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EXPLORING THE RELATIONSHIP BETWEEN PRE-SERVICE TEACHERS' MATHEMATICAL ORIENTED BELIEFS AND THEIR PEDAGOGICAL PRACTICES WITHIN THE REAL CLASSROOM

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ABSTRACT: Over the past few decades, there has been much research on teachers' cognitive and affective variables such as beliefs, emotions, conceptions and knowledge as well as their relationship with teaching practice. This study has been conducted to explore the relationship between future teachers' mathematical beliefs and their initial teaching practice in a classroom setting. A collective case study approach was used, in which future teachers were observed using a variety of procedures to reveal qualitative data about their initial teaching practice during the school-based practicum, and were then requested to complete six open-ended questions form concerning a mathematical beliefs. The preliminary analysis of data revealed that most of the participants hold constructivist-oriented mathematical beliefs. The initial observation and field notes demonstrated that most pre-service teachers who have had a constructivist-oriented belief teach utilizing contemporary approaches in mathematics teaching. However, some pre-service teachers held learner-based pedagogical belief, but did not integrate constructivist ideas into their teaching. The paper presented some implications for teacher education programs and teachers' professional development.

Key words: Pre-service teachers, mathematical beliefs, initial teaching experience, school-based practicum

INTRODUCTION

Teacher may design interactive, diverse and innovative learning environments relying on their own beliefs (Wilson and Cooney, 2002), which are frequently formed by previous experiences. In fact, teachers' beliefs are received from their individual experiences as learners in school and later through knowledge they maintain from pre and in service teacher education programs (Lortie, 1975). In the last decade, constructivism became widespread in Turkish educational arena and led the recent mathematics curriculum towards learner-based approaches. The idea behind the new curriculum is that learners are given a central role in learning process, which they can build their own knowledge and develop their own mathematical thinking skills through active participation (Baki, 2008). Reformatations based on the innovative approach have been also established for teacher education courses. The aim of this was to replace the traditional-oriented teaching approaches, which is described as a telling and showing of mathematical procedures with new constructivist teaching ideas. This particular study aimed at better understanding of what type of pedagogical beliefs pre-service teachers hold and how they enact these beliefs into their teaching practice.

Beswick (2011) defined mathematical beliefs as what individuals believe to be true about the discipline of mathematics as well as its teaching and learning that shape teaching practice. Ernest (1989) stressed that to design effective and meaningful learning environments, it is important to identify and comprehend individual teaches' beliefs in relation to mathematics teaching and learning. Pedagogical beliefs of teachers including beliefs about what teachers should do to assist pupils learn mathematics. For this study, beliefs about mathematics teaching and learning are categorized as a traditional and constructivist perspective reported in the literature (Chan and Elliot, 2004).

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METHODS

A collective case study approach was used, in which future teachers were observed using a variety of procedures to reveal qualitative data about their initial teaching practice during the school-based practicum, and were then requested to complete six open-ended questions form concerning a mathematical beliefs. The sample in this study for qualitative data comprise of nine pre-service teachers from Faculty of Education at the University of Artvin Coruh. It was expected from novel teachers to teach students age of 8 and 10 in classrooms once time a week during one-term school period. The constant comparison method were used so as to ascertain themes relevant to participants.

FINDINGS

Stated beliefs

When directed what pre-service teachers thought about mathematics, it teaching and learning, majority of them responded that mathematics is being useful to individuals for daily-life routines such as counting, marketing, measuring, drawing and so on. The considered mathematics as a vehicle for solving problems within the daily-routine activities, make it easier for his everyday life. Only one teacher characterised mathematics as pure logical thinking and as an instrument for exercising the mind. It can be interpreted that the development of reasoning skills in mathematics was regarded as an important aspect of mathematics. Six participants out of nine back up progressive the ideas and methods of teaching mathematics which stressed that the learners can ascertain, solve problems, share and argue their findings and approaches. It was shared belief that learning abstract mathematical ideas through concrete materials is vital and viewing such connections would assist pupils to make sense of abstract concepts by introducing ideas from simple to complex. It was a belief that concrete and visualisation makes learning effective and permanent due to the immobility of mathematical objects on the white board. The comment is consonant to a constructivist-oriented pedagogical beliefs where the pupil is active during learning process and the teacher's role is guide. Some of them held belief that more practice and more examples may provide better results in understanding of mathematical concepts. It was noted that repetition seemed to be essential element in her learning of mathematics.

Enacted beliefs

The analysis of the classroom observation data and field notes showed that while pre-service teachers were teaching mathematics in classroom, some of them made great efforts to create a progressive learning environment where pupils have an opportunity to work on mathematical task, discover, solve mathematical problems and express their approaches and ideas with the peers.

This teacher's role was mainly as a guide who introduced mathematical tasks and assisting the pupils to find out and explore mathematical ideas embedded in activities by using a variety ways of teaching and learning approaches such as discovery learning, active involvement and informal discussion during her school-based practicum. However, some pre-service teachers utilized some concrete materials to provide more detailed explanations to pupils, to request a selected pupils practice with material and to interrogate their understanding in terms of what they understood. While working on mathematical modelling activities with each other, pupils were given not enough opportunity to contribute to their own mathematical knowledge and talents with their own efforts, teachers providing immediate answer when they tackled with mathematical task rather than experiencing with trial-and error approach.

CONCLUSION

The study made great efforts to observe pre-service teachers' current practice during the one term school period and determine their mathematical beliefs by asking open-ended written questions so as to reveal whether they are consistent each other or not. A collective case study of pre-service teachers illustrated that classrooms can be complex sites of social and cultural effects, and that the candidate teacher's mathematical beliefs were less conventional than their current teaching practice. Candidate teachers' beliefs involved both some elements of traditional and constructivist-oriented pedagogical beliefs about subject-matter. This showed that the early experience in both teacher education program and educational system appeared to affect pre-service teachers' beliefs about mathematics and their pedagogical decision making about mathematics teaching and learning.

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