

Problems Encountered During the Scientific Research Process in Graduate Education: The Institute of Educational Sciences

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Abstract

This study was conducted to determine the problems faced by graduate students when conducting scientific research and to make suggestions for solving these problems. The research model was a case study. Semi-structured interviews were conducted with participants in the study with questions about the problems encountered during scientific research in graduate education, recommendations for solutions to these problems, and participants' experiences in terms of their scientific research knowledge and skills. As a result of the discussions, the participants suggested that courses should be more practical and that there should be more taught courses, so that educators can direct students and facilitate access to resources.

Keywords: graduate education, scientific research process, proficiency level

1. Introduction

1.1 Introduce the Problem

Postgraduate education is the training that, after a four-year undergraduate program, allows graduates to earn masters' and doctoral degrees and specialize in specific sciences (URL-2, 2008; Sağlam, 2007). Doctoral studies are carried out in order to produce individuals who are able to conduct original research in a free manner in line with their interests (Gardner, 2008). Doctoral education lies at the core of a university's research capacity (Kehm, 2008, p.19). Studies show that research environment's microclimate in the form of a shared emotionality is to be regarded as a pervasive and significant feature in the daily activities of doctoral students and employees in general a common and important feature in the daily activities of doctoral students in general (Christensen & Lund, 2014).

Graduate education is a long process involving both taught courses and the writing of a thesis. PhD students perceive PhD studies as a burdening and stressful process (Anttilla, Lindblom-Ylänne, Lonka & Pyhältö, 2015). In this process, students must generally first study for and pass a course (URL-1, 2008; Güven, Kerem Aktan & Ersoy, 2007). Therefore, the current study aims to determine associated to the primary challenges and solution suggestions of graduate students enrolled in higher education in the Turkey sample.

This study aims to determine the difficulties encountered in the process of graduate education. These include conceptual problems that students may encounter in the process (Kiley, Grant, Gordon & Clouder, 2009), intrusive supervisors (Alam, 2013; Bakioğlu & Gürdal, 2001; Styles & Radloff, 2001), determining the topic of the thesis (Kalem & Akman, 2007), participants who do not want to give up forms of education they are accustomed to (Torkul, 2012), difficulties in obtaining legal permissions (Çetin, Asker, Çirkinoğlu & Karaca, 2007; Suna, Karadağ & Selanik, 2007), personal relationships, family responsibilities, financial issues, problems relating to work and health, as well as a reduction of interest in the topic and changes of career plans (Appel & Dahlgren, 2003; Wright, 2003). These may vary from student to student (Yazgan, 2015). Developed countries are now moving to implement brain based learning approach because of the closer relationship with attitude and motivation (Akyürek & Afacan, 2013a). It is believed that this study may help minimize these problems. In addition, in the light of the knowledge and experience of individuals who are in the process of scientific research, the level of awareness of graduate students who have recently started research may be increased.

In solving any problems encountered, it has been reported that adopting a work schedule/timetable (Gupta, 2012),

using internet-based databases (Abiddin, 2011; Olmos, Juanjo, Eva & Ana, 2015), constant monitoring of research already conducted (Jalan, Nusantara, Subanji & Chandra, 2016) and collaborative work (Igun, 2010) are all beneficial. Motivation and effective learning process are also important for higher education instructors (Sogunro, 2017).

1.2 Purpose

The aim of this study was to identify the problems faced by graduate students in the scientific research process and to determine the solutions for these problems. For this purpose, the problem statement of the research was:

“What kinds of problems do graduate students face during the scientific research process and what do they do to solve these problems?”

In this context, the following sub-problems emerged:

1. What are the main problems experienced by graduate students during the scientific research process?
2. What kinds of solutions to these problems are suggested by the students and do they think that these suggestions are effective?
3. What kinds of attempts have been made to gain knowledge and skills while doing scientific research?

2. Method

2.1 Research Model

A case study model was used in this study. This model allows for one aspect of the problem investigated to be studied in depth and in a relatively short time. The subject of the study can be a person, a school or a group (Cohen, Manion & Morrison, 2000; Yıldırım & Şimşek, 2013). In this study, the problems experienced by graduate and doctoral students at a university in the Central Anatolia Region when conducting scientific research were considered on an individual basis.

2.2 Sampling

Typical case sampling was chosen from among the sampling methods for the purpose of determining the sample of the research. The study included graduate students, which is a typical group for sampling, as the study was going to examine the problems encountered by graduate students during the scientific research process. The sample of the research was made up of research assistants and teachers studying at the Institute of Educational Sciences of a university in the Central Anatolia Region. Participants' demographic characteristics are given in Table 1.

Table 1. Demographic Characteristics of Participants

Level of Education	
Postgraduate	8
PhD Student	21
Department	
Primary School	3
Computer Studies	7
Elementary Mathematics	1
English Language and Literature	1
Turkish Language	2
Science	8
Preschool	5
Social Studies	1
Psychological Counseling and Guidance	1
Total	29

Nine of the individuals in the sample were male and 20 were female. The distribution of the individuals in the sample by department was as follows: 3 primary school teachers, 7 computer studies teachers, 1 primary mathematics teacher, 1 English language and literature teacher, 2 Turkish language teachers, 8 science teachers, 5 preschool teachers, 1 social studies teacher, 1 psychological counseling and guidance teacher.

With regard to the educational level of the participants, 8 were postgraduate students and 21 were doctoral students.

2.3 Data Collection Tool

Structured interview questions were used as data gathering tools in the study. In order to clarify the scope of interview questions, three experts in the field were consulted (Büyüköztürk et al., 2012). In addition, questions were addressed to ten participants from different universities, and in line with the criticisms received the questions were revised with the experts.

2.4 Data Analysis

The data obtained from structured interviews were analyzed using the content analysis method. The interviews were first transcribed and then two experts from different disciplines analyzed their content. Analysis by experts from different disciplines is known to increase reliability (Yıldırım & Şimşek, 2013).

In the content analysis, data were analyzed and coded with regard to the research aims. By using codes to define similar situations, themes were created in line with the purpose of the research (Yıldırım & Şimşek, 2013). The coding for the participants' statements about the themes and themes created are presented in the tables. Direct quotations from the participants are also given in order to increase the validity of the data and to provide an understanding of the themes and coding made by the researchers. Examples from the participants' statements are very important to ensure the validity of the data (Yıldırım & Şimşek, 2013).

First, the problems the participants encountered in their research are listed. In the second stage, the themes were analyzed in terms of the data thought to be attributed to the theme's source, and the sub-themes and common points of the themes were determined.

In the next stage, the list of themes that identified common areas was grouped by three experts from different disciplines under agreed-upon headings. After this, the three experts independently analyzed the data sets obtained from each other. After the content analysis, the two researchers compared the results of the analysis. The reliability of the study was calculated using the formula of Miles and Huberman (1994) (reliability = opinion association/opinion association + opinion separation) by determining the number of opinions and opinions in comparison. In qualitative studies, a level of reliability is achieved when the compatibility between expert and researcher evaluations is 90% and above (Saban, 2009). In the reliability study conducted specifically for this study, a compromise (reliability) of 94% was achieved. Finally, the problems identified by the participants trained in different departments for each category were classified separately and the number, frequencies and percentages of the themes developed in relation to the category were calculated.

3. Findings and Comments

In this section, the results obtained from the responses of the participants to the structured interview questions are presented.

3.1 Findings and Comments Related to the First Sub-Problem

Findings for the first sub-problem of the research "What are the main problems experienced by the participants in the scientific research process?" are presented in Table 2. Nineteen participants stated that their solutions to problems were effective (*) and 10 people stated they were not effective (-) solutions.

According to Schatzman and Strauss (1973), the most important process in qualitative research is the discovery of the most distinctive characteristics that define people and events (p. 110). In order to provide for ease of reading during the presentation of the findings, avoid excessive repetition of words, and to specify who the statement belongs to when presenting the sample associated with each category, symbols were used in the "gender-code-department" (e.g., F-H-E-T, female H code English teacher or male XX participant researcher M-XX-P-R) (The department codes were shown in Table 1). The distribution of the problems that the participants experienced during scientific research is shown in Table 2.

Table 2. Distribution of the problems experienced by participants in postgraduate education with regard to scientific research by theme

Theme Order	Theme Name	Frequency (f)
1	Level of Scientific Knowledge	12
2	Supervisor	8
3	Methodology	18
4	Problems with Resources	9
5	Legal Procedures	3
6	Problems with Participants	4

In Table 2, the problems participants had with postgraduate education during the scientific research phase are divided into the following themes: level of scientific knowledge, supervisor-related issues, methodology, problems with resources, legal procedures and problems with participants.

Participants (F-F-E-T), (F-H-S-T) and (F-Y-S-T) stated that it was problematic for them to have to follow the interests of their supervisors while determining the subjects of their research. Related statements are as follows:

“In general, what is done at this stage in our country is based on the interest of your thesis supervisor, using his orientation to make a choice of subject and prepare a thesis in line with that, but I think it the person in postgraduate education knows better.”(F-F-E-T)

“The biggest problem at the moment is to determine the subject. I’ve chosen the subject in accordance with my supervisor’s advice.” (F-H-S-T)

“In addition, we have to be dependent on the thesis supervisor when writing the thesis, mainly working in his/her field of study; we are not free to choose the subject. In particular, supervisors play an active role in the scientific research processes for a master’s thesis.”(F-Y-S-T)

Participants (M-C-P-R) and (F-J-P-R) expressed problems with data analysis:

“I’ve had a lot of trouble analyzing data.”(M-C-P-R)

“I think I’ve had some trouble with the data analysis process.”(F-J-P-R)

Participants (F-W-S-T) and (F-X-S-T) stated that lack of planning posed a problem for them. An example statement is as follows.

“It also made it difficult for my work to progress when its final form wasn’t planned.”(F-X-S-T)

Participants (F-U-S-T), (F-K-P-R), (F-P-P-R), (M-G-T-T) and (M-I-S-T) stated that they had problems accessing resources. Sample statements are as follows:

“Many of the articles and works which I need to access have to be paid for or don’t give you permission to publish them.” (F-U-S-T)

“In fact, my main problem was accessing resources. I came from out of town, and I couldn’t get to the resources when I wanted to.”(M-G-T-T).

Some participants had problems with the method to be used:

“There is also the problem of determining the method. For example, after formulating the research problem, determining which method to use and finding or developing the appropriate tools for this method was a bit troublesome for me.” (F-J-P-R)

Some participants stated that they had problems with the content of the courses being insufficient. An example statement is as follows:

“I see it not only with regard to myself, but also in my friends: it is often the case that scientific research methods are very important, but sometimes they can be overlooked.” (F-D-P-R)

Table 3. Distribution of the problems experienced by participants during scientific research

Themes	Problem name	Frequency(f)
Level of Scientific Knowledge	Lessons remain theoretical	2
	Course has insufficient content	8
	Research stage	2
Supervisor-related issues	Determination of the topic according to the field of interest of the supervisor	4
	Supervisor failure	2
	Unable to meet the supervisor	1
	The supervisor does not help	1
Methodology	Problems with the method	5
	Problems with planning	3
	Issue related to the research problem	2
	Problems with data collection tools	3
	Problems in data analysis	3
	Problems encountered during the basic research process	2
Problems with resources	Language problems with foreign resources	2
	Problems with accessing resources	7
Legal procedures	Problems getting permission when collecting data	2
	Problems resulting from late granting of permits	1
Problems with Participants	Unwillingness of participants	3
	Participants are not honest	1

As a result of this research, a lack of scientific knowledge was stated to be a problem by 12 participants. Eighteen of them had problems caused by methodology, 8 had problems caused by supervisors, 9 had problems with resources, and 4 had problems related to participants. Some participants experienced problems in all of these areas.

3.2 Findings and Comments Related to the Second Sub-Problem

The second sub-problem of the study was “What kinds of solutions to these problems are suggested by the students and do they think that these suggestions are effective?” The students' answers to this question are given in Tables 4 and 5.

Table 4. Proposals for solutions to the problems experienced by participants during scientific research

Theme	Suggested Solution	Frequency (f)
Level of Scientific Knowledge	Taking lessons	8
Methodology	Keeping the survey short	1
	Planning the developmental process of research	1
Topic Determination	Deciding on a topic that attracts the researcher	2
Consultation	Asking the supervisor for guidance	7
	Peer support	4
Support from Publications	Browsing previous work conducted	9
	Browsing books	1
Using Technology	Accessing different databases	2
	Distance education	2
	Contacting experts by email	2
Legal Procedures	Ensuring rapid progress of the legal procedure	1
Solving problems during the implementation of a survey	Informing participants	3
	The researcher's own practice	2
	Preparing a work schedule	2
	Reach more participants	1

Participants (M-C-P-R), (F-H-S-T), (F-K-P-R), (M-N-P-R), (F-R-P) and (F-Z-S-T) stated that reading publications helped in eliminating the problems encountered during the scientific research process. The

participants' statements are as follows:

"I reviewed a sample thesis and a large number of articles. This was effective."(M-C-P-R).

"I also looked at publications from international conferences." (F-H-S-T)

"I found first-hand quotes by accessing books related to the bibliography of the articles and theses I reviewed." (F-K-P-R)

"I've expanded my searches as far as I can. I tried to fill in the gaps by using different websites and electronic documents. I studied articles published in magazines and tried to understand scientific research methods. I think the techniques I've used are effective." (F-R-P).

"The solution I've developed for these problems is to read the works done in the literature and to review how they were conducted. Yes, it helps solve the problems I experienced to approach problems in this way." (F-Z-S-T)

(F-M-P-R), (F-S-U-L), (F-U-S-T), (F-W-S-T), (F-V-S-T), (F-V-S-T) coded users are encouraged to take 1 semester courses in order to gain scientific research skills

"To take courses for research in master's and doctoral degrees." (F-M-P-R)

"To take other lessons so that I can develop myself." (F-S-U-L)

"At the beginning of graduate education, this course should be made compulsory."(F-U-S-T)

"To take a course on scientific research in order to overcome these issues."(F-W-S-T)

Participants (M-X-S-T), (M-S-P-R), (M-I-S-T), (F-J-P-R) stated that asking the supervisor could solve problems. Example statements are as follows:

"I was getting help from my supervisor at first. That's easiest, isn't it? And I've already learned how to contact the right people to help me in the field." (M-I-S-T).

Participants (M-A-S-T) and (M-N-P-R) indicated that the support of friends was an effective solution but (F-XX-TT) said that assistance from friends was a temporary solution. Related statements are as follows:

"I talk with my friends and address my own inadequacies."(M-A-S-T)

"I'm trying to figure out what I'm missing with the support of my friends in the same process. I think this solution is an effective method."(M-N-P-R)

"In the beginning, my friends found what I needed, but it was a temporary solution."(F-XX-T-T)

Participants (F-T-P-R) and (F-W-S-T) recommended using a timeline:

"Create a work calendar and stick to it as much as possible."(F-T-P-R)

"An effective way is to create timesheets before you start working."(F-W-S-T)

Table 5. Themes for solutions to the problems that participants experienced during scientific research

Theme Order	Theme Name	Frequency (f)
1	Level of Scientific Knowledge	8
2	Methodology	2
3	Topic Determination	2
4	Consultation	11
5	Support from Publications	10
6	Using Technology	6
7	Legal Procedures	1
8	Solving problems during the implementation of the survey	8

The research shows that solutions were proposed to problems regarding level of scientific knowledge (8 participants), methodology (2 participants), for determining topics (2 participants), for consultation (11 participants), for using support from publications (10 Participants), with legal procedures (a shorter legal procedure) (1 participant), and during the implementation of surveys (8 participants). Nineteen participants indicated that these solutions were effective, while 10 participants indicated that they were not effective, and 1

participant did not propose any solutions.

3.3 Findings and Comments Relating to the Third Sub-Problem

The third sub-problem of the study was “What kinds of attempts have been made to gain knowledge and skills while doing scientific research?” The students' answers to this question are given in Tables 6 and 7.

Table 6. Distribution of experience and attempts to gain knowledge and skills in scientific research

Theme	Proposed Solution	Frequency (f)
Level of Scientific Knowledge	Taking lessons	8
	Publication	7
	Going to the course	2
Consultation	Consulting your friend	3
	Doing joint work with peers	2
	Getting help from an expert	2
Unnecessary knowledge	Prevent information pollution	1
Literature Review	Browsing the work done	8
Think-aloud Protocol	Reading books	2
	Learning to scan resource	2

Participants (F-F-E-T), (M-S-P-R), (F-Y-S-T), (F-W-S-T), (F-V-S-T), (F-O-U-L) and (F-R-U-L) stated that they have made attempts to solve their problems by publishing their work. Sample statements are as follows:

“Although I did not think I was good enough, I attempted to do so with my teacher and gained experience gained from my attempt to write an article.” (F-F-E-T).

“It also contributes to the development of articles or papers.” (F-Y-S-T)

“In fact, I think that studying and practicing helps in writing articles.” (F-W-S-T)

“As I worked and did research, I gained experience.” (F-V-S-T)

Participants (F-B-S-T), (F-E-M-T) and (F-S-L) expressed their experiences of looking at publications:

“I don't see enough myself. I'm looking at online research. I compare it to them. And I choose what makes sense to me.” (F-B-S-T)

“I attempt to acquire information from a variety of books to gain knowledge about this subject.” (F-S-L)

Participants (F-E-M-T) and (F-L-P-R) took lessons in this area. Sample statements are as follows:

“I realized how inadequate my knowledge was when I first started my doctorate. For this reason, I have chosen courses so that I can gain more knowledge of scientific research. I attended the scientific research techniques seminar at the university.” (F-E-M-T)

“As I said, I'm taking a special course about the method.” (F-L-P-R)

Participant (M-I-S-T) used the following expression with regard to noise pollution:

“You have to block off your ears from the sounds around you.” (M-I-S-T)

Participants (M-N-P-R), (F-K-U-L) and (F-R-U-L) discussed their experiences of asking experts.

“I have done research on related topics and tried to learn by asking the teaching staff who uses these techniques questions.” (M-N-P-R)

“I've also received help from experts in the field.” (F-K-U-L)

“I improved myself by researching and reading using the knowledge I obtained from experienced people and by learning from my supervisors.” (F-R-U-L)

Table 7. Themes related to attempts to gain knowledge and skills in scientific research

Theme Order	Theme Name	Frequency (f)
1	Level of Scientific Knowledge	17
2	Consultation	7
3	Unnecessary knowledge	1
4	Literature Review	10
5	Think-aloud Protocol	2

In the research, with regard to the themes of the participants' attempts to improve their scientific knowledge, 17 participants had made attempts to improve their scientific knowledge, 7 participants had consulted others or experts, and 13 participants stated that they had reviewed the literature.

3. Discussion and Conclusion

This section contains discussions and conclusions regarding the sub-problems of the research.

3.1 Discussion and Conclusion regarding the First Sub-Problem

When the opinions of the participants regarding how to decide on a topic for the thesis are examined, it is seen that their supervisors played a role in determining the subject. In this research, as stated in the literature, supervisors directed their students to work in current, original and necessary fields. The supervisor's field of expertise is important in determining the topic of the thesis, because the more the supervisor knows about the field, the better s/he can guide her student. Otherwise, students will not be able to understand the conceptual boundaries of their study areas properly (Kiley et al., 2009). Although many of the participants stated that their supervisor was pivotal in determining the subject matter (F-Y-S-T), when they told their supervisor that they wanted to decide on the topic, he or she asked them to produce an original problem in the field of interest and stated that the participant had chosen the subject matter. This indicates that supervisors are guiding students to develop their creativity and research skills. If supervisors engage too much in the process, it is not possible for students to use their own creativity (Bakioğlu & Gürdal, 2001). According to Alam (2013), continuous supervision makes a researcher unhappy and delays the progress of the research. Therefore, it is important for supervisors to prepare environments that will convey the feeling that the student is valuable (Akyurek & Afacan, 2013), to provide support to graduate students for active, student-centered learning and to enable them to develop their research skills (Styles & Radloff, 2001). In addition, other variables taken into consideration in determining the topic of a thesis may be different from the original topic chosen, and the interest of the individual in the topic is vital. Studying subjects that are not of interest can adversely affect students' performance. As reported by Rudd (1991), when interest in the subject of the research decreases, there can be problems completing the thesis on time (Bakioğlu & Gürdal, 2001). It is generally understood that the purpose of the doctor of philosophy degree is the creation of an independent scholar, or a scholar who independently produces original research (Council of Graduate Schools, 2005). Supervisors are expected to assist their students in overcoming their problems. As one of the problems that the participants encountered, the process of deciding on the topic of study was mentioned. The participants had problems because they had not reviewed the literature during the decision-making process. This may be due to the participants lacking both the ability to use databases and the skills to analyze and synthesize the literature. Participants (F-K-P-R) and (F-P-P-R) also expressed their difficulties in accessing resources. Kalem and Akman (2007) found that there were difficulties in determining the topic of the thesis. Students will have difficulty in finding an effective research topic as long as they do not critically examine the literature, even if they study it and make notes on it.

While working on their theses, participants (F-M-P-R) and (F-E-M-T) had a common problem related to getting legal permission and finding willing participants in their research. This shows the lack of understanding of would-be participants in a new and different system, and their lack of ability to engage in new behaviors. It thus reveals the need for them to engage better, because they were not able to easily leave behind the education system and practices that were familiar (Torkul, 2012). It is a great challenge for researchers to find participants who are willing to take part in innovative research. Researchers can also have trouble getting permission for the work they are carrying out. Çetin et al. (2007) and Suna et al. (2007) also showed that graduate students had similar problems acquiring permission to carry out research.

The participant coded (F-XX-T-T) said that he had left the city and had problems accessing resources and that this was why he could not continue with his doctorate. Similarly, Rudd (1991) found that delays to a thesis, students' personal relationships, family responsibilities, financial opportunities, job-related problems, sickness, and, sometimes, a lack of interest in the subject all had an impact in students' changing their career plans (Appel & Dahlgren, 2003, cited by Bakioğlu & Gürdal, 2001; Wright, 2003).

The study also shows that master and doctoral students usually have difficulties with the higher-level thinking skills required, especially in terms of methodology. Lessing and Schulze (2002) identified the areas required by graduate students in the research process and found that with regard to scientific method PhD students carry out more original work than master level students and thus need the ability to discuss topics more deeply, produce syntheses and develop critical thinking.

3.2 Discussion and Conclusion regarding the second Sub-Problem

Participants (F-T-P-R) and (F-W-S-TÖ) recommended using a timetable to address the main problems encountered in the scientific research process. A similar study by Gupta (2012) suggests using a diary to solve problems.

Participants (M-N-P-R) and (M-A-S-T) indicated that talking with friends could be a solution to problems. A similar study by Gupta (2012) reported that sharing issues with peers in the same class would eliminate stress. This enables researchers to approach problems from different perspectives and collaborate on solving problems.

Participants (F-T-P-R), (F-B-S-T) and (F-R-U-L) thought that the use of technology-based databases and distance education might be a solution to their problems. Integrating graduate education with developing technology to enable the right use of resources is an effective way to solve problems (Abiddin, 2011). Collaborative work is also recommended as an effective solution. Igun (2010) stated in his research that conducting collaborative studies was effective.

3.3 Discussion and Conclusion regarding the Third Sub-Problem

According to the research, the majority of respondents had attempted to take appropriate courses, ask their supervisors for advice and publish their research in order to make up for the areas in which they were lacking. For many students making this jump into the unknown is a positive experience and facing such challenges facing is exciting at a personal level (Liu, 2015). In conclusion, it was observed that the participants experienced various problems during the scientific research they conducted as graduate students but gained experience during this process and will be guided by this experience in the future. The brain-based learning approach can also be considered in overcoming these difficulties (Aky ürek & Afacan, 2013b). In the light of these findings, it can be said that the problems experienced by the participants during the scientific research process actually contributed to the development of their research skills. Governments initially has to encourage the expansion of graduate education primarily to prepare more and better qualified instructional staff capable of staffing the rapidly expanding network of universities in pursuit of a longer-term objective of raising the quality of higher education across the country (Chapman & Chien, 2015). In addition, if students who are going into graduate education become aware of the problems they may face, and the suggestions about how to solve them found in this research, they may have a better understanding of those problems when they arise during the process and be able to take measures to avoid them. Different notions of course design is necessary if Higher Education wants to be a democratic and knowledge creating activity and not just a reproductive practice where grades and credits are consumed and exchanged (Forsman-Renehart, 2016).

4. Recommendations

It would be beneficial for supervisors working at universities to receive training in how to equip future researchers with the necessary research skills. In the light of this study, it can be ensured that academics are aware of the problems that graduate students may face before these problems occur. Those who wish to pursue postgraduate education can be aware of the issues they may encounter.

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