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PROSPECTIVE SECONDARY MATHEMATICS TEACHERS' REFLECTIONS ON TEACHING AFTER THEIR FIRST TEACHING EXPERIENCE[1]

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Abstract: The aim of our study was to examine prospective secondary mathematics teachers' reflections about teaching after their first teaching experience. We carried out five interviews during the two semesters with four Turkish prospective secondary mathematics teachers. The data analysis suggests that prospective secondary mathematics teachers' reflections based on their pedagogical content knowledge differs according to their experience. After "Teaching methods in mathematics education" course, we determined that prospective secondary mathematics teachers were willing to apply group working activities in the classroom. During "School experience" course, were cognized that prospective secondary mathematics teachers' ambition of applying student-oriented and group working activities in the classroom were decreased.

Key words: Prospective secondary teachers, Reflections, Pedagogical content knowledge, Mathematics education, Teaching experience

1. Introduction

Effective teaching is the ultimate goal of researchers, mathematics educators, and teachers. However, effective teaching may be challenging especially for the prospective teachers, who are at the beginning of their career. There are various elements that may influence effective teaching including; (i) understanding and having knowledge on mathematics, (ii) students and, (iii) pedagogical strategies (NCTM, 2000). Prospective mathematics teachers' theoretical knowledge on pedagogy and mathematics grounds for the performance they will display in practice. One of the common problems in teacher education is bridging the gap between theory and practice. In teaching profession, it is important how and in what ways the theoretical knowledge is put in place for the practice. Pedagogical content knowledge of mathematics teachers and prospective mathematics teachers have been conducted from different perspectives in the literature (An, Kulm, &Wu, 2004; Chick, Baker, Pham, & Cheng, 2006; Türnüklü &Yeşildere, 2007). The studies indicate that content knowledge and pedagogical content knowledge have an impact on the quality of education and the development of students' learning (Baumert et al., 2010). The recent studies suggest that the learning context created in classrooms affect students' learning and motivation (Kleickmann et al., 2013).

Teachers' knowledge is considered to be one of the fundamental components of both teaching and students' success in the educational context (An et al., 2004; Lannin et al., 2013). The studies focusing on teachers' knowledge are mostly based on Shulman's (1986, 1987) works. Shulman's (1987) theory for knowledge of teaching consists of subject matter knowledge (SMK), general pedagogical knowledge, and pedagogical content knowledge (PCK), which he defines as a "special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional

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understanding" (p. 8). Most scholars and policy makers agree on Shulman's pedagogical content knowledge (PCK) in that it has an important contribution to teaching and learning mathematics (Hill, Ball, & Schilling, 2008). How to teach mathematical content and to understand students' thinking have been an issue for pedagogical content knowledge (An et al., 2004). Shulman's (1986, 1987) PCK conceptions have been extended by the researchers in mathematics education (Fennema & Franke, 1992; Grossman, 1990; Hill et al., 2008; Baumert et al., 2010). For example, Baumert et al. (2010), within the scope of COACTIV (Professional Competence of Teachers, Cognitively Activating Instruction and the Development of Students' Mathematical Literacy) have examined pedagogical content knowledge into three subcategories, including; (i) knowledge of mathematical tasks, (ii) knowledge of students' thinking and assessment, and (iii) knowledge of multiple representations and explanations of mathematical problems. As Hill et al. (2008) describes; mathematical knowledge for teaching (MKT) comprises of subject matter knowledge (SMK) and pedagogical content knowledge (PCK). Subject matter knowledge consists of common content knowledge (CCK), specialized content knowledge (SCK), and knowledge at the mathematical horizon. Subcategories of pedagogical content knowledge (PCK) include knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of curriculum. In our study, we used Hill et al.'s (2008) framework to investigate the reflections of prospective mathematics teachers' pedagogical content knowledge in their first teaching experience.

Teaching experiences can be considered as one of the sources for the implementation process of PCK in teacher education (Kleickmann et al., 2013); yet there are few studies that examine the process of prospective mathematics teachers' pedagogical content knowledge (Kinach, 2002; Lannin et al., 2013; Kleickmann et al., 2013). Kinach (2002) has determined PCK on adding-subtracting operations of prospective teachers in a lesson; and has monitored PCK developments of prospective teachers by implementing an instructional model. Lannin et al. (2013) has examined how PCK of two prospective teachers change after they start to their career; and has found out that the knowledge of these prospective teachers have focused on are different from one another. In this respect, examining process for PCK of prospective teachers in a classroom setting is of importance. Development of teachers' PCK is fundamentally influenced by their teaching experience. In order to get more advanced insight for the results of teacher education, more elaborated researches examining this education process in its implementation phase are required. Moreover, there is further evidence supporting that teaching experience alone is insufficient on its own; and thus teaching experience should be accompanied by a thoughtful reflection of instructional practices (Kleickmann et al., 2013). Therefore, we formulate our research question as following: "what are prospective secondary mathematics teachers' reflections on teaching after their first teaching experience?" In addition to the current literature, we have examined the reflections of prospective mathematics teachers by evaluating their PCK which they developed within the scope of *Teaching methods in mathematics education* and *School experience* course.

2. Methodology

2.1. Context of the Study

In Turkey, prospective teachers observe the teachers in the public schools from the perspective of their content and theoretical knowledge on education and mathematics within the scope of the "*School experience*" course. They also conduct a few classroom activities. It is possible to say prospective teachers acquire their first teaching experiences within the context of this course. In order to construct pedagogical knowledge, prospective teachers observe learning environments and interact with students according to these observations. Subsequently, they have the opportunity to make reflections regarding their own teaching experiences (Oliveira &Hannula, 2005). Furthermore, prospective teachers get to improve their own knowledge on teaching via such environments (Kleickmann et. al, 2015).

2.2. Participants

We conducted this study with four prospective secondary mathematics teachers, Burçak, Hülya, Ebru and Eda (pseudonyms), who study a five-year teacher education program at the Secondary Mathematics Education department of a public university in Turkey. Prospective secondary

mathematics teachers have completed most of the mathematics content courses, including Algebra, Geometry, Calculus, and Analysis. In addition, they took most of the pedagogy courses such as Developmental psychology, Classroom management, Counseling and, Approaches and theories of teaching and learning. After completing these courses, they took Technologies and material design, and *Teaching methods in mathematics education* courses, which are combinations of knowledge from mathematics content and pedagogy courses. Thus, it can be said that these prospective teachers studying their 5th year are about to complete the theoretical base for knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of curriculum, which are the categories of PCK. Moreover, we have chosen these four prospective teachers because of their curiosity and questioning, and awareness, based on the observations we have conducted in the *Teaching methods in mathematics education* course. We have believed that these prospective teachers can carry out reflections about teaching experience, which is stated in research problem.

2.3. Data Collection and Analyses

We collected data from the *Teaching methods in mathematics education course*, which prospective secondary mathematics teachers take in the 8th semester, and the *School experience* course lasting for 14 weeks, which they take in the 9th semester of the program. The data for this study was collected through interviews and observations, which were videotaped. The whole data collection period took one year.

In order to reveal the experiences of prospective mathematics teachers within the context of pedagogical content knowledge; two focus group interviews that are videotaped have been conducted at the beginning and end of the *Teaching methods* course. Within the scope of this course, Burçak and Ebru, and Hülya and Eda have gathered in two groups and prepared and presented a lesson plan in accordance with a certain acquisition included in mathematics curriculum. Burçak and Ebru have prepared a lesson plan according to an acquisition of 11th grade, which is "Student describes the concepts of definition, axiom, theorem, and proof. Student indicates the hypothesis and conclusion of a theorem" (MoNE, 2013); Hülya and Eda prepared a lesson plan according to an acquisition of 9th grade, which states "Student explains the concepts of finite set, infinite set, empty set, and universal set with their examples" (MoNE, 2013). In the focus group interviews, we asked the questions (Table 1) so as to reveal the experiences the prospective teachers had during the process of designing a lesson plan.

Table 1. Interview questions

1) Can you discuss the experiences you had during the process of preparing a lesson plan? (what did you primarily consider as you start to design a lesson such as sources, previous lesson plans, acquisitions etc. / what was the final objective of the lesson you planned: enabling students to obtain acquisitions, using the lesson efficiently)
2) After the lesson designing experience you have had, what do you think should be included in a lesson plan? What should a lesson plan cover?
3) After the lesson designing experience you have had, how do you think a lesson should be designed? What should you take into consideration while designing a lesson plan?
4) What do you think of the necessity and significance of designing a lesson plan?

Throughout the *School experience* course, the data were collected via three focus group interviews which were videotaped. The objective of *School experience* course is to enable prospective teachers to obtain experience on teaching through observations and implementations. The prospective teachers were asked to take observatory notes in three columns while observing the in-service teachers, whom they worked with. The first column indicates the time in 5 minute intervals. The second column includes the explanations of how teacher instructs the subject during the lesson. The third column displays what they would do if they were the teacher. In the focus group interviews, these observatory notes were examined and we asked them to elaborately explain what they had written in their notes during the interviews.

Moreover, two classroom observations that are videotaped were conducted while Burçak and Hülya and Ebru and Eda were implementing the activities they had prepared within the scope of *School*

experience course in pairs. Burçak and Hülya prepared and implemented an activity according to an acquisition included in 10th grade mathematics curriculum, which is "Student creates the area equation of a parallelogram. It is used for the area equations of quadrangles in modeling and problem solving. Student defines the midsegment of a trapezoid and finds the midsegment by making use of longer base and shorter base lengths" (MoNE, 2013. As for Ebru and Eda prepared and implemented an activity in accordance with an acquisition included in 11th grade curriculum, which is "Student describes exponential function. Student demonstrates that exponential functions are bijection. Student gets logarithmic function as the reverse of exponential functions" (MoNe, 2013).

The qualitative data analysis, designated by Auerbach and Silverstein (2003), was adopted while analyzing the data collected throughout the research. Firstly, the data retrieved from the *Teaching methods* course were coded. By taking these coding into account, the data obtained from the *School experience* course were coded. In this way, the pedagogical content knowledge of the prospective teachers throughout this process was revealed. After this coding, the prospective teachers' reflections about teaching after their first teaching experiences were coded.

3. Findings

In this section, firstly, knowledge of teaching acquired by prospective teachers after taking *Teaching methods* and *School experience* courses will be discussed. In direction of knowledge of teaching, we examined the reflections of prospective teachers on their first teaching experiences.

3.1. Prospective Teachers' Knowledge of Teaching

We found six subcategories of the prospective teachers' knowledge of teaching which were obtained in both *Teaching methods* and *School experience* courses (Table 2).

Table 2. Subcategories of the prospective teachers' knowledge of teaching

(i) enabling student to discover, (ii) using student-centered approaches, (iii) enabling students to question reasons, (iv) working in groups (v) being aware of and using different forms of representation, (vi) knowledge on the documents to be used in class (material preparation, study paper, everyday life problems, modeling, portfolio)

The observations made in the *School experience* course suggest that the prospective mathematics teachers carried out activities, which aimed towards enabling students to discover. A part of the activity prepared by the prospective teachers for enabling students to discover is indicated in Table 3.

Table 3. The activity prepared by Burçak and Hülya by using a geometric board

Apply the instructions given below by using rubber bands on the geometric board, which is divided into equal parts. STEP 1: Create a parallelogram on the geometric board by using the rubber bands. STEP 2: Divide the parallelogram into two equal triangular areas and state the areas you divided. STEP 3: Explain the relation between the areas you created and the area of the parallelogram. Let's formulate the area of the parallelogram.

Eda explains the class applications, which enable students to discover, in the interview as the following. She gives an example from the observations in *School experience* course and reflects on what she would do if she was the teacher:

> Eda: When we look at the classroom, we see that either our teacher or one of the students solve the problem, and we do not know whether the rest of the class was able to

> solve or understand the problem or not. However, if I were to prepare an activity, I would be able to see where students make mistakes, whether they can solve it or not. I would not solve the problems on the board, instead, since I would distribute them the activities I would personally go to their desks and direct them on how to solve the problem, but, I would not give them the answer on the board or tell them how it is solved by any means. I would walk around their desks and help the students to do this and that but I would never give them the answer.
>
> Researcher: Why wouldn't you give them the answer?
>
> Eda: Because if I did, they would not understand the answer, instead I would be completely transferring my solution to the students. It would be like "this is how I solved it, so you need to memorize it", but instead I would expect them to think on their own. I would expect them to think to themselves like that is "how I consider this, how I evaluate it or deal with it, how we could proceed". What is important is not that I think, but the fact that the student does.

Eda considers enabling student to think and question to be a significant component of the profession of teaching. In the interviews conducted within the context of *Teaching methods* course, the prospective teachers made an effort to enable students to question reasons in their lesson plans. Regarding this, Burçak discussed the approach of her own high school teachers. Moreover, Ebru also made remarks about her experiences with her own high school teachers and agreed with Burçak:

> Burçak: My school was good, all of us got there by scoring high at mathematics. I also liked mathematics at my school. When I think about all of these we talk about and evaluate my teachers, I realize that they were really good teachers, but that is it, but the background of it... [Thinks to herself for 1-2 seconds and nods her head in a negative manner] I do not think they were doing this much, they did not have a lesson plan or anything.
>
> Ebru: We did not question anything.
>
> Burçak: We were doing mathematical operations when we were in high school, I could take integrals with no difficulty, I could do these operations, and my test scores were really high. These were okay, however they did not have such things.
>
> Ebru: I do not think they were as conscious as this, either. Right now, we do our job after being truly trained. Yes we might not want to learn it, it is up to us to whether apply it or not, but we were taught some certain things and were told about how some things should be. However, when I look at our own teachers, I believe they lack of some of these things. For instance, the younger teachers had a different approach, however, the older they were the more close minded they became.

As Ebru and Burçak indicated in their remarks about their own teachers, prospective teachers think that it is not adequate to discuss only about operational knowledge when it comes to any mathematical concept. They stated that students' questioning of a concept is at least as important as students' ability to make operations.

In the interviews and observations conducted with prospective mathematics teachers in the *School experience* course, they included working in groups and applied the activities on a student-centered basis. Burçak's explanation of the working in groups and student-centered activities she will apply in class is as follows:

> Burçak: I would definitely instruct my lesson on a student-centered basis, and would ask them to do work in groups instead of working individually. I would let them create their own groups so that they could pick their own friends, but I would pay attention to balance the levels of groups by transferring more successful students to the groups with a lower success level. I mean we will not be able to take care of everything. Because the classrooms are crowded I will not be able to balance their levels, however, if their more

> successful friend answers a question, their problem will be solved and they will advance faster with the subject.

In *School experience* course, we observed that prospective mathematics teachers were aware of different types of representations and tried to use them. Burçak's explanation about this situation in the interview is as follows:

> Burçak: I believe they have trouble with verbally expressing mathematical statements or writing mathematically what is verbally written, because a student told me during the lesson, "Although, I have verbal skills, I actually love mathematics." Afterwards, the student wrote that if the areas of these triangles are equal, then the area of ABC is equal to that of BCD. The student wrote a verbal sentence, in which he/she stated that the areas of triangles are equal. I told him/her "no, we indicated above that their areas are equal and I want you to write them in equations using mathematical statements", he/she asked me how and told me "I am already [verbally] writing they are equal".

Burçak mentioned that the student was unable to algebraically use mathematical symbols and terms; realized that the student tried to verbally express them, and emphasized the necessity for teachers "to correctly and consistently use mathematical symbols and terms".

In the interviews conducted in *Teaching methods* course, they provided information regarding the documents they could use in class such as material preparation, study paper, everyday life problems, modeling, portfolio. The statements of Hülya and Eda, in which they explained how they chose the documents they plan to use in lesson plans they prepared for *Teaching methods* course and how they will benefit from these documents, are as follows:

> Hülya: We thought of using material for infinite and finite sets since "infinity" is an abstract concept. We also had difficulty with it, so we decided to use chickpeas in a glass. Then we realized that we had a hard time with it, too. Afterwards, we decided to display a video about fractal.
>
> Eda: We had showed them a fractal video, in order to enable students to better understand and to define infinity. Because, even we used to consider some things quite differently when we were in high school, for instance I would consider sands in a beach as infinite, that was what I thought infinite set was about. They were not finite. These were provided as examples. For example, a truck full of sand was an infinite set for me. When we started university, we were told sands were not infinite. So, we left them to the side. I believe that we had a problem there.

Hülya and Eda enabled students to question whether the sets given in Table 4 were finite or infinite through the everyday life examples they provided in their lesson plans. As displayed in Table 3, Hülya and Eda designed the activity in their lesson plan by bringing various everyday life situations together.

Table 4. Everyday life examples used in the lesson plans of Hülya and Eda

Sets	Set with finite number of elements	Set with infinite number of elements
A={Marbles in a net}		
B={Regions in Turkey}		
C={Number of steps on a staircase, end of which cannot be seen, indicated in the picture}		
D={Sands in the beach}		
E={Ela's reflections on the mirror}		
F={Stars in the space}		
G={Planets in the universe}		
H={Recurring patterns (both small and big) in a fractal}		

3.2. Prospective Teachers' Reflections about their Knowledge of Teaching

As emphasized in the previous section, it was determined that mathematical prospective teachers' knowledge of teaching remains the same after *Teaching methods* and *School experience* courses. However, the interviews also indicated noticeable changes in the prospective teachers' desire and interest in the activities they would conduct in class, within the context of lesson plans. The prospective teachers' reflections about knowledge of teaching will be included in this section. Eda clearly put out the difference between the thoughts after *Teaching methods* and *School experience* courses by referring to the interviews conducted at the beginning of the *School experience* course.

> Eda: When we talked to you at the beginning of the semester about applying our first activity in the class we told you "the classrooms are convenient, they have smart boards, we can join the desks and do group work, the students are open to it, and so are the teachers". We applied the activity [all prospective teachers laugh] well that might not be the case in each class.

Eda mentioned that she considered the physical conditions of the classrooms they observed to be convenient for carrying out working in groups and technology use. Furthermore, she also mentioned observing that both students and counselor teachers were open to such applications. Eda was quite eager to apply student-centered activities when she would become a teacher, in all of the interviews, except for the last interview. However, she mentioned that such activities might not be convenient in every classroom, after applying an activity within the context of *School experience* course. Burçak, Ebru, and Hülya also made similar remarks. This section will include dialogues of the other three prospective teachers, in which they express their views:

> Hülya: There were some problems while applying the activities. Here, [she refers to the lesson plan they prepared in *Teaching methods* course] eventually, we applied these on our friends. Their readiness was complete. [They laugh]
>
> Ebru: Or they pretended as if it was. [They laugh]
>
> Hülya: We did not have problems there, but, I think the students are quite different. Each grade is different, for instance, 10th graders are different and so are the 11th graders.
>
> Ebru: Even the classes in grades are different.
>
> Hülya: Therefore, it is not possible to foresee what the students will do, I mean it is difficult. In fact, in some cases you can foresee where the students will have a hard time, but you might face with quite different questions.
>
> Burçak: We applied a very simple activity; we thought to ourselves "there is nothing they would have difficulty with". But the time was not enough. We were like "is that break time bell?" Yes, we did not properly prepare it. Alright, this is not how it is going to be, we are going to prepare easier activities. Time might not be enough for this part and there were still difficult parts.
>
> Hülya: It could have been like this maybe, for example we mentioned the areas of parallelogram and trapezoid. However, the teacher only gave the trapezoid. We might have created a difficult activity.
>
> Burçak: We assumed the teacher already taught about it. Maybe that's the reason, but of course, in general, students' readiness was not adequate. They were eager, but they could not do it because they did not remember how to factorize. It was really different though. I felt sorry because I thought I could do more, but I felt bad because we could not even complete this on time. There were students who were really willing, I was really happy to see them. I told Hülya "they ask questions, they are willing to do it" We continued to do it even on break time. Some students brought other questions. They told me "it is actually enjoyable to do it this way". It was very nice. It was different for them too; however, the things we thought of in *Teaching methods* course will not happen right away.

The prospective teachers assumed the activities were applicable in classroom before they applied them in *School experience* course. However, they stated that they came across with factors, which they did not take into account beforehand, when they applied the activity in classroom. These factors include (i) the deficiencies in students' readiness, (ii) being unable to conveniently time planning, and (iii) intensity of mathematical content. In the interviews conducted after *Teaching methods* course, the prospective teachers supported that the lesson plans they prepared should be exactly applied the same in classes, and expressed that they aspired to be teachers, who prepare for lessons the same way. Ebru's explanation of the situation in her own words is as follows:

> Ebru: For instance, when we would do it in our *Teaching methods* course, our friends' reactions would be like "why are they necessary? Are we really going to do this?" We would stand against them and tell them "no, this is not how it is done, we have to change it". But, now that we are in the field, we realize it is wrong to approach it that way, that is another issue but seriously sometimes we have to stop, too. Alright, we are quite willing and the opportunities are limited, but this time I believe that the way students view their teacher changes because of that. Okay, we apply the activities, and remember I said they are not psychologically ready, and you told me [looks at Burçak] it feels as if it is an idle class. They actually learn it without realizing, but since they view it as an idle class they cannot comprehend it the way they should. They can in fact learn something if they make a little bit of an effort. Since they do not approach it with such a mentality, and consider the activity to be an empty one or a game, they do not learn what they should learn. This causes serious problems.

As indicated in Ebru's statement, prospective teachers' knowledge of teaching and their views on its application did not display any changes. However, with their experiences through *School experience* course, they realized that the classroom setting they idealized after *Teaching methods* course does not correspond to the real classroom setting. Ebru expressed that besides themselves, the students could also be effective in applying the activities. Thereby, it is possible to say that although prospective teachers are quite eager to apply the activities, they still question the circumstances in which those activities would be applied in real-life classroom settings.

3. Conclusion

In this study, we aimed to reveal the prospective secondary mathematics teachers' reflections about teaching after their first teaching experience. We observed that the views of prospective secondary mathematics teachers on teaching knowledge have changed after their in-class implementation experiences. Within the scope of "*Teaching methods*" course, the prospective teachers have prepared student-centered lesson plans, which include constructivist approaches. In the interviews conducted at the end of the course, it has been determined that they are willing to implement group works in class. Moreover, it has been observed that they are highly motivated to organize activities which include modeling, using manipulative, and everyday life problems. However, in the interviews conducted after they prepared and implemented the activities within the scope of "*School experience*" course, we have observed a decrease in their motivation and willingness to implement activities, which were student-centered or group work. They have discussed the difficulty of implementing such activities in classroom, and claimed it is due to the fact that classrooms are crowded and students are not used to have such activities. In brief, they asserted that the students in the practice school were used to direct instruction and it was difficult to implement group works and activities, which possess the perspective of constructivist approach. One of the main reasons of this may be due to prospective teachers' lack of experience in the classroom. They have also mentioned the challenges they faced with when they were implementing the methods which they considered to be theoretically perfect and possible to implement. Thus, they have had the opportunity to examine and improve their pedagogical content knowledge. Furthermore, the necessity to give a longer time for the transition of students from direct instruction to the methods, which are based on the constructivist approach; and the necessity to have a teacher, who is aware of students' previous learning approaches and habits, have been come to the light.

In this study, we observed that prospective mathematics teachers have difficulty with implementing their theoretical knowledge. It is believed to result from the inexperience of prospective teachers (Feiman-Nemsera & Parker, 1990; Türnüklü &Yeşildere, 2007). Therefore, the results of the study are consistent with those of previous studies. Regardless of how rigorous pedagogical content knowledge teachers and/or prospective teachers have, we have thought that the feasibility and strength of this knowledge is revealed in the process of implementation. In this study, the views of prospective teachers on their own teaching knowledge have displayed changes after experiencing implementation of only one activity in classroom. In this context, it can be asserted that evaluating pedagogical content knowledge in a process provides a broader perspective (Kleickmann et al., 2013).

Recently conducted studies have pointed out the role teacher education plays for both content knowledge (CK) and pedagogical content knowledge (PCK) of teachers (Kleickmann et al., 2015). In that sense, it can be suggested that teacher training institutions take into account that teaching is a practice based profession and provide a more practice based education. These institutions should pay significance to not only theory but also practice. We believed that introducing prospective teachers to different learning situations by using scenarios and teaching situations in classroom could enable them to complete the transition from theory to practice, which is the most fundamental problems of teacher education. In order to make such a transition, the reflections of prospective teachers should be revealed. Similarly, in this study, we have seen that teachers' reflections about teaching reveal their potential to improve their teaching practices (Hurell, 2013; Kleickmann et al., 2013). In addition, it is believed that conducting studies on how prospective teachers put their knowledge on teaching mathematics into practice in the teaching practice course, which is a follow-up course of *School experience* course, will be beneficial. Moreover, prospective teachers could improve their teaching knowledge through the reflections they may make about themselves or each other in classrooms.

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