with those of other disciplines.

Thus, the current study aims to analyse the views of the master's degree students at the mathematics teaching department on using qualitative research methods. Accordingly, the research problems formulated are as follows:

1. What are the views held by mathematics teaching department master's degree students inrelation to determining the research problem in qualitative studies?
2. What are the views held by mathematics teaching department master's degree students inrelation to forming the conceptual framework in qualitative studies?
3. What are the views held by mathematics teaching department master's degree students inrelation to determining the design in qualitative studies?
4. What are the views held by mathematics teaching department master's degree students inrelation to reporting the data of qualitative studies?

Method

The Research Design

The current study employs a case study approach - one of the qualitative research designs. It uses a single-case holistic design so as to analyse cases such as an individual, an institution, or a school in detail (Güler et al., 2015). The case here was describedas taking the qualitative research methods course in mathematics teaching during master's degree education and being at the stage of writing thesis.

Participants

The participants were chosen through criterion sampling, and the criterion set for the study was the same as the case in the study. The two criteria for the selection of the participants were determined as having taken the qualitative research methods course and having conducted a qualitative study. The study group was composed of 12 master's degree students of education mathematics teaching who were writing their thesis in a university in the Mediterranean region of Türkiye. The participants- whose demographic properties are shown in Table 1- were coded as T1, T2… T12.

Table 1. Demographic features of the participants

Participants	Gender	Place of work	The stage of Education	Whether or not they have taken the course	Whether or not theyhave conducteda qualitative study	Whether or not theirqualitative study hasbeen published
T1	K	MoNE	Thesis writing	✓	✓	
T2	K	MoNE	Thesis writing	✓	✓	✓
T3	K	Unemployed	Taking courses	✓	✓	
T4	K	A private institution	Thesis writing	✓	✓	
T5	K	MoNE	Thesis writing	✓	✓	
T6	K	MoNE	Thesis writing	✓	✓	
T7	K	A private institution	Thesis writing	✓	✓	✓
T8	E	MoNE	Taking courses	✓	✓	
T9	E	A private institution	Thesis writing	✓	✓	
T10	E	Unemployed	Thesis writing	✓	✓	✓
T11	E	MoNE	Taking courses	✓	✓	
T12	E	MoNE	Thesis writing	✓	✓	

MoNE: Ministry of National Education

According to Table 1, the participants consisted of seven female and five male students, and four of the female students and three of the male students worked as mathematics teachers in the middle schools of MoNE. They mostly said that they were at the stage of thesis writing in master's degree education, that they had taken a course in qualitative research during the master's degree education, that they had conducted a qualitative study and that three of the qualitative studies had been published.

Data Collection Tools and Processes

The research data were collected through personal interview forms (PIF) and focal groupinterview forms (FGIF). Four semi-structured questions prepared by the researchers were sentto four mathematics educators and two experts in methodology for the validity test of the PIF. The experts stated that one of the questions was not adequate and an addition should be made, and thus, the question was arranged in the light of expert opinion. The remaining three questions, on the other hand, were found appropriate, and the rate of agreement between the experts was calculated at 92% by calculating the mean for agreement scores. The final version of the open-ended questions is as follows:

1. What kind of approach do you follow when determining the research problem and the design of your qualitative studies? Why? Explain.
2. What kind of approach do you follow in creating the conceptual framework of your qualitative studies? Why? Explain.
3. How do you go about reporting the qualitative studies you have conducted? Why? Explain.

The FGIF, however, contained six open-ended questions. Expert opinion was consultedsynchronically with PIF for the validity test of FGIF. Two questions were added to the existing six questions in accordance with expert opinion. The rate of agreement between the experts was found to be 88%. The PIF was used in individual interviews with the participants. The participants were asked to answer each question and the interviews lasted approximately 65-80 minutes. After analyzing the participants' answers, focal group interviews were held with six master's degree students who had diverse opinions. The FGIF was used in the focal group interviews. FGIF questions included probing questions aimed at "elaborating what the participants meant" in their answers to the individual interviews.

Eternal experts (two mathematics educators and an expert of methodology) weresummoned to the focal group interviews, and thus it was assumed that they would contribute to the research process and to the post-research process objectively and with no prejudice as observers. The researchers took part in the study as participant observers in order to understand the answers given by the participants in the individual focus group interviews in depth.

Data Analysis

The data were subjected to content analysis and descriptive analysis. Similar concepts and themes (Yıldırım & Şimşek, 2016) were put together in content analysis. The stages of qualitative research, which were determined by researchers beforehand, were considered themes, and coding was done accordingly for content analysis. The statements made by the participants in relation to the research problem were directly quoted through descriptive analysis.

The interviews with the participants were transcribed, and the themes and codes were distinguished in accordance with the purpose of the study through content analysis by using the transcriptions by the researchers and by the experts independently of each other. The themes were configured based on the stages of the qualitative research process, and the sub-themes were configured according to the participants' responses to the PIF and FGIF.

The researchers and the three experts who analysed the codes and themes discussed theconsistency between the codes and themes and thus reached agreement. The similarity which Miles and Huberman (1994) call internal consistency and which they conceptualise as interrater agreement is calculated by using the $\Delta = C \div (C + \partial) \times 100$ formula, in which Δ is reliability coefficient, C is the number of topics or terms in which agreement is reached and ∂: the number of topics or terms in which there is no agreement. Agreement between the 5 coders

was found to be 89% according to the coding check, which yielded internal consistency. The final shape was given to the codes and themes following the necessary regulations.

The participants were frequently made to confirm their statements during the focal groupinterviews so as to increase persuasiveness due to the fact that researchers' perspectives had impacts on the persuasiveness of qualitative studies, and therefore one way of securing persuasiveness was to choose and use objective methods (Baltacı, 2017). Besides, the participants' statements were also cited directly in the findings section; and the transferability of the study was increased in this way.

Findings

Determining The Research Problem in Qualitative Studies

The views of the master's degree students in the mathematics teaching department on determining the research problem in qualitative studies are shown in Table 2.

According to Table 2, participants' thoughts on determining the research problem were divided into such themes as the problems noticed, the problems encountered in practice, the problems reached through past experiences, the problems reached through a literature review, determining the sub-problems, and personal competence. All the participants said that they set out from the fact that there were problems stemming from the system in teaching mathematics and that it was influential in determining the subject of study. Thus, T2 said,

> *"First, I worked in a private school, and then I began to work in a state school; but thereis a system which makes things difficult both in private schools and in state schools. For example, whenever I want to hand out tests to students, the school manager says the printer is out of order. But I notice that it works. We ask families for help in favor of their children, but they keep away. I mean, there is a system which hinders the things you want to do. And I want to be a part of the solution to the system. I do not know how much space it holds or how much I can do, but I believe that I can do something."*

Personal competence involves positive and negative competence. While participants' curiosity, competence in the method they use, and their belief that they can be a part of the solution are positive competence and the idea that they cannot conduct long-term studies is negative competence. Such competence is thought to be influential in master's degree students' determination of problems. T4, for instance, stated their competence with the following statement:

> *"I took a lot of courses in creative drama during my undergraduate education, and I liked them very much. I made self-development in this respect, and I taught courses. I felt that I would be successful if I used drama as a method. So, I wanted to use drama in my study. So, what I would study and how I would study it became apparent."*

Table 2. Mathematics teaching department master degree students' views on determiningthe research problem in qualitative studies

Themes	Sub-themes	f
The problemsnoticed	The availability of problems encountered by teachers in the immediate surrounding in teaching mathematics	10
	The availability of problems about the system encountered byindividuals in the immediate surrounding	4
	Family members who encountered problems in teaching mathematics	5
The problems encountered in practice	The availability of problems encountered in teaching practice	11
	Having problems in teaching private mathematics courses	8
	Having problems in the classroom while teaching mathematics	10
	Having problems stemming from the system while teaching mathematics	12
The problems reached through past experiences	Having problems in teaching mathematics while they were students	7
	Noticing that mathematics teachers have problems while they are students	4
The problems reached through literature review	Thinking that the topic was not studied because the subject was not encountered in literature review	6
	Studies available in international literature but not available in national literature	3
Determining the sub-problems	Thinking that problems are encountered in distinguishing between sub-problems and research questions	9
	Noticing that the problem was not divided into sub-problems	5
	Thinking that different measurement instruments should be used for sub-problems	5
Personal competence	Failure to conduct long-term studies	4
	Having too much curiosity	10
	Belief that they can be a part of the solution	9
	Having competence in the method to be used in a study.	3

Table 3. Mathematics teaching department master's degree students' views on forming the conceptual framework

Themes	Sub-themes	f
Making use of the previous studies	Forming by using the recommendations made in the studies analysed	8
	Forming by using the conclusion and discussion sections of the studies analysed	4
	Forming by predicting the theories in a different way.	2
Spotting the gaps in other studies	Methodological gaps in other studies	7
	Application gaps in other studies	8
Using a certain framework (distinguishing categories and themes	Using the existing framework	8
	Availability of the phenomena which are thought to be completed in the process	2
Personal competence	Being dependent on the ability to understand foreign literature	2
	Ability to read a great number of studies depending on the daily work routine	4

In addition to that, the participants also stated that the problems they encountered in schools of practice teaching where they had practice teaching during their undergraduate education were influential in determining the problem in their qualitative study. Thus, a participant, T3 said,

"There was a student in the classroom who I will never forget. He could not learn the multiplication table despite being a 7th grader. The teacher asked me to care for him. It was evidentthat he had learning difficulties in mathematics although, there was no diagnosis. I prepared lots of activities for him and we worked together. I said to myself, 'why they cannot learn? There should be a way.' I wondered and then I came across the concept of dyscalculia and I wonderedwhat it was."

Apart from that, participant T9 stated:

"Students were always late for classes. The teacher was not angry with them, and others' attention was distracted. I talked to the teacher. He/she said that he/she had 40-years of experience and that he did not want to argue with others. I felt sorry for children, and I thought about what I could do for them. Perhaps it caused me to find the causes of their distracted attention. But I studied a more specific subject later."

Another remarkable situation was that the experiences of participants' family members were influential in determining the problems in the studies. A participant, T3, described it as the following:

"My brother was in middle school, but he always came home saying that mathematicswas difficult. I asked him what was difficult about mathematics, and I recommended helping him, but he never accepted my offer so that his failure would not be known. Everything continuedin the same way for a few months. I said I had not understood mathematics at his age and suggested studying together. I realised that he had not understood the topics for three months. He did not know anything about positive or negative numbers. He had not done any homework. He would take an important exam the following year without any knowledge. I thought mathematics might be difficult for students. I was good at math, and why were those who failed math were bad at it."

Forming The Conceptual Framework in Qualitative Studies

Table 3 shows the participants' views on forming the conceptual framework in qualitative studies.

The participants thought that the conceptual framework in qualitative studies was formed by making use of the previous studies, by spotting the gaps in other studies, by using a certain framework, and through personal competence.

They said in the theme of making use of the previous studies that the conceptual framework was formed with the help of recommendations made in the studies they had read, by using the conclusion and discussion sections of the studies and through different predictionsof the theories. T7, for instance, said,

"The lecturer told us to make a summary of the studies we read in a Word document by giving the necessary information about them when I started my master's degree education. I later noticed that each study I read led me to read another study. I think now that the conceptual framework I formed was formed on the basis of such work.

Additionally, the participants thought that spotting the methodological and practical gaps in other studies, using the existing framework, determining the phenomena that could be completed in the process and personal competence were also influential in forming the conceptual framework. Thus, T7 said,

"There was a framework which belonged to Ball in teaching mathematics, and I wanted to analyse mathematics teachers according to this framework, which was widely accepted.

Determining The Research Design in Qualitative Studies

Table 4 shows the participants' views on determining the research design in qualitative studies.

As it is clear from Table 4, the views are divided into such themes as choosing a design, determining the sample suitable to the design and the problem, developing and using data collection tools, deciding on data collection methods, analysing the data, and personal competence. In the theme of choosing a design, 11 participants stated that it was comforting forthem to know that the design could change due to the fact that qualitative studies were flexible.T5, for instance, said,

"I was indecisive about doing the study qualitatively. In fact, I am more inclined toward quantitative studies. But it was good for me to know in the qualitative studies course that such studies were flexible. A qualitative study was something that I did not know about- like a sea thatI did not know. But I was to dive into it and reach the coast. I wouldn't be drowned in that sea. Choosing a design is important. I should determine it according to the problem. I continued with the first design that I had determined. But the idea of flexibility is good!"

Table 4. Mathematics teaching department master's degree students' views on determining the research design in qualitative studies

Themes	Sub-themes	f
Choosing a design	That the choice of a design can change in the process because qualitative study is flexible	11
	That the choice of a design is restricted in teaching mathematics	6
	That building a theory is a difficult process	4
	That the designs used in teaching mathematics are fixed	7
Determining the sample according to the design and the problem	That the sample size is not clear in the literature	10
	That the participants are not eager	11
	That the participant cannot profit from the process	3
	That receiving the ethical permissions to reach the sample group takes a long time	8
Developing data collection tools suitable for the design and to the problem and using them	That the number of experts to consult in developing the data collection tools is small	10
	That feedback for expert opinion is given in a long time	5
	Failure to distinguish between the necessary data due to the abundance of data collection tools	9
	Considering the data collection tools deficient and re-developing them	4
Deciding on data collection methods according to the design and the problem	Failure to use the data collection tools (interviews, observations, etc.) functionally while collecting the data	4
	Failure to collect data from older people while using the data collection tools in individual interviews	2
	That the recording process is difficult in data collection	9
Analysing the data according to the design and the problem	Having difficulty in deciding what data to include and what data to exclude in data analysis	11
	Limiting the types of analysis to two İ	8
	That coding takes too much time	4
	Considering experts' demands for coding as negative	5
Personal competence	Considering the responses adequate in interviews and not insisting on more	3
	Being able to get responses without leading	7
	Failure to devote more time	2

Another sub-theme with high frequency stated by the students in the theme of determining the sample according to the design was that the participants were not eager. Another point stated was the fact that the sample size was not clear in the literature. Thus, the participant coded as T7 made the statement:

"According to some resources we had read in the qualitative studies course, six to eight people were necessary for action research. I noticed while starting the study and while talking to my colleagues that I would need at least 10 participants if I formed the sample according to yearsof experience and gender. The number is not stated in some resources. I started with 10 participants and have two of them left in week two. I thought eight people would not be adequate, and I lengthened the process. Two more people came to the point of leaving. I am also a teacher, but I found it difficult to decide on the number.

In the theme of developing data collection tools according to the design and the problemand using them, the participants pointed to the small number of experts to consult in developing and using the data collection tools and their failure in distinguishing between the necessary data due to the abundance of data collection tools. Besides, they also said that feedback for expert opinion was given in a long time and that they tried to develop data collection tools againbecause they found them deficient. In this respect, T8 said,

"I need to look at agreement between experts. Two experts sent the results, but the thirdone answered my e-mail two months later. It was strange to me that it took such a long time."

On the other hand, T1 said,

"I had interviews, made observations, and held focal group observations, but I had difficulty in using the data I had collected with these tools. I could notice the need for checking which data would be useful to me only after transcription. It is necessary to keep awayfrom the study for a while after transcription. The advisor told me that I should put the data aside for a while so I could look at them from a different perspective. And I did so. I understood that I could not see some of the things while I was working."

The participants mentioned the difficulty of recording the data in the theme of decidingdata collection methods according to the design and the problem. They said that such problems were not encountered too often when the participants were teachers and family members. T2, for instance, made the statement:

"I needed to record a modeling activity in the classroom with the video camera. The questions would be shaped later, accordingly. Although I had permission for video recordingand the participant was informed of it, they did not permit the video recording. I had to take lotsof photos in order not to miss any points."

Most of the participants mentioned difficulty in deciding what data to include and whatdata to exclude in data analysis, with the theme of analysing the data according to the design and the problem. Other views stated in the theme were about

limiting the types of analysis to two, about coding, which took too much time, and about considering experts' demands for coding asnegative. To exemplify, T2 stated the opinion:

"I worked with six prospective teachers, but I felt as if I was listening to the same things from four people. It seemed like four was enough. I thought about whether or not to include the data in analysis, but then I did. Then I coded according to the unit of analysis. The third person would need to listen to thousands of minutes of recording. It was very difficult for me tofind an expert who would help me in coding."

The master's degree students said that they did not insist on more detail and considered the answers adequate in the interviews on the theme of personal competence. In addition to that,they also stated that they could receive answers without leading and that they had problems with data analysis due to a failure to devote more time. T8, for example, made the following statementin this respect:

"The teacher I interviewed was older than me. The answers I received were not more than a few sentences despite all my effort. So, I considered the answers adequate. But the answers were not useful for me."

Another participant, T7, said,

"The lecturer asked us to hold interviews while doing our assignment in the qualitative studies course. I interviewed my students. Then, I noticed while listening to the voice recordingsthat I had led them by saying 'Do you?' Is that right?' 'Do you mean…?' but I did not do it in my thesis. I did not lead the participants. I only asked them to clarify what they said. It was a great success for me."

Reporting The Data in Qualitative Studies

The views stated by the master's degree students are shown in Table 5.

Accordingly, the students' views on reporting were divided into such themes as reporting the problem, reporting the method, reporting the conclusion and discussion, reportingthe recommendations, and the physical properties of reporting. The problem and the introductionsections were considered together because of the availability of joint studies. The participants thought in the theme that the purpose was confused with the problem and with the significance, that describing the problem was difficult while performing a qualitative study about teaching mathematics, and that limitations were not mentioned. For example, T8 stated their view as:

"We include it in theses, but I haven't seen it in articles. I hesitated whether to include it or notin my study. To what extent should the limitations be described? I believe that everything is already clear. But I sometimes think about what to write if I need to write."

T10, on the other hand, said,

"I think that the purpose is confused with the significance. In my opinion, limitations are determined by the significance of the study, but we do not mention them. The extent of limitation confused me."

Conclusion and Discussion

The current study concludes that the articles and theses written in the qualitative study method are more difficult than the ones written in the quantitative study method, but that master's degree students think they can cope with the work due to their personal competence. The study analysed master's degree students' perceptions of methodology used in qualitative studies (Saban, 2007) and concluded that the students were eager to perform such studies, that they perceived qualitative studies as humanistic and sincere, that they had self-confidence to performsuch studies, that the method was appropriate for subjects of research, and that those studies gave the opportunity to do deeper research. Therefore, the conclusions reached were in parallelto the ones reached in this current study. The distinction between the two was that the mathematics department master's degree students had the opportunity to experience doing qualitative studies in the current study. And the fact that graduate students are able to structure interviews in a qualitative study depending on their personal competencies can be explained by the fact that qualitative research is sensitive to the natural environment and that the researchers personally interview and interact with the participants they meticulously select (Seggie & Bayyurt, 2017).

Table 5. Mathematics teaching department master's degree students' views on reporting the qualitative research data

Themes	Sub-themes	f
Reporting the problem(Introduction)	Confusing the purpose with the problem	4
	Confusing the purpose with the significance	5
	Difficulty in describing the problem of teaching mathematics while performing aqualitative study	6
	Not writing down the limitations in a qualitative study	2
Reporting the method	Describing the participants' demographic features which are not used in the study	3
	Describing the participants and the atmosphere in articles (due to the number of pages)	5
	Thinking that it is the same as other studies	3
Reporting the findings	Indecisiveness about which statements made by participants are to be included	8
	Failure to state the pattern available in the qualitative study	9
	Considering the findings as if they were statements listed one after another	7
	Not describing the findings independently of comments	3
Reporting the conclusion and discussion	Associating the results with disciplines other than mathematics teaching	4
	Not believing in supporting the results with other studies	6
Reporting the recommendations	Including general recommendations for teaching mathematics	11
	Recommendations are independent of results	8
The formal properties ofreporting	Reducing the number of pages	11
	Problems stemming from the fact that each journal has a different format	5

Another finding obtained here was that the participants configured their problems according to different types of problems. Thus, the participants who had taken a course in qualitative studies and who contributed to qualitative studies set out from the problems available in their environment while determining the problems, and the problems were the problems their friends had encountered, and the problems related to the system. In addition to that, the participants' desire to fill the gap in the literature, their curiosity and their belief and self-confidence in performing such studies were also influential in determining the research problem. The main reason why graduate students have difficulty in expressing the problem statement in a qualitative study can be explained by the fact that qualitative research has a theoretical structure (Cresswell, 2018) embedded in interpretive frameworks (Yıldırım & Şimşek, 2016), as well as post-positivist and interpretivist understandings (Yıldırım & Şimşek, 2016).

This was a finding similar to the ones obtained in studies on formulating the research problem (Büyüköztürk et al., Ekiz, 2009; Neuman, 2006; Punch, 2013; Usta, 2012) which also aimed to fill in the gaps in the literature. The point where this study differs from others is its argument that detecting the problems on the basis of experience and observations was influential in determining the problem in qualitative studies.

It was also found here that; the participants could not distinguish between research sub- problems and research questions, they could not divide the problems into sub-problems, they confused the problem with the purpose, and they had problems in using different measurements. (Horzum et al. (2016) showed that those students confused the research problem with the purpose of the study, a finding similar to the one obtained in the current study.

Another finding obtained here was related to forming the conceptual framework, and accordingly, the participants tended to fill the gaps in the conceptual framework of other studies, and to use the existing framework, and they had personal competence. Additionally, students' lack of proficiency in using a foreign language, reading skills, and conducting their studies during their daily work also caused them problems in forming the conceptual framework. The relevant literature contains various concepts, associations between concepts, and data (Miles & Huberman, 2002) and it is in fact a construct built by researchers (Çepni, 2021). And they couldbe said to be indicators of forming a conceptual framework for the participants.

It was found that the participants noticed that the research design could change in the process due to the flexibility of qualitative studies but that the research design of studies in teaching mathematics was limited and fixed. The finding was in parallel to the ones which emphasised the flexibility of qualitative studies (Ergutay, 2019; Karataş, 2015). No studies that indicated the qualitative studies had limited and fixed designs were found. The current study also found that the participants had difficulty in determining the sample and that there was no clear information on the sample size in relevant literature. Another finding was that there were only a small number of experts to consult in developing data collection tools according to the problem and the design, and that expert opinion was obtained over a long period of the time. It was also found in this study that the participants could not use the time functionally after interviews and observations, that they had difficulty in recording the studies, that it was tiring to create codes while analysing the data, and that the types of analysis were limited to two. It also became apparent that some of the participants could not go beyond the responses they had gotten in interviews and that they were concerned about the usefulness of the data they collected because they did not insist on getting more detailed answers. A study (Ergutay, 2019) was found to be parallel to this study in that it included personal subjectivity and competence in the processand that it interacted and communicated directly with the social reality it analysed.

The participants stated their thoughts on reporting the qualitative study in terms of reporting the problem, reporting the findings, reporting the conclusion and discussion, and reporting the recommendations in terms of the formal properties of reporting. Another finding obtained in the study was that the participants collected data while reporting the findings, that they were indecisive about what data to include, that they considered findings asa list of statements written one after another, and that they thought independently of commentswhile reporting the findings. It was also found that the recommendations were limited to general recommendations about teaching mathematics, that the recommendations were independent ofresults, and that the participants had difficulty in reducing the number of pages. The participantsalso stated that they had problems due to the different formats that journals used and that they needed rearrange their study accordingly.

Within the scope of this study, the views of mathematics teacher education graduate students on the use of qualitative research methods were determined. These opinions include the difficulties and conveniences experienced in this discipline, and it is recommended that the opinions of the participants who have a master's degree in different disciplines should also be taken. It is also recommended that these views should be a road map and that studies should be carried out to structure the parts that emerge as problems with an action plan.

Author Contributions

All authors were equally involved in all processes of the manuscript. All authors have read and approved the final version of the manuscript.

Ethics Declaration

This study was conducted with the approval decision taken at the 2022/19 meeting ofAkdeniz University Human Research Ethics Committee in Social Sciences (Protocol No. 2022/392) dated November 7, 2022.

Conflict of Interest

The authors declare that there is no conflict of interest with any institution or personwithin the scope of the study.

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