Exploring Prospective Mathematics Teachers' School Placement Induction through Communities of Practice

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Communities of practice is one of the most common interdisciplinary terms which is mainly used by anthropologists, sociologists and educationalists. This paper aims to analyse the induction experiences of prospective mathematics teachers during their school placements through the lens of communities of practice. The main research question was concerned with how they perceive what constitutes the practice of community. For that purpose, the research was designed as a qualitative cross-sectional study. A convenient sample of four prospective mathematics teachers was selected. Data collection consisted of face-to-face interviews. Interview transcriptions were analysed using content analysis method. Findings indicated that participants' observations of professional interaction among colleagues in the school are concerned with teachers' subject knowledge, cooperation among colleagues, assessment and being a mathematics teacher in a private school.

Keywords: Communities of practice, prospective mathematics teachers, initial teacher training

Introduction

This study reports on one component of a project entitled "Socio-cultural Approach to Pre-service Mathematics Teacher Education" supported by Marmara University. The departure point of the project is related to our concerns with the effectiveness of field experience courses, both in the international and Turkish context, that is also reported in teacher education literature in general, and mathematics teacher education literature in particular. Gale & Jackson (1997) mentioned that a limited amount of time is one of the problems of field experiences in teacher education programs. Duration of school practicum changes from one country to another. For instance, field experience in PGCE (Post Graduate Certificate for Education) in UK is for a term and prospective teachers spend approximately 80% of their time in one term in school doing actual teaching. In the Turkish context, on the other hand, actual teaching in schools is around one to six hours a week for a term.

It is a common practice that field experiences take place during the last year of teacher education programs. Sutherland, Scanlon & Sperring (2005) embraced a different approach to university-school partnership where school practicum took place in the first year of teacher education program. The aim was to provide an opportunity to engage prospective teachers with the daily work of teachers and help them acquire professional knowledge so that they can integrate what they learnt from experience with the theoretical knowledge provided by teacher education program at the university. This more integrated approach is important since one of the problems is

that what prospective teachers learn from university are washed out in the more conservative setting of the school (Zeichner & Tabachnick, 1981, cited in Peressini, Borko & Romagnano, 2004). Research calls for precaution to be taken during initial teacher training courses. In that sense, Postlethwaite & Haggarty (2012) present findings regarding prospective mathematics teachers' views about ideas that were valued in university and the school context. They suggest that teacher educators should take these views into consideration. Similarly, Goos (1999) designed a study in which the role of the university-based mentor is to scaffold prospective teachers' post-lesson reflections with the aim of helping prospective teachers to analyse and resolve conflicts between school and university experiences.

This paper particularly focuses on prospective mathematics teachers' initial interactions with a professional community. We investigated their perceptions of what constitutes the practice of the school community in general and mathematics teachers in particular.

Theoretical Framework

The theoretical framework of the study is based on the notion of "communities of practice" by Lave & Wenger (1991) and Wenger (1998). As a framework which focuses on socio-cultural aspects of learning, communities of practice is thought to be a useful framework since we are interested in how prospective teachers make an induction to a school community. In this respect, there are multiple contexts (university and school) and multiple communities (university tutors, school community and prospective teachers' peers). As a result, prospective teachers are faced with different norms and values.

Lave & Wenger (1991) claimed that members of a community learn from each other through the process of sharing experiences. Therefore, during this process, new members become familiar with the norms and values of the community and learn to perform basic tasks by gradually participating in the community.

As prospective teachers enter the school community, university and school components of teacher education programs interact with each other and these interactions inform the pedagogical practice of prospective teachers (Sutherland et al., 2005). In that sense, this paper investigates the first phase of this development, in other words, induction activities in our teacher education program during which prospective teachers are introduced to the school community.

Focusing on learning to teach as a socially situated activity, research questions are formulated as follows:

- How do prospective mathematics teachers interact with the head teacher and mathematics teachers including their school-based mentors?
- What do prospective mathematics teachers observe concerning professional interaction among colleagues in schools?
- How do experiences of prospective mathematic teachers in schools (interactions and observations) effect their perception of being a mathematics teacher?

Methodology

Background of the study

This study is situated within a teacher preparation program in a Faculty of Education of a state university in Istanbul, Turkey. The data was collected during the Autumn

term of the 2013-2014 academic year. It is a five-year program which awards its participants a diploma for teaching mathematics in high school for students aged between 15 and 19. In the program, there are four kinds of courses which are a total of 272 ECTS (European Credit Transfer System): subject matter courses, education courses, mathematics education courses and general knowledge courses.

This study particularly focused on field experiences. There were two courses during which prospective teachers have their field experiences in partnership schools. The first one was called the "School Experience" course which was in the Autumn term in the fifth year. It has two components. The university component lasts for an hour every week and is guided by a university mentor (the first author of this paper). During the school component, prospective teachers spent four hours a week in a partnership school. This component is mostly based on observations on issues such as school resources, classroom management, staffroom, teaching methods, questioning, students' difficulties and mathematics curriculum. The second course was called the "Teaching Practice" course that was in the Spring term in the fifth year. The course requires actual teaching in schools up to six hours a week.

The mathematics teacher education program admits around forty prospective teachers every year. Around eight prospective teachers were allocated to each partnership schools. Generally, one mentor was appointed to one to three prospective teachers, depending on school administration.

During the first term, participants of this study were allocated to a very prestigious private school in İstanbul, Turkey. The school had a very high success rate and allocated extra study time before and after school hours for revision.

Data Collection

This is a qualitative cross-sectional study. A convenient sample of four prospective mathematics teachers was selected for the study. Data collection consisted of face-to-face interviews. At the end of the School Experience course (end of Autumn term), face-to-face interviews were conducted in the mathematics education department. Researchers and participants signed "informed consent forms". Interviews were tape-recorded. On average, interviews took about thirty to forty-five minutes. In the interviews, participants were asked the following questions:

- What kinds of dialogues have you had with the head teacher and mathematics teachers?
- What kinds of dialogues have you witnessed among mathematics teachers?
- Have these observations changed your perception of being a mathematics teacher? If so, how?

Data Analysis

Content analysis was used to analyse the data. Interviews were verbatim transcribed. Data was analysed by two different researchers and themes were specified for each research question. Findings are presented below based on the themes discovered.

Findings

This section presents two aspects of the findings. First, themes emerged from participants' interactions with members of the professional community and observations of interactions among mathematics teachers are given. Second, findings

focus on what participants learnt from their experiences concerning what constitutes being a mathematics teacher (or to be a member of the community).

Participants did not report any information with regard to their interaction with the head teacher. Instead, some of them mentioned that the assistant head teacher talked to them about discipline issues such as how s/he intervened with the classroom when it is noisy and how s/he inspected the homework of students. During the interview, Gaye mentioned that there was too much discipline. Zeliha also found the discipline too much: "I think it's not right. The assistant head teacher should not interfere with lessons or discipline issues in the classroom. It threatens the authority of the teacher."

Participants' observations of interactions among mathematics teachers revealed two themes. The first one is related to teaching materials (exercise worksheets, trial exams) and the second one is related to the exchange of ideas among mathematics teachers. With regard to teaching materials Filiz said: "They continually talk about the changes in the exams, when to do it, checking them together… They always talk about questions in the tests…. Maths teachers study all the time in the staff room!"

The second theme emerging from participants' observations of interactions among mathematics teachers is concerned with how they exchange ideas and cooperate with each other. Two prospective mathematics teachers talked about this collaboration as follows:

> The teacher teaches different classes at the same age level. They (maths teachers) prepare a common exam together. He was discussing about what to include in lessons. For example, he was teaching vectors, one can find the area of a triangle using matrices and determinants. The other maths teacher suggested not to include this method in lessons and let students solve the question without using it (Giray)

> They advise strategies to each other. They solve the questions in the tests together, then compare to each other's. Then they decide to exclude some questions since they thought it would be difficult for students (Gaye)

Filiz also talked about how mathematics teachers discussed the solutions of problems: "They discuss about how to find simpler solutions to the questions. They compare their solutions and try to find the most practical one." Giray, on the other hand, complainingly said: "They do not talk about teaching activities or tasks in the classroom…but just about exam questions. However, he found that the way mathematics teachers exchange ideas very useful since they look for advice from teachers, even those who have less experience.

Participants were also asked what they learnt from their observations on interactions among mathematics teachers. Analysis of data indicated three themes: Subject knowledge, exchange of ideas and assessment.

With regard to subject knowledge, three of the participants acknowledged the importance of subject knowledge to be a mathematics teacher. For example, Gaye and Filiz said the following:

> I always think that subject knowledge is important but now I see that it is very, very important. Sometimes students ask a difficult question and then you are stuck. You have to minimize these situations (Gaye)

> Maths teachers were very good at practical maths. I want to be like them. You know, practical maths is like making a show in the classroom. It will make me feel so good! (Filiz)

Cooperation among colleagues is another aspect of being a mathematics teacher which was learnt from observations in schools by two of the participants. For

example, Giray said: "Maths teachers I see in the staffroom exchange ideas in a very good way. It's like teamwork. After I see that I thought this is something I should do when I become a maths teacher."

Another aspect of being a mathematics teacher is concerned with assessment. One of the participants mentioned the importance of assessment as follows:

> I observed how teachers are concerned about giving feedback to students. In fact, making exams or any other kind of assessment is for learning. Not for marking. This was something we learnt in the university but it was very good to see it in practice (Giray)

As can be seen from the excerpt above, Giray's belief about the importance of assessment was reinforced with his observations on how mathematics teachers used formative assessment in a useful way.

Data also revealed participants' perceptions of being a mathematics teacher in a private school. None of the prospective teachers wants to be a mathematics teacher in a private school although it is much more advantageous in financial terms. Some of them mentioned that they used to prefer it as a second option but changed their minds after their school placements:

> I used to think of private school as a second option if I cannot be appointed to a job in a public school. But this private school does not give what I want. I'd like to use technology or other teaching materials (Gaye).

> My first preference is a public school. I used to think that if I won't be able to be happy in my school, I would work in a private school. I was willing to do that until I came to this school. Here they work so hard...they only aim to prepare students for university entrance exam, and I don't want this (Zeliha)

Data indicated three unexpected issues that threaten participants' existing perceptions of being a mathematics teacher in a private school: Too much discipline, respect for teachers and traditional mathematics teaching methods.

Conclusion and Discussion

This study investigated four prospective mathematics teachers' perceptions of what constitutes being a mathematics teacher during their initial interactions with a professional community. Participants' observations of members of the community are mostly about being a teacher in general though there are a few issues about being a mathematics teacher. Central themes emerged from the data are concerned with subject knowledge, exchange of ideas, assessment and being a mathematics teacher in a private school.

Under the theoretical framework of communities of practice, data indicated the way prospective teachers align themselves with norms and values of university and school cultures. With regard to this, examples of both tension and reinforcement were evident. One of the prospective teachers was in favour of *practical mathematics* or so-called *instrumental mathematics* in Skemp's (1976) terms. This approach to teaching mathematics was privileged by school culture where academic success in university entrance examination with multiple-choice questions is important. On the other hand, teacher education program in the university encourages "relational understanding of mathematics" where necessary. The influence of traditional school culture was also reported by Zeichner & Tabachnick (1981, as cited in Peressini et al., 2004) who emphasised that what prospective teachers learn from university are washed out in the more conservative setting of the school. Similarly, Frykholm (1996, as cited in Frykholm, 1998) emphasise the inconsistency between reform-based

teacher education programs and traditional approaches of school-based mentors. In some cases, experience in schools reinforces what is learnt in the university, as in the case of Giray who was glad to see the importance of assessment in practice. Another example is collaboration among mathematics teachers. Most of the participants took this case as a model for themselves.

This study has some implications for teacher education. Efforts should be carefully made by teacher educators to monitor how prospective teachers align themselves with the norms and values of theory and practice that emerges from different cultures. Opportunities should be provided for prospective teachers for full-participation in professional communities. In addition to these, research on mathematics teacher education that focuses on communities of practice framework should expand the community to include mathematics teacher educators.

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