

Opinions of Mathematics Teacher Candidates on Subject Area Courses

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Abstract

In order to teach mathematics effectively, both the knowledge of the subject and the knowledge of the field education are needed. The need for both pieces of information in this regard reveals that one of these pieces of information is not superior to the other and that both are needed. This study, it is aimed to examine the opinions of pre-service mathematics teachers about field-based courses. In this sense, it is aimed to reveal the personal views of the candidates in terms of the content and necessity of the courses they have taken until their last year. The study was carried out with 26 senior mathematics teacher candidates. The research was carried out within the scope of the phenomenology design, which is one of the qualitative research designs. In the study, a questionnaire consisting of 2 open-ended questions was presented to the candidates. The content analysis method was used in the analysis of the data. As a result of the analysis, it was found that some courses were beneficial for reasons such as dominating the field, learning the history of mathematics, and facilitating transfer to students; it has been determined that some courses are useless due to excessive information stack, the way they are taught, being difficult and worrying that they will not work in professional life. As a result of the study, various suggestions were made on how these courses could be more beneficial.

Keywords: Teacher Candidate, Opinion, Field Lessons

INTRODUCTION

In order to teach mathematics effectively, both the knowledge of the subject and the knowledge of the field education are needed. While subject matter knowledge generally refers to knowledge about mathematics, field education knowledge includes information about how to teach mathematics (Shulman, 1986). The need for both pieces of information in this regard reveals that one of these pieces of information is not superior to the other and that both are needed. Because it is important to know what to teach as much as to teach mathematics. In other words, being aware of information such as concepts, principles, rules, techniques, or strategies in mathematics and their underlying meanings is an important element in teaching this information (Genç & Akıncı, 2019; Toluk-Uçar, 2011).

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Various studies have been carried out in the field of content knowledge or teaching knowledge, and most of them are based on the work of Shulman (1986). The common point of these studies is based on the mathematical knowledge needed to teach mathematics. While Ball, Thames, and Phelps (2008) define mathematical knowledge as subject knowledge and pedagogical content knowledge in their studies, horizon area knowledge is mentioned as a third component in different studies. Since advanced mathematics courses such as analysis, abstract algebra, topology, and linear algebra are seen as part of horizon knowledge, the horizon has been evaluated in the context of content knowledge (Wasserman, 2016; Zazkis & Mamolo, 2011). These courses are mostly seen as courses that develop students' mathematical knowledge and conceptual understanding. In this sense, it is recommended that these courses be included in the education order and that the relevant concepts and information should be given to the pre-service teachers (Leitzel (1991). Because it is thought that pre-service teachers should go down to the deep surface of mathematics in order to establish mathematical relationships and provide concept-based learning (Ma, 1999).

It has been observed that teachers' field knowledge is reflected in their lesson plans and classroom practices (Heid, Blume, Zbiek & Edwards, 1999). However, in some studies, it is claimed that the information obtained by pre-service teachers during their undergraduate education is insufficient for teaching (Bryan, 1999; Ball & Wilson, 1990; Tirosh, 2000; Toluk-Uçar, 2009). Therefore, pre-service teachers were insufficient to understand the logic behind some mathematical concepts. The reason for this situation is that pre-service teachers see this information as unnecessary or there may be some negative opinions that they will not use it in their future professional life. Therefore, this situation necessitated the revealing of pre-service teachers' views on these courses in reality. This study, it is aimed to examine the opinions of pre-service mathematics teachers about field-based courses.

METHODOLOGY

This research, which aims to reveal the personal opinions of the candidates in terms of the content and necessity of the courses they have taken until their last year, was carried out within the scope of the phenomenology design, which is one of the qualitative research designs. Phenomenology studies are an effective method used to reveal and interpret individual perceptions, experiences, or opinions (Yıldırım & Şimşek, 2016). In this sense, in the study, the phenomenology design was determined as a qualitative method suitable for the research in order to reveal how the candidates interpreted their experiences and what kind of meanings they attributed to the field courses.

Implementation Process

The study was carried out with 26 senior mathematics teacher candidates. In the study, a questionnaire consisting of 2 open-ended questions was presented to the candidates. The content of these questions is based on the useful and non-useful aspects of the field-based courses (Analysis, Abstract Mathematics, Linear Algebra, Analytical Geometry, Probability, Statistics, Algebra, History of Mathematics, Philosophy of Mathematics, Algorithm and Programming). In the development of this questionnaire, the study of Genç and Akıncı (2019) was used and expert opinions were sought. The content analysis method was used in the analysis of the data. With this method, the data were analyzed in-depth and previously unspecified themes were revealed and collected under certain categories. The creation of these categories was based on bringing together similar codes by making appropriate coding.

RESULTS

According to the results of the analysis, the candidates stated that the most useful course for them was the history of mathematics. In their explanations, they stated that this course was very beneficial for them in terms of learning about the history of mathematics and where it came from. On the other hand, most of the candidates stated that the philosophy of mathematics course did not benefit them. They cited the abstract and complex nature of the course as a reason for not being useful. On the other hand, the candidates stated that the analysis course was beneficial for them, especially in the context of mastering the field. However, many candidates stated that they could not get much efficiency from this course due to the fact that the course content was very broad and complex. Most candidates saw the algorithm and programming course as useless because they would not be able to use it in their professional life. A few candidates stated that this course was effective in understanding computer programs. Lessons such as abstract mathematics, analytical geometry, probability, and statistics were found useful in terms of providing mastery of the field, facilitating the kpss exam, and improving the teaching profession. In general, the benefits of field-based courses for candidates are summarized as follows:

- ✓ Development as knowledge and thought
- ✓ Ensuring dominance of the field
- ✓ Laying the foundation
- ✓ Associating with daily life
- ✓ Obtaining useful information
- ✓ Learning the history of mathematics
- ✓ Concretizing abstract concepts
- ✓ Facilitate transfer to student

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- ✓ Ease in KPSS exam

The non-beneficial aspects of the field-based courses according to the candidates are summarized as follows:

- ✓ Too much information
- ✓ Memorization information
- ✓ Processing style
- ✓ Not suitable for the KPSS exam
- ✓ Inconsistency of the course with the content
- ✓ To be difficult
- ✓ Lack of efficiency from distance education
- ✓ Worried that it won't work in your professional life

In general, some courses are found to be beneficial for reasons such as establishing a command of the field, learning the history of mathematics, and facilitating transfer to students; it has been determined that some courses are useless due to excessive information stack, the way they are taught, being difficult and worrying that they will not work in professional life. It is necessary to examine the courses that the candidates find useless and to carry out studies focusing on the benefit of these courses in order to eliminate negative opinions. For this reason, simplifying the content and associating it with daily life during the teaching of the field courses may be beneficial in eliminating these negativities. Focusing on applications such as mathematical modeling, problem-solving, reasoning, and proof making that require using basic mathematical skills and adapting them to real-life problems can increase the motivation of the candidates and make the lessons more meaningful (Genç & Akıncı, 2019). Therefore, highlighting the meaningful dimension of the field courses for students and presenting them in a way that students can enjoy can play an effective role in eliminating negative thoughts.

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