

PREPARING PRE-SERVICE TEACHERS FOR REFORM-MINDED
TEACHING THROUGH ONLINE VIDEO CASE DISCUSSIONS: CHANGE
IN NOTICING

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ABSTRACT

PREPARING PROSPECTIVE TEACHERS FOR REFORM-MINDED TEACHING THROUGH ONLINE VIDEO CASE DISCUSSIONS: CHANGE IN NOTICING

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The aim of this study was to investigate the changes on what the prospective elementary mathematics teachers noticed as they watched video cases and discussed online. More specially, I wanted to answer the question “To what extent the elementary prospective mathematics teachers’ noticing with respect to reform-minded teaching changes during their video case-based teacher education, in terms of teacher and student roles?” With this question in mind, I asked senior prospective mathematics teachers at METU to watch six video cases depicting real elementary mathematics classrooms, and then discuss these cases in an online forum. The research was conducted during the 2008-2009 fall semester. Participants were asked to write reflection papers after watching a video each week. The online discussions took place in Metu Online-Net ClassR online forum, and each discussion was about a long week.

The research study was qualitative in nature. Specifically, it was a case study research. Prospective teachers' reflection papers on the videos, the online discussions, and interviews with the selected 15 focus participants at the beginning, in the middle and at the end of the study were the data sources. The data were analyzed through the qualitative data analysis techniques. The findings suggested that prospective teachers' noticing skills with respect to the teacher and student roles in reform-minded teaching and learning were developed throughout the online video-case based discussions.

Keywords: Case-Based Pedagogy, Video Cases, Noticing Framework, the New Elementary Mathematics Curriculum, Prospective Teacher Education

ÖZ

ÖĞRETMEN ADAYLARININ ÇEVİRİMİÇİ ORTAMDA YENİ İLKÖĞRETİM MATEMATİK PROGRAMI VİDEOLARI ÜZERİNE TARTIŞMALARI: NELER FARKETTİLER?

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Bu çalışmanın amacı İlköğretim Matematik Öğretmenliği Programı öğretmen adaylarının video örnek olayları izleme ve çevrimiçi tartışmalar ile fark etme becerilerinde meydana gelebilecek değişikliklerin incelenmesidir. Araştırma sorusunu “Video örnek olay kullanımı ile matematik öğretmen adaylarının yeni ilköğretim matematik programı üzerine fark ettikleri noktalar öğretmen ve öğrenci rolleri açısından nasıl değişim göstermektedir?” oluşturmaktadır. Bu amaçla ODTÜ İlköğretim Matematik Öğretmenliği Programı son sınıf öğrencilerinden bir ders kapsamında gerçek matematik sınıflarında çekilmiş videolar izlemeleri ve bunları çevrimiçi ortamda tartışmaları istenmiştir. Çalışma 2008-2009 güz döneminde gerçekleştirilmiştir. Katılımcılardan her hafta sınıfta video izledikten hemen sonra video yorumlarını yazmaları istenmiştir. Çevrimiçi tartışmalar Metu Online-Net ClassR tartışma forumunda gerçekleştirilmiş ve tartışmalar her bir video üzerinde yaklaşık bir

hafta sürmüştür.

Bu çalışma nitel bir çalışmadır. Daha detaylı belirtmek gerekirse, bu çalışma bir durum çalışmasıdır. Veri toplama araçları temel olarak yazılı yansıtıcı video raporları, seçilen öğrencilerle gerçekleştirilen görüşmeler ve çevrimiçi tartışma ortamıdır. Seçilen 15 öğrenciyle dönem başı, ortası ve sonunda gerçekleştirilen görüşmeler ana veri toplama araçlarıdır. Veriler nitel veri analizi teknikleriyle ve seçilen kuramsal çerçeveye ait analiz prosedürüyle analiz edilmiştir. Bulgular, öğretmen adaylarının yeni ilköğretim matematik programında vurgulanan öğretmen ve öğrenci rollerine yönelik fark etme becerilerinde çevrimiçi video örnek olay tartışmaları ile ilerleme kaydedilebildiğini göstermektedir.

Anahtar Kelimeler: Örnek Olay, Video Vakaları, Fark Etme Teorisi, Yeni İlköğretim Matematik Programı, Hizmet Öncesi Öğretmen Eğitimi

To my dear nephew Kayra and my niece Ezgi...

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LIST OF ABBREVIATIONS

ABBREVIATIONS

EME	Elementary Mathematics Education
METU	Middle East Technical University
NCTM	National Council of Teachers of Mathematics
MoNE	Ministry of National Education
PCK	Pedagogical Content Knowledge
GPK	General Pedagogical Knowledge
CK	Curriculum Knowledge
COK	Content Knowledge
TC	Teacher Characteristics
E	Equity
OC	Out-of-Class Activity

THE BEGINNING

Time for a tough work. I know it won't be easy to understand what prospective teachers notice related to reform-minded teaching and how their noticing changes through online video-case based discussions. I also know that I really want to do something to help future teachers get ready for reformed classrooms. They are the ones who will change the system. They will educate children for a better world. I believe in the new elementary mathematics curriculum, and if only I can do something to enhance future teachers' understanding of it, then I can feel satisfied as a future teacher educator. What I hope is to see some improvement in their noticing skills at the end of this study because I believe only that way they can be prepared for real classrooms, focus on student thinking and understanding, and develop skills to make rapid decisions in the midst of instruction as van Es and Sherin (2008) suggested.

I will employ case-based pedagogy to create an environment to foster future teachers' skills to teach in line with the new elementary mathematics curriculum. I know that it is a great way of preparing future teachers for real classrooms. In a research study with two other teacher educators, I've already seen how much the use of cases in teacher education was effective. I believe it will be the case for this study as well. Using cases in teacher education is a great method for me to use in the future. I hope I can provide prospective mathematics teachers with such environments to become more qualified teachers.

Let's see what happens...

CHAPTER I

INTRODUCTION

“The reform efforts in mathematics education have, once again, directed the spotlight on understanding” (Hiebert et al., 1997, p. 3).

Learning with understanding as opposed to memorizing is a commonly heard wording in education, especially in recent years. As in several countries including the U.S (National Council of Teachers of Mathematics [NCTM], 1989, 2000), a new curriculum have been implemented both in elementary and secondary education in Turkey (Talim Terbiye Kurulu [TTKB], 2006) where reform movements aimed at changing the conventional teaching to focus on learning with understanding. When it comes to the mathematics education area, developmental changes in mathematics curriculum from prekindergarten to grade 8 were made (TTKB, 2006) to provide children with sense making without solely relying on memorization (TTKB, 2006). To state differently, the approach to teaching and learning has changed in Turkey in order to increase student understanding.

1.1. New Curricula in Turkey

In several countries in the world, education systems have been changed. In Canada, Quebec, the education system was renewed in all levels starting in 1997 with the aim of enhancing students’ success. In China, the renewed curriculum were started to be implemented in 2001 in order to promote quality education and improve students’ creativity. An ongoing change continues in Denmark since the mid of 90s. In Finland, primary and secondary education was

improved, and while the education system remained unchanged, new core curricula were required to be used in schools in 2006. There are several other countries, like Australia, around the world that make changes on their curricula (International Conference on Education [ICE], 2004).

In Turkey, also, there was a need for change; and policy makers, educators, and teachers came together and examined other countries' curricula in order to create a new curriculum suiting our needs best, both in elementary and secondary levels. Through examining curricula of countries including England, U.S.A., Canada, Ireland, Singapore, France, and Malaysia, they listed the commonalities across these curricula (TTKB, 2006). Accordingly, in these curricula, students were at the center and active through the learning process, and were supposed to reach information through discovery, analysis, and investigation. Additionally, instruction was sensitive to individual differences; conceptual learning was emphasized more than procedural learning; the aesthetic side of mathematics was emphasized; learning continued outside the school; and reasoning, connection, and problem solving were aimed rather than memorization of rules. These commonalities across the curricula of other countries helped shaping the new curricula in Turkey.

1.1.1. The Elementary School Mathematics Curriculum

As briefly explained above, with the appreciation of the need for change in curricula in Turkey, the Ministry of National Education (MoNE) took a step to change the elementary (1st to 8th grade) and secondary (9th to 12th grade) school curriculum six years ago. The elementary mathematics curriculum is among those being changed and improved. The pilot study of the new curriculum was implemented in six selected geographical regions and in different grade levels each year since 2004. The curriculum was started to be used in elementary level in 2005-2006 academic year, and in 2007-2008

academic year, it started to be implemented in 6-8-graders gradually (TTKB, 2006).

While the traditional instructional programs mainly see mathematics as facts or rules that are prescribed to students and focus on teaching procedural knowledge (Ball, Lubienski, & Mewborn, 2001; Hiebert et al. 1997; McTighe, Seif, & Wiggins, 2004; TTKB, 2006), the new elementary mathematics curriculum in Turkey aims to create an environment for effective, meaningful, and long-term learning via paying attention to students' cognitive levels. The new curriculum includes the presentation of topics via multiple representations such as symbols, texts, pictures, graphs, or active images in order to facilitate learning (TTKB, 2006). The logical coherence between the units is the characteristic of the new curriculum. Each mathematical topic in the new curriculum follows each other within a logical sequence. The new curriculum presents the same topic several times with an increased level of cognition and through linking it to other information (Bulut & Koc, 2006a).

In the new elementary mathematics curriculum, mathematics is not seen as a body of principles, symbols, or algorithms anymore, but as a net of meaningful relations (TTKB, 2006). The curriculum focuses on learning with understanding, sense making, reasoning, making connections within mathematics and with other learning areas, higher cognitive demands, and more student-centered learning with more activities. Communication is another requirement of the curriculum. Students are expected to be more actively involved in learning via communicating with their teachers and peers (TTKB, 2006). The new curriculum provides opportunities for investigation, questioning, inquiry, discovery, active participation, group work, and building new knowledge on previous one. The vision of the new curriculum is to raise students who can use mathematics in their daily lives and professional practices, solve problems, share their ideas and solutions, do group work; who have self-confidence in mathematics; and who feel pleasure from learning mathematics

(TTKB, 2006). Such an approach to learning is expected to lead to a more meaningful learning (Bulut & Koc, 2006b; TTKB, 2006).

1.1.1.1. Student Responsibilities in the New Curriculum

In the new curriculum, learning is formed by students through student-centered activities and their active role. The students are given several responsibilities to carry out in this curriculum. They are supposed to be active both mentally and physically during the learning process, be able to express their ideas, to question and inquire, to discuss, be responsible of their own learning, to work together, to communicate effectively, and to carry out their responsibilities. During the learning process, students are expected to make use of their previous knowledge, and combine it with what is learned. To form new knowledge through such a process saves them from memorization. The curriculum targets to help students with being able to transfer their knowledge to different fields, and use it effectively and creatively in other areas too. The students are expected to gain some common main skills through the curriculum. Critical thinking skill, creative thinking skill, communication skill, inquiry skill, and problem solving skill all aim to give students the essence of learning with understanding.

1.1.1.2. Teacher Responsibilities in the New Curriculum

The new curriculum also expects several responsibilities from the teachers. According to the report of TTKB (2006), some of the teacher roles and important characteristics they need to have are to believe that students can learn mathematics; to ensure that students develop positive attitude toward mathematics; to improve themselves; to guide and motivate students; to develop activities and apply them in classrooms; to examine students, make them question, think, and discuss; to measure and evaluate; to act harmonious with human rights; to act ethical both during in and out classroom activities; to self-evaluate themselves during in and out classroom activities, and use the results in

improving teaching-learning process; to have self-confidence; to have skill of self-preparation; to perform their profession willingly; to know their students; to create teaching-learning environment; and to use time effectively in teaching-learning process.

All the above characteristics teachers are expected to have indicate how important the teachers' responsibilities and their role in implementing the new curriculum. To achieve the targets of the new curriculum, it is necessary and sufficient condition that the teachers receive help with understanding the new curriculum and have opportunities to experience it. Obviously, not only in-service teachers, but also prospective teachers need such opportunities. Teacher education programs should model teaching in order to help future teachers to develop necessary professional knowledge, and to have opportunities of discourse on mathematics (NCTM, 1991). State differently, it is important that they are trained well enough to fulfill the requirements of the new movement in terms of understanding the requirements and what it expects from them in order to minimize the difficulties they may encounter. However, the literature on teacher education programs indicates that prospective teachers face several difficulties when they enter the teaching profession.

1.2. Difficulties Prospective Teachers Might Face when They Enter the Profession

When prospective teachers enter the teaching profession, the survival stage begins and they experience reality shock (Veenman, 1984) because of the complexities of teaching work. Not feeling ready to teach is what they encounter during that period (Hebert & Worthy, 2001). In this stage, their beliefs about teaching and learning may change, they may miss or create several teaching and learning opportunities, and they may struggle with the obstacles in creating opportunities for learning to teach. They struggle especially when they are not well prepared for the complexities and difficulties of the real classroom

environments, and experience difficulty with transferring what they learn during their formal education to practice (Black & Halliwell, 2000). Prospective teachers not only have difficulty with connecting theory which they learn in their formal education to practice which they need to know to survive in the profession, but also with teaching the subject matter effectively, classroom management, understanding students' points of views, how students learn and what kind of difficulties they encounter while learning, and understanding policies (Brock & Grady, 1996; Davies & Ferguson, 1997; Hebert & Worthy, 2001).

There are several reasons or explanations for the difficulties that teachers experience during their initial years. The insufficiency of initial teacher education; the mismatch between beginning teachers' expectations, characteristics, and school context; the heavy load of new and difficult responsibilities; and the difficulty of finding a place in a new culture are among possible reasons (Hebert & Worthy, 2001). Although initial teacher education helps prospective teachers with gaining theoretical and some practical knowledge, it does not prepare them for the complexity of professional work (Green & Campbell, 1993). When they enter the profession, prospective teachers have to develop necessary knowledge, skills, and personal attitude for teaching in their first years. Beginning teachers experience difficulties while going through *learning by doing* period (Flores, 2006), and the load of responsibilities limits the opportunities to learn to teach (Huling-Austin, 1992). Then, it is important for them to receive sufficient education in order to minimize the problems they face and maximize the opportunities to learn to teach. In other words, well-educating prospective teachers before they enter the profession and preparing them for the realities they will encounter are vital. Especially, as the new elementary mathematics reform is required to be implemented in classrooms, it is important that prospective teachers get ready for this movement.

1.2.1. The New Curriculum and the Support Teachers Need

With the introduction of the new elementary mathematics curriculum in Turkey, mathematics teachers' job becomes heavier as the responsibilities of teachers become more loaded with the demands of reform efforts (Borko et al., 2000). According to Borko et al. (2000), teachers need to get to know the reformed curriculum and make modifications on their instruction in order to be able to effectively implement it (Borko et al., 2000), which is the case for Turkey now. Reform demands conceptual understanding and meaningful learning (TTKB, 2006), and in order to teach in line with the new curriculum, teachers are required to learn how to teach with respect to reform. More specifically, literature suggests that what makes a reformed curriculum successful is up to the extent teachers can apply it to their classrooms (Feiman-Nemser, 2001; Spillane, 1999), and being able to successfully implement reformed curriculum requires "...a great deal of learning on the part of teachers and will be difficult to make without support and guidance" (Borko, 2004, p. 3). On the other hand, the literature also suggests that teacher education programs do not support teachers in that aspect. As van Es and Sherin (2002) underline,

...current programs of teacher education often do not focus on helping teachers learn to *interpret* classroom interactions. Instead, they focus on helping teachers learn to *act*, often providing them with instruction concerning new pedagogical techniques and new activities that they can use (p. 572).

While van Es and Sherin (2002) suggest a way to guide teachers during their teacher education in learning how to teach in line with the reformed curriculum, Davis, Petish, and Smithey (2006) also underline the necessity of providing teachers support in enacting reform. They state that both in-service and prospective teachers should be given opportunities to understand the reform. Especially, it is critical that prospective teachers should receive support (San, 1999; see Davis et al., 2006) as they not only need to get prepared for the

difficulties of the teaching profession, but also to understand the kinds of instructional changes the reform requires.

It should be taken into account that the opportunities for prospective teachers to get prepared for the challenges of the new movement are limited to their formal education. In other words, they can learn about the reform movement through taking congruent teaching methods courses and going to schools for field experience to observe teachers and implement what they learn in their university courses. However, the literature on the teacher education programs indicates that these opportunities are not satisfying alone (Clift & Brady, 2005). Shulman J. (1992) further adds that traditional preparation of prospective teachers is not answering the problems of teaching profession, and they are not preparing teachers for the realities of classrooms. Similarly, Davis et al. (2006) state that,

Yet new teachers are crucial for enacting and spreading reforms—many learn about current reform movements in their teacher education programs and thus seem most likely to be able to adopt and promote reform-oriented instruction. Supporting them in doing so effectively would help to make their early years of teaching more effective, thus improving the instruction that students receive (p. 608).

Thus, during their teacher education program, it is important to provide prospective teachers with several opportunities to get ready for the challenges of the real classrooms, and understand the teaching and learning environment required in the new curriculum. To state differently, sufficient teacher support is important in enacting reform and improving instruction. As indicated, “When the situations of teacher education share conceptions of teacher learning and a vision of reformed practice, teacher education does make a difference in preparing reform-oriented educators to join the profession” (Borko et al., 2000, p. 204). Then, creating such opportunities for future teachers during their education programs is vital. As van Es and Sherin (2008) underline, if

prospective teachers are given opportunities to develop norms to notice important features in a classroom environment and be able to interpret classroom interactions, then they might learn to analyze teaching in the context of reform to get ready for the reform-minded classrooms. When they notice and reflect on several features of reform-minded classrooms such as teacher and student responsibilities, they can understand the reform better. Thus, it is important to create environments to develop prospective teachers' noticing skills as "in the context of reform, noticing is a skill that teachers may need to develop further" (van Es & Sherin, 2008).

While prospective teachers experience several difficulties as explained above and they need support in understanding and enacting reformed curriculum, there is also another issue to taken into account. Shulman L. (1987) points on this issue and remarks one of the difficulties prospective teachers face when they enter the profession as the deficiency in their subject matter knowledge.

1.2.2. Teacher Knowledge

Shulman L. (1987) states that teachers should have a knowledge-base in order to be able to improve student comprehension. Accordingly, they should have content knowledge; general pedagogical knowledge; curriculum knowledge; pedagogical content knowledge; knowledge of their learners and their characteristics; knowledge of educational contexts; and knowledge of educational ends, purposes, values, and their philosophical and historical grounds (see p. 8). In other words, it is important that teachers have strong content knowledge in order to be able to teach it. "Indeed, it is hard to imagine teachers engaging their students in deep and productive conversations about mathematics without themselves having a strong grasp of the content that they are trying to discuss" (Fernandez, 2005, p. 266). However, while it is important that teachers should have content knowledge in order to teach it, Ball (1990)

underlines that teachers “...lack explicit understanding of concepts and principles even when they can perform the calculations involved” (p. 458). Similarly, teachers, especially the elementary teachers, lack mathematical knowledge needed for reform-minded teaching (Ball, 1990; Fernandez, 2005).

Reform demands for student understanding, thus, it is very important in the context of reform that teachers have adequate knowledge for teaching mathematics for student understanding. As Fernandez (2005) puts it “...the mathematical demands of reform-minded teaching go well beyond mastery of subject matter knowledge. Most notably, teachers need to know mathematics for teaching; that is, they need to know how to support their students’ developing mathematical understandings” (p. 266).

Knowledge needed for teaching is described by Ball, Thames, and Phelps (2007). In this kind of teacher knowledge, subject matter content knowledge (SMCK) and pedagogical content knowledge (PCK) are the two main categories of teacher knowledge for teaching. While the former includes specialized content knowledge (SCK), common content knowledge (CCK), and horizon content knowledge (HCK); the latter covers knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of content and curriculum (KCC). The aim of these researchers is to focus on teacher knowledge for teaching instead of teacher knowledge, and they try to understand what teachers should know in order to be able to teach, and what mathematics they need to know and use. Shulman (1987) also reports that pedagogical content knowledge -covering understanding students’ thinking, anticipating their difficulties, and being able to produce strategies in classrooms in order to help students understand the content better- is a must to have for reform-minded teachers. At this point, teachers may need support in gaining such knowledge. Additionally, when it comes to reform-minded teaching, if a program asks teachers to transform themselves from an authority to autonomy (Lundeberg, Levin, & Harrington, 1999), that is, if they should learn to be critical, appreciate

learning as a team, and strengthen their content and pedagogical content knowledge (Barnett & Tyson, 1999); then they need to understand that neither knowledge comes from any external sources nor they are the authorities to give it to their students. Instead, they need to realize that knowledge is gained from internal sources, constructed, evolving, and learning occurs through a collective work. Then, in order to be able to satisfy the requirements of the reform, teachers may need to go through such a change process.

Thus, if teachers are expected to go through a change process and to provide students with an environment fostering learning with understanding, it is crucial that they learn how to teach effectively. Battista (1994) states that "...once they fully understand and believe in the reform movement, teachers will lead the way in implementing it" (p. 462). While even working teachers need support in reform-minded teaching, it might be anticipated that prospective teachers may have difficulties with teaching when they lack professional knowledge and skills. At this point, the importance of developing prospective teachers' noticing skills comes to the fore. Through giving chances to improve their noticing skills to analyze classroom situations, prospective teachers might have opportunities to reflect on teacher knowledge for teaching mathematics for student understanding, and thus enhance their professional knowledge for reform teaching.

1.2.3. Summary

Teachers, especially the prospective teachers, may have difficulties understanding the reform, and their professional knowledge might prevent them from gaining knowledge on reform-minded teaching, and may influence their practice (Borko et al., 2000). Ball (1994, 1996) underlines that teachers' knowledge affects what they get from professional development opportunities (as cited in Wilson & Berne, 1999). In the same manner, Borko et al.'s (2000) study reveals how a teacher education program influenced a teacher's

professional knowledge in regard to reform-based pedagogy. What is suggested here is that it is possible to foster future teachers' development as mathematics teachers during the teacher education programs. As Borko et al. (2000) state,

The visions of classrooms called for by current educational reform efforts pose great challenges for mathematics teachers and the schools in which they work... To move successfully toward these visions requires major changes in many teachers' professional knowledge and beliefs, as well as their pedagogical practices (p. 193).

Then, if it is aimed to educate teachers who are qualified to teach according to the demands of reform, it is necessary to understand their view of teaching and learning, and to help them internalize the characteristics and requirements of reform. Only after this is achieved, it might be possible to provide them effective teacher education. At this point, the use of cases might be one of the ways in teacher education to accomplish this goal (Harrington & Garrison, 1992; Mayo, 2004; Merseth, 1996).

In the following part, explanation on case-based pedagogy with its definition, and the use of case-based pedagogy in initial teacher education are discussed.

1.3. Initial Teacher Education and Case-based Pedagogy

As it was explained above, prospective teachers need support for getting ready for the realities of classrooms. Then, in order to prepare the future teachers for reform-minded classrooms, the *case idea* (Sykes & Bird, 1992) as a pedagogical approach (called case-based pedagogy) might be employed in teacher education programs. Case methods of teaching are defined as "...the methods of pedagogy employed in conjunction with teaching cases" (Shulman, 1992, p. 19) where teaching cases are case reports or case studies that prepared for teaching. Case-based pedagogy is an effective method to prepare teachers for

the complexities of teaching (Harrington & Garrison, 1992; Mayo, 2004) as it provides teachers with opportunities such as to connect their theoretical and practical knowledge (Butler, Lee, & Tippins, 2006), to analyze and reflect on student thinking (Masingila & Doerr, 2002), and to reason about teaching (Harrington, 1999). If observing other teachers is an effective way of teacher development (Moran, Dallat, & Abbott, 1999) and reflective teacher education is the kind of education novices should receive (Manouchehri, 2002; San, 1999; Stockero, 2008), it might be a feasible way prospective teachers reflect on other teachers' cases.

Then, although the implementation of reflective teacher education approach is more difficult than theory-based and short teacher education, it is more effective (San, 1999) and it is the core of reform in teacher education (Darling-Hammond, 1994 as cited in Manouchehri, 2002). With all its responsibilities and challenges, it should be a part of initial teacher education to provide opportunities for future teachers to improve and increase their reasoning abilities as well as their knowledge for teaching.

1.3.1. The Use of Cases in Teacher Education

Research studies indicate that case-based instruction fosters the individual and social constructivist models of teaching and learning via taking learning as an active process (Mayo, 2004). Similarly, the new elementary mathematics curriculum in Turkey demands teachers to create learning environments in which the learning is active (TTKB, 2006). This view point as to the use of cases has the potential to model reformed curriculum for teachers in that they might learn to appreciate the new understanding of teaching and learning required. Additionally, initial teacher education is the period that teachers develop teaching skills, and it is necessary them to observe, interpret, and analyze in order to understand teaching. Then, the use of cases in initial teacher education becomes more critical. Lloyd (1999), supporting Feiman-

Nemser (2001), states that along with innovative curriculum materials, cases “...are particularly appealing teacher education tools because they offer detailed images of what reformed mathematics teaching and student learning can look like” (p. 249). Specifically, Sowder (2007) points that cases help teachers “...develop critical analysis of teaching and learning that is student centered...” (p. 180). Then, providing teachers with case learning opportunities that mirror reform requirements might help them implement what the reform necessitates.

One of the studies in the literature by Walen and Williams (2000) is an example to the use of cases in teacher professional development with respect to reform. In that study, the use of cases provided teachers opportunities with discussing and solving their problems. Through discussions on cases, they had chances to realize the mismatch between the assessment in traditional and reformed curriculum. Additionally, as they realized the similarities among their ideas, they felt more confident in working on changing the system. The researchers concluded that case methodology could be an effective way to help teachers understand and implement reform.

As stated before, the literature also reveals that prospective teachers may struggle when they enter the profession because of lack of knowledge (Borko et al., 2000); and for the reform to be successful, it is crucial that teacher education programs provide teachers with opportunities to improve their knowledge for teaching. At this point, case-based pedagogy might be a tool for teacher development as it “...embraces ideas that are grounded in critical curriculum inquiry and the importance of teachers' knowledge” (Arellano et al., 2001, p. 506). Borko et al. (2000) suggest the use of cases to improve teachers' pedagogical knowledge. Similarly, Hammerness, Darling-Hammond, and Shulman (2002) underline that the use of cases in teacher education can provide prospective teachers with opportunities to connect their theoretical and practical knowledge, and thus to improve their professional knowledge. More specifically, their study implies that through case-writing, prospective teachers

can improve their knowledge on student understanding, and what and how to teach via considering factors such as students' previous knowledge and experiences as well as subject matter and context. Additionally, Fernandez's (2005) lesson study might be an example to the use of cases in teacher education. In that study, the participant teachers showed lack of knowledge for reform-minded teaching, and it was only after they had discussions on teaching that they developed the mathematical knowledge for teaching to be able to enact reformed lessons. After engaging in lesson study, the teachers were able to develop their pedagogical content knowledge, and their reasoning abilities improved in line with the reform. As Darling-Hammond (2006) states through examining several teacher education programs, use of case methods is one of the common features of these exemplary programs in integrating theoretically based and experience-based knowledge.

In sum, it is important to develop future teachers' knowledge for reform-minded teaching during their teacher education programs, and the use of cases might be one of the ways to achieve this. Making use of cases in teacher education might provide teachers with opportunities to critically reason on classroom practices (Lundeberg, 1999), develop teacher autonomy (see the case discussion example in Lundeberg et al., 1999, p. 59), and improve themselves as teachers of the new movement. At this point, case-based pedagogy is expected to serve "...as an opportunity to teach critical inquiry practices by highlighting and critiquing deeply held assumptions that might otherwise go unnoticed" (Arellano et al., 2001, p. 524). When case-based pedagogy is employed in teacher education, it might be possible to improve teachers' noticing skills to get ready for reform-minded classrooms.

1.4. Purpose and Research Questions

In an effort to help prospective teachers get ready for reform-minded classrooms, in this study, I wanted to study case-based pedagogy, and conducted a qualitative study to answer the following questions:

1. To what extent elementary prospective mathematics teachers' noticing with respect to reform-minded teaching changes during their video case-based teacher education?
 - 1.1 How prospective mathematics teachers' noticing with respect to the teacher roles in reform-minded teaching changes during online video case-based discussions?
 - 1.2 How prospective mathematics teachers' noticing with respect to the student roles in reform-minded teaching changes during online video case-based discussions?

My goal was to examine the changes on prospective teachers' noticing skills with respect to the reform-minded teaching as they involved in video case-based teacher education. In other words, the purpose of this study was to provide prospective teachers opportunities to get ready for the complexities of real classrooms and prepare them for reform-minded teaching. With this aim in mind, I investigated the changes on what the prospective elementary mathematics teachers noticed as they watched video cases from real classrooms and discussed these videos online. More specifically, with the questions above in mind, I asked senior prospective elementary mathematics teachers at METU to watch video cases depicting real elementary mathematics classrooms, and then discuss these cases in an online forum.

1.5. Explanations of Key Terms

Reformed Mathematics Curriculum/Reform-Minded Teaching and Learning: The curriculum underlining the importance of learning with understanding. The focus is on students' building their own knowledge through the guidance of the teachers. Meaningful learning is the main goal of this kind of teaching and learning (TTKB, 2006).

Prospective Elementary Mathematics Teachers: The prospective teachers are the senior students in elementary mathematics education department in Middle East Technical University (METU). They have completed most of their course load including mathematics, pedagogy, and education courses. These teachers are educated to teach mathematics in public and private schools from fourth to eight grades in primary and middle schools.

Case-based Pedagogy: A case in classroom teaching context is "...a piece of controllable reality, more vivid and contextual than a textbook discussion, yet more disciplined and manageable than observing or doing work in the world itself" (J. Shulman, 1992, p. xiv). It is constructed to be used in teacher education and it describes teaching (Sykes & Bird, 1992). More specifically, it is a tool for developing problem solving skills and opportunities for reflection, and understanding teaching (Merseth, 1996). In this study, case-based pedagogy refers to a way of initial teacher education as it describes teaching, and helps teachers with reflecting on teaching through the use of videos from real elementary mathematics classrooms.

Video-based Cases: Video cases are one of the types of cases among text-based cases, multimedia cases, and hyper-media cases. According to Lundeberg and Levin (2003), video-based cases are identified as one of the several types of cases that are available to use in teacher education, other than short cases, dilemma-based cases, multimedia cases, and self-developed cases. Richardson (1999) defines video cases as "...multimedia presentations of

classroom actions and analyses that include moving pictures (usually on videocassette) of classroom action” (p. 122). In this study, video cases refer to the videos taped in real elementary mathematics classrooms in Ankara.

Noticing Skill: Noticing is a skill that teachers should have to be able to notice classroom interactions (van Es & Sherin, 2002). Accordingly, teachers should be able “to identify what is important or noteworthy about a classroom situation, make connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent, and use what they know about the context to reason about classroom interactions” (van Es & Sherin, 2002, p. 573).

Change in Noticing: In this study, it was expected to see improvements on participants’ noticing skills in terms of teacher and student roles in the new elementary mathematics curriculum. In other words, participants were expected to notice and reflect on more issues related to the teacher and student roles with respect to reformed-minded teaching as they watched mathematics videos from real classrooms and discuss those videos online during a semester.

Online Discussion Forums: Discussion forums are one of the communication tools in Computer-mediated communication (CMC) (Herring, 2001), in which people communicate through computers in anywhere and anytime in order to share and build new ideas, knowledge and skills (Harasim, Hiltz, Teles, & Turoff, 1995). In online discussion forums, people post email messages on discussion lists, and asynchronously comment on each others’ messages. In this study, NetclassR forum in METU online webpage was used as an online discussion environment to discuss the video cases.

1.6. Motivation for the Study

As a research assistant at METU, I have been in dialogues with prospective teachers, and had the chance to hear their concerns. As far as I observed, I saw that although they are satisfied with the education they got in

their teacher education program and found it very strong in quality, mostly theoretically, they believed that their practical knowledge is weak. They visit schools for their internship and observe teachers and students, but such experience sometimes make them think that in real classroom life teachers do not follow the requirements of the new elementary mathematics curriculum. I anticipated that it was discouraging for them to see traditional teaching a lot, and they sometimes lost their courage to apply what they learned during their teacher education when they start teaching. I felt that there should be some ways to help them to observe and analyze real classrooms in which the teachers try to implement the new curriculum, and talk about the reform aspects in those lessons. This would also help them connect their theoretical knowledge to practical knowledge.

Starting from this point, for my dissertation study, I selected to study the use of video cases in teacher education. I hoped that creating environments in which prospective teachers observe, analyze, and interpret real classrooms with reform-minded teaching in their minds could be an effective way of preparing them for the realities and complexities of classrooms. When the prospective teachers, who were educated in reform-minded teaching theoretically during their teacher education, watch videos and discussed them together, it could be possible to see them notice more on reform-minded teaching and learning. They may also have opportunities to talk about teacher and student roles in the new curriculum more in depth. As the senior students were the ones who mostly finished their course work and close to become teachers, I selected them as my participants.

1.7. Significance of the Study

The present study has several significances. First, when it comes to the reform-based visions of teacher education, it is necessary to provide future teachers with opportunities to get to know reformed curriculum, and what the

reform-minded teaching and learning demands from them. Otherwise, as it was presented at UNESCO International Conference on Education in 1996, the demands of reform may fatigue teachers. Teachers show burnout because of the reform policies, and either they leave the profession or their teaching quality decreases (in Day, Elliot, & Kington, 2005). Additionally, Borko et al. (2000) state that,

Although a number of colleges and universities throughout the country are making changes in their teacher education programs to take reform-based visions of classrooms into account, we have little systematic information on the nature of these programs or their impact on prospective teachers (p. 193).

Then, it is essential to help future teachers get ready for reform-minded teaching during teacher education programs. This study contributes to the literature that it creates a learning environment in which prospective teachers have opportunities to discuss on videos from real classrooms and learn from each others' points of views. The literature indicate that the opportunities for teachers to analyze, discuss, reason, and reflect on cases are important as they foster their decision making skills through understanding not only theories and practices in real classrooms, but also the complexities of classrooms (Shulman, J., 1992). One of the studies in the literature reveals how teacher education can be useful in reformed practice (Borko et al., 2000). In that study, mathematics methods courses provided a participant teacher with collection of tasks that depict reformed teaching, and teacher education contributed to her development as a teacher. The teacher in that study was able to incorporate tasks, which encourage multiple representations and different solution strategies and actively involve students in learning process, into her repertoire. Additionally, she improved her ability to engage students in mathematical discussions. In the present study, a teacher education program for prospective teachers is created to

help them notice the characteristics of reform-minded teaching and learning to get ready for reformed teaching.

Second, van Es and Sherin (2008) underline that "...noticing is a skill that teachers may need to develop further" (p. 245) even if they already have it since being able to notice and interpret classroom situations is essential for reform teaching. To state differently, teachers should be able to notice important aspects of reform-minded teaching and learning to get ready for reformed classrooms. In the context of the present study, participants are the prospective teachers and they are not expected to have advanced noticing skills. As "...recent research points to the value of teachers learning to examine classrooms in new ways in the context of reform" (van Es & Sherin, 2008, p. 245), it is important to provide prospective teachers opportunities to develop noticing skills in their teacher education programs. Additionally, Star and Strickland (2008) underline that it is important to develop teacher candidates' observation skills in order to help them think about teaching and learning process more deeply. They suggest that it might be possible to increase the effectiveness of field observations through developing prospective teachers' noticing skills. Thus, this study contributes to the literature that it creates a professional development environment for prospective teachers in which they can develop noticing abilities with respect to reform-minded teaching and learning.

Another contribution of this study is that it makes use of video cases as a professional development tool. Boling (2007) points out that there is not much study on the pedagogy of teacher education and there are few studies on what candidates learn from hypermedia case-based teaching. From another perspective, as Star and Strickland (2008) state, "...there is little research that confirms whether preservice teachers attend to the aspects of the video(s) that teacher educators anticipate or desire" (p. 107). It is believed that this study may

contribute to the literature on what teachers gain from the use of video-based cases in teacher education.

In addition to above, in this study, communication technology is used. The participants discussed the videos in an online discussion forum called NetClass-R developed by METU. Ellis, Calvo, Levy, and Tan (2004) underline that “The contribution of communication technologies to quality experiences of learning through discussions is an area that requires more rigorous evidence...” (p. 73). Similarly, Llinares and Valls (2010) suggest that more research employing new communication tools other than face-to-face instruction should be done to understand how future teachers develop teaching skills. The present study makes use of online discussions to be able to improve prospective teachers’ noticing skills.

Additionally, the need for examining whether and what teachers learn from cases is appreciated. Nemirovsky and Galvis (2004) state that how the “...process of learning to see teaching and learning situations in a new light unfolds over time remains as a major research question for the field” (p. 77). Shulman L. (1992) also states that it is necessary to investigate what teachers learn from cases. He underlines that,

Those of us who wish to introduce such approaches to the education of teachers must not only commit ourselves to a generalization of case writing, careful editing, and curriculum development; we must also plan to conduct serious investigations of learning and teaching with cases (p. 28).

As Shulman suggested, it is important to examine whether and what teachers learn from cases. A review of case studies conducted in several disciplines reveal that only 15 out of 100 case studies included learning outcomes, and more research opportunities in case-based teaching and learning are needed (Kim et al., 2006). Thus, it is necessary to conduct studies on what prospective teachers gain from the use of cases in teacher education. The present

study aimed to investigate the changes on prospective teachers' noticing skills as they reflected on video cases.

Besides all, there is another issue to underlie. Prospective teachers value taking courses on teaching and doing teaching practice, but they think it is not that necessary or useful to take theoretical lectures on education (Moran, Dallat, & Abbott, 1999). They complain that these lectures do not prepare them for the difficulties they encounter during their initial years. They also state that they do not receive much on information technology. Then, through the use of cases, it might be possible to minimize prospective teachers' difficulties that they face when entering the profession. It might also show them the link between theory and practice via connecting what they learn to their practice. Such connections might improve their understanding of teaching. This study aims to provide prospective teachers with opportunities to get prepared for teaching.

Finally, there is not enough study on the use of cases in teacher education in Turkey. My review of the theses in Higher Education Council's database revealed that there are limited studies on the use of cases in teacher education in Turkey. The thesis study on the dynamics of online communities of practice environments in initial teacher education by Baran, B. (2007) is one of the examples to the use of video cases in teacher education. Another study on the use of video cases in teacher education aimed to investigate the differences between the affects of traditional versus video-case based instruction on prospective teachers' ability to connect their theoretical and practical knowledge (Baran, E., 2006). Yecan (2005), on the other hand, examined the affects of three factors that are prospective computer teachers' cognitive styles, their computer competency levels, and their domain knowledge on their hypermedia learning. Adali's (2005) thesis study in which the experimental group who was instructed with case-based instruction showed higher achievement and attitude toward science than that of the control group is another example to the use of case-based instruction. Similarly, Cam's (2009) thesis study examined the effects of case-

based learning method on students' understanding and attitudes toward chemistry. The other related studies might be the studies on the reflective teacher education by Erginel (2006), and prospective teachers' attitudes toward the use of microteaching as a reflection tool in teacher education by Celik (2001). There is also a study on the use of video cases in teacher education in Turkey. Olkun and his colleagues carried out a teacher training project supported by The Scientific and Technological Research Council of Turkey [TUBITAK]. With this project, L-Test, they aimed to help teachers and teacher candidates develop their professional knowledge, skills, and attitudes through video-cases. They attempted to help in-service and prospective teachers get to know student thinking and the new curriculum via video cases (Olkun & Altun, 2007; Olkun, Altun, & Deryakulu, 2006). Based on the literature review, there are limited studies on the use of cases in teacher education in Turkey, and thus, it was necessary to conduct a study on what prospective teachers gain from the case-based pedagogy.

CHAPTER II

REVIEW OF THE LITERATURE

“When the situations of teacher education share conceptions of teacher learning and a vision of reformed practice, teacher education does make a difference in preparing reform-oriented educators to join the profession” (Borko et al., 2000, p. 204).

In this section, the research studies from the literature and the theoretical perspective of the study are presented. Specifically, the use of cases in teacher education is discussed in terms of the definition, types and characteristics of the cases; the significance and strengths of cases; the theory explaining their use; what teachers learn from case-based pedagogy, particularly with respect to reform efforts; and their use in the literature.

2.1. The Use of Case Studies in Teacher Education

In order to explain the use of cases in teacher education in detail; the definitions and types of the cases, their use in literature, the theoretical framework employed, strengths of cases, discussions around cases, use of cases in reform efforts, and limitations of cases are provided respectively in sub-headings below.

2.1.1. Cases: Definitions, Types, and Characteristics

Taking into the consideration the history of case studies in teaching, it can be asserted that they have long been employed in various disciplines such as law, medical education, business and management (Masingila & Doerr, 2002; Shulman L., 1992; Sowder, 2007). In U.S., the idea of using cases in teacher

education is also not new and their use in teacher education institutions goes back to 1920's (Merseth, 1999) though it became more common (Masingila & Doerr, 2002; Shulman L., 1992; Van Den Berg & Visscher-Voerman, 2000) and turned out to be a tradition over the past two decades (Darling-Hammond & Hammerness, 2002; Merseth, 1996). In Turkey, on the other hand, their use is very novel and there are not enough studies on the effects of case-based pedagogy on teacher education. Olkun and his colleagues' study, and thesis studies conducted on written, video or hypermedia cases are the examples to the use of cases in teacher education in Turkey (Adali, 2005; Baran, E., 2006; Baran, B., 2007; Cam, 2009; Olkun & Altun, 2007; Olkun, Altun, & Deryakulu, 2006; Yecan, 2005).

There are various definitions of teaching cases in the literature stemming from a variety of purposes and uses of cases (Merseth, 1996). Bruner (1986, 1990) sees cases as a way of knowing (as cited in L. Shulman, 1992). A case in classroom teaching context is "...a piece of controllable reality, more vivid and contextual than a textbook discussion, yet more disciplined and manageable than observing or doing work in the world itself" (J. Shulman, 1992, p. xiv). It is constructed to be used in teacher education and it describes teaching (Sykes & Bird, 1992). It is a tool for developing problem solving skills and opportunities for reflection, and understanding teaching (Merseth, 1996). In other words, cases are seen as a way of learning as they describe teaching, and help teachers with reflecting on teaching.

There are several types of cases; text-based cases (Butler, Lee, & Tippins, 2006; Dori & Herscovitz, 2005; Jackson, 1999; Levin, 1995; Mayo, 2002; Mayo, 2004; Powell, 2000; Smith, Silver, & Stein, 2005), video-based cases (Boling, 2007; Borko, Jacobs, Eiteljorg, & Pittman, 2007; Copeland & Decker, 1996; Nemirovsky & Gallis, 2004; Tippins, Nichols, & Dana, 1999; van Es & Sherin, 2008), and multimedia cases (Abell, Bryan, & Anderson, 1998; Doerr & Thompson, 2004; Herrington & Oliver, 1995; Lampert & Ball, 1990;

Lampert & Ball, 1998; Masingila & Doerr, 2002; Mccurry, 2002; McGraw, Lynch, Koc, Kapusuz, & Brown, 2007; Van den Berg & Visscher-Voerman, 2000). Lundeberg and Levin (2003) identify several types of cases that are available to use in teacher education as short cases illustrating theoretical principles, dilemma-based cases, video-based cases, multimedia cases, and self-developed cases. They support the use of dilemma-based cases in teacher education and state that they help prospective teachers confront their beliefs and change them, and also foster social interaction and reasoning abilities. There are also subject-specific cases and context-specific cases (Sykes & Bird, 1992). For example, while Barnett's (1991) case on multiplication of fraction is a subject-specific case, cases on teaching in Alaskan communities written by teachers and edited by Kleinfeld (1988) is a context-specific case (in Sykes & Bird, 1992). Putnam and Borko (2000) suggest that different kinds of cases illustrate the complexity of classroom life in different levels.

The structure of cases is of significance when it comes to their use in education. What makes a case is the knowledge it represents, and the instructive power of a case lies in its structure, purpose, and content (Merseth, 1996). Thus, it is important to know what type of cases should be selected for particular purposes and what characteristics they should have (Kim et al., 2006). Having discussed Doyle (1990), L. Shulman (1986, 1992), and Sykes and Bird's (1992) views on the purpose and use of cases, Merseth (1996) provides a framework dividing the purpose and use of cases in three categories. Accordingly, cases can be exemplary; opportunities to practice analysis and make decisions on action; or stimulants to reflection.

These different categories are based on different intentions. When cases are used as exemplary models, they model the best, theoretical, or prescriptive practice for teachers (Merseth, 1996). When teaching as a profession is considered to be complex and context-specific, then cases are not used to exemplify theories, but to practice action and to help teachers "think like a

teacher” (Shulman, L., 1992, p. 1) as in Arellano et al.’s (2001) study. In the third use of cases, cases are employed to foster teacher learning from their own or others’ experiences. Studies in the literature indicate that researchers select different types of cases to use in teacher education. Since Van den Berg and Visscher-Voerman (2000) stated that “...which type of case (or combination) fosters teacher learning best is an issue as yet unresolved, because empirical research on cases in teacher education is limited” (p. 121), researchers conducted several studies on the use of cases with different characteristics. For example, referring to Merseth’s (1996) framework, Walen and Williams (2000) preferred not to give participants an exemplary case or an opportunity to practice already had skills. Their intent was not to provide answers or moral lessons. Instead, they aimed to provide participants with an environment in which they could reflect on cases and find solutions to the problems they identified.

Wallace (2001) examined the use of teaching cases with different characteristics in a special issue of *Research in Science Education*. Via identifying three uses of cases –1) the direct construction of cases by participants, 2) interpreting already finished cases through personal experiences with a less authority than the case, and 3) finally using cases as tools for interpretation with the precedence of reader’s experience and perspective – he summarized six studies on the use of cases in science education (Arellano et al., 2001; Bencze, Hewitt, & Pedretti, 2001; Daehler & Shinohara, 2001; Louden, Wallace, & Groves, 2001; Loughran, Milroy, Berry, Gunstone, & Mulhall, 2001; Van den Berg, 2001) with primary, secondary, and/or tertiary uses. He concluded that studies employing the use of cases with different characteristics revealed that the majority of cases promoted rich discussions about teaching and learning, and provided insight of teachers’ histories, their knowledge, and what they got from the case experience. Only in Van den Berg’s study (2001), teachers were merely able to interpret the case in the image level. From a different viewpoint, Jay (2004) conducted a study comparing the social work

students' learning experiences of the use of cases in education to the experiences of teacher education students. Her comparison study used Sykes and Bird's (1992) framework which classifies cases into four categories -foundational, pragmatic, narrative, and casuist- and highlighted the differences among different types of cases in order to help teacher educators select cases. Accordingly,

- The first kind honors theory and treats teaching as a matter of applying theory to practice....,
- The second kind also concerned with the relation between the theory and practice but ... assigns priority to the situated problems of practice ...,
- The third kind of community relies on stories and other narrative modes of knowing and communicating...Here, cases are literature, as well as a kind of knowledge that theory cannot supply,
- The fourth kind of conversation resembles the tradition of moral casuistry; members of the community reason from case to case by analogy-without resort to theory... (Sykes & Bird, 1992, p. 466).

Jay's (2004) study revealed that learning from cases can be expanded beyond the foundational approach widely adopted in teacher education in USA, and supplementing foundational approach with other approaches can foster learning and may lead to different kinds of thinking.

Cases – no matter which type they belong to – may appear to be a model to be strictly followed when they are too compelling (Shulman, L., 1992). Instead, they should be images of real teaching with real consequences. Shulman (1992) added that cases also should not be boring written materials or compulsory assignments to read, but should be in a position that necessitates extra readings. Additionally, although they may provide theoretical knowledge about teaching, theoretically specified cases are not satisfying enough as

“knowing a principle is of little use if the practitioner is unable to recognize the application of the principle or to spot the salient issue” (Merseeth, 1992, p. 53). The characteristics that cases are expected to have indicated the importance of the selection of cases for educational purposes.

2.1.2. The Use of Cases in the Literature: The Theories, Why and How they are Used

As well as the types, characteristics, and selection of cases, it is also important how they are used in teacher education. The literature on the use of cases in teacher education reveals how cases and case discussions have been used in teacher education, and points on how learning can occur through case studies. Mostly qualitative in methodology, several studies on the use of cases in teacher education were conducted on prospective and/or in-service teachers (Arellano et al., 2001; Baran, E., 2006; Baran, B., 2007; Bencze et al., 2001; Boling, 2007; Daehler & Shinohara, 2001; Koc, 2010; Louden et al., 2001; Loughran et al., 2001; Maor, 2000; Mayo, 2004; Mccurry, 2002; Powell, 2000; Rosaen et al., 2010; Schrader et al., 2003; Star & Strickland, 2008; Van den Berg, 2001), and particularly on mathematics teachers (Alsawaie & Alghazo, 2010; Borko et al., 2007; Doerr & Thompson, 2004; Hill & Collopy, 2003; Llinares & Valls, 2010; Masingila & Doerr, 2002; McGraw et al., 2007; Stockero, 2008; van Es & Sherin, 2008, 2010). Some of these studies made use of narrative cases while some others employed video or multimedia cases.

Either conducted with prospective or in-service teachers, or they examined the use of narrative or video-based cases, the literature indicates that the use of cases in teacher education might mainly be based on three particular theories: situated perspective of learning; the unity of cognitive and sociocultural perspectives, and constructivist theory; and Schon’s reflection-in and on-action theory. In the next part, these theories are explained in detail.

2.1.2.1. Situated Perspective of Learning

Several studies (Abell, & Cennamo, 2004; Borko et al., 2007; Doerr & Thompson, 2004; Herrington & Oliver, 1995; Herrington & Oliver, 2000; Powell, 2000; Putnam & Borko, 2000) made use of the situated perspective of learning theory developed by Lave and Wenger (1991). According to this theory, learning occurs through participation and interaction in communities of practice situated in authentic activities (Borko et al., 2007; Lave & Wenger, 1991) rather than through acquiring knowledge (Smith, 1999). Here, learning is seen as a function of context, culture, and activity in which it occurs. In other words, it is situated. Learning occurs in social relationships (Smith, 1999), and the learners move from the periphery to the centre of the community as they become more competent in social participation (Lave & Wenger, 1991). This social participation is called legitimate peripheral participation, and the nature of the situation is believed to have a strong impact on this process. The mastery of knowledge and skills are tied to this process, and becoming a full participant in sociocultural practice brings about learning (Lave & Wenger, 1991). Such situated perspective helps teachers with adapting their knowledge to the changing situational demands through transferring the knowledge and skills from the situation they are learned to other situations (Shulman, J., 1992). This cognitive flexibility contributes to teacher learning and development (Lundeberg et al., 1999). Merseth (1996) states that several researchers suggest "...the application of several cases to a particular domain, where each case presents an opportunity to explore the content domain from different vantage points and perspectives" (p. 730). Then, teachers can have a chance to anchor their instruction in the complex nature of teaching (Van den Berg & Visscher-Voerman, 2000) through case-based instruction.

Herrington and Oliver's (2000) study is an example to the studies in the literature making use of situated learning theory. Their study illustrated how a situated learning environment can be designed in a multimedia program.

Through the use of cases, they created a multimedia learning environment for prospective teachers in which they collaboratively had a chance to learn to teach through discussion and reflection (Herrington & Oliver, 2000; Lave & Wenger, 1991). Borko et al. (2007), on the other hand, used videos from the participant teachers' own classes in a professional development program, and created a learning community in which productive discussions were made. Learning occurred in that study as the participants experienced belief-change through conflicts arising from the case discussions, acquired broader perspectives, and solved educational dilemmas.

2.1.2.2. The Unity of Cognitive and Sociocultural Perspectives, and Constructivist Theory

The second theory is the unity of cognitive and sociocultural perspectives (Mayo, 2002), and constructivist theory (Harrington, 1995). Case-based instruction (CBI) is stated as providing an environment for the learner to be active. In such an environment, the learner not only constructs knowledge individually, but also learns through social interaction while working on cases (Mayo, 2002). Case-based instruction is tied with constructivist pedagogy as it represents a constructivist stance and problem solving approach in learning. It supports a learning environment in which the learner constructs her knowledge through building it on prior knowledge (Harrington, 1995) where the teacher facilitates learning (Mayo, 2004). Through relating cases to existing knowledge, meaningful learning occurs (Mayo, 2004) and it becomes possible for students to see alternative solutions (Harrington, 1995). Mayo (2004) states that "As students apply theoretical concepts observed in others to their own life situations, this conceptual information becomes personalized and thereby stimulates introspective life analysis" (p. 143).

Boling (2007) also mentions that learning from cases mainly has been explained by conceptual change and cognitive flexibility theories in the

literature. From the aspect of the former theory, conceptions are changed through new ideas and evidence, and it is vital to provide new concepts in order to modify already existing beliefs through creating conflicts. Cases are expected to accomplish this. The latter theory helps how people acquire advanced knowledge in ill-structured domains versus introductory learning. Mayo's (2004) study is an example showing that social constructivism of knowledge happens through classroom interaction, finding solutions to problems together, and creating personal knowledge via integrating theoretical constructs and personal experiences in a CBI setting. When teachers have opportunities to reflect on the dilemmas of practice that are grounded in this perspective, they learn to become more reflective (Grossman, 1992). Thus, from the perspective of sociocultural theory, via conversations in a learning community learners construct and question both personal and social knowledge (Arellano et al., 2001).

2.1.2.3. Schon's Reflection-in and on-action Theory

The third theory on which the use of cases can be based on is Schon's (1987) reflection-in and reflection-on-reflection-in-action theories. Farrell (1998) explains the differences between the two theories. According to him, reflection-in-action refers to reflecting while teaching in the classroom and looking at teaching from a different perspective. Reflection-on-action, on the other hand, refers to reflecting on teaching after the lesson. In this case, a teacher's lesson becomes a case to analyze. Teacher here recalls and evaluates her teaching including the reflection-in-action episodes after the lesson.

Schon (1987) explains his theories via giving examples from classrooms. Accordingly, reflection-in-action involves,

... getting in touch with what kids are actually saying and doing; it involves allowing yourself to be surprised by that, and allowing yourself to be surprised, I think, is appropriate, because you must permit yourself to be surprised, being puzzled by what you get

and responding to the puzzle through an on-the-spot experiment that you make, that responds to what the kid says or does (p. 3).

In order to be able to teach what a competent professional knows, she needs to think about what to do and observe herself doing it, because her knowledge is tacit and implicit in the complex and uncertain settings (Schon, 1995). Without actually doing it, one may not know the answer directly or may not be able to clearly define it (Schon, 1987, 1995). Especially, for the prospective teachers, it is hard to see and understand the actions of an expert. Even in the case that they ask the expert to explain her thinking, the expert may not be able to adequately describe her moves. As Masingila and Doerr (2002) put it, “Rich descriptions of reasons for actions or of strategies for deciding what elements of a situation to attend to are not necessarily part of the reflection-in-action” (p. 239). On the other hand, reflection-on reflection-in-action requires making assumptions, strategies, understandings, and moves explicit (Schon, 1995). Masingila and Doerr (2004) explain this via giving examples of questions that a teacher may ask herself during reflecting on reflection-in-action:

By reflecting on reflecting-in-action, the practitioner restructures her or his understanding of the problem situation and of the strategies (“Why didn’t that work?” or “What should I try next time?”), the examination of assumptions (“How was I thinking about that student’s ideas?”), and the understanding of variations in problem-settings (“What does this mean for my teaching of some other content to a different group of students?”) (p. 240).

As Masingila and Doerr (2002) explained how a teacher might reflect on her actions after instruction through self-asked questions as given above, several studies in the literature focused on teacher reflection and how effective it was on teacher improvement. In the literature, there are studies on reflectivity of teachers showing that it improves teachers’ effectiveness. For example, Reed, Davis, and Nyabanyaba (2002) conducted a practice-based case study of cases

on reflective practice and what teachers got from it. They studied on primary and secondary school English, Mathematics, and Science teachers, and found that the teachers who were able to reflect more were more effective than the teachers who reflected less. In Farrell's (1998) study, English teachers were able to reflect on their personal theories of teaching and the problems they faced while teaching through group discussions, but in different degrees.

Masingila and Doerr's (2002) study also contributed to the research on the effectiveness of the use of cases in teacher education. The study findings indicated that multimedia case study promoted the reflection-on-reflection-in-action in prospective teachers. Authors concluded that opportunities for prospective teachers to reflect on student thinking via analyzing expert teachers' lessons are needed for the development of the teachers. Arellano et al.'s (2001) study also implied that case-based pedagogy might be a basis for critical reflection for teachers. In Barrantes and Blanco's (2006) study, the aim was to determine the prospective teachers' geometrical conceptions via looking at their memories and expectations through questionnaires and discussion groups. The participants were prospective primary teachers who did not receive any instruction on geometry or its teaching and learning. Through discussion groups and reflections, it was possible to determine participants' geometrical conceptions. Another study by Artzt (1999) also made use of reflection on teaching. The study implies the importance of teacher cognition and reflection on understanding prospective teachers' teaching experiences. With the theory that teachers' knowledge, beliefs, and goals affect their practices, the authors viewed teaching as a whole and cognition as an important component of instruction. Through reflection, they aimed to study teacher cognition.

A recent theory developed by van Es and Sherin (2002) also frames the use of cases in teacher education. According to this theory, what teachers notice from classroom interactions matters with respect to their learning opportunities. Learning to notice noteworthy events, connect them to broader principles, and

reason about those interactions are important components of getting to know reformed classrooms. As indicated, teachers or teacher candidates' professional visions may not be parallel to the reform movements, and it might be necessary to provide them with support in understanding reform. Then, as a first step they should be trained in learning to notice and interpreting what they notice next.

2.1.2.4. Learning to Notice Framework

Learning to Notice framework was developed by van Es and Sherin (2002) in the light of previous research on teachers' ability to notice classroom interactions with the aim of supporting teachers in learning to notice throughout their teacher education. Especially, with the use of this framework, the researchers aimed to help teachers learn to notice aspects of reformed classrooms.

According to this framework there are three key aspects of noticing that are;

- a) identifying what is important or noteworthy about a classroom situation,
- b) making connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent, and
- c) using what one knows about the context to reason about classroom interactions (van Es & Sherin, 2002, p. 573).

The first aspect of noticing, the ability to identify noteworthy events, is particularly important. In reformed classrooms, the teachers do not have the luxury of completely planning their lessons in advance and also they have to make several rapid decisions during instruction. In such a case, they need to be able to understand and identify the events in their classrooms and precede their lessons accordingly. The second aspect is also important that not only describing a situation literally but also connecting specific events to broader and general

issues is an important skill a teacher should have. The third and last aspect is also important as it completes the picture. Accordingly, the ability to notice is not enough alone and teachers should have the skill of interpreting the events they notice. Van Es and Sherin (2002) explain what taking an interpretive stance means, and claim that teachers should be able to look "...at a teaching situation for the purpose of understanding what happened, what students think about the subject matter, or how a teacher move influenced student thinking, as opposed to examining a situation for criticism or to take action" (p. 575).

Then, it is expected from a teacher education program to give teachers opportunities to notice, interpret, and use those interpretations for pedagogical decisions. Teachers should learn to notice aspects of reform pedagogy that is called *professional vision for reform teaching* (van Es & Sherin, 2008, p. 244). Teachers' professional vision may not be in line with reform targets, and thus it is essential they receive help. If "...noticing and interpreting are important skills for teaching in the context of reform" but "...current programs of teacher education often do not focus on helping teachers learn to interpret classroom interactions" (van Es & Sherin, 2002, p. 572), then some steps should be taken in order to support teachers and future teachers in learning to notice. With this aim in mind, it should be targeted by researchers and teacher educators to examine whether it is possible to provide teachers with opportunities to notice classroom interactions, especially the aspects related to reform (van Es & Sherin, 2002).

As van Es and Sherin (2008) state, it is possible to examine the development of *teachers' professional vision for reform pedagogy* through the use of *Learning to Notice* framework (p. 245). Beyond the studies on the comparison between novice and experts in literature, via utilizing this framework it might be possible to understand the changes in teachers' thinking along a period. As the literature suggests, the experts may notice more and be able to see more meaningful patterns, but it is another look at educating teachers

to investigate the teachers' improvement in seeing meaningful patterns as they learn to notice. In a study by Star and Strickland (2008), it was aimed to help teacher candidates learn to notice classroom aspects that teacher educators anticipate. It was stated that prospective teachers do not focus on students while watching classroom videos, but it is possible to develop their ability to notice. In that study, significant changes were found in prospective teachers' ability to notice after one semester. Specifically, their ability to notice the features of classroom events, mathematical content, and communication in a classroom was increased. Similarly, in a more recent study, Alsawaie and Alghazo (2010) studied with prospective mathematics teachers in order to investigate the possible effects of video lesson analysis method on their abilities to analyze mathematics teaching. In this intervention study, the authors employed the *Learning to Notice* framework and examined the changes on participants' noticing skills over time. They concluded that the experimental group noticed more at the end of the intervention compared to the control group. That is, they were successful at noticing noteworthy events, interpreting them, and linking classroom interactions to the broader issues, NCTM vision in that case. The researchers suggested that the use of video lesson analysis method in teacher education was effective and should be encouraged.

In the present study, *Learning to Notice* framework was used in order to examine the changes in future teachers' ability to notice the aspects of reform-minded teaching and learning.

2.1.2.5. Theories Revisited

The *Learning to Notice* theory is important that it might be connected to other theories on the use of cases in teacher education. That is, in a study employing this framework, it is possible, even somewhat necessary, to make use of situative, sociocultural, and reflective perspectives. Helping teachers learn to notice may require creating an environment in which they learn through

interacting in communities of practice. This situated perspective is expected to help teachers adapting their knowledge and skills to different situations which is the aim of the use of different cases in teacher education. *Learning to Notice* framework expects teachers to be able to connect their knowledge to broader principles of teaching and learning, and this also requires them to transfer their knowledge to different situations. This parallelism between the two theories makes it meaningful to consider them together.

It is also possible to connect the noticing framework to social constructivism. Interacting with other teachers and creating personal and social knowledge through conversations in such learning communities might be seen as a part of the learning to notice process. Finally, learning to notice via the use of cases requires a teacher to reflect on cases. Only through critical reflection on teaching and learning in a case, a teacher can start noticing and interpreting what she noticed.

In this study, *Learning to Notice* framework was used in order to examine the changes in future teachers' ability to notice the aspects of reformed teaching and learning.

After explaining the theories that the use of cases in teacher education was mainly based on; in the following section, the strengths of cases and what teachers learn from the use of cases are discussed.

2.1.3. The Strengths of Cases: Their Use and What Teachers Learn

Why researchers conduct studies on the use of cases in teacher education merits consideration. Merseth (1996) states that the interest in teacher knowledge, the reform efforts in teacher education, and the use of cases in other fields made them valuable tools in teacher education. One of the reasons why case-based pedagogy increasingly receives support in professional education of teachers is that it is an effective way of preparing teachers for the complex teaching environments (Harrington, & Garrison, 1992; Mayo, 2004). As there

are not many stages and occasions for teachers to develop shared cognition abilities, the use of cases in teacher education becomes a useful method (Pressley, 1999) as a way of putting knowledge of teaching into the practice (Butler et al., 2006).

The use of cases in teacher education provides a context for prospective teachers, which prepares them for the realities of teaching (Butler et al., 2006; Lundeberg & Levin, 2003; Lundeberg et al., 1999; Powell, 2000; Shulman J., 1992). Case studies are essential components of teaching practice as they reflect characteristics of a real classroom. By analyzing cases, prospective teachers are given the opportunity to understand what happens in a classroom (Lundeberg & Levin, 2003; Lundeberg et al., 1999; Shulman J., 1992). It is effective that through cases teachers engage in teaching activities as learners (Borko, 2004).

Cases also allow both prospective and in-service teachers to analyze and reflect on student thinking and on how to facilitate student learning (Masingila & Doerr, 2002), and they are expected to prompt discussion and reflection (Arellano et al., 2001; Shulman, L., 1992). Furthermore, they provide a context for collaborative teaching and reflection (Arellano et al., 2001). The use of cases in schools of education also frees prospective teachers from the unrealistic and utopian reform ideals, and gives them opportunities to get to know good practice (Shulman, L., 1992). It is also convenient that cases can be used in a single course in or during the teacher education program (Kleinfeld, 1992). Their use is valuable in foundations courses as they make the issues more concrete, and valuable in methods courses since they serve as a context to methodological choices (Kleinfeld, 1992).

Additionally, Harrington (1999) states that via cases it might be possible to provide prospective teachers with opportunities to reason about teaching. Cases not only show prospective teachers the complex and contextualized side of teaching, but also provide a common theoretical basis for decision making (Grossman, 1992). Through cases teachers may connect theory into practice

(Merseth, 1992; Schrader et al., 2003; see Easterly, 1992; Shulman, J., 1992; Van Den Berg & Visscher-Voerman, 2000). Through case discussions, teachers collaboratively "...practice in making complex decisions and judgments that will ultimately need to be made independently" (Jay, 2004, p. 48). These characteristics of case-based pedagogy make it an effective way of preparing prospective teachers for teaching profession (Harrington & Garrison, 1992; Mayo, 2004).

In the following parts, different uses of cases are discussed in detail under related sub-headings.

2.1.3.1. Different Uses of Cases in Teacher Education: Benefits of Using Cases

2.1.3.1.1. Minimizing Problems in Teacher Education

Case studies can be used in professional teacher education in order to minimize the problems in teacher education. Preparing effective and well qualified teachers is not an easy task (Harrington, 1999), and teacher preparation programs face several challenges (Borko et al., 2000). While the expectations from the programs and the prospective teachers are loaded, there are several studies in the literature indicating the difficulties and challenges beginning teachers face (Achinstein & Barrett, 2004; Flores, 2006; Kagan, 1992; Lindgren, 2005; Moran, Dallat, & Abbott, 1999; San, 1999). These studies point that traditional preparation of teachers is not answering the problems of teaching profession, and they are not preparing teachers for the realities of classrooms (Shulman, J., 1992).

Satisfying the expectations and overcoming the challenges require an improvement on the side of teacher education programs. Then, through teacher education programs, it should be aimed to give teachers chances to increase their professional knowledge and reasoned decision making abilities. Borko et al.

(2000) underline that teacher education programs are expected to model teaching, help teachers develop their identities, develop subject matter and pedagogical knowledge, and provide multiple perspectives as suggested by NCTM (1991). Then, it might be a feasible way that prospective and in-service teachers reflect on cases in order to develop professionally. Beyond the observational field experiences, case studies provide a common experience for inexperienced teachers rather than merely providing individual observation and interpretation experiences (Masingila & Doerr, 2002). Connecting and applying theories and practice in education through cases, teachers can develop higher order (Butler et al., 2006) and critical thinking skills (Mayo, 2004). As they dialogue on critical aspects of cases and on the similarities and differences between cases, reason from one case to another, and create a knowledge base out of cases, teachers might learn important points on effective teaching (Jay, 2004), and might get prepared for the realities of teaching (Butler et al., 2006) through understanding what happens in a classroom (Lundeberg & Levin, 2003; Lundeberg et al., 1999; Shulman J., 1992). As Lundeberg et al. (1999), Lundeberg and Levin (2003), and Merseth (1996) suggest, through cases in teacher education it might be possible to provide opportunities for teachers to apply their theoretical and practical knowledge to real classroom contexts.

In a study on the use of video cases in teacher education, Baran, E. (2006) suggests that video-case based instruction have positive effect on prospective teachers' ability to connect their theoretical and practical knowledge. In other words, video-case based instruction helps prospective teachers connect their practices to their theoretical knowledge. She further states that that in order to provide prospective teachers with opportunities to build their own knowledge as highlighted in the new curriculum, analyze teaching situations, and experience new methods of teaching; teacher education programs should include new methods such as video-case based instruction.

Through the use of cases in teacher education, it might also be possible to improve and increase teachers' reasoning (Harrington, 1999; Lundeberg, 1999) and decision making abilities (Grossman, 1992; Jay, 2004; Merseth, 1992) as well as their subject specific, pedagogical and professional knowledge (see Fernandez, 2005; Manouchehri, 2002; Mayo, 2002); to develop metacognition (Lundeberg, 1999); to reflect on their beliefs about teaching (Lundeberg, 1999); to value multiple perspectives via gaining knowledge on teaching contexts that they could not physically to be found (Merseth, 1992); to develop multicultural perspectives; and to learn in a community (see Arellano et al., 2001) through social interaction, pedagogical conversations, reflection, and analysis (Shulman, J., 1992). Lundeberg & Levin (2003) state that "...case-based pedagogy can be used as a catalyst to challenge the participants' prior beliefs, help them understand different perspectives than their own, and encourage them to articulate, defend or change current beliefs about their practice..." (p. 28).

2.1.3.1.2. Reflecting and Reasoning on Student Learning

Cases also allow teachers to analyze and reflect on student thinking and on how teachers facilitate student learning (Masingila & Doerr, 2002). Via reflective dialogue on cases, prospective teachers may go through the transition period from being student to becoming a teacher more easily and they can start thinking like a teacher (Jay, 2004). Maor (2000) indicates that in professional development seminars, learning occurred in a constructivist multimedia learning environment through reflection and negotiation. In this study, a professional development program in which an interactive multimedia program was used was examined. The study reveals how teachers develop understanding of a constructivist epistemology and can change their practices after participating into several workshops. Powell (2000) also underlines that through critical reflection and reasoning, teachers are believed to develop themselves personally, and case-based pedagogy is a way of providing such opportunities. Arellano et

al.'s (2001) study is also an example showing that teachers can develop self-awareness and learn to reason critically through cases.

Yadav et al.'s (2007) national survey study also provides insight into understanding how cases can help overcome the limitations of teacher education, and what teachers can gain from the use of cases. Through online surveys sent to 101 science faculty at universities and colleges in USA and Canada, the authors concluded that faculty had positive opinions on case studies, and they thought that case-based instruction improved student learning, critical thinking skills, ability to make connections across content areas, understanding of concepts, ability to look at an issue from multiple perspectives, and participation and interaction. They also suggested that case-based instruction was parallel to the principles of National Research Council (NRC, 1996) stating that learning should be active and should involve minds on activities in which students have the opportunity to interact with their teacher and the peers. It also fitted with the reform ideas. The use of cases is also found to be useful in increasing teachers' pedagogical content knowledge as in Barnett and Tyson's (1999) study. In that study, the participant teachers realized through the discussions that manipulatives could cause deficiencies in students' learning of fractions as the pre-subdivided pieces prevented students from seeing any need to divide the whole into equal pieces.

2.1.3.1.3. Developing Multiple Perspectives

Some of the studies in the literature indicate that cases are effective in developing multiple instructional perspectives (Arellano et al., 2001; Schrader et al., 2003). Arellano et al.'s (2001) study with prospective elementary teachers, their cooperating teachers and teacher educators indicated that the use of cases promoted participants' reflection on alternative methods and ideas in teaching, and through case discussions, participants became aware of different ways of looking at teaching and learning, and learned to see each other as learning

resources. The use of cases also facilitated the building of community identity, and was helpful in generating knowledge. In their exploratory study, Schrader et al. (2003) examined whether multimedia cases promoted prospective teachers' knowledge of practices for teaching, and concluded that cases promoted discussions, and students benefited from multiple perspectives on instruction.

In his study describing the effects of using video and hypermedia cases on the transformation of teacher candidates' knowledge and beliefs, Boling (2007) concluded that video and hypermedia cases assisted one teacher candidate in transforming her knowledge and beliefs about literacy instruction. She could develop practical understanding, make personal connections to the cases, and evaluate her prior assumptions. The difference was drastic in her case, but not that much in the cases of other candidates. They were also able to use videos to obtain new ideas on teaching, but they modified their ideas only to meet the needs of their classrooms and couldn't make personal connections. Overall, it was suggested that providing prospective teachers with opportunities to share ideas, discuss several issues, make personal connections to cases, and write about their experiences through technology might be helpful in transforming teacher candidates' knowledge and beliefs about instruction.

In a quantitative study by Mayo (2004), with the assumption that case-based instruction facilitates critical thinking and connects theoretical and applied knowledge, 122 college freshmen and sophomores were asked to analyze and discuss actual cases. In this experimental study, intact classes were randomly assigned to case-based instruction group with a collaborative component, and to traditional instruction alone. The results indicated that CBI group significantly outperformed the control group on conception and application of course principles. Through engaging in discussions, CBI group was able to develop conceptual applications. Additionally, the questionnaire results indicated a positive perception toward CBI in the treatment group.

2.1.3.2. Different Uses of Cases in Mathematics Teacher Education

The literature on case studies in mathematics teacher education reveals similar results to that of general teacher education. In their multimedia case study, Masingila and Doerr (2002) tried to understand the reflective thinking of teachers. The analysis of the data indicated that the cases they developed supported prospective teachers in understanding the complex teaching experiences and guided their instructional practices. Prospective teachers were able to frame several issues like using student thinking and focusing on difficulties. They were able to connect their own practice to the practice of the teacher in the case study. The connections they made revealed what kind of deficiencies they had in their mathematical thinking. Van Es and Sherin's (2010) study also focused on teachers' attention to student thinking, and revealed how the video clubs influenced teachers' professional development. This study not only suggested that engaging in video clubs provided teachers with more focusing on student mathematical thinking, but also with opportunity to change their instruction accordingly.

Another study was conducted on graduate and undergraduate prospective teachers and teacher educators (Doerr & Thompson, 2004). In this qualitative study, while prospective secondary mathematics teachers reflected on a multimedia case study of practice, teacher educators tried to understand their professional development. The fact that cases were situated in practice and they could be used as sites for analysis provided a conceptual framework for the study. The identification of the issues through the investigation revealed that, with the use of case study, teacher educators were able to understand prospective teachers' thinking about teaching, and both prospective teachers and teacher educators learned to appreciate the role of teachers' mathematical content knowledge. In Stockero's (2008) study, the researcher investigated how the use of video cases develops habits of reflection in prospective mathematics teachers through both qualitative and quantitative methods. The researcher examined the

changes in participants' reflection as they analyzed the classroom interactions in the videos in terms of instructional decisions and student thinking. He concluded that via the use of video-case curriculum, the prospective mathematics teachers reflected more, they learned to provide evidence to their comments, they started to consider alternative instructional moves to improve student understanding, and they focused more on student thinking. He also underlined that such an environment now only develops reflective habits of future teachers, but also helps transferring such skills to the practice of teaching.

Hill and Collopy (2003) also studied the use of video-based cases in teacher learning, but this time they worked with in-service teachers. They attempted to investigate the effectiveness of a video case mathematics module in improving teachers' mathematical understanding. In their experimental study, they studied 11 video case module participants and six comparison group teachers. The findings suggested that the video-case group was more effective in understanding the subject matter and was more able to identify student misconceptions. On the other hand, since the sample size was small and thus any statistical analysis could not be employed, researchers concluded that it was hard to state that there was any statistical difference between groups.

Manouchehri's (2002) study is another example showing that through peer interaction and discourse, teachers can develop professional knowledge. In that study, prospective secondary mathematics teachers did not reflect on a given case, but on their own practices during the practicum experience. The study showed that when they feel a need to reflect and know how to make a critical reflection, prospective teachers can see each others' perspectives, justify their interpretations, and extend their knowledge to a more theoretical level via peer discussions. In that study, prospective secondary mathematics teachers were able to explore mathematics, student learning, and curriculum innovation through interaction. They realized the gaps in their professional knowledge, and they

developed a more sophisticated understanding of both content and teaching through collaborative analysis of teaching.

In another study conducted by Alsawaie and Alghazo (2010), the use of video lesson analysis helped prospective mathematics teachers notice important events in a classroom situation, interpret the events, and connect them to the NCTM vision (NCTM, 1991, 2000). In this intervention study, the experimental group in which the video lesson analysis method was employed, the prospective teachers improved their ability to effectively analyze mathematics teaching when compared to the control group. The researchers concluded that teacher education programs should encourage the use of video lesson analysis to prepare future teachers for more effective teaching.

In Llinares and Valls's (2010) study, on the other hand, the researchers examined what prospective teachers gained through online discussions as they analyzed mathematics video-cases. They concluded that through the employment of video-clips of mathematics teaching and online discussions, the participants were able to use theoretical information to frame events, identified and interpreted several aspects of teaching, and provided evidence from the videos; they communicated and built new ideas through using writing as a tool; they shared different view of points and thus improved their view of teaching; and made connections between theory and practice. They suggested that in order to develop future teachers' learning-to-notice skills of mathematics teaching, virtual learning environments should be designed via considering how they could be more effective in teacher education.

To sum up, the literature on the use of case studies in teacher education reveals positive results. Although the implementation of reflective teacher education approach is more difficult than theory-based and short teacher education, they are more effective (San, 1999). As Darling-Hammond (1994) puts it, they are the core of reform in teacher education (as cited in Manouchehri,

2002), and thus they received a prominence in teacher education (Walen & Williams, 2000).

In sum, providing prospective teachers opportunities during their teacher education with reasoning and reflecting, building theory into practice, developing critical thinking and getting ready for the complexities of real practice through cases might increase the influence of teacher education on their teaching practices. Especially, “When the situations of teacher education share conceptions of teacher learning and a vision of reformed practice, teacher education does make a difference in preparing reform-oriented educators to join the profession” (Borko et al., 2000, p. 204). Thus, through cases, not only preparing teachers for real classrooms, but also for reformed classrooms might be feasible.

2.1.4. Discussions around Cases

Although the use of cases is stated to be useful in teacher education, actually, it is not just merely the use of cases that makes a difference, but it is the discussion around cases (Lundeberg, 1999). As Nemirovsky and Galvis (2004) put it, “In all instances, what counts is not only the content and structure of the case itself but also the ways in which it is discussed” (p. 68). Mayo (2002) states that one of the advantages of the case-study approach as an instructional method is that it includes discussion. Still, it is not enough to have a discussion around cases. As Kleinfeld (1992) states, “It is easy to have a stimulating and exciting class discussion. The question is whether such discussion leads to learning or whether it amounts to little more than loose talk” (p. 41).

What is important during a discussion should not be looking for a right answer, but developing analytic skills of teachers and providing them with a way of thinking (Merseth, 1992). Wolf, Bixby, Glenn, and Gardner (1991) claim that whether a student “...acts only as a correct summarizer or whether he develops a point of view...” makes the difference in whether they learn from case

discussions or not (as cited in Lundeberg et al., 1999, p. 34). Through the discussions around cases, prospective teachers are expected to construct knowledge, discover new knowledge, improve their awareness, and gain new and different perspectives (Barnett & Tyson, 1999). Especially when cases necessitate extra readings, dialogue may become more reflective (Shulman, L., 1992), and when teachers share their anecdotes it becomes learning with reasoning (Kleinfeld, 1992).

In the following part, the role of the facilitator in case discussions is discussed.

2.1.5. The Role of Facilitator in Case Discussions

The use of cases in initial teacher education not only has benefits like promoting reflection and decision making, but also it creates a learning community. In case-based pedagogy, teacher educators communicate with prospective and/or in-service teachers in the role of facilitators, and they model a learning environment for them (Grossman, 1992). As Arellano et al. (2001) put it, case-based pedagogy is a "...potential vehicle for building the kinds of teacher learning communities that reflect transformative curricular interests" (p. 503). Then, one of the responsibilities of a facilitator should be to create a rich learning community for the participants, and provide opportunities for them to share different perspectives. At that point, it is vital to have rich discussions around cases.

Discussions around cases are the central tools in learning in teacher education, and how the facilitator directs the discussion, controls and fosters it is an important issue on what the participants learn from cases (Nemirovsky & Galvis, 2004). Barnett and Tyson (1994) state that facilitators should help teachers with having learning opportunities, becoming aware of multiple perspectives, and building on a shared culture (in Nemirovsky & Galvis, 2004). In a study by Fernandez (2005), the importance of the role of facilitators was

also underlined. In that lesson study, Fernandez stated that what the participant in-service teachers learned was up to the quality of the staff developers. Accordingly, they not only need to know how to identify learning opportunities, but also to know how to help teachers with making use of such opportunities. They should create a learning environment which does not discourage teachers, and in which teachers are in charge of their work.

After pointing on the importance of discussions around cases and the role of facilitator in case discussions, in the following part, the use of cases in reform efforts is discussed.

2.1.6. The Use of Cases in Reform Efforts

The paradigm shift from theory to practice and from exposition to narrative in teacher education (Sykes & Bird, 1992) is only a part of a larger change in thought and might be seen as one step of reform effort in education. Teaching is a tough profession with all its complexities and unpredictabilities as an ill-structured domain (Shulman, L., 1992). Especially with the demands of reform efforts, particularly with the introduction of the new elementary mathematics curriculum in Turkey, mathematics teachers' job becomes more loaded as they need to get to know the new curriculum and make necessary modifications on their beliefs and instruction in order to be able to effectively implement it. What makes a reformed curriculum successful is up to the extent teachers can apply it to their classrooms (Feiman-Nemser, 2001; Spillane, 1999), and being able to implement reformed curriculum successfully requires "...a great deal of learning on the part of teachers and will be difficult to make without support and guidance" (Borko, 2004, p. 3). Davis, Petish, and Smithey (2006) underline the necessity of providing teachers support in enacting reform; especially for the prospective teachers as they not only need to get prepared for the difficulties of the teaching profession but also for understanding the reform. As stated before, the opportunities for prospective teachers to get prepared for

the challenges of the reform movement are limited to their formal education. That is, they can learn about the reform in teaching methods courses and in field experiences, but these may not be sufficient alone (Olkun, Altun, & Deryakulu, 2006). Thus, it is necessary to create environments for prospective teachers in which they can understand the vision of the new curriculum and get prepared for real classrooms. The use of cases might be one of the ways in teacher education to accomplish these.

Research studies indicate that case-based instruction fosters the individual and social constructivist models of teaching and learning via taking learning as an active process (Mayo, 2004). This view point as to the use of cases has the potential to model reformed curriculum for teachers that they might learn to appreciate the new understanding of teaching and learning the reform requires. The new elementary mathematics curriculum in Turkey demands teachers to create learning environments in which the learning is active (TTKB, 2006). Providing teachers with case learning opportunities that mirror reform requirements might help them implement what the reform necessitates from them. For example, Sowder (2007) points that cases help teachers "...develop critical analysis of teaching and learning that is student centered..." (p. 180). Baran, B. (2007) adds that through reflecting on video cases from real classrooms, prospective teachers might have an experience on the new mathematics curriculum.

Feiman-Nemser (2001) underlines that the success of reform is up to extend that teachers can implement it in their classrooms, and being able to implement reform is up to the learning opportunities teachers have. Reform asks for conceptual understanding, meaningful learning, and connection (TTKB, 2006). In order to be able to give such an instruction, teachers need to be "practical intellectuals, curriculum developers, and generators of knowledge" (Feiman-Nemser, 2001, p. 1015). The use of cases in teacher education might accomplish some of these. Additionally, when it is taken into the account that

initial teacher education is the period that teachers develop and form skills and habits necessary for teaching and it is necessary them to observe, interpret, and analyze in order to understand teaching, the use of cases in initial teacher education becomes more critical in achieving these goals. Lloyd (1999) also supports what Feiman-Nemser (2001) says. She states that along with innovative curriculum materials, “Videos and cases are particularly appealing teacher education tools because they offer detailed images of what reformed mathematics teaching and student learning can look like” (p. 249). Through case-based discussions, teachers can analyze practices with successes and difficulties of the teachers in those cases. Via collaborative analysis, they can face and develop multiple perspectives on teaching and learning, and “...may learn to more carefully observe and listen to students, and as a result, expand their conceptions of students and how they learn mathematics” (Lloyd, 1999, p. 250).

To give an example, Baran, B. (2007) states that it might be possible to develop prospective teachers’ professional knowledge through the use of video cases in teacher education. More specifically, she suggests that in a portal including videos from real mathematics classrooms, prospective teachers might have different perspectives and have a chance to observe several teachers’ classrooms, take the useful parts of the lessons and commit not to repeat the faults in the videos, develop their practical knowledge and build connection between theoretical and practical knowledge, and have experience on the new mathematics curriculum.

In another study on the use of cases in reform efforts, Walen and Williams (2000) revealed the use of cases in teacher development with respect to reform. Their study with the teachers who were using innovative mathematics curriculum with the emphasis on student-centered instruction, exploration of mathematical ideas, use of materials, and assisting students in making mathematically informed decisions indicated that the use of cases helps teachers

recognize their concerns as well as it provided them opportunities with discussing and solving their problems. Through discussing cases, teachers mentioned assessment and communication issues, and they realized the mismatch between the traditional assessment and the assessment in reformed curriculum. They further realized the need for the improvement in the communication between schools and universities, and teachers and parents. Additionally, as the teachers realized the similarities among their ideas, they felt more confident in working on changing the system. In other words, they started to be the “change agents” (Merseth, 1996, p. 733). Also, through discussions, they developed ideas to solve problems. This would be expected to help them create similar environments in their own classrooms. Making use of what they learned from cases in their own practice was also beneficial for them. It helped them deal with the group work underlined in reform; they could analyze problems, and find alternatives. The use of cases in teacher education helped teachers support each others’ reform efforts. Walen and Williams (2000) concluded that “If, as Preston and Lambdin (1995) suggested, the success of the reform movement hinges on identifying teachers’ areas of concern and helping them find solutions, we have demonstrated that case methodology is a powerful tool to support teachers in a time of reform” (p. 22). In other words, the researchers stated that employing case-based pedagogy might be useful for the success of reform.

2.1.7. The Limitations of Case Method

With all its advantages and strengths, case method has disadvantages too. L. Shulman (1992) lists the disadvantages of case-based instruction as below;

- Cases are expensive and time-consuming to produce and demanding to field test,

- Cases are difficult to teach well. Especially when paired with Socratic teaching, they require well-trained, gifted teachers who are willing to invest longer periods of preparation than is typical for other methods,
- Cases are very inefficient; very little material is covered in rather long periods of time. Even though we may wish to argue that content is far less important than process, we must attain a judicious blend of the two; case methods may make that difficult to accomplish,
- Cases are episodic, discontinuous, hard to structure and organize into larger wholes in the minds of students. In curricula (especially teacher education) already criticized because they are too fragmented and lack integration, case methods could exacerbate the problem. Learning through cases, therefore, could blind the learner to critical generalizations and principles because the particularities of the narrative overwhelm the general conceptions,
- Cases may be susceptible to overgeneralization. A single case may be so powerful that its apparent message is transformed into a rigid maxim by the learner (p. 26-27).

As seen from the list above, the use of cases is expensive, takes time, and requires longer preparation; little material is covered through the cases; their use might make it hard to see generalizations and broader principles; and it might cause overgeneralization. Moreover, according to the findings of a national survey by Yadav et al. (2007), teacher educators see some obstacles in using cases-study teaching. Specifically, they stated that the use of cases in teaching requires long preparation time; assessing student learning with the case method is difficult; there is a lack of relevant case studies; and students are resistant to case-study teaching as they find the case format challenging and they become frustrated because of the ambiguity of case-based instruction.

In addition to the limitations above, there is another limitation of the use of cases in teacher education. That is, it is not rational to give a case to participants and expect them to learn from it. Merely giving a case to prospective or in-service teachers does not bring about learning. It is important how a case is discussed in a teacher education program. When there is no quality discussion around cases, there is no use of giving cases. What is important is to create a rich discussion environment and facilitate teacher learning through discussion on cases.

The limitations of cases do not suggest that the use of cases in teacher education is infeasible. In spite of the limitations of cases, it is possible to promote learning through eliminating or at least minimizing the limitations. For example, in his study on the effectiveness of case-based instruction in teaching psychology of adjustment, Mayo (2004) was aware of the limitations of cases. He knew that cases might be related only few concepts because of limited length, and be fictional and hard to connect to real life situations. Thus, he tried to deal with the pitfalls of CBI method through employing cases that cover several intended course content, and through encouraging students to discuss multiple explanations, and employing cases that are based on real experiences. As Yadav et al. (2007) suggests, the limitations of the case-based instruction are not unsolvable and they do not constitute barriers to use this method, even, the limitations can be minimized as the case-based instruction is used more.

Additionally, it should also be taken into consideration that cases should to be a part of teacher education instead of being taken as a one-time pill to remedy illnesses. As Grossman (1992) put it, it is important to;

...clarify what our students are not likely to learn from cases...
Case methods are not an all-encompassing panacea for the preparation of teachers. Teachers must still acquire classroom techniques as well as habits of thought. We need to consider the kinds of learning cases are and are not good for and to understand

how cases fit within the larger curriculum of teacher education, which includes field experiences (p. 234).

In sum, when they are well selected and fit within the curriculum of teacher education, the use of cases might be a strategy for "...overcoming many of the most serious deficiencies in the education of teachers. Because they are contextual, local, and situated-as all narratives-cases integrate what otherwise remains separated" (Shulman, L., 1992, p. 28). Good cases, which consist of multiple issues and which are objective (Merseeth, 1992), may accomplish a great deal.

In the part above, the use of cases in teacher education was tried to be explained. More specifically, their use was discussed through the definitions and types of the cases, their use in literature, the theoretical framework employed, strengths of cases, discussions around cases and the role of facilitator in discussions, use of cases in reform efforts, and limitations of cases. In the following part, the use of computer-mediated communication (CMC) in teacher education is discussed as in the present study CMC was used as a vehicle to employ case-based pedagogy in initial teacher education.

2.2. The Use of Computer-Mediated Communication (CMC) in Teacher Education

Computer-mediated communication (CMC) is an alternative to traditional communication in which people communicate through computers in anywhere and anytime in order to share and build new ideas, knowledge and skills (Harasim, Hiltz, Teles, & Turoff, 1995). One of the communication tools in CMC is the discussion forums (Herring, 2001). In discussion forums, people post email messages on discussion lists, and asynchronously comment on each other's messages. The asynchronous discussion is advantageous in the sense that it does not asks people to be online at the same time, and also gives more time to think (Connor, 2003; Harasim et al., 1995).

The use of CMC in education is an effective way of promoting learning through communication (Ellis et al., 2004) as it offers rich opportunities for the education of teachers and teacher candidates (Boling, 2007; Sherry, 2000). In other words, “The use of information and communication technology in multimedia cases is expected to create a powerful and flexible learning environment” (Van Den Berg & Visscher-Voerman, 2000, p. 119). Especially, when technology brings teachers together in an environment fostering discussion on teaching and learning, it becomes possible to see them reflect and share. “Boundary-crossing changes become visible in the collaboration between more experienced teachers and those who are newly qualified, especially when they work on a common development project” (Andersson, 2006, p. 665). Specifically, the use of computer-mediated communication (CMC) in educational settings impacted on teaching and learning as it provides an environment for communication which promotes shared learning (Ellis et al., 2004).

In initial teacher education, providing an online discussion environment for novices might foster discussions around the cases, and might enlighten what and how they learn from cases. With an environment providing online discussion opportunities it might be better examined what and how prospective teachers learn from cases. For example, in a study on the use of technology in teacher education, Li (2007) suggested that through the online discussions it was possible to assess students’ thoughts and beliefs about geometry in a methods course. Via the feedback gathered from the online discussions, he was able to change or refine his instruction (as cited in Li, 2005). In another study by Li (2003), the online forum “...enabled the discussions to develop at a much deeper level and with a broader scope than merely face-to-face interactions” (as cited in Li, 2005).

Overall, the use of technology in teacher education is stated as promising while the research on the effectiveness of hyper-media cases as well as what the

teachers get from them is limited (Boling, 2007; Brophy, 2004 as cited in Borko et al., 2007). Thus, in order to be able to understand better what the use of video cases in teacher education brings about, and what the nature of discussions on video cases is (McGraw, Lynch, Koc, Budak, & Brown, 2007), more research on technology use is needed (Hara, Bonk, & Angeli, 2000). In particular, research on the effects of video-cases in teacher education needs to be conducted (Hartley & Wang, 2003). Accordingly, in this study, prospective elementary mathematics teachers' discussion on video cases on an on-line discussion forum was examined.

2.3. A Last Word

The use of cases in teacher education contributes to our understanding of the nature of teaching and learning, and helps providing learning opportunities for teachers. One important point to take into account when using cases is that it is necessary to know what the cases can teach and what we want the class discussion to accomplish (Kleinfeld, 1992). The use and impact of cases rely on their purposes, content, and methods (Shulman L., 1992), and what makes a case effective is up to what it is meant by learning from a case. If we support the use of case method in teacher education, we need to understand the nature of learning from cases and its difference from other teacher education methods (Grossman, 1992). As the cases with different purposes bring about different learning, "We need to define more clearly what we mean by learning from cases in the field of teaching...When we talk about learning from cases, are we talking about learning particular content differently or learning a different way of thinking about teaching?" (Grossman, 1992, p. 232). We should also consider that meaningful learning for teachers is a slow and uncertain process as in the case for students (Borko, 2004). To conclude, if we can appropriately use case studies in teacher education, particularly in mathematics teacher education, we

can expect to increase the quality and amount of learning on the side of the teachers.

In the next part, the literature review section will be concluded with a summary on the use of case-base pedagogy in teacher education.

2.4. Summary

The purpose of this study was to provide prospective teachers opportunities to get ready for the complexities of real classrooms and prepare them for reform-minded teaching. With this aim in mind, the changes on what the prospective elementary mathematics teachers noticed as they watched video cases from real classrooms and discussed these videos online were investigated.

As stated throughout this section, the literature suggest that with the use of cases in teacher education, teachers have several opportunities to develop professionally such as putting knowledge of teaching into the practice (Butler et al., 2006; Merseth, 1992; Schrader et al., 2003; see Easterly, 1992; Shulman, J., 1992; Van Den Berg & Visscher-Voerman, 2000); getting prepared for the realities of teaching (Butler et al., 2006) through understanding what happens in a classroom (Lundeberg & Levin, 2003; Lundeberg et al., 1999; Shulman J., 1992); engaging in teaching activities as learners (Borko, 2004); analyzing and reflecting on student thinking and on how to facilitate student learning (Masingila & Doerr, 2002), changing instruction according to students' mathematical thinking (van Es & Sherin, 2010), and considering alternative instructional moves to improve student understanding (Stockero, 2008); identifying student misconceptions (Hill & Collopy, 2003); improving and increasing their reasoning (Harrington, 1999; Lundeberg, 1999) and decision making abilities (Grossman, 1992; Jay, 2004; Merseth, 1992) as well as their subject specific, pedagogical and professional knowledge (see Fernandez, 2005; Manouchehri, 2002; Mayo, 2002); providing a common theoretical basis for decision making (Grossman, 1992); developing higher order (Butler et al., 2006)

and critical thinking skills (Mayo, 2004); valuing multiple perspectives via gaining knowledge on teaching contexts that they could not physically to be found (Merseth, 1992) and developing multiple instructional perspectives (Arellano et al., 2001; Schrader et al., 2003); learning in a community (see Arellano et al., 2001) through social interaction, pedagogical conversations, reflection, and analysis (Shulman, J., 1992); learning to appreciate the role of teachers' mathematical content knowledge (Doerr & Thompson, 2004); exploring curriculum innovation through interaction (Manouchehri, 2002); developing critical analysis of student-centered teaching and learning (Sowder, 2007); and having experience on reformed curriculum (Baran, B., 2007). To state briefly, the literature on the use of case studies in teacher education reveals positive results. Thus, providing prospective teachers opportunities to experience case-based learning might improve them professionally and increase the influence of teacher education. While the new elementary mathematics curriculum demands teachers to carry out several responsibilities, use of cases might help them get ready for reform-minded teaching environments.

To conclude, when it is taken into account that this study creates a learning environment in which prospective teachers have opportunities to discuss on videos from real classrooms and learn from each others' points of views, and get prepared for teaching; it creates a professional development environment for prospective teachers in which they can develop noticing abilities with respect to reform-minded teaching and learning through the use of video-based cases in teacher education; it makes use of online discussions to be able to improve prospective teachers' noticing skills; and it contributes to the limited literature on the use of cases in teacher education in Turkey, the necessity of conducting this study comes to the fore.

In this study, in the light of the previous studies on the use of case-based pedagogy in teacher education, it was aimed to provide prospective teachers

opportunities to get ready for the complexities of real classrooms and to prepare them for reform-minded teaching and learning.

CHAPTER III

METHOD

The aim of this study was to investigate the changes on what the prospective elementary mathematics teachers noticed as they watched video cases and discussed the videos online. This chapter presents the method of the research study. Specifically, it covers research questions, research method, procedures, and data analysis sections. Information on trustworthiness, ethics and limitations, and assumptions of the study are also included.

3.1. Research Questions

This qualitative case study explores the following research questions:

1. To what extent the elementary prospective mathematics teachers' noticing with respect to reform-minded teaching changes during their video case-based teacher education?
 - 1.1 How prospective mathematics teachers' noticing with respect to the teacher roles in reform-minded teaching changes during online video case-based discussions?
 - 1.2 How prospective mathematics teachers' noticing with respect to the student roles in reform-minded teaching changes during online video case-based discussions?

3.2. Research Method

The improvement of education is up to our ability to strengthen education research (Lagemann, 2002). Quality education is increasingly recognized as playing a vital role in the progress of society (Hite, 2001), and quality research is needed for the quality education. However, research and policy literature generally affirm that much educational research is not of particularly high quality (Hite, 2001).

When it comes to quality research, the question of which source of knowing is more useful needs an answer. There are different sources of knowing including the scientific knowledge. Scientific knowledge is seen as the most powerful way of reaching the reliable and accurate knowledge (Fraenkel & Wallen, 2005), and it includes the quantitative and qualitative research methodologies. Which methodology is more effective to employ is another question to answer. As Dewey (1938) puts it,

We know that some methods of inquiry are better than others in just the same way in which we know that some methods of surgery, arming, road-making, navigating, or what-not are better than others. It does not follow in any of these cases that the "better" methods are ideally perfect... we ascertain how and why certain means and agencies have provided warrantably assertible conclusions, while others have not and cannot do so (as cited in NRC, 2002, p. 123).

As Dewey mentions, there is no perfect method; and either the source of knowledge is quantitative or qualitative research, what is needed is the quality and the appropriateness of the methodology used. In some cases, a researcher might need to use quantitative method in order to find answers to his questions, and some other cases qualitative methodology might be the only way. In some other cases, the complimentary use of these two methods might be required. Then, questions to answer for a researcher should be what she wants to know and how.

With the aim of understanding the changes on prospective teachers' noticing skills with respect to the reform-minded teaching and learning, in this study, I employed qualitative research method. I was a part of the study as the researcher and I valued the perceptions of the participants, and I aimed to depict the whole picture of the experience.

In some cases of research, when the complexity of educational settings and the role of the values in educational research are taken into consideration, a researcher may need to select qualitative research methodology. In educational research, social issues and culture have an influence. Culture influences our questions, interpretations, reactions, and conclusions (Gould, 1996). In other words, social sciences are not like the physical sciences. In social sciences, we can not deal with the objects as they exist outside of us. Instead, we have to engage in our study as both the subject and the object of it. As Smith (1983) puts it,

Since researchers were human beings engaged in studying the meaning of the social action of human beings, they were both the subject and object of their own study. We must, therefore, stand in a different relationship to our subject matter, if only of interest, when compared with physical scientists (p. 7).

Smith (1983) further adds that human experience is context-bound. In other words, we can not explain what happened in social world with a *context-free or neutral scientific language* (p. 8). Moreover, educational research requires a researcher to deal with several variables some of which can not be controlled or quantified (Verma & Beard, 1981). Qualitative research, on the other hand, "...has great potential for capturing the complex layers of meaning that always coexist in any classroom or in any educational experience" (Lagemann & Shulman, 1999, p. 6). Jackson (1990) claims that classroom life is too complex to be viewed from a single perspective, and thus it is vital to employ all the ways of knowing to grasp the meaning of our research context.

This means that we must listen, ask, count, observe, and interpret. Experimental method can not always be suited to the complex problems of educational settings, and for the sake of good research, a more suitable method should be employed. Sikes, Nixon, and Carr (2003) claim that,

...good research in education and allied fields must be transparent in its methods. This does not, however, imply a principle of replicability. Because educational research concerns itself essentially with human beings and their learning, the researcher cannot always be controlled for in the way he or she can be in the pure sciences (p. 110).

When it comes to the objectivity issue in scientific research, Gould (1996) claims that scientists should give up the myth of objectivity in order to fully identify the cultural influences and constraints. The objectivity from the quantitative research perspective is to see "...the world free from one's personal place or particular situation in it" while it is "...nothing more than social agreement" from the interpretive perspective (Smith, 1983, p. 10). As the validity of a research study does not imply the existence of an objective truth (Maxwell, 1996), science should be seen as a social phenomenon but not an objective knowledge. In educational research, objectivity does not mean that the facts should dominate the research. As Gould (1996) states, facts are not fixed, and culture has an effect on what and how we see. Being objective does not mean that a researcher should be outsider to the world, but it means that she needs to deal with both facts and values at the same time.

The nature and purpose of the present study requires understanding prospective teachers' experiences in an online environment in which they discuss on video cases depicting real practices in elementary mathematics classrooms. In other words, it was vital to fully understand their perspectives and interpret the changes they went through. Therefore, it was necessary to get a big and in-depth picture of the experiences the prospective teachers had. For this, the

employment of the qualitative research was needed.

In sum, this study is a qualitative study, specifically a case study, in which I was a part of the study as the researcher, valued the perceptions of the participants, employed several data collection tools, and tried to depict the whole picture of this experience.

In the following part, information on case study research in qualitative studies is provided, and the case study design of this study is discussed.

3.2.1. Case Study Research

Creswell (2007) stated that there are five approaches to qualitative study, which are narrative research, phenomenological research, grounded theory research, ethnographic research, and case study research. Among these approaches, case study research studies "...an issue explored through one or more cases within a bounded system like a setting or a context" (Creswell, 2007, p. 73). Similar to Merriam (1998) and Yin (2003), Creswell (2007) takes this research as a comprehensive research methodology.

As a qualitative approach, "A case study is a method for learning about a complex instance, based on a comprehensive understanding of that instance obtained by extensive description and analysis of that instance taken as a whole and in its context" (United States General Accounting Office [USGAO], 1990, p. 15). As Feagin, Orum, and Sjoberg (1991) state, it is the methodology to employ when in-depth and holistic examination is necessary (as cited in Tellis, 1997).

What makes a research a case study is explained in the literature. Yin (2003) states that case study answers how and why questions, there is little control over events, it focuses on contemporary events, and consists real-life context. Creswell (2007) explains that the case of the study should be identified, the case should be a bounded system, extensive data sources should be used to collect the data, and the researcher should spend considerable time describing

the context for the case. As the aim of case study research is to understand a case in-depth, the case should be described in detail and it should be stated which kind of a case it is.

Creswell (2007) explains several procedures for conducting case studies and different types of case studies. Via referring to Stake (1995), he distinguishes cases in terms of the intent of the case analysis. Accordingly, there are three variations that are single instrumental case study, the collective or multiple case study, and the intrinsic case study. In instrumental case study, the researcher focuses on one issue and selects a bounded case in order to understand this issue that is the case in the present study.

Creswell (2007) also mentions the unit of analysis employed in different qualitative approaches, and explains that in case study research, unit of analysis can be studying an event, a program, or an activity. Similarly, Yin (2009) defines unit of analysis as a way of explaining what the case in a study is, and states that the case can be an individual or individuals, or an event or entity. In the present study, the unit of analysis was the participants' noticing in the six videos watched during online video case-based discussions.

According to Yin (2003, 2009), there are four basic types of designs for case study, two for the single-case designs and two for the multiple-case designs. He names these designs as single-case holistic and multiple-case holistic designs, and single-case embedded and multiple-case embedded designs. Single and multiple case designs refer to the number of cases in a study, and holistic and embedded designs refer to the number of the unit of analysis involved. Single-case design is a common design in case studies where single-case embedded design involves more than one unit of analysis. The model for the single-case embedded design is given in Figure 3.1 below.

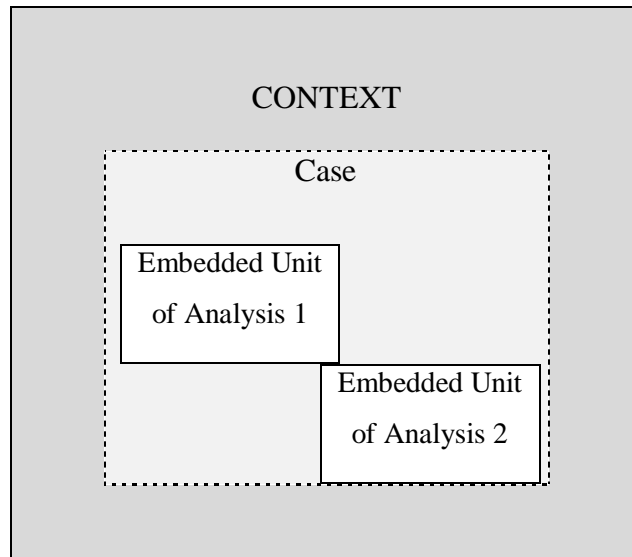


Figure 3.1. Single-case embedded (multiple units of analysis) design (Yin, 2009, p. 46)

In this study, my case was the senior prospective elementary mathematics teachers' noticing in an online video case-based discussion environment. My case was bounded by both time and place. Specifically, it was bounded by one semester of data collection and it was bounded by senior students in the EME program at METU. I employed single-case embedded design since I had one context that is the Elementary Mathematics Education [EME] program at METU and a single case with embedded units that were the participants' noticing in six videos watched during online video case-based discussions (Figure 3.2).

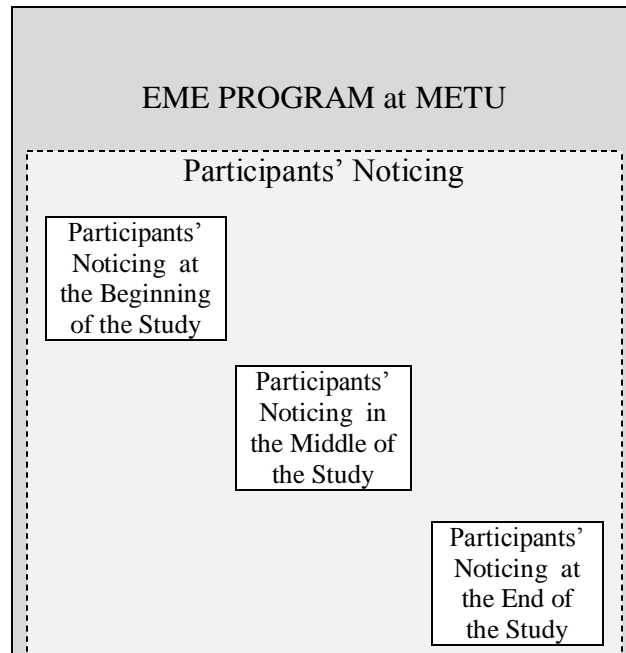


Figure 3.2. Single-case embedded (three units of analysis) design

In sum, in the present study, in an effort to help prospective teachers get ready for reform-minded classrooms, I wanted to study case-based pedagogy and conducted a qualitative study to answer the question, “To what extent the elementary prospective mathematics teachers’ noticing with respect to reform-minded teaching changes during their video case-based teacher education, in terms of teacher and student roles?” My aim was to catch the meaning the prospective teachers gave to the experience. With this aim, I examined the changes on prospective teachers’ noticing skills, and I used multiple sources of information to collect my data in order to provide in-depth picture of the experience as explained in the next part.

3.3. Procedures

In this study, I studied with 15 selected participants among 45 senior elementary mathematics prospective teachers (30 females and 15 males) in order to examine whether and what they gained from case-based pedagogy in their teacher education program in the METU where I have been working as a graduate assistant for 4 years.

Before the study began, a voluntary participation form was distributed to all participants, and all of them agreed to participate in the study. In this study, the real names of the participants were not revealed, instead pseudonyms were used.

During the 2008-2009 fall semester, I asked the participants to watch six videos. These videos were 6th to 7th grade mathematics classes that I video-taped in addition to one 5th and one 6th grade videos from the previous semester. The detailed information on the videos can be found in the data collection part of this section.

In order to develop norms to watch and analyze the video cases, I visited a class hour of senior prospective teachers prior to the online discussions on video cases. I gave them a guideline on how to watch videos and how to discuss them online. Accordingly, participants were instructed that they could take notes while watching the videos in the class and watch the videos several times during the online discussions. In addition, they were informed that they had to send at least 3 messages per week with no less than one paragraph, and supposed to raise new topics in discussions in addition to commenting on others' postings. They were also informed that they were free to generate anti-thesis against others' position as long as they presented evidences and respected each other.

When selecting videos and directing the discussions, I did not have any "predetermined notions of what were acceptable interpretations" in mind (van Es & sherin, 2008, p. 5). Through this, I aimed to let the participants talk about various issues related to the videos as well as creating an environment in which

the facilitator and the participants played critical roles in shaping the discussions together. I aimed to examine whether the participants could identify critical points in the video cases even if they did not match with the points identified by the researcher; whether they had any check points in their minds while analyzing the videos; and whether they could move from the specific events to the general and broader principles and relate the two. Van Es and Sherin (2008) stated that if teachers can achieve the last, then they may have a repertoire including abstract principles and use this repertoire to reason in similar situations, and also they can develop a language for reform pedagogy.

3.3.1. Pilot Study

Before conducting the main study, I collected data for a full semester from senior elementary mathematics major prospective teachers at METU during the 2007-2008 spring semester. I worked with 43 prospective teachers (25 females, 18 males), and asked them to watch 6 videos from second to sixth grades video-taped in reformed classrooms. Each week the participants watched a video in the classroom and wrote reflection papers, and then discussed the videos in an online forum for a week. These real classroom videos related to the new curriculum in Turkey were video-taped by Baran B. (2007). What made these videos reform-minded was the fact that the researcher came together with the teachers and decided on the topic to teach, and prepared lesson plans in line with the new elementary mathematics curriculum to let teachers apply them in their classrooms.

At the beginning of the study, to create an environment for the online discussions, I designed a blog named *Mathematics Teacher Education*. I first signed up for the web site *bloggerspot.com*, and then created the blog. The idea of using a blog for the purpose of online discussions came from the belief that blogs would provide richer discussion environments than online discussion

forums as they were more user-friendly, colorful, and attractive. They would also allow the moderator to download videos and other links to the page.

For the discussion on the first video, the participants were distributed to 5 different groups and to 5 similar blogs. The main reason to form five different groups was to allow richer discussions with the idea that discussions in groups with so many or so few participants may not be effective. To distribute the participants to different groups, I considered their gender, GPA, and their characteristics. Specifically, I tried to put equal numbers of females and males in each group, equalized the academic levels of participants according to their GPAs, and also paid attention to their characteristics such as being talkative, enthusiastic, open to learning, shy, or disinterested. To do the last, I asked an instructor at METU for her opinion who knows the participants very well in person. A table (Table 3.1.) on the characteristics and distribution of the participants to the groups with the blog addresses is provided below.

Table 3.1. The characteristics and distribution of participants to the discussion groups in the pilot study

1st group	2nd group	3rd group	4th group	5th group
5 females 4 males	4 females 4 males	6 females 3 males	5 females 3 males	5 females 4 males
GPAs from 2.09 to 3.15	GPAs from 2.18 to 3.34	GPAs from 2.09 to 3.12	GPAs from 2.39 to 3.17	GPAs from 2.30 to 3.78
<a href="http://www.mathteach
eredu1.blogspot
.com">www.mathteach eredu1.blogspot .com	<a href="http://www.mathteach
eredu2.blogspot
.com">www.mathteach eredu2.blogspot .com	<a href="http://www.mathteach
eredu3.blogspot
.com">www.mathteach eredu3.blogspot .com	<a href="http://www.mathteach
eredu4.blogspot
.com">www.mathteach eredu4.blogspot .com	<a href="http://www.mathteach
eredu5.blogspot
.com">www.mathteach eredu5.blogspot .com

The participants in different blogs were able to see each others' blogs and get ideas on what others were discussing on. After a week-long-discussion on the first video in the blogs, I realized that the blogs did not allow me to see the interaction between the participants. That is, the blogs were letting the participants write comments to each others' posts, but were not suitable to follow who answered whom. The participants were writing the name of the

person to whom they were commenting on, but still it was not a rich environment to see the flow and the dynamics of the discussions.

Thus, after the first week, I asked the participants to discuss the video cases on an online forum called NetclassR in METU webpage. The groups did not change, and I continued to download the videos in the blogs in addition to the online forum. The participants reached the videos, the lesson plans, and the discussion questions in the online forum. The forum let me see the interaction among the participants, and made it easier to understand the dynamics of the groups. The only problem with the online forum was technical. Sometimes the online forum page was unavailable, and the participants complained that they could not open the page anytime they wanted, sometimes they lost the message text they wrote before sending it, and they could not watch the videos from outside of the campus. Still, using the online forum instead of the blogs was a smart move since blogs were quite new to the participants and they were experiencing difficulties using it. On the other hand, the participants were comfortable with using the forum as they used it for a couple of times during their teacher education at METU. As indicated, forum was also useful in allowing to see the interaction among the participants.

3.3.1.1. Data Collection Procedure in the Pilot Study

Each week, after the participants watched a video in the classroom and wrote reflection papers, they discussed the videos in the online forum for a week. I was the facilitator of the discussions where I raised discussion prompts and directed the flow of the discussions. In addition to my own reflections on the videos, I asked one elementary mathematics teachers and an instructor in mathematics education department at METU to list the critical points in the videos with respect to the new elementary mathematics curriculum. More specifically, I let them express their ideas about the videos with respect to the new curriculum components, teachers' instruction, and students' roles. In some

cases, the mathematics educator sent emails about her ideas on the videos regarding the new elementary mathematics curriculum. In other cases, we came together, and I wrote down what she said about the videos in terms of the new curriculum, right after she shared her ideas after watching the videos. The mathematics teacher, on the other hand, visited me each or every other week for couple hours, we watched the video together, and he dictated his interpretations on the videos. These comments on the videos let me raise more effective questions during the online discussions. I transferred each written document to a word document in each discussion per video, and based on those discussions I raised three main questions per each video (see Table 3.2) during the online video case discussions. Participants also were free to raise their own topics, and were encouraged to ask questions to each other.

Below, after providing information on the videos watched, the data collection tools used in the pilot study are explained in detail.

3.3.1.1.1. Videos Watched in the Pilot Study

The 1-5th grade videos, some of which were used as professional development tools during the pilot study, were video-taped by a graduate student at METU for a Ph.D. dissertation. The classrooms in the videos were selected for the purpose of depicting reform-minded teaching and learning. The teachers in these videos were supported in teaching in line with the new elementary mathematics curriculum. There were 10 different videos taken in different elementary classrooms from public schools in Ankara. Four of the teachers (one male and three female) in the videos were in-service teachers. The other teachers in the videos were prospective teachers who were conducting their student teaching. The topics of the lessons ranged from geometry to measurement, from symmetry to probability, and from subtraction to division.

For this study, I watched all the videos, prepared checklists of the critical points in videos with respect to the teaching and learning moves congruent with

the new elementary mathematics curriculum, and then selected the 5 most appropriate ones (2nd to 5th grade videos) which depicted the reform-minded classrooms better and were more open to discussion. In addition to the checklists, I made use of the critical points that were listed by a mathematics educator and a mathematics teacher, as explained before. In addition to these videos, another video taped in a 6th grade classroom in Polatli, Ankara was used. This video was belonged to a research assistant at METU who taught for 4 years in public schools. She was also willing to participate in the online discussions. She not only answered the questions in the forum but also shared her ideas with the participants for two weeks. At the end of the video discussions, she also visited the classroom and answered prospective teachers' questions about her teaching in the video face to face. Moreover, I interviewed her on her teaching experiences, the lesson in the video, the new curriculum, and her ideas on the whole experience. This knowledge provided me to analyze prospective teachers' reflections on the videos more in-depth.

The detailed information on the videos watched with the main questions that I raised for each video as the facilitator in the pilot study is provided in Table 3.2 below.

Table 3.2. Videos watched and facilitator prompts in the pilot study

Teacher name	Status	Level	Content	Facilitator Prompts
Emel	Prospective	4th grade	Geometrical shapes	<ol style="list-style-type: none"> 1. We watched the video together. Now, I would like to have your comments on this video. Please share all your ideas related to the video with each other. 2. In your opinion, how was the classroom interaction in this video (between the teacher and the students, and among the students). Explain. 3. What kind of learning opportunities the students caught or missed in this video? Explain.
Muazzez	In-service	3th grade	Geometry	<ol style="list-style-type: none"> 1. We all watched the video. Now, I would like to have your comments on it. What stood out to you in this video? 2. Please focus on the part of the video where they were talking about the difference between a square and a rectangle. What do you see? How would you teach that difference? What kind of descriptions/definitions you would make? 3. In your opinion, what kind of learning opportunities the students caught or missed in this video? What kind suggestions you would make to improve this lesson?
Sevgi	In-service	2nd grade	Geometry	<ol style="list-style-type: none"> 1. First of all, let's talk about the teacher and student roles in this video. What can you say? How was the classroom environment and culture in the video? 2. In your opinion, what was the aim of the activity in this video? How it might have contributed to the students' understanding? 3. When you go back to your own studentship, how did you learn the differences among the geometrical shapes? Does the lesson in this video different in this respect? How? 4. How do you think the assessment of this lesson should be? What might be the objectives of the following lesson?

Table 3.2 (Continued)

Aydan	Prospective	5th grade	Geometry	<ol style="list-style-type: none">1. Which instructional methods were used in this lesson? Discuss the effects on student learning.2. The teacher wants students to give examples to the rectangular prisms at the beginning of the lesson. Then, she asks a male student to tell the properties (beginning from the 40th second). Now, imagine yourself in that boy's shoes. What you were thinking and feeling at that moment? What do you know and do not know?3. Do you think the students understood the 2D and 3D concepts? Was the transition between those dimensions successful? Please explain with specific examples from the video.4. What do you think the students who were trying to draw the net of a cube at the board were thinking? What they knew? What about the students trying to draw a cube on their notebooks?
Gizem	In-service	6th grade	Patterns	<ol style="list-style-type: none">1. What was the aim of this lesson? What kind of instructional moves were made to reach those aims? Please discuss with concrete examples from the video.2. What were the teacher and student roles in this video? How was the classroom culture? Explain with examples from the video.3. What would you say if you compared the mathematical thinking of the students who were drawing 100 blocks one under the other on their notebooks or trying to add all the numbers to that of the other students? What might be done in order to raise all students to the targeted level?4. What the students learned/not learned in this lesson? How the activity might be improved to enhance student learning? What other topics this activity might be connected to or how it might be extended? Discuss what might be the next step in this lesson.

Table 3.2 (Continued)

Ada	Prospective	4th grade	Probability	<p>1. What was the aim in this lesson? How do you think the teacher selected her questions?</p> <p>2. We did not talk about the classroom culture. Especially, what can we say about the classroom culture based on the student who threw up the glass?</p> <p>How do you think the disk-turning activity could be improved? I think the concept of “certainty” was not understood well. What do you think? How it could be taught more effectively? Did one of you check the objective of this lesson at the guide book? What did you see?</p>
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3.3.1.1.2. Reflection Papers in the Pilot Study

As mentioned before, during the pilot study I asked the participants to write reflection papers for each videos right after they watched videos in the classroom. Before they start to watch a video each week, I distributed one page for each participant with their names, the date, and name of the teacher in the video. I collected these papers at the end of each lesson. In the reflection papers, I asked them to answer the question “What did you see/notice in the video and what stood out to you?” I distributed the papers before they watch the videos since I wanted the participants to take notes while watching the video where extra pages were provided if needed. In this way, I aimed to capture every detail they noticed from a video.

3.3.1.1.3. Online Discussions in the Pilot Study

As mentioned before, for the online discussions, the participants were distributed into 5 groups (see Table 3.1). The groups discussed the six cases on METU-Online Forum, and answered the main questions that I raised for each video as the facilitator (Table 3.2). I read and utilized participants’ reflection papers before online discussions to effectively direct the flow of the discussions. During the online discussions, participants were free to raise their own topics, and were encouraged to ask questions to each other. The discussions on six videos took place from March 12th to May 14th.

3.3.1.1.4. Interviews in the Pilot Study

Another data collection tool in this study was the interviews. Before the study, at the beginning of the semester, I gave the participants an interview protocol (written form). With this initial interview, I aimed to get information on the participants’ view about teaching and learning with their ideas on teacher and student responsibilities. At the end of the semester, I administered a post interview

(written form), which was modified from Exit Interview developed by van Es and Sherin (2008). This interview was designed to understand participants' impressions on the video cases, and the modified version of this protocol was developed with a mathematics educator. I gave this protocol to the participants to learn what they got from the whole experience.

At the end of the study, I also interviewed with selected 10 prospective teachers -focus participants- face to face to get deeper and more information on what they got from the video case-based discussions. Specifically, in this interview, my aim was to examine the changes in participants' noticing skills in more detail and to understand how the online video-case based discussions contributed to their professional development. For the validity of the interview questions, I got opinion from a mathematics educator.

In order to select the focus participants, I employed a type of purposive sampling, the maximum variation method. This technique was selected as it describes central themes of a research with a variation of participants (Patton, 1987). Accordingly, the variations of selecting focus participants were gender, discussion groups, and online discussion participation. Specifically, while selecting the focus participants, I considered the gender and the level of contribution of the participants. In the pilot study, I selected two persons from each discussion group with one female and one male as the focus participants with respect to their high and low contributions.

During the interviews I had a chance to examine the change in participants' noticing skills in more detail and to understand their personal experiences. More specifically, I tried to analyze what they learned from the video cases (Boling, 2007). In Boling's (2007) study, the researcher was able to capture a focus participant's transmission from the traditional conception to the student-centered conception, and was able to see how she used her prior learning experiences and

how she formed new knowledge and beliefs. To analyze such change, during the interviews, I asked participants questions about the difference in their noticing at the beginning and at the end of this study, their gains from watching the videos and from the online discussions, and their learning with respect to the reform-minded classrooms after participating in the study. Through this close analysis, I aimed to follow the process by making meaning of their experiences.

3.3.1.2. Results and Implications of the Pilot Study

The pilot study suggested some modifications in my study. At the end of the pilot study, I got more experience on how to conduct this study and also received some suggestions from my committee. With those suggestions in mind, for the main study, I decided to show maximum 6 or 7 videos to not to decrease the effectiveness of the discussions. I realized that the participants got bored at the end of the study and it would be ineffective to ask them to watch and analyze more videos. I also decided not to select videos with the same topic because the participants mentioned that it was boring to watch such videos as it was like watching the same video again. I decided to continue asking specific questions during the discussions and to guide the participants directly to the new curriculum and textbooks as I observed its effectiveness during the pilot study.

I decided to increase the number of the participants in groups and decrease the number of groups, and be more careful with the characteristics of the participants while grouping. In the pilot study, I asked the participants how effective their groupings were, and they mentioned that they would want to have richer discussions. For that reason, I decided to increase the number of the participants in each group. Prospective teachers also mentioned that it was effective to be in a group in which they had a chance to communicate with people that they did not talk much. Forming the groups with this idea in mind let the participants see different

and multiple perspectives. This was the case as I grouped the participants purposively with certain criteria in mind. For the main study, I decided to follow the same procedure. I also decided to pay attention to the quality of the videos that I was planning to tape as the participants complained about some of the videos in terms of volume quality. Additionally, I decided to record male-teacher videos for the main study as the participants requested to watch teachers from both sex. In the main study, I was careful to follow these steps in order to improve the quality of the experience for the participants.

The analysis of pilot study also provided me some insights for the main study in terms of content. My analysis of a 5th grade video reflections and online discussions for a conference study indicated that the use of video cases in teacher education with the online discussions helped prospective teachers notice more on reform-minded teaching and learning. In that study, I reduced the data from participants' reflection papers and online discussions into meaningful segments, and then assigned names for those segments from the teacher and student roles explained in the new elementary mathematics curriculum. Then, I combined the codes into broader categories, and finally I compared the data.

Particularly, the analysis revealed that prospective teachers focused on most of the teacher roles pointed in the new elementary mathematics curriculum's vision in their reflections (79.3%) and in online discussions (62.9%) while they focused more on student roles in the online discussions (42.52%) than that of the reflections (20.7%). The results indicated that before the online discussions, participants were mostly focusing on teacher roles, and they learned to talk about student roles as the discussions took place. The participants also mostly focused on the teacher roles such as *creating teaching-learning environment*, *classroom management*, and *using time effectively in teaching-learning process* while writing reflections, and they started to talk about the teacher roles such as *probing questions and inquiry*, and

making students question, think, and discuss during the online discussions. Similarly, while they focused on the student roles such as *actively participating in the learning process*, and *using materials* in their reflections, they also started to focus on *thinking* and *using their knowledge to learn* in addition to the previous roles. Additionally, participants were able to talk about several student roles that they did not mention in their reflections as they discussed the cases online. These roles were *asking questions, inquiring, communicating, being responsible from their own learning, using their knowledge to learn, and having confidence*.

In sum, the findings indicated that the participants mostly focused on general teacher responsibilities and classroom management at the beginning, but were able to notice and talk about several teacher and student roles that were underlined in the new elementary mathematics curriculum at the end of the study. These findings confirm van Es and Sherin's (2008) study. In that study mathematics teachers learned to notice in the context of a video club. More specifically, they learned to interpret students' thinking, and they shifted their focus to students' mathematical thinking. In line with the literature, in my study, seeing that the use of video cases with online discussions helped prospective teachers observe a real classroom and talk about reform-minded teaching and learning encouraged me to continue my study with another senior prospective class.

To conclude, the pilot study helped me to see the patterns of the ways that the prospective teachers gain from the video-based discussions, and became a base for my research as it led me to keep my research questions and expand the amount of the data that I collected. This experience also suggested me to continue conducting interviews with selected participants to gather more in-depth data on what they got from this study in terms of getting prepared for the realities of reform-minded classrooms.

3.3.2. Data Collection Procedure of the Main Study

As stated before, in this study, I employed qualitative research methods in order to generate rich data which is embedded in context. I used numerous data sources such as prospective teachers' reflection papers, online discussions, and interviews with selected focus participants to collect and triangulate the data.

In the main study, as in the pilot, I collected my data for a full semester of 2008-2009 academic year from senior elementary mathematics prospective teachers at METU. In the main study, I worked with 45 prospective teachers, and asked them to watch six videos from real elementary mathematics classrooms. Similar to the pilot study, each week we watched a video in the classroom and they wrote reflection papers, and then discussed each video in an online forum for a week.

As I mentioned while explaining the implications of the pilot study, in the main study, I increased the number of the participants in groups and decreased the number of groups. Similar to pilot study, I created my groups via taking characteristics of the participants into consideration as explained in detail in the pilot study. To do that, I got opinion from a mathematics educator.

In the following part, I provide detailed information on the elementary mathematics education program at METU and on the participants.

3.3.2.1. The Context and the Participants

As indicated before, the context in this study was elementary mathematics education program at METU, an English-medium university. The EME program aims to raise future mathematics teachers who are capable of teaching mathematics for student understanding. It focuses on developing prospective teachers' critical thinking skills and on developing them professionally. In this program, prospective teachers are required to complete mathematics and mathematics education courses in addition to other courses such as general educational courses, technology,

physics, chemistry, history, and English. After taking mostly mathematics courses in their first and second years, prospective teachers start taking Teaching Methods courses in their third and fourth year. While taking a course on Methods of Mathematics Teaching in their last year, prospective teachers also do their last school experience in School Experience II course. The prospective teachers graduating from this program teach mathematics in public and private schools from fourth to eight grades in primary and middle schools. The courses offered in EME program at METU are provided in the Table 3.3 below.

Table 3.3. Courses taken in EME program at METU

FIRST YEAR			
First Semester		Second Semester	
MATH111	Fundamentals of Mathematics	MATH112	Introductory Discrete Mathematics
MATH151	Calculus I	MATH152	Calculus II
MATH181	Basic Physics I	PHYS182	Basic Physics I
EDS119	Introduction to Teaching Profession	ELE132	School Experience I
ENG101	Development of Reading and Writing Skills I	ENG102	Development of Reading and Writing Skills II
IS100	Introduction to Information Technologies and Applications		
SECOND YEAR			
Third Semester		Fourth Semester	
MATH115	Analytical Geometry	MATH116	Basic Algebraic Structures
MATH201	Elementary Geometry	MATH255	Introduction to Differential Equations
CHEM283	Introductory General Chemistry	BIO106	General Biology
ENG211	Academic Oral Presentation Skills	ELE224	Instructional Planning and Evaluation
EDS221	Development and Learning	ELE300	Computer Applications in Education
HIST2201	Principles of Kemal Atatürk I	HIST2202	Principles of Kemal Atatürk II
THIRD YEAR			
Fifth Semester		Sixth Semester	
MATH260	Linear Algebra	ELE240	Probability and Statistics
ELE317	Instructional Development and Media in Mathematics	ELE332	Laboratory Applications in Science II
ELE331	Laboratory Applications in Science I	ELE336	Methods of Science and Mathematics Teaching
TURK305	Oral Communication	EDS304	Classroom Management
	Elective I	TURK306	Written Communication
	Elective II		Elective III
FOURTH YEAR			
Seventh Semester		Eighth Semester	
ELE437	School Experience II	ELE420	Practice Teaching in Elementary Education
ELE443	Methods of Mathematics Teaching	EDS448	Textbook Analysis in Mathematics Education

Table 3.3 (Continued)

ENG311	Advanced Communication Skills Elective IV Elective V	EDS424	Guidance Elective VI
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The participants in this study were senior prospective teachers in elementary mathematics education department at METU. These senior prospective teachers have completed most of their course load including mathematics, pedagogy, and education courses. They were purposively selected as participants in this study since they were close to become teachers. During the study, they were in their seventh semester, and they were taking Mathematics Teaching Methods and School Experience II courses. The online video-case based discussions were held in the School Experience II course. In this course, prospective teachers were expected to do observations in schools in terms of organization, management, daily activities, group activities, teacher and student responsibilities, courses, school problems, and materials. They were also required to prepare two observation reports including observations on the teaching of a mathematics concept and related student difficulties, and description on the culture of the school and the classroom observed. Implementing a learning center project with 4-5 activities, preparing a teaching portfolio, and writing a reflection paper on the overall school experience were the other requirements of the course. In the present study, during the 2008-2009 fall semester, there were two sections taking this course, and each section was divided into two discussion groups forming 4 different discussion groups in total. The first group included 5 females and 5 males, the second group included 6 females and 4 males, the third group included 10 females and 3 males, and finally the last group included 9 females and 3 males.

The 15 focus participants were selected from each group through maximum variation sampling as explained in detail below. From each discussion group, 3 or 4 prospective teachers were selected as focus participants. There were 4 males and 11 females in this focus group. Participants' GPA's ranged from 2.09 to 3.38. Some of the participants had private teaching experiences. It should also be noted that most of the focus participants were willing to become mathematics teachers, but one of the female focus participants (Participant-10) was motivated not to perform the teaching profession with a 3.34 GPA.

Below, after providing information on the videos watched, the data collection tools used in the main study are explained in detail.

3.3.2.2. Videos Watched in the Main Study

For the main study, I got permission to record videos in 6-8th grade elementary mathematics classrooms in 22 public schools in Cankaya district, Ankara. More specifically, in order to get permission to record in elementary mathematics classrooms, I talked to the administrators of 22 schools, and identified mathematics teachers who were willing to participate in the study. I conducted this study only with the volunteered teachers, so I could record 12 mathematics classroom videos in 5 schools. In these videos, the purpose was not to reflect the implementation of the new elementary mathematics curriculum as they did not completely and accurately reflect the reform-minded mathematics classrooms. Instead, they were depicting real mathematics classrooms in which the teachers were trying to implement the new curriculum to some degree.

I started to video-tape the lessons in the beginning of May 2008. During the video recordings, I tried to capture all the major activities during the lessons. When the teacher was active in the lesson I zoomed in the camera in order to catch every moves of the teacher. When the students were active as a whole class, I zoomed out

to capture the whole interaction. When they worked in groups, on the other hand, I zoomed in the nearest group in order to picture the interaction among the group members and their mathematical thinking. Additionally, as long it was possible, I tried to video-tape classes in the morning rather than in the afternoon as I anticipated that students might be more attentive in the mornings. In order to provide prospective teachers with more diverse and rich examples of classrooms, I tried to select teachers from different gender and experiences. By this way, I tried to maintain the variation between the cases. I also talked to the students to make them comfortable with video taping in each classroom before recording.

As I recorded the videos of classrooms, I also made interviews with the teachers in the videos to learn their ideas on how they implemented the new elementary mathematics curriculum. In order to do that, I raised questions about their perceptions of the new curriculum and their thoughts about the issues related to congruent teaching methods. The framework for the interview was developed with the help of a mathematics educator at METU. These interviews were used to inform the prospective teachers about the background details of the videos.

At the end of the semester, I video-taped 12 classrooms in total. To decide on which videos to select among the new videos that I recorded, I asked a mathematics educator to watch the videos and give feedback on their suitability for my study. Another criterion to select videos was their openness to discussion. More specifically, the videos selected from the pilot study were the ones which led most discussion.

With the experience I got from the pilot study, during the main study, I showed 6 videos again, but this time they were from 6th and 7th grades mathematics classrooms with one 5th grade video. The 6th grade video was also unique as the teacher in the video was available for the online discussions. Participants knew her as they took a course in which she was the graduate assistant. She participated in the

discussions and raised and answered questions, but she did not visit the classroom to answer participants' questions face-to-face.

In the main study, I tried to select both in-service and prospective teachers' videos to provide participants with different perspectives, and selected male-teacher videos and videos with different topics. Additionally, I tried to improve the quality of the videos in terms of volume and clarity. For the main study, unfortunately, I could not record any videos in 8th grade classrooms as they were not attending to the school to get prepared for the SBS examination.

Detailed information on the videos watched with the facilitator prompts is provided in Table 3.4 below.

Table 3.4. Videos watched and facilitator prompts in the main study

Teacher name	Video	Status	Level	Content	Facilitator Prompts
Aydan	From the pilot study	Prospective	5th grade	Geometry (Properties and surface area of a cube)	<ol style="list-style-type: none"> 1. First of all, let's talk about the teacher and student roles in this video. What can you say? How do you think the classroom environment and culture were? 2. In your opinion, did the students understand the 2D and 3D concepts? Do you think the transition between the dimensions was successful? Discuss with examples from the video. 3. Now, put yourself into the students' shoes who were trying to draw a cube on their notebooks. What were you thinking at that moment? What did you know?
Gizem	From the pilot study	In-service with 3 years experience	6th grade	Patterns	<ol style="list-style-type: none"> 1. In your opinion, what was the aim of this lesson? What kind of instructional moves were made to reach the aims? Discuss with concrete examples from the video. 2. Now, imagine yourself as the students in the video, and try to understand what they were thinking. What they were thinking: the students who were making estimations for the given problem (min 02:27), the student who was drawing the blocks one under the other (min 11:47), the students who asked whether it could be 55x10 (min 12:59) and/or the group who told it was 15 for each 5 (min 14:13)? What can you tell if you compare these students in terms of their mathematical thinking? 3. Let's make a last evaluation for this lesson. What do you think the students learned/ could not learn in this lesson? How the activity might be improved to enhance student understanding? What other subjects it might be connected to or how it might be extended? Discuss what might be the next step in this lesson.

Table 3.4 (Continued)

Mehmet	New-participant in the pilot study	Prospective	6th grade	Ratios and Proportion	<ol style="list-style-type: none"> 1. What was the aim of this lesson? Discuss about the instruction in this lesson and whether the activities were proper for the aim. Provide examples from the video. 2. Now, think about the following part of the lesson in the video, and what the teacher might have been done. In your opinion, what might be the things to do in the following lesson? Then, I will share what the teacher did in the next part of the video so that we can talk about it together. 3. You may find the raw video and the second part of it attached. Let's see whether your predictions were congruent with the second part of the video. Let's evaluate this video together, what do you think? Please discuss with specific examples from the video, and raise questions as many as possible.
Metin	New	In-service with 15 years experience	6th grade	Measurement (Liquids)	<ol style="list-style-type: none"> 1. What do you think the aim of this lesson was? What kinds of moves were made to reach the aims? To what level the aims were attained. Discuss with examples from the video. 2. Please look at the teacher and student roles mentioned in the vision and the approach of the new program. Which of them you can see in this video? Which of them are absent? Let's evaluate this video from this aspect as well. 3. How do you think the assessment of this lesson should be? What might be the objectives of the following lesson?
Nergis	New	In-service with 20 years experience	6th grade	Multiplication with decimals	<ol style="list-style-type: none"> 1. What was the aim of this lesson? What the students learned/ could not learn in this lesson? 2. Let's take this lesson and adopt it entirely to the new program. What we should do? What we should change? How should we teach this lesson? Please explain with specific examples.

Table 3.4 (Continued)

Gülşen	New	In-service with 26 years experience	7th grade	Interest	<ol style="list-style-type: none">1. How do you think this video was congruent with the new program? From which aspects it was congruent and from which aspects it was not? Please discuss with examples from the video.2. If you were the teacher in this video, how would you teach this lesson? Let's share different methods and ideas in detail. Discuss how it is given in the guide book, and what is needed to make students more active? What might be done to improve this lesson? Provide specific examples.3. We talked about how the teacher gave instruction. Well, what do you think about the level of the teacher's subject matter and pedagogical knowledge? To what level she was successful at transferring her knowledge to real life?
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3.3.2.2. Reflection Papers in the Main Study

During the main study, I asked the participants to write reflection papers for each videos right after they watched videos in the classroom. I asked them to answer the question “What did you see/notice in the video and what stood out to you (in terms of the teacher roles, student roles and classroom culture in relation with the new curriculum)?” Similar to the pilot study, the participants were given a sheet, and extra pages were provided if needed.

3.3.2.3. Online Discussions in the Main Study

For the online discussions, the participants were distributed into 4 groups (see Table 3.5). The main reason to form four different groups was to allow richer discussions with the idea that discussions in groups with so many or so few participants may not be effective. There were two sections in this class of senior prospective teachers and two groups in each section. The groups discussed the cases on METU-Online Forum, and answered the questions that I raised as the facilitator. The discussions on the six videos started on 13 October and ended on 01 December.

Table 3.5. Discussion groups in the main study

Group1_1	Group1_2	Group2_1	Group2_2
5 females	6 females	10 females	9 females
5 males	4 males	3 males	3 males

As in the pilot study, I was the facilitator of the discussions, and raised about three main questions per each video. I continued asking specific questions during the discussions (see Table 3.4), but this time I also guided the participants directly to the new elementary mathematics curriculum and to related textbooks. Similar to the pilot study, to prepare the discussion questions I asked a mathematics educator and a mathematics teacher to watch the videos before starting the discussions, and also made use of my own interpretations. The lists I

got from these experts helped me ask more effective questions during the online discussions. Additionally, I read and utilized the prospective teachers' reflections on videos before each online discussion session in order to direct the flow of the discussions more effectively. As in the pilot study, during the online discussions, participants were free to raise their own topics and were encouraged to ask questions to each other.

3.3.2.4. Interviews in the Main Study

During the semester, I interviewed 15 selected prospective teachers - focus participants- face to face to get deeper and more detailed information on what they got from the video case-based discussions. In order to select the focus participants, I employed the maximum variation method. As explained before, this technique was selected as it describes central themes of a research with a variation of participants (Patton, 1987). Accordingly, the variations of selecting focus participants were gender, discussion groups, and GPA's. More specifically, I ranked the participants into 3 groups according to their GPA's, and with their gender and discussion groups in mind I selected 15 prospective teachers in total as my focus participants.

The interviews with the focus participants were administered at the beginning (Appendix A.1.1), in the middle (Appendix A.1.2), and at the end of the study (Appendix A.1.3). I took opinion from two mathematics educators for the validity of these interview questions. With these interviews, I aimed to get information on their ideas on the new elementary mathematics curriculum and understand how they watched the videos, what they noticed, why they focused on specific issues or segments in the videos rather than others, and what they got from the whole experience. More specifically, with the first interview protocol, I aimed to get information on what the participants noticed in the first video in terms of teacher and student roles with respect to the reform-minded teaching and learning. With the second interview, my aim was to understand the changes

on their noticing skills after watching three videos and discussing them in the online forum. Finally with the last interview (Exit Interview), I aimed to examine the changes in participants' noticing skills in more detail. My target in the last interview was to understand how they analyzed the six videos, what kind of changes they went through during the experience, what they learned with respect to the reform-minded classrooms after participating in this study, and whether and how the online video-case based discussions contributed to their professional development.

3.4. Data Analysis

According to Merriam (1998), there are different categories of qualitative data analysis that are ethnographic analysis, narrative analysis, phenomenological analysis, the constant comparative method, content analysis, and analytic induction. In my study, to analyze the data I used constant comparative method developed by Glaser and Strauss (1967). Accordingly, I compared different occasions in the same or another set of data, and this comparison lead to tentative categories. I compared those with each other as well, and determined the similarities and differences. Then, I grouped the data into similar dimensions. I gave them names and they became categories. To name the categories, I used two approaches that were the researcher and the literature. Then, I integrated the categories.

More specifically, to analyze the data, I created and organized files first. I read all the texts, made margin notes, and formed initial codes. I already had some codes from the literature, and I modified them and added new codes as I examined the data. I analyzed the data through examining my data, categorizing the sets of data, grouping the sets into similar dimensions, and naming them. To name the categories, I made use of the literature, and also got opinions from teacher educators at METU. I established themes or patterns, and used direct interpretation. Meanwhile, I tried to present in-depth picture of the case using

narratives and tables/matrices (Creswell, 2007). In other words, I aimed to provide a detailed description of the case and the setting in the study as it is important in case studies to make in-depth description of the case and its setting.

With respect to the unit of analysis selected in data analysis, in this study prospective teachers' each answer to the interview questions and the ideas included were examined; and a sentence, couple sentences, or an entire paragraph(s) was coded. De Wever, Schellens, Valcke, and Van Keer (2006) note that the unit of analysis in a study might be a sentence, a paragraph or a complete message, depending on the context of the study. Similarly, Merriam (1998) states that a unit of data might be any meaningful piece of data which gives the smallest piece of information, and it can either be a sentence or pages-long-field notes. In the present study, while a sentence or a paragraph was selected as the unit of analysis, sometimes it was also possible to assign multiple codes to a single unit. Similarly, for the reflection papers and online discussions, the meaningful pieces of data with the smallest piece of information were used as the unit of analysis.

In the following part, the formation of coding categories is discussed in detail.

3.4.1. Coding Categories

In this study, I coded the reflection papers of the participants with the help of the analytic framework *Learning to Notice*. I also transcribed all the interviews with the focus participants as it was vital to get first-hand information from them without just making inferences, and as they were the main and very essential parts of the study. I coded the interviews in order to identify the changes on participants' noticing over time. To code the interviews, I again made use of *Learning to Notice* framework (van Es & Sherin, 2008, 2010).

According to this analytic framework, there are five dimensions to analyze the data. The first dimension is *Actor* that is the person the participants

comment on (teacher, student, curriculum developers, self, other). The second one is *Topic* that is what the participants notice (mathematical thinking, pedagogy, climate, management, other). The third dimension is the *Stance*, which is how the participants analyze the practice (describe, interpret, evaluate). The fourth dimension, *Specificity* is about how the participants discuss the events they notice (general, specific). The fifth and last dimension is *Video-focus* which examines whether participants' comments are based on the video or not (video based, non-video based). Through taking this framework into consideration, I tried to analyze my data. In addition to the analytic framework, I also used open coding just to see what comes out of the data. After initial coding process through the use of *Learning to Notice* framework and open coding, I came up with new coding categories. To get a clean picture of the experience, the new coding categories were limited to the *Actor* dimension in the framework (see Appendix 1.4). With the opinions taken from the teacher educators in my thesis committee, I mainly focused on teacher and student roles with respect to the reform-minded teaching.

As briefly mentioned before, to name new themes and categories and finalize the codes, I asked for opinion from teacher educators. More specifically, I came together with mathematics educators and discussed the codes coming out of the data. We then established the main themes, and put the main and sub-issues under the main themes in a matrix. During this process, I prepared two different tables via using Ball, Thames, and Phelps (2008), and Shulman's (1987) categories on teacher knowledge (Appendices A.2.1 and A.2.2 respectively). Specifically, first I organized my codes into different types of teacher knowledge as explained by Ball et al. (2008) and Shulman (1987), and then with the help of my advisor I decided to keep the second version by Shulman since placing concepts into categories was more problematic in the first coding system. The final teacher and student roles/codes are provided in Table 3.6 and Table 3.7 respectively below.

Table 3.6. Final teacher roles

Main-themes	Methodological Perspective					Attitudinal Perspective	Other		
	Reform-minded Teaching (subject matter knowledge)						(A)	Teacher characteristics (TC)	Equity (E)
Main-issues	Pedagogical content knowledge (PCK)	General pedagogical knowledge (GPK)	Curriculum knowledge (CK)	Content knowledge (COK)	Other (O)				
Sub-issues	Facilitation	Communication	Materials	Subject-matter knowledge	Motivation	Mathematics as fun	Self-improvement	Reaching all	Preparing students for the future
	Instructions	Management	Lesson planning		Self-esteem	Enthusiasm	Self-assurance	Ensuring understanding of all	Parental support
	Real-life	Approach	Connections		Experience	Comfort	Mistakes	Maximum capacity	Following students
	Reasoning	Pressure	Wrapping up		Effective instruction	Positive attitude	Collaboration	Addressing to students with different levels	
	Thinking time	Student differences	Introduction		Reaching targets	Valuing ideas		Activating all	
	Student-centeredness	Decision-making	Challenging mathematics		Technology	Voice tone			
	Representations	Shaping students	New program		Classroom culture	Knowing students			
	Group work	Competition	Being prepared		Student expression	Patience			
	Evaluation	Expectations	Student knowledge			Student psychology			
	Activities	Engaging	Student levels			Respect			
Understanding		Guide book							

Table 3.6 (Continued)

Inquiry
Terminology
Student understanding
Discussion
Misconceptions
Explanations
Student difficulties
Different solutions
Not binding
Student thinking

Table 3.7. Final student roles

Main-themes	Methodological Perspective	Attitudinal – Affective Perspective	Classroom Culture (responsibility-behavioral perspective)	Other
Sub-issues	Discovery	Active participation	Responsibilities	Imagination
	Inquiry	Being relaxed	Following the lesson	
	Using materials	Enjoying math	Aiming to understand	
	Group work	Excitement	Directing	
	Real life examples		Following rules	
	Constructing one's own knowledge		Being respectful	
	Connections between subjects		Expressing themselves	
	Discussion		Mistakes	
	New program			

To ensure the dependability during the coding procedure, which is also explained in the trustworthiness section below, I discussed the codes with my advisor and asked a Ph.D. student in mathematics education department at METU to code the data as a second coder. First, before finalizing the coding categories, after coding all the interviews individually, I asked the second coder to open code approximately 10% of the data. Then, we compared our initial codes to see the commonalities and differences between our codes. After organizing the codes, we again came together and discussed the codes until we reached an agreement on the categories. Then, with my advisor, we organized the codes into the main themes and main-issues as well as sub-issues, and finalized the categories. After coding all the data individually with the final codes, I asked the second coder to code approximately 13% of the data with the final coding categories, namely six randomly selected interviews (two from first, second, and third interviews). Then we came together and compared our codings. The inter-rater reliability was about 70%. To increase the percentage of the agreement, we discussed our codings in a two-way conference. At the end, we reached a total consensus.

All the sub-issues related to teacher and student roles will be described in detail in the result section.

3.5. Trustworthiness

Validity and reliability are two important issues to consider while conducting a study. In quantitative studies, validity is defined as "...referring to the appropriateness, correctness, meaningfulness, and usefulness of the specific inferences researchers make based on the data they collect (Fraenkel & Wallen, 2006, p. 151). Reliability, on the other hand, "...refers to the consistency of the scores obtained-how consistent they are for each individual from one administration of an instrument to another and from one set of items to another" (Fraenkel & Wallen, 2006, p. 157).

In qualitative study, validity and reliability concepts are perceived and named differently. Lincoln and Guba (1985) identified the terms used in qualitative studies as credibility, transferability, dependability, and confirmability; referring to internal validity, external validity/generalisability, reliability, and objectivity respectively. According to Lincoln and Guba (1985), these terms are the indicators of trustworthiness which shows the quality of a qualitative study. In other words, trustworthiness is the term to be used in qualitative studies instead of validity and reliability.

The first criteria to establish trustworthiness in a qualitative study is credibility referring to internal validity (Lincoln & Guba, 1985). Internal validity "...deals with the question of how research findings match reality" (Merriam, 1998, p. 213). Merriam further adds that reality may never be grasped, thus the question to ask should be "... are the findings credible given the data presented?" (p. 213).

Merriam (1998) explains that in order to ensure credibility a researcher should use triangulation having four types that are data triangulation, investigator triangulation, theory triangulation, and methodological triangulation (Patton, 2002); member checks; long-term observation; peer examination; participatory or collaborative modes of research; and researcher's biases techniques. Shenton (2004) further adds that the ways to ensure credibility are the adoption of well established research methods, prolonged engagement, random sampling, triangulation, ensuring honesty, iterative questioning, negative case analysis, debriefing sessions, peer scrutiny, reflective commentary, credibility of the researcher, member checks, thick description, and examination of other research.

In this study, I tried to ensure the credibility through prolonged engagement with the participants; data triangulation, namely comparing the data from reflection papers, online discussions, and interviews to know how valid the ideas the participants shared were; interviewing only the willing participants;

debriefing sessions with the supervisor and thesis committee members; peer scrutiny in national and international conferences; member checks during the interviews through going back to the reflection papers and online discussions; thick description of the study; and assessing the findings of the study with that of the previous research in the literature.

Additionally, during the interviews, before moving to a new question I waited until I heard no new information from the participants. Strauss (1987) calls this *theoretical saturation*. Via doing this I aimed to maintain the credibility of my study. Moreover, these interviews were voluntary and the selected participants were comfortable with being interviewed. I do not suppose that they gave me the answers that I wanted to hear, which is called respondent bias (Lincoln & Guba, 1985). The answers they gave me pointed that they freely shared what they thought. For example, one student mentioned in the first interview that she was not satisfied with the online discussions because she found her friends' messages too negative. Another student was comfortable with sharing that the participation of the teacher in the video in the online discussions was a bad idea. Such sharing increased my confidence in the credibility of my study.

The second criteria to establish trustworthiness in a qualitative study is transferability referring to external validity. External validity deals with the question of "...how generalizable are the results of a research study?" (Merriam, 1998, p. 223). Although in qualitative studies it is not possible to talk about generalizability from a quantitative point of view, through sufficient data, it is possible to ensure transferability (Merriam, 1998). Shenton (2004) underlines that in qualitative studies "...it is the responsibility of the investigator to ensure that sufficient contextual information about the fieldwork sites is provided to enable the reader to make such a transfer" (p. 69). Thus, researchers should provide sufficient thick description of their studies so that the readers understand it and compare to their own studies.

In this study, in line with the list to ensure transferability provided in Shenton (2004); I tried to explain the context of the study, the selection criteria of the participants, the number of the participants, the data collection methods, the number and length of the data collection sessions, and the time period of the study in detail in the method section.

The third criteria to establish trustworthiness is dependability which refers to reliability. Reliability is defined as "...to the extent to which research findings can be replicated" (Merriam, 1998, p. 220). In qualitative studies, on the other hand, the issue is not whether the same results are gathered by other researchers, but it is whether the results of the study are dependable and consistent with the data (Merriam, 1998). Shenton (2004) explains how to ensure dependability of a qualitative study, and states that the research design, how it was implemented, how the data was gathered, and what was done in the field should be described in detail; and the effectiveness of the process should be evaluated. He further adds that ensuring the credibility also helps establishing the dependability. He suggests using multiple methods of data collection and analysis, and validity triangulation to increase the dependability as well as to describe how you collected the data, how you derived the categories, and how you made decisions in detail. Patton (2002) also states that investigator's position, triangulation, and audit trail are the techniques to ensure dependability. Finally, Creswell (2007) adds that reliability is the "...stability of responses to multiple coders of data sets" (p. 210), and the ways to ensure reliability are obtaining detailed fieldnotes and maintaining intercoder agreement.

In this study, through providing detailed information on the processes within the study, I aimed to help other researchers repeat the work, "...if not necessarily to gain the same results" (Shenton, 2004, p. 71). More specifically, I tried to explain my research design, how I collected the data, and how I derived the coding categories in detail. I also tried to ensure dependability of the study through ensuring the credibility. Additionally, as I mentioned before while

explaining the coding categories, to ensure the dependability during the coding procedure, I discussed the codes with my advisor and then coded the data with a second coder. More specifically, after coding all the interviews individually, I asked the second coder to open-code some of the data. Then, we compared our initial codes. After organizing the codes, we again came together and discussed the codes until we reached an agreement on the categories. Then, we organized the codes with my advisor into main themes, main-issues, and sub-issues, and finalized the categories. After coding all the data individually with the final codes, I asked the second coder to code six randomly selected interviews. Then we came together and compared our codings until we reached a total consensus.

The fourth and last criteria to establish trustworthiness in a qualitative study is confirmability referring to objectivity. Shenton (2004) states that “The concept of confirmability is the qualitative investigator’s comparable concern to objectivity” (p. 72), and explains how to ensure confirmability as using triangulation to reduce the researcher bias, explaining how the decisions throughout the study were made and how they were affected by the beliefs and assumptions of the researcher, providing detailed methodological description, and discussing the expected results which were not come out of the data but existed in the preliminary theories. In this study, the confirmability was tried to be ensured through triangulation and detailed description on the methodology of the study.

3.5.1. Summary

To sum up, in order to maintain the trustworthiness of the present study, I tried to use multiple sources of evidence (data triangulation); collected my data over an extended period of time (one semester for the pilot study and another semester for the main study); used different evaluators (investigator triangulation); used direct quotations (verbatim) in order to decrease the amount of inferences that I make; and received feedback from different people such as

my advisor, previous advisor, my thesis committee members as well as from other academicians (Johnson, 1997). I also created a case study database as suggested by Yin (2003) in order to let other investigators review the evidences. Via these different approaches and data triangulation, I tried to ensure the trustworthiness of my study.

3.6. Ethics and Limitations

For the ethical consideration in this study, I took permission from the Ethical Committee at METU and asked all prospective teachers to sign the consent form. Additionally, for the video-taping, I got permission from the Ministry of National Education (MoNE) and METU Ethical Committee, and also talked to the administrators and teachers in the schools in the selected district to get their approval. More specifically, in order to get permission to record in elementary mathematics classrooms, I talked to the administrators of 22 schools, and identified the mathematics teachers who were willing to participate in the study. Then, I met with the teachers, and arranged the video taping schedule. In this study, only the volunteer teachers were included.

All participants in this study were informed that there would be no harm or deception to the participants, and confidentiality of research data would be ensured. These were expected to reduce the violation of participants' rights. The subjects volunteered to participate in the study, including the prospective teachers and in-service teachers, were also informed that their names would not be revealed anywhere as for the credibility of a study ensuring honesty is one of the methods (Shenton, 2004). To ensure honesty in the present study, I studied with participants who willingly took part in the study, I informed them that there were no right answers to the questions raised throughout the study, and tried to let them share their ideas freely without any restrictions. Additionally, I used pseudonyms in this study instead of the participants' real names.

As stated before, this study was conducted in the context of School Experience II course. I was the second instructor of the course and the facilitator of the online discussions. As a requirement of the course, I asked prospective teachers to watch videos, write reflection papers, and discuss the videos in an online forum, and I graded their online discussion participation. During the study, although I put an at-least-3-messages-per-video limit, I emphasized that prospective teachers' voluntary participation would matter. Considering the fact that grading might have affected their participation, I did not announce their grades until the end of the study since I did not want them to write messages to get higher grades. Instead, I wanted them to see this experience as an opportunity, and to discuss the videos willingly as future teachers.

While I assume that there were no unethical issues in this study, I also anticipate that there might be some potential risks that my study carries. For example, when it comes to the video-taping process, I might have an effect on the flow of the lessons as well as on students' behaviors, which is called reactivity (Lincoln & Guba, 1985). Video-taping might have distracted them or made them behave differently than they would ordinarily. In other words, my presence in the classrooms and the video camera might have disturbed the teacher and/or the students. I observed that some of the teachers in the videos were not comfortable with the video-taping maybe since they felt that they were evaluated. The prospective teachers also might have been realized this issue and it might have been affected their interpretations. Considering such risks, to overcome this threat I tried to refrain from influencing the flow of the lessons during video-taping. To do that, I spent time in the classrooms to make the teacher and the students got used to the camera. I also tried to persuade the teachers in the videos that the videos would be used only for research purpose, and I also informed the prospective teachers about this discourse.

Another risk might be that, as I collected large amount of data from online discussions, interviews, and reflection papers, I anticipate a substantial

amount of work that I needed to accomplish. Being the only researcher in this study carries the risk of limiting the horizon of the study, and therefore, what I can validly represent. In order to reduce the effect of this risk, with the decision of my thesis committee, I limited my study to the data coming from 15 focus participants' interviews and reflection papers, and I principally focused on their noticing in terms of teacher and student roles in reform-minded teaching and learning.

Another risk this study carries might be researcher bias (Lincoln & Guba, 1985). Johnson (1997) states that "researcher bias tends to result from selective observation and selective recording of information, and also from allowing one's personal views and perspectives to affect how data are interpreted and how the research is conducted." (p. 160). He further states that reflexivity is the main strategy to reduce researcher bias, and it is the responsibility of the researcher to monitor and control their biases. At this point, I anticipate that my own perspectives, personal view, and background -as the researcher in this study- might have an effect on my role in this study. Considering that reducing researcher bias and explaining how the decisions throughout the study were made and how they were affected by the beliefs and assumptions of the researcher are among the ways to ensure confirmability (Shenton, 2004); I aimed to be careful enough to examine such effects in order to prevent any possible bias, and got feedback from my advisor and from colleagues in order to increase the validity of my study. Via making my aim clear to the participants, studying with voluntary participants, assuring confidentiality, trying to make the participants comfortable during the data collection process, and checking my own interpretations with the participants; I targeted to reduce researcher bias. I hope that clarifying my own biases would help readers understand my position, and thus validate the study (Creswell, 2007).

3.7. Assumptions of the Study

This study has several assumptions. First of all, it should be noted that in this study, it was assumed that the teachers in the videos tried to adopt new elementary mathematics curriculum in their lessons. In other words, the teachers in the videos were trying to implement the new curriculum, and the participants analyzed those videos with the assumption that the videos were reform-oriented. When it is taken into account that the new elementary mathematics curriculum was implemented since 2004 (TTKB, 2006), it might be assumed that the teachers were implementing it in their lessons. However, since the teachers in the videos were not instructed to teach specifically in line with the new curriculum, their lessons might not completely and accurately reflect the reform-minded mathematics classrooms, and this might influence the structure of the online discussions around the videos. Still, as indicated in the results section, prospective teachers noticed and commented on not only the issues related to the new curriculum, but also the issues which were not in line with it. To state differently, they shared both their positive and negative views related to the videos with respect to the reform-minded teaching and learning. Thus, in both cases where the videos were totally reform-oriented or not, prospective teachers were able to reflect on reform-minded teaching and learning.

Another assumption in this study is that the teachers in the videos were assumed to give instruction as they always do in their teaching routine. The classroom environments in the videos were also assumed to mirror real classroom environments. Additionally, it was assumed that the prospective teachers expressed and shared their ideas honestly during the study. In other words, what they noticed in the videos and what they discussed in the online forum were the reflections of their own thinking as opposed to the ideas given to please the facilitator.

In the next section, the findings of the study will be presented.

CHAPTER IV

FINDINGS

The aim of this study was to examine the changes on prospective teachers' noticing skills with respect to the teacher and student roles in reform-minded teaching when they were engaged in video case-based discussions. This chapter presents the findings of the research study. Specifically, it covers the findings of the data analysis that is about the noticed topics with respect to the teacher and student roles in the new elementary mathematics curriculum. In the first part, findings related to the teacher roles in the reform-minded teaching are presented. In the second part, findings about the student roles in reform-minded teaching are documented.

4.1. Noticed Topics about Teacher Roles in Reform-Minded Teaching and Learning

In the next section, the noticed topics with respect to teacher roles in the three interviews (the first, second, and last/exit interview) and three reflection papers are presented in order to answer the first sub-research question. Related texts from the online discussions are also provided in order to shed more light on what the prospective teachers noticed.

The main-issues with their percentages in the first, second, and last interviews can be seen in the Table 4.1 below.

Table 4.1. The main-issues related to teacher role in the interviews

<i>Methodological Perspective</i>					<i>Attitudinal Perspective</i>	<i>Other</i>		
Reform-minded Teaching (subject matter knowledge)						Teacher Characteristics (TC)	Equity (E)	Out-of-Class Activity (OC)
Pedagogical Content Knowledge (PCK)	General Pedagogical Knowledge (GPK)	Curriculum Knowledge (CK)	Content Knowledge (COK)	Other (O)				
100%, 100%, 100%	93.3%, 100%, 100%	100%, 93.3%, 100%	26.7, 13.3, 33.3%	66.7%, 60%, 86.7%	66.7%, 66.7%, 93.3%	13.3%, 40%, 33.3%	46.7%, 60%, 73.3%	6.7%, 6.7%, 6.7%

4.1.1. The Main Themes related to Teacher Roles in the First Interview and the First Reflection Papers

The main themes with respect to the teacher roles in the reform-minded teaching were given in the method section (Table 3.6). In main titles, there are 3 main themes that are *Methodological Perspective*, *Attitudinal Perspective*, and “*Other*”.

Among the 15 participants, data analysis indicated that in the first interview, all participants were able to talk about *Methodological Perspective*. On the other hand, 10 participants talked about *Attitudinal Perspective*, and 8 participants reflected on the “*Other*” theme.

In the first reflection papers, all participants were able to talk about *Methodological Perspective*, 6 participants talked about *Attitudinal Perspective*, and 3 reflected on the “*Other*” theme.

In the next section, the main-issues under the main themes are provided.

4.1.1.1. The Main-Issues Related to Teacher Roles in the First Interventions

There are 5 main-issues under *Methodological Perspective* that are Pedagogical Content Knowledge, General Pedagogical Knowledge, Curriculum Knowledge, Content Knowledge, and “*Other*”; no main-issues under *Attitudinal*

Perspective; and 3 main-issues under the “*Other*” theme that are Teacher Characteristics, Equity, and Out-of-Class Activity.

It should be noted that, in the rest of the results section, related vignettes on the sub-issues under each main themes are presented first in English and then in Turkish language (the original language) in order to be able to provide the exact meaning the participants gave to each sentences. Because of both cultural and linguistic considerations, through presenting the original vignettes, it is expected to provide the readers with more accurate understanding of the dynamics of the context. Additionally, in some quotes, in order to increase the readability, extra meanings were provided if needed for specific words/sentences in parantheses. Another point to note is that square brackets with triple dot were used to indicate the claims between sentences that were not included in the quote, and triple dot was used to indicate a pause between the sentences.

In the following part, frequencies of the main-issues under *Methodological Perspective* that are Pedagogical Content Knowledge, General Pedagogical Knowledge, Curriculum Knowledge, Content Knowledge, and “*Other*” roles are provided in detail. First the frequencies in the first interview and then in the first reflection papers are documented.

4.1.1.1.1. The Main-Issues related to Methodological Perspective in the First Interventions

As indicated above, among the 15 participants, results indicated that in the first interview, all participants were able to talk about *Methodological Perspective*. Among those, all of the participants reflected on Pedagogical Content Knowledge, 14 talked about General Pedagogical Knowledge, 15 of them mentioned Curriculum Knowledge, 4 talked about Content Knowledge, and 10 talked about the “*Other*” roles with respect to the *Methodological Perspective*.

Parallel to the first interview, in the first reflection papers all participants were able to reflect on teachers' Pedagogical Content Knowledge. In terms of other main-issues under *Methodological Perspective*, 10 reflected on General Pedagogical Knowledge, 13 reflected on Curriculum Knowledge, only one participant mentioned Content Knowledge, and 4 mentioned "Other" roles.

In the next part, the sub-issues under Pedagogical Content Knowledge are presented with their frequencies. Additionally, the related vignettes are provided.

4.1.1.1.1. The Sub-Issues related to Pedagogical Content Knowledge in the First Interventions

As indicated above, in the first interview all of the 15 participants were able to talk about Pedagogical Content Knowledge. There are 21 sub-issues under this main-issue, which were briefly explained in the method section. In the first interviews, 18 of these sub-issues were noticed by the participants. The sub-issues related to Pedagogical Content Knowledge are given with their explanations in Appendix 3.1.

As stated, there are several issues related to Pedagogical Content Knowledge of teachers in reform-minded teaching that the participants noticed and discussed in the first interventions. For example, through praising or criticizing the teacher in the video, prospective teachers taught and discussed that a teacher should facilitate student understanding, connect mathematics to real life, do activities and group work.

In terms of frequencies, one of the most popular roles related to Pedagogical Content Knowledge noticed in the first interview was "Reasoning". That is, participants reflected that teachers should motivate students to think and reason, should not let them memorize, give the underlying meaning of concepts, let students build their own knowledge, make them reach generalizations, and ensure long-lasting comprehension. Eleven out of 15 prospective teachers

mentioned this teacher role. For instance, Participant-6 mentioned the effectiveness of making *students reason* as in below:

Because she asks ‘why’ when she gets an answer which I believe it is a must. To make students think...I mean it makes students understand the meaning behind (P6-1)

Çünkü hani bir cevap aldığımda niçin böyle düşündün diye soruyordu ki, bu olması gereken birşey diye düşünüyorum. Öğrencileri düşünmeye ve üzerinde... Yani bunun arkasındaki mantığı anlamasına sebep oluyor.

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. For instance, during the discussions on the first video watched, participants focused on the fact that the teacher in the video didn’t make students think and reason, but let them memorize. One of these participants reflected that:

You are certainly right, the students knew almost all of the properties of a cube. They even were able to talk about the parallelism of opposite sides which shows that they knew it already. I mean I don’t think that they discovered it. However, in my opinion while stating the properties of a cube, the first thing they should say was that it was three dimensional. They were not aware why an object was 3D. Even the teacher made them give real life examples, she didn’t connect the cube to the main subject that was the 3D shapes. (P6-OD)

Kesinlikle haklısın, öğrenciler küpün neredeyse tüm özelliklerini biliyorlar. Karşılıklı yüzlerinin paralel olduğuna kadar söyleyebiliyorlar ki bence bu daha önce bildikleri birşeydi yani keşfettiklerini düşünmüyorum. Ancak küpün özelliklerini söylerlerken bence ilk demeleri gereken şey 3 boyutlu olmasıydı. Öğrenciler bir cisim neden 3 boyutludur bunun farkında değiller. Öğretmen günlük hayattan örnekler verdirse de küp konusunu ana konu olan 3 boyutlu şekillere bağlamıyor.

As seen from the verbatim above, the Participant-6 noticed the issue where she thought that it was missing in the lesson in the video. In other words, she criticized that there was no reasoning in the lesson. Similarly, another participant (Participant-1) criticised that the teacher made the students memorize instead of reasoning where she also provided suggestions to improve the lesson in that respect as in below:

In my opinion, the students were used to memorizing. I mean without discovering or reasoning. Giving prisms in their hands and encouraging them to use their previous knowledge, students could be motivated to list its properties without being afraid of making mistakes. (P1-OD)

Bence daha önce öğrenci ezberleyerek derse hazırlanmış yani keşfederek veya düşündürülerek değil. Öğrenciye daha önceki bilgilerini kullanarak ve eline prizma şekli verilerek hadi şimdi ne gibi özellikleri vardır sence hata yapmaktan korkmayarak söylebilirsin şeklinde teşvik edilebilir.

Another participant (Participant-9) also commented on this role where she noticed that the teacher in the video did not have students reason. She suggested that the teacher could have asked students to show what they meant on a concrete material as in the below vignette:

Similarly what took my attention was that when a student asked what 3D meant, another student said that it was an object with a length, width, and height. Then the teacher asked the student who raised that question first whether he got it or not. And the student answered similarly that it was an object with a length, width, and height. I think he memorized it. At least the teacher could ask the student to show where the length, the width, and the height was on a concrete cube. (P9-OD)

Aynı şekilde benim de dikkatimi çeken olay şuydu ki öğrenci 3 boyutun ne demek olduğunu sorduğunda bir öğrenci eni, boyu ve yüksekliği olan cisimlerdir diye cevapladı. Öğretmenimiz de asıl

soruyu soran öğrenciye tekrar ne olduğunu anlayıp anlamadığını sordu ve öğrenci aynı şekilde eni, boyu ve yüksekliği olan cisimdir diye cevap verdi. Ezberden konuştu gibi. En azından bir küp üzerinde en neresi boy neresi yükseklik neresi diye sorup gösterilebilirdi diye düşünüyorum.

Similarly, in the first reflection paper, participants were able to reflect on the importance of motivating students to think and reason. That is, 6 participants reflected on this role. For example, Participant-12 mentioned this role as in the below vignette where she pointed on the role of reasoning on student learning with understanding:

The fact that the teacher asked students to explain their answers while they were sharing the properties prevented them from memorizing and let them learn with understanding (P12-R1)

Özellikler paylaşılırken öğretmenin peki bu özellik ne demek açıklar mısın gibi soruları ezberci eğitimi engelleyip çocukların anlayarak öğrenmelerini sağladı.

The role “Student understanding” was among the most popular teacher roles with 10 participants. More specifically, participants noticed that teachers should ensure student understanding, and use the new curriculum even if it takes more class time. While most of the participants reflected on this role, some mentioned it in detail more than once. For example, Participant-15 reflected on how student understanding could be ensured and what could be done to increase student understanding in two different vignettes as below:

There is a time the teachers give to students in order for them to understand, engage, and play with the materials during the activities. During that time, the teacher could go around the classroom to understand which students are active, which one of them are less active, what can be done for them. By considering

these issues, it may be possible to make students understand.
(P15-1)

Hani etkinlik sırasında grup çalışmalarında bir süre veriliyor ya öğrencilere, kendileri anlasınlar, ilgilsinler, materyalle oynasınlar diye. O sürede aralarda gezinerek, hani hangi öğrenciler daha aktif katılıyor, hangileri daha az aktif, işte o daha az aktif olan öğrenciler için ne yapılabilir. Hani bunlar üzerine düşünülerek belki öğrencinin anlaması sağlanabilir.

and

After the teacher put the shapes on the board, they only found the areas of single squares in the net. Only the areas of each squares. Instead of this, they could find the whole area, and then reach a generalization from there. The students did not understand that the generalization was coming. She told them to call a side of the square “a”. What is “a”? If I were a student at that age, I would not understand why we called it “a”. Like where that “a” comes from, what are we doing? (P15-1)

Tahtaya yapıştırıldıktan sonra o şekiller, sadece açınımdaki karelerin alanları bulundu. Mesela tek tek. Sadece karelerin alanlarını buldurdu. Onun yerine tam, bütün alanı bulup ordan bir genellemeye gidilebilirdi. Ve genellemenin geldiğini öğrenciler anlayamadı mesela. Hani hemen işte bir kenara a diyoruz, falan mesela. A ne. Ben öğrenci olsam ve o yaşta olsam yani aklıma takılır niye şimdi buna a dedik. A nerden çıktı, ne yapmaya çalışıyoruz, falan.

Participant-4, on the other hand, focused more on the teacher role on maintaining student understanding:

If from the beginning she could explain what a cube is... It is a 3D object consisting of congruent squares. If only they could get it, they would also understand that not every prism is composed of rectangles. If the teacher had explained it. Explain like ‘we are moving from rectangular prisms to cube’. Like ‘what is the difference?’. Here for example there were rectangles, but here

there are squares. We see that the faces are squares. If only they did it that way, it would have been different. It attracted my attention that in spite of her warnings, nothing was changed. Most of the students... Because it means that almost none of the students got it. (P4-1)

Hani en başından eğer küp ne demek. Eş karelerin oluşturduğu, bir araya gelip oluşturduğu bir 3 boyutlu cisim. Bunu eğer tam oturtturabilmiş olsalardı, hani her prizmanın dikdörtgenlerden oluşmadığını da hani oturmuş olurlardı. Aradaki farkı belki açıklasaydı hoca. Hani arkadaşlar dikdörtgenler prizmasından küpe geçiyoruz. Farkı ne. Burda mesela dikdörtgenler vardı, ama burda kareler var. Yüzeyle baktığınızda kare olduğunu görüyoruz. Mesela bu şekilde yapmış olsaydı farklı olurdu bence. Hani uyarılarına rağmen düzelmemesi benim çok dikkatimi çekti. Birçok öğren... Çünkü hiçbir öğrenci nerdeyse bunu yapamamış demektir.

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, participants noticed that the teacher in the video couldn't achieve ensuring student understanding. One of them reflected that:

When I put myself into a students' shoes in that class, even if I learned all the properties of a cube, I wouldn't be able to draw it on my notebook. Because in order to be able to draw it one has to know more than the properties. Even you knew that a cube was a 3D object, it wouldn't be enough. You also have to know what perspective drawing is. The near surface should be large, and the far surface should be small. From which direction you are looking at the cube, whether it is upon, under or above the horizon line... It is not easy to transform a 3D object into a 2D shape. I certainly couldn't do it with my present knowledge and I would struggle to draw it. (P12-OD)

Kendimi o sınıftaki bir öğrencinin yerine koyduğumda, her ne kadar küpün tüm özelliklerini öğrenmiş de olsam yine de defterime çizemezdim. Çünkü çizim küpün özelliklerini bilmekten daha fazlasını gerektirir. Hatta küpün üç boyutlu olduğunu dahi bilsem yetmez. Bunların dışında bir de perspektif çizim ne

olduğunu bilmem gerekir. Yakındaki yüzey büyük, uzaktaki küçük olmalı. Küpe ne tarafından baktığım, ufuk çizgimin üzerinde mi, altında mi, yukarısında mı... Neticede üç boyutlu bir cisim iki boyuta aktarmak kolay bir iş değil. Kesinlikle elimdeki bilgilerle beceremezdim, çizeceğim diye bocalar dururdum.

Similarly, another participant reflected that:

I think that the teacher directly passed to the prisms and she didn't mention 2D and 3D before that. Even a student asked a question indicating that he didn't understand the subject. But the teacher passed it over lightly with a short answer. Yet, the students were introduced to 3D objects with respect to the prisms for the first time, and they didn't know their differences from 2D shapes they learned before. Also when we consider that dimension concept is abstract, we can clearly see how much difficulty students may have conceptually. So, before moving to the prisms, the teachers should have done an activity taking students from 2D to 3D and making them understand the difference between the two. (P4-OD)

Bence öğretmen direkt olarak prizmalar konusuna geçiş yaptı ve bunun öncesinde hiç 2 boyut 3 boyut kavramına değinmedi. Hatta öğrencilerden biri bu konuyu anlamadığını belirten bir soru sordu. Fakat öğretmen kısa bir cevapla geçiştirdi. Oysa prizmalar konusunda öğrenciler ilk kez 3 boyutlu cisimlere giriş yaptı ve daha önce gördükleri 2 boyutlu cisimlerle ne farkının olduğunu bilmiyorlar. Bir de boyut kavramının soyut bir kavram olduğu düşünüldüğünde çocuklarda ne kadar kavrama zorluğu ortaya çıkaracağı daha net oluyor. Bana göre prizmalara giriş yapmadan önce öğretmen öğrencileri 2 boyuttan 3 boyuta geçirecek ve aralarındaki farkı kavramalarını sağlayacak bir aktivite yapmalıydı.

This role was also mentioned in the first reflection papers by more than half of the participants (8). To give an example, Participant-1 praised the teacher in the video for being able to ensure student understanding:

When she mentioned the 3D concept, it was really nice that the teacher repeated it for the student who previously didn't

understand it through comparing 3D to 2D. In that way, she ensured that the students who didn't know it at all and couldn't say it or who knew it with errors learned the correct way. (P1-R1)

3 boyut kavramı geçtiğinde, daha önce bu kavramı anlamamış olan öğrenciye bu kavramı 2 boyutla kıyaslayıp tekrar etmesi gerçekten hoştu. Bu sayede bilmeyip söyleyemeyen ya da bilip de yanlış bilen öğrencilerin doğrusunu öğrenmeleri sağlandı.

With respect to another role, 9 out of 15 participants mentioned “Facilitation”. In other words, they talked about the teachers’ facilitation role, and underlined that teachers should assist students, help them discover, and provide hints when necessary. This role was among the most popular roles that the participants noticed in the first interview. For example, Participant-4 emphasized the importance of teachers’ facilitation role in the new curriculum as in below:

The most important aspect of the new program. The teacher is a guide. That is, it is what I want to do... I mean I will try to guide children. To facilitate. That will be my difference from other teachers, hopefully. (P4-1)

Yeni müfredatın en önemli özelliği. Öğretmen rehberdir. Rehber. Yani benim mesela en büyük... İnşallah yapmak istediğim, olmak istediğim şey bu. Yani ben orda çocuklara rehberlik yapmaya çalışacağım. Yönlendirmeye. Aramızdaki tek fark bu olacak yani inşallah.

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, Participant-5 underlined that one of the main roles of teachers in the new curriculum was to facilitate student understanding:

One of the issues we discussed with respect to the new curriculum –even the most important issue- was facilitating students on

finding answers as I said before. For example, the teacher could have been analyzed student thinking in order to understand where they were and where they struggled, and to facilitate them even while telling students in groups to list the properties of the shape on the worksheets. (P5-OD)

Yeni müfredat ile ilgili olarak da bu bahsettiğimiz şeylerden -en güzellerinden birisi hatta- başta da dediğim gibi öğrencilerin cevapları bulmalarına yol göstermek. Örneğin, grup olarak önümüzdeki kâğıtlara bu şeklin özelliklerini listeleyen derken bile onlara rehberlik etmek nerelere gelebildiklerini nerelerde ne gibi takıntılar yaşadıklarını anlamak amacıyla yanlarına gidilebilir, düşünceleri incelenebilirdi.

The first reflection papers also support this idea. Although the participants did not reflect on issues as much detail as in the interviews, they were still able to mention a variety of roles including this role. That is, 3 participants reflected on facilitating students in the first reflections. In other words, parallel to the first interview, the participants were able to reflect on facilitating student understanding as in the below vignette:

[...] The teacher facilitated students with her questions and guided them to the right answer. (P6-R1)

[...]Öğretmen sorularıyla öğrencileri yönlendirdi ve onları doğru cevaba yöneltti.

Related to Pedagogical Content Knowledge, 9 participants mentioned the issue “Student-centeredness”. More specifically, the majority of the participants noticed that one of the responsibilities of teachers was activating students, conducting student-centered lessons, giving students opportunities, and not directing students too much and not being the center of the answer/approval process. In other words, prospective teachers noticed that one of the teacher responsibilities should be activating students instead of being the center of the class and not interfering too much. This role was among the popular roles

noticed. For example, Participant-5 praised the teacher in the video for accomplishing this role:

The teacher tries to make the lesson student-centered. She really tries. She wants to make the lesson student-centered, to use new and effective methods [...] (P5-1)

Hoca sistemi tamamen, aynı konuları öğrenci merkezli anlatmak için uğraşiyor. Gerçekten uğraşiyor yani. Hani öğretmen gerçekten bu anlamda, hani ben çocukları merkeze alayım, onlara bu yeni ve daha etkili yöntemleri kullanmak için uğraşayım [...]

This idea was also supported in the first reflection papers. Parallel to the first interview, the participants were able to reflect on this role. In other words, four participants mentioned this role in the reflections. For example, Participant-8 was able to reflect on activating students as in the below vignette:

Giving the instructions clearly, the teacher lets the students work on their own and meanwhile she does not intervene in the group work. She puts an effort to have students make deductions and generalizations. (P8-R1)

Öğretmen yapmaları gerekenleri açıkça ifade edip çalışmalarına izin veriyor ve bu süreçte gruplara müdahale etmiyor. Çıkarımları ve genellemeleri öğrencilere yaptırmaya gayret ediyor.

Another noticed issue was “Representations”. That is, participants talked about teacher roles such as using multiple instructional methods and multiple representations, selecting the most appropriate method for student understanding, and using instructional methods and conducting lessons in line with the new curriculum. Eight participants mentioned this role. For example, Participant-1 emphasized the teacher’s effort to implement the new curriculum and the effectiveness of using multiple representations:

I am very positive at this point, because the teacher tries to adapt to a new system. She really tries to do her best. For example, the net of the cubes. I would have never thought this, the different nets of cubes. It is very useful for students. (P1-1)

Burada çok olumlu düşündüm ben, hani sonuçta yeni bir sisteme ayak uydurmaya çalışıyor hoca da. Gerçekten elinden geleni yapmaya çalışmış. Mesela o küplerin açılımı. Benim hiç aklıma gelmezdi, bu küplerin farklı farklı gösterimi. Öğrenciler için çok güzel.

Parallel to the first interview, in the first reflection paper, participants were able to reflect on using multiple representations, but with a lower frequency (5 participants). For example Participant-6 reflected on this role as in the below vignette where she pointed on the effectiveness of using multiple representations on student understanding:

The fact that the students showed the open shape of the cube by materials and verbally described it indicates that different instructional methods were employed in the lesson. This makes student learning easier for those who learn in different ways (P6-1)

Küpün açık halinin çizim, materyal kullanılarak gösterilmesi ve sözlü yöntemle açıklama yapılması, derste farklı yöntemlerle anlatım yapıldığını gösterir. Bu durum, farklı yollarla öğrenen çocukların öğrenmesini kolaylaştırır.

More than half of the participants (8 participants) mentioned the issue “Group work”. In other words, they mentioned that teachers should make group work and manage it, should be able to deal with students during the group work, manage the labor division in group work, activate the communication between students during the group work, and let them learn from each other via group work. This role was more popular when compared to some other teacher roles

noticed in the first interview. For example, Participant-4 reflected on the importance of managing group work for student learning as in below:

It is always like this. For example, there are always a couple of leader types in a class, and they carry the lesson. The rest follow them like train wagons. In my opinion, it is so important to prevent this. In fact, it is so important to manage it, because unintentionally, even us, we do this when we do group work at university. If there is someone you depend on, (s)he carries it and we just copy. It is really important to trace the process... (P4-1)

Bu hep böyledir. Mesela sınıfta birkaç lider tiplene vardır. Onlar işi yürütürler. Arka taraf, vagon misali, arkasından gider yani. Onu engellemeye çalışmak çok önemli bence. Daha doğrusu bunu yönetmek çok önemli. Çünkü ister istemez orda birisi, biz bile yani, üniversitede grup çalışması yaparken bile bunu yapabiliyoruz yani çok rahatlıkla. Eğer güvendiğimiz birisi varsa o götürüyor, biz arkadaştan bakıyoruz. Bu süreci takip etmek bence çok önemli [...]

When it comes to the first reflection papers, more participants than that of in the first interviews were able to reflect on this role (10 participants). For example, Participant-6 reflected on *group work* as in the below vignette:

The students do group work in this lesson and they use materials. As far as I observed, the students did group work before because they all got motivated easily and they worked with their group members successfully. (P6-R1)

Derste grup çalışması yapılıyor ve materyal kullanılıyor. Öğrenciler grup çalışması gözlemlediğim kadarıyla daha önce de yapmışlar, çünkü herkes çok çabuk motive oldu ve grup arkadaşlarıyla güzel çalışabildiler.

Almost half of the participants (7 participants) mentioned the issue “Activities”. More specifically, participants talked about the teacher roles such as making activities, familiarize students with the activities, selecting appropriate

activities and examples, preventing students from perceiving activities as games, and applying activities appropriately. For instance, two of the participants reflected on this role where they both emphasized the importance of the appropriate application of activities. The first participant reflected that:

(S)he should have explained what she expected from the students before starting the activity. She should have told her expectations before she distributed the materials and before drawing their attentions. (P13-1)

Etkinliğe başlamadan önce öğrencilerden neler beklediğini anlatması gerekirdi. Materyalleri hiç öğrencilerin eline vermeden önce, dikkatlerini oraya çekmeden önce beklentilerini söylemeliydi.

Similarly, the second participant reflected as below:

The role of the teacher, of course, is to plan the activity appropriately. There should be no unnecessary parts in the activity. To give an example, I found a part in the activity unnecessary. After the teacher put the shapes on the board, they only found the areas of single squares. Only the areas of squares. Instead of this, they could find the whole area, and then reach a generalization from there. The students did not understand that the generalization was coming. In my opinion, the teacher could have made her direction more clear. (P15-1)

Öğretmenin rolü tabi ki, etkinliği çok güzel planlayacak ve etkinlikte hani gereksiz yer olmayacak. Mesela ben etkinlikte bir kısmı gereksiz buldum. Tahtaya yapıştırıldıktan sonra o şekiller, sadece tek karelerin alanları bulundu. Mesela tek tek. Sadece karelerin alanlarını buldurdu. Onun yerine tam, bütün alanı bulup oradan bir genellemeye gidilebilirdi. Ve genellemenin geldiğini öğrenciler anlayamadı mesela. Bence öğretmenin gideceği yön biraz daha belli edilebilirdi.

In the first reflection paper, on the other hand, only 2 participants reflected on this role. For example, one of them, Participant-2 reflected on activities made in the lesson in the video as in the below vignette:

The activity on the nets of 3D objects was a good one. It was also good that the students calculated the areas on the board. (P2-R1)

3 boyutlu cisimlerin açılımının yaptırılması güzel bir etkinlikti. Tahtaya çıkan öğrencilerin alan hesaplamaları da güzel etkinlikti.

Six participants mentioned the issue “Misconceptions”. In other words, they were able to talk about not generating misconceptions, preventing misconceptions and wrong and deficient understanding. For example, Participant-1 provided a specific example from the videos where she criticized the teacher for creating a misconception on 2D and 3D objects:

[...] About the length and height, the teacher takes the cube and says that we can look from the front, from the top, and also from the side. What if a student asks we have another side and the other side as well? Am I right? She left a huge gap there. Holding the paper and saying that we can look at this 2D example from this direction and that direction. However, it has a length and a height. I mean it has width and length. That part disturbed me a lot. (P1-1)

[...] Ama boy ve yükseklik deyince, hatta küpü de alıyor hoca eline gösteriyor, bir buradan bakabiliriz diyor ön tarafından, bir üstten, bir de yandan. Peki, öğrenci derse bu yan, bir de öbür yan var, alt var. Di mi yani? Orda büyük bir açık bırakıyor bence. Ve kâğıdı böyle tutup 2 boyutlu örneğe bir buradan bakabiliriz bir buradan. Hâlbuki bir boyu vardır, bir yüksekliği vardır. Yani eni vardır, boyu vardır şeklinde. Mesela orası beni çok rahatsız etti.

Parallel to the first interview, in the online discussions, this role was emerged. For instance, during the discussions on the first video watched,

participants noticed that the teacher in the video created some misconceptions.

One of them reflected that:

If I were a student there, I would think that length and height were not the same... I mean, I remember it like width-length-depth. Correct me if I am wrong, please... In this respect, some of the students probably couldn't understand the 3D concept (I couldn't at least). (P5-OD)

Şimdi ben orada öğrenci olsaydım, boy ve yüksekliğin aynı olmadığını sanırdım bu söylenen terim ile... Yani ben en-boy-derinlik diye hatırlıyorum. Yanılısam düzeltiniz lütfen... Bu bağlamda öğrencilerden kimisi tam oturtamamıştır 3D kavramını (Ben oturtamazdım en azından).

Similarly, another participant agreed that there were some misconceptions generated in the lesson, but she also provided couple suggestions to overcome those:

I agree that there were misconceptions. The net of rectangular prism was to eliminate these misconceptions, but I suggest the below in order to get rid of them. The students have difficulties with 3D, they feel stressed. In the class, they talk about cube, rectangular prisms, and they even give the nets of these. Then students would be asked:

--What do you see when you look at the rectangular prism from the right, left, above, and below? Which shape do you think it is similar to?

-- What do you see when you look at the cube from the right, left, above, and below?

That way, I believe, students would be able to understand the difference. (P2-OD)

Ben de misconceptionların var olduğunda hemfikirim. Dikdörtgenler prizmasının açılımı da bir nevi bu misconceptionları ortadan kaldırmak ama bunları ortadan kaldırmak için ben şunu öneriyorum. Çocuklar zorlanıyor 3 boyut deyince geriliyorlar. Derste küpten ve dikdörtgenler prizmasından

bahsediliyor hatta açılımları da veriliyor. O zaman çocuklara şu sorgulanabilir:

--dikdörtgenler prizmasına sağdan, soldan, yukardan, aşağıdan bakınca ne görüyorsun? Hangi şekle benzetiyorsun?

--kareye sağdan, soldan, yukardan, aşağıdan bakınca hangi şekli görüyorsunuz?

Bu şekilde çocuklar yavaş yavaş farkı kavrar diye düşünüyorum.

In the reflection papers, on the other hand, only 3 participants were able to reflect on this role. For example, Participant-9 mentioned how the teacher in the video prevented a possible misconception as in the below vignette:

When the teacher asked students to draw the cube on their notebooks, I realized that some of the students drew it by hearth like I did before. The teacher showed by examples that there is not one way of drawing a net of a cube, but there are different nets of it. Additionally, some students may think that a side length of a cube is fixed. In this activity, different examples of cubes with different side lengths are shown to the students. (P9-R1)

Öğrencilerden küpün çizimini defterlerine yapmaları istendiğinde bazı öğrencilerin çizimlerinin benim de daha önce yaptığım gibi ezber bir çizim olduğunu farkettim. Küpün tek bir açınının değil, farklı açınımlarının da olabileceğini örnekleriyle göstermiş oldu. Ayrıca bazı öğrencilerimiz küpün kenar uzunluğunun sabit olacağını düşünebiliyorlar. Bu aktivitede öğrencilere farklı kenar uzunluklarında küp örnekleri gösteriliyor.

Another sub-issue related to pedagogical knowledge that is “Real-life” was mentioned by 5 participants. More specifically, the participants mentioned that one of the teacher responsibilities was to connect mathematics to real life and to teach solid mathematics. With respect to this role, one third of the participants were able to reflect on this issue. For example, Participant-2 mentioned that:

For example, the first thing comes to my mind is that examples from real life were given. I guess like the shapes similar to

rectangles, or squares etc. It is a little bit related to general knowledge or to students' awareness. I mean, where they meet them in real life... Anything else... There were some good real life examples about the rectangles actually. (P2-1)

Mesela ilk başta, ilk aklıma gelen, hayattan örnekler veriliyor mesela. İşte sanırım ilk önce dikdörtgene benzeyen şekiller, işte kareye benzeyen şekiller falan. Mesela bu birazcık tabii genel kültüre girer. Ya da çocukların farkındalığına giriyor. Yani günlük hayatta nerelerde karşılaşıyorlar... Başka aklıma gelen... Güzel cevaplar vardı aslında dikdörtgenle işte günlük hayattan.

As the Participant-2 noticed in the first interview that real life examples were given during the lesson in the video; similarly, in the first reflection papers, the participants were able to focus on connecting mathematics to real life. That is, 6 participants reflected on this issue. To provide an example, the Participant-2 (the same participant) mentioned that starting a lesson via building connections between mathematics and real life and providing related examples improves the quality of instruction as in the below vignette:

She starts the lesson with real life examples. The subject was initiated through real life examples. Students give examples to the shapes similar to square. In my opinion, the introduction of the lesson was really good (P2-R1)

Konuya günlük hayattan örnekler verilerek başlanıyor. Dikdörtgene benzeyen günlük hayatta karşılaştığımız cisimler söyleniyor. Kareye benzeyen cisimler öğrenciler tarafından dile getiriliyor. Derse giriş bence çok güzel.

Another issue that is "Inquiry" was mentioned by 5 participants. More specifically, participants were able to notice that teachers should ask questions, encourage students to inquire, ask for reasons and have students explain and justify their answers, and should not give the rules. For example, Participant-6

reflected on this role where she praised the teacher in the video for asking students the rationale behind their answers as below:

I defended this during the discussions. Because she was asking ‘why’ when she got an answer, and in my opinion, this is how it is supposed to be. She was having students think...she made them understand the logic behind. (P6-1)

Tartışmada da bunu savundum ben. Çünkü hani bir cevap aldığımda niçin böyle düşündün diye soruyordu ki, bu olması gereken birşey diye düşünüyorum. Öğrencileri düşünmeye ve üzerinde... Yani bunun arkasındaki mantığı anlamasına sebep oluyor.

This role was mentioned by more than half of the participants (8 participants) in the first reflection papers.

The issue “Discussion” was mentioned only by 5 out of 15 participants, which was not mentioned in the first reflections. That is, establishing a discussion environment, and having students discuss was not among the commonly noticed issues. To provide an example, one of the participants (Participant-13) criticized the teacher for not being able to foster classroom discussions as in below:

During the discussions after the group work, it was like the teacher was asking and the students were answering. Starting off these answers, the teacher could pose questions to other students. Like ‘your friend says this, what do you think?’ or like ‘Ayse, Fatma what do you think?’. She could create a discussion environment leading students to interact with each other. I saw such a deficiency. It was only between the teacher and the students [...] (P13-1)

Grup çalışması sonrasında yapılan tartışmada, hani daha çok böyle öğretmen soru soruyor, öğrenciler cevaplıyor. Daha sonra bu öğrencilerin cevabından yola çıkarak başka öğrencilere sorular yöneltebilirdi. Bakın bu arkadaşınız böyle diyor, siz ne

düşünüyorsunuz ya da Ayşe, Fatma sen ne düşünüyorsun gibi böyle. Öğrencileri birbirine yönelten bir tartışma ortamı sağlayabilirdi. Öyle bir eksik gördüm ben. Sadece öğretmenle öğrenci arasında [...]

As seen from the vignette above, the participant not only criticized the teacher for not being able to establish a discussion environment, but also provided specific suggestions to improve the discussion among the students.

Another teacher role related to Pedagogical Content Knowledge that the participants noticed in the first interview was “Thinking time”. With respect to this role, only 4 out of 15 participants were able to reflect. That is, when compared to the other roles, only few participants were able to notice that teachers should provide students enough time to think and should not provide answers right away. To give an example, Participant-15 reflected that the teacher in the video did not give enough time to students to think:

The teacher herself gave answers to some of her questions before the students did. It is possible to say that she was deficient in that aspect. (P15-1)

Bazı sorduğu sorulara öğrencilerden önce kendisi cevap verdi öğretmen. Hani bu konuda biraz eksikliği vardı diyebiliriz.

In the first reflection papers also, only 2 of the participants were able to reflect on this role. To give an example, the same participant (Participant-15) criticized the teacher for directly giving students the right answers and not providing them with enough time to think as in the below vignette:

[...] In some places, the teacher answered her question without waiting students to discuss it. For example, after asking the question “what is a 3D object?”, without letting them reason enough, and she started to explain the differences between 2D and 3D objects (P15-1)

[...] Fakat bazı kısımlarda tartışma oluşmasını beklemeden sorduğu soruyu gene kendisi yanıtladı. Örneğin, 3 boyutlu cisim nedir sorusunu sorduktan sonra öğrencilerin fazla fikir yürütmesini beklemeden 2 boyutlular ve 3 boyutlular arasındaki farkları anlatmaya başladı.

Only 4 participants mentioned the role “Evaluation”. That is, the issues like evaluating student understanding, assessing through observation, and arranging lesson flow according to student understanding were noticed by only few participants. The frequency in the first reflection papers was even lower (2 participants). For instance, one of these participants (Participant-4) reflected on this role in the first interview from a different perspective and focused more on the attitudinal aspect of assessment as in the below vignette:

We can do like this to a student whom we feel that (s)he did not understand. Without breaking the flow of the lesson, not like we are dealing with her, we can do it together like we are doing our normal checks. (P4-1)

Hani anlamadığını hissettiğimiz öğrenciye, şey yapabiliriz gibi geliyor bana. Devamlılığı kesmeden, hani onunla ilgileniyormuşuz gibi değil de, hani mesela normal kontrollerimizi yapıyormuş gibi beraber yapmaya çalışarak.

The issues such as “Explanations” that is appropriately explaining the subjects was mentioned by only 3 participants, and “Alternative solutions” referring to making students compare and share different solution methods was mentioned only by 2 participants. These roles were not mentioned in the first reflection papers.

With respect to another sub-issue related to Pedagogical Content Knowledge, only 2 participants were able to reflect on the issue “Instructions”. That is, they mentioned that teachers should use clear and proper instructions and statements during instruction. One of these participants (Participant-3)

mentioned this role as in below where she criticized the teacher for using unclear statements:

She used the word *thing* a lot, I guess because of her inexperience. For example, as she was taking the cubes out, she said we would do something with them. What does that mean? She explained later, but she used that word a lot. Be honest, it didn't sound good. (P3-1)

[...] Yani herhalde acemilikten kaynaklanan bir şekilde sürekli "şey" kelimesi. Mesela küpleri çıkarırken bunları şey yapacağız dedi. Hani ne yapacağız. Daha sonra açıkladı ama hani çok fazla şey kelimesini kullandı. Bu da hoş görünmedi gözüme açıkçası.

Similarly, in the first reflection papers, 3 participants mentioned this role and criticized the teacher for not being clear. For example, the same participant (Participant-3) reflected on using inappropriate directions and wording as in the below vignette:

The teacher said we would do something with the cubes as she distributed the cubes, and she used this word many times unnecessarily. (P3-R1)

[...] Öğretmen küpleri dağıttığı zaman bunları şey yapıcaz ifadesi kullandı ve aslında videoda daha birçok yerde şey ifadesini gereksiz yere kullandı.

As understood from the interviews, reflection papers, and online discussions, prospective teachers were sensitive to the issue that a teacher should use appropriate and clear statements.

The sub-issue "Understanding", which was related to Pedagogical Content Knowledge, was mentioned only by one participant. In other words, the issues such as being able to understand student questions and what they say, being able to answer student questions and providing feedback, and giving

concrete answers were not noticed by the most of the participants. On the other hand, this role was mentioned by 2 participants in the reflection papers.

The issue “Correct terminology” was also mentioned only by one participant. That is, using correct mathematical terms in class and having students do likewise was not a commonly noticed issue among the participants. In the first reflection paper, on the other hand, more than half of the participants were able to reflect on this role (8 participants). To give an example, the only participant reflecting on this role in the first interview, the Participant-15, reflected on this role in the reflection paper as in the below vignette:

[...] She used the synonym terms as much as she could. For example, she taught that the lower surface and the base were the same. I believe that students will be able to express themselves better as they learn more terms. (P15-R1)

[...] Bunun yanında olabildiğince eş anlamlı kelimeler kullandı. Örneğin, alt yüzey ve tabanın aynı olduğunu öğretti. Öğrencilerin bol kelime öğrenmesi kendilerini daha rahat ifade etmelerinde yararlı olacaktır.

As seen from the above vignettes, the Participant-15 focused on the point that when a teacher uses synonymous mathematical terms, (s)he also helps students improve their ability to mathematically express themselves.

The noticed teacher roles related to the Pedagogical Content Knowledge in the first interventions were given above. As stated, the most noticed sub-issues in the first interviews were “reasoning”, “student understanding”, “facilitation”, and “student centeredness”. The sub-issues which were not noticed in the first interviews, on the other hand were “student difficulties”, “not binding”, and “student thinking”. In the following part, the teacher roles related to the General Pedagogical Knowledge under *Methodological Perspective* in the first interventions are provided.

4.1.1.1.2. The Sub-Issues related to General Pedagogical Knowledge in the First Interventions

As indicated previously, in the first interview 14 out of 15 participants talked about the issues related to General Pedagogical Knowledge. There are 10 sub-issues under this main-issue, which were briefly given in the method section (Table 3.6). In the first interviews, 9 of them were noticed by the participants. The sub-issues related to General Pedagogical Knowledge are given in detail in Appendix 3.2.

As stated, there are several issues related to General Pedagogical Knowledge of teachers in reform-minded teaching that the participants noticed and discussed about in the first interventions. For example, in terms of teachers' General Pedagogical Knowledge, they taught and discussed that a teacher should manage the classroom, communicate with students, and engage them while praising or criticizing the teacher in the video.

In terms of frequencies related to General Pedagogical Knowledge, 14 participants reflected on "Management" issue. More specifically, participants talked about teacher roles such as managing the classroom, setting up the rules, managing the time and establishing the order. This role was the most popular role that the participants noticed in the first interventions. For example, Participant-15 mentioned that:

[...] The role of the teacher, of course, she uses the time efficiently, she manages the classroom [...] (P15-1)

[...] *Benim, öğretmenin rolü tabii ki, hani işte zamanı iyi kullanacak, sınıfa hakim olacak [...]*

Parallel to the first interview, in the online discussions, participants reflected on this role. To give an example, during the discussions on the first

video watched, participants focused on classroom management. One of these participants reflected that:

I think that the teacher tried to make students discover through materials, but she couldn't succeed. Because one of the most important things to consider while letting students discover a topic is to be able to manage the classroom, and this teacher struggled a lot with that. She couldn't make students listen to each other while one of them gave an answer, and there was constantly murmuring in the classroom. Additionally, one of the requirements of a successful discovery method instruction is that the teacher periodically sums up the lesson and draws a conclusion. That way, the misunderstandings would be solved if there was any. However, the teacher in the video preferred to do this once and left it to the end of the lesson, and unfortunately couldn't do it since she couldn't manage the time. (P4-OD)

Bence öğretmen materyal kullanarak çocukların keşfetmelerini sağlamaya çalışmış ama başarılı olamamış. Çünkü bir konuyu öğrenciye keşfettirirken en önemli şeylerden bir tanesi sınıf yönetimi ve öğretmen de bu konuda çok sıkıntı yaşamış. Bir öğrenciye cevap hakkı verdiğinde diğer öğrencilerin onu dinlemesini sağlayamıyor ve sınıfta sürekli olarak bir uğultu söz konusu. Ayrıca discovery metodunun amacına tam ulaşabilmesi için olması gereken en önemli şeylerden bir tanesi de öğretmenin belirli aralıklarla konuyu toparlayıp bir sonuç çıkarmasıdır. Böylelikle eğer yanlış bir anlama söz konusu ise bunun düzeltilmesi sağlanır. Oysa bu videodaki öğretmen bu işlemi tek bir seferde yapmayı tercih edip sona bıraktı ve maalesef zamanı iyi ayarlayamadığı için hiç yapamadı.

While Participant-4 reflected that the teacher in the video could not manage the classroom and the time, another participant disagreed with her and suggested that it is quite acceptable that there is some noise in the classroom and it does not show that the teacher could not manage the classroom:

In my opinion, the teacher was able to manage the classroom both before and after the activity. I don't know any student at that age

can study without making any noise. No matter how perfectionist you are, a child is a child. And she/he would speak up because of the excitement of what she/he is doing. As a matter of fact, I don't think that there was a noisy environment in class. The voices were perceived as noise since the students spoke all at the same time. (P15-OD)

Bana kalırsa öğretmen hem aktivite öncesinde hem de sonrasında sınıf kontrolünü sağlıyordu. Hiç gürültü çıkarmadan çalışabilecek o yaşta öğrenci tanımıyorum ben. Siz istediğiniz kadar mükemmeliyetçi olun, çocuk çocuktur ve çalışırken, yaptığı işin heyecanından dolayı, sesini yükseltecektir. Ki bana kalırsa öyle gürültülü bir ortam da yoktu. Sesler birbirine karıştığı için gürültü gibi algılanıyor.

Similarly, in the first reflection papers, the majority of the participants reflected on this role in detail (10 participants). For example, Participant-4 reflected on this role through criticizing the teacher for not being able to manage the classroom:

The first thing I noticed was that the number of students was way too high and the classroom was too small. Because of this, it was hard for the teacher to reach the students. There was too much noise because of the crowd. I realized that the teacher had difficulty with ensuring silence. For example, since the teacher couldn't achieve silence when she got an answer to her question from a student, other students didn't hear what that student was saying. Except for the noise, there was chaos after each question posed, and the teacher did nothing to prevent this. (P4-R1)

Benim ilk olarak farkettiğim sınıf mevcudu çok kalabalık ve sınıf çok küçük. Bundan dolayı hocanın öğrencilere ulaşması zor oluyor. Kalabalık olduğu için de sınıfta gürültü fazla oldu. Hocanın sessizliği sağlamada zorlandığını fark ettim. Mesela birşey sorduktan sonra bir öğrencinin cevabını alırken sessizliği sağlamadığı için sınıftaki herkes arkadaşının ne dediğini duyamadı. Ayrıca gürültü dışında sınıfta soru sorulduktan sonra kargaşa çıkıyor ve hoca bu durumu engellemek için birşey yapmadı.

The role “Pressure” that is not putting too much pressure on students, approaching the students who make mistakes positively, and providing them opportunities, on the other hand, was among the popular roles noticed. Nine prospective teachers mentioned this role. For example, Participant-1 reflected on how a student would feel when (s)he was sent back to her seat as she made a mistake at the board :

For example, I am sure you would be afraid when you were at the board, but how you would feel if the teacher sent you back to your seat when you made a mistake. How would that student feel?
[...] (P1-1)

Mesela tahtaya kalktığında korkuyorsundur eminim ki ama mesela hata yaptığında hoca tarafından oturtulursan eğer ne hissedersin. Ne hissediyor o öğrenci [...]

Another participant also commented on this issue from the same perspective as below:

I believe that, that the student was lost. Because she was sent her back to her seat before she found the correct solution and her face was really bad as she sat down. I believe that the teacher lost that student. Some of my friends, for example, think that she was given enough chance. This made me upset. I wouldn't want any student to be sent back to his/her seat when he/she made a mistake and another student to be called to the board [...] (P2-1)

Açıkçası ordaki öğrencinin kaybedildiğine inanıyorum ben. Çünkü doğruyu bulmadan oturtuldu ve çocuğun otururken yüzü çok kötüydü yani. Onu kaybettiğini düşünüyorum öğretmenin. Onu mesela bazı öğrenciler, yani öğrenciye yeteri kadar şans verildiğini düşünüyor. Ya bu mesela beni üzdü... Oraya çıktığında bir öğrenci, yani yanlış yaptığı zaman, ha sen otur bakalım diğeri gelsin yapilsın istemem açıkçası [...]

This view was also established in the online discussions. For instance, during the discussions on the first video watched, participants focused on

whether the teacher gave enough opportunity to the student at the board or not.

One of these participants reflected that:

It didn't draw my attention. You are right, she could give the student more chance or she could also have asked him to draw the net of rectangular prism. In this way, the student would draw the net again and could figure out his mistake. The teacher should certainly be careful in order not to make a student feel bad in front of the class. (P1-OD)

Benim bu durum dikkatimi çekmemiştir, haklısın öğrenciye daha çok şans verebilirdi veya bir de dikdörtgenler prizmasının açılımını çizmesi istenebilirdi, belki böylece öğrenci tekrar aynı şekli çizip hatasını kendi kavrayabilirdi diye düşünüyorum. Kesinlikle öğrencinin sınıf önünde kendisini kötü hissetmemesi için öğretmenin çok dikkatli olması gerekir.

Another participant, on the other hand, disagreed with his friends and defended the teacher in the video for giving enough chance to the student at the board:

Guys, the teacher already tried to help. The student drew a net consisted of rectangles. The teacher asked whether the surfaces were rectangles while pointing at the cube, and the student realized that they were squares. Then, he erased the net and was supposed to draw it with squares, but he drew rectangles again. I mean the teacher gave enough chance to the student. (P7-OD)

Arkadaşlar öğretmen zaten yardımcı olmaya çalıştı. Çocuk dikdörtgenlerden oluşan bir açılım çizmişti, küpü gösterip bu yüzeyler dikdörtgen mi dedi çocuk kare olduğunu gördü sonra silip kareler halinde çizecekti ama yine dikdörtgenler halinde çizdi, yani öğretmen bence yeterince şans verdi.

In the first reflections, on the other hand, only 2 participants mentioned this role. To give an example, the same participant as in the first interview (Participant-2) reflected on this role as in below:

[...] I think it was wrong that the student at the board was sent her back to her seat when she drew the net of the cube incorrectly. No matter how much noise the other students make, I would prefer that the student sat down after she found the right way to draw the net of the cube. (P2-R1)

[...] Ancak derste sınıfa kaldırılan öğrencinin küpün açılımını yanlış yapması ve bunun üzerine yerine oturtulması bence doğru değil. Diğer öğrenciler her ne kadar gürültü yapsa da o öğrencinin doğruyu bulduktan sonra yerine oturmasını tercih ederdim.

With respect to another role, 7 out of 15 participants mentioned “Communication”. In other words, the issues like communicating with students, and setting up proper relationships and securing the interaction among the students were noticed by several participants in the first interview. For example, Participant-6 appreciated the teacher for building proper relationships with her students as in the below vignette:

We talked about teacher-student relationship. Because, the teacher was saying ‘yes it is true’ after she got students’ answers. Even, she thanked some of them. It was one of the positive points we noticed. (P6-1)

Öğrenci öğretmen ilişkisini konuştuk evet. Çünkü şey, öğretmen cevap aldıktan sonra onları evet, doğru diyordu. Ve hani teşekkür etti hatta birkaç tanesine. O, bizim gördüğümüz artı yanlardan bir tanesiydi.

In the first reflection papers, on the other hand, none of the participants were able to reflect on communicating with students and building communication between students.

Another issue related to General Pedagogical Knowledge was “Approach”. That is, the participants reflected that teachers should positively

approach their students, give them flexibility, be decent, should not control them too much, should not be too harsh, not behave rude, and not humiliate them. Only 4 participants were able to reflect on this role in the first interviews where none of the participants mentioned it in the first reflections.

In terms of other roles under General Pedagogical Knowledge, 3 participants reflected on “Expectations” that is establishing expectations from students; 2 participants mentioned “Decision-making” that is having a contingency plan at hand, interfering with such situations, and having a pragmatic mind; and 2 participants mentioned “Shaping students” that is shaping them, teaching them their roles, and distributing student roles appropriately. These roles were not mentioned in the first reflection papers. On the other hand, the issue “Engaging” that is not leaving students disengaged and being able to involve them was mentioned in the first reflection papers by 3 participants while it was only mentioned once in the first interviews.

The only role that was not mentioned in the first interview but in the reflections with 4 participants was “Competition” that is preventing student competition or creating a competitive environment for motivation purposes. For example, one of the participants reflected on this role where he criticized that the students were competing with each other instead of working collaboratively:

There was competition in the class more than sharing. The students were competing with each other instead of putting a collaborative product forward. (P14-R1)

Sınıfta paylaşımından çok rekabet vardı. Öğrenciler ortaya ortak bir ürün koymaktan çok birbirleriyle yarış içerisindediler.

The noticed teacher roles related to the General Pedagogical Knowledge in the first interventions were given above. As stated, the most noticed sub-issues in the first interviews were “management” and “pressure”. The only sub-issue which was not noticed in the first interventions was “student differences”.

In the following part, the teacher roles related to the Curriculum Knowledge under the *Methodological Perspective* are provided.

4.1.1.1.3. The Sub-Issues related to Curriculum Knowledge in the First Interventions

As indicated before, in the first interviews all participants were able to talk about Curriculum Knowledge. There are 11 sub-issues under this main issue, which were briefly explained in the method section. In the first interviews, 10 of them were noticed by the participants. The sub-issues related to Curriculum Knowledge are given with their explanations in Appendix 3.3.

More specifically, there are several issues related to Curriculum Knowledge of teachers in reform-minded teaching that the participants noticed and discussed about in the first interventions. For example, they taught and discussed that a teacher should prepare and use effective materials, make lesson plans, understand the new curriculum while praising or criticizing the teacher in the video.

In terms of frequencies, in the first interview, 11 out of 15 participants mentioned the issue “Materials”. In other words, the majority of the participants noticed that one of the responsibilities of teachers was to prepare and use correct materials in an accurate way without creating misconceptions, and prevent misconceptions through the use of materials. This role was the most popular role noticed by the participants. For instance, Participant-3 mentioned the role of materials in the new curriculum and how the teacher in the video used them as in below:

There is a lot learning by seeing and doing in the new curriculum. For this, the teacher prepared cubes, and she distributed the cubes to the groups and wanted the students to learn by seeing and discovering... Later when she wanted the students to see the net of a cube, she had them open up each one of the cubes. (P3-1)

Görerek yaparak öğrenme var çok fazla yeni programda. Ve bunun için de küpler hazırlamıştı, bunları gruplara dağıtarak kendilerinin görerek keşfederek öğrenmesini istedi... Teker teker küpün daha sonra açılımını görmelerini istediğinde teker teker açtırdı.

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, participants criticized the teacher for not managing materials appropriately. One of these participants reflected that:

If I would talk about the materials, it was nice that the teacher asked students to open up the cubes. But, as far as I observed, the cubes were not the same (the lengths of their sides were different). I think that it would be better if they used cubes of the same sizes, because the students could see the connection between the shapes as they opened the cubes and as they came up with different nets. (P5-OD)

Biraz da materyaller konusunda laf edersem, bu küpleri açtırması güzel bir durum, lakin gördüğüm kadarıyla küpler aynı değil (kenar uzunlukları farklı). Küplerin açtırılması ve onların değişik şekiller oluşturması durumunda çocukların bu şekiller arası ilişki kurmalarını beklerken aynı ebatlarda küplerde çalışılmış olsa daha da güzel olurdu.

Similarly, another participant reflected that:

Before starting the activity, the teacher told the students that they would work in groups and told them what to do as she handed out the materials. When the students got the materials, they stopped paying attention to the teacher and started to play with the materials. (P13-OD)

Etkinliğe başlamadan önce bir taraftan materyalleri çocuklara verirken, aynı anda hem grupla çalışacaklarından hem de ne yapacaklarından bahsediyor. Çocuklar da materyali ellerine

alınca dikkatleri öğretmenlerden kopuyor ve ellerindeki materyalle ilgilenmeye başlıyorlar.

Similar to the first interview, in the first reflections, the majority of the participants were able to reflect on this role (10 participants). To give an example, Participant-6 was able to reflect on preparing and using materials and its importance in the new curriculum as in the below vignette:

The use of materials was in line with the new curriculum, and the use of hands-on tools develops students' psychomotor skills. It also helps them understand the 3D objects perceptually. In the new curriculum, you don't give it directly. You give students the reasons behind. The child perceives it as she conceives it. This is why I think that the use of hands-on tools is effective. (P6-1)

Materyal kullanılması hani yeni müfredatta uygun ve çocukların sonuçta hands-on toollar kullanması onların el becerilerini geliştirecek. 3 boyutlu cisimleri algısal olarak anlamalarına neden olacak. Yeni müfredatta da direkt vermiyorsun. Çocuğun altındaki nedeni, niçin böyle olduğunu genelde veriyorsunuz. Çocuk oradan kendisi nasıl düşünüyorsa ona göre algılıyor. O yüzden hani hands-on kullanılması iyi diye düşünüyorum.

Six participants mentioned "Wrapping up" the lesson", and it was the second most popular role noticed after the the role *use of materials* related to Curriculum Knowledge in the first interviews. For example, Participant-6 reflected on this role via focusing on the effect of wrapping up the lesson on student understanding as below:

The least effective part I found was that the teacher didn't finish the lesson and couldn't wrap up the subject. However, I think that it is the most important part of a lesson, because in my opinion, after the students work in groups, if they don't know the meaning of the subject and to which topics it is related, they can't really understand the subject. (P6-1)

En eksik gördüğüm yanıysa öğretmenin dersin kapanışını yapamaması ve konuyu toparlayamamasıdır... Ve hani en önemli

yanının bu olması gerektiğini düşünüyorum ben. Çünkü çocuklar grup çalışması yaptıktan sonra eğer hani esas yönünün ve hangi konularla bağlantısının olduğunu bilemezlerse o konuyu tam olarak anlayabildiklerini söyleyemeyiz diye düşünüyorum ben çünkü.

Parallel to the first interview, in the online discussions, this role was emerged. To give an example, during the discussions on the first video watched, participants criticized the teacher for not summing up the lesson. One of these participants reflected that:

[...] However, I believe that one of the roles of a teacher is to wrap up the lesson and finish it at the end of the class. I couldn't see it in this video. I think it was the deficient part of the lesson. (P6-OD)

[...] Ancak bence öğretmenin rollerinden bir tanesi de anlatılan konuyu ders sonunda toparlamak ve dersin kapanışını yapabilmektir. Ben bu videoda bunu göremedim. Bence bu dersin eksik kalan yanıydı.

Similarly, another participant reflected that:

The lacking part was that there was no summing up discussion at the end of the lesson. I wonder whether the teacher will make it up in the following lesson or it will not come to a conclusion. (P9-OD)

Eksik olan kısmı sanki ders sonunda toparlayıcı bir discussion yapılmaması. Öğretmen bunu diğer derste mi telafi edecek yoksa havada mı kalacak discussion merak ediyorum doğrusu.

In the first reflection papers, on the other hand, only 4 participants were able to reflect on this role. One of these participants (Participant-13) reflected on this role via crediting the teacher for summing up the lesson:

She facilitates the students by the questions she raises during the group work and she reaches a generalization after summing up the subject. (P13-R1)

Grup çalışması sırasında sorduğu sorularla öğrencileri yönlendiriyor ve sonunda gerekli toparlamayı kendi yapıp genellemeyi yapıyor.

Five participants reflected on “Connections”. More specifically, one third of the participants were able to talk about taking students’ preknowledge into account and connecting the subjects. One of these participants (Participant-13) commented on the importance of taking students’ previous knowledge into account as in below:

It is not about the old system or new system. In my opinion, the previous knowledge should be examined. What the students know and what they remember should be examined. (P13-1)

Eski sisteme yeni sisteme has değil, eski bilgiler yoklanmalı bence. Ne biliyorlar, ne hatırlıyorlar.

Another participant (Participant-4), on the other hand, focused on the deficiencies of the teacher in connecting mathematical subjects:

If from the beginning she could explain what is a cube... It is a 3D object consisting of congruent squares. If they could have got it, they would also have understood that not every prism was made of rectangles. If the teacher had explained the difference. Explain like ‘we are moving from rectangular prisms to cube’. Like ‘what is the difference?’. Here for example there were rectangles, but here there are squares. We see that the faces are squares. If she had done it that way, it would have been different. (P4-1)

Hani en başından eğer küp ne demek. Eş karelerin oluşturduğu, bir araya gelip oluşturduğu bir 3 boyutlu cisim. Bunu eğer tam oturabilmiş olsalardı, hani her prizmanın dikdörtgenlerden

oluşmadığını da oturtmuş olurlardı. Aradaki farkı belki açıklasaydı hoca. Hani arkadaşlar dikdörtgenler prizmasından küpe geçiyoruz. Farkı ne. Burda mesela dikdörtgenler vardı, ama burda kareler var. Yüzeyle baktığımızda kare olduğunu görüyoruz. Mesela bu şekilde yapmış olsaydı farklı olurdu bence.

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, participants criticized the teacher for not checking at the beginning of the lesson what the students knew:

It was not the topic of that lesson to discuss the dimension concept, of course, but before starting the activity, one of the things that the students needed to know was the dimension concept. The teacher should have checked whether the students knew the concept of dimension and the difference between the 2D and 3D, and whether they had misconceptions before starting the activity. She could have asked simple questions about those or made a short warm-up activity. But we see that she didn't think about it at all before as she ended the subject abruptly... (P13-OD)

Boyut konusunu tartışmak tabii ki o dersin konusu değildi ancak etkinliğe hiç başlamadan önce öğrencilerin konu ile ilgili bilmeleri gerekenler arasında boyut kavramı da var. A hoca etkinliğe başlamadan önce öğrencilerin boyut kavramı ve iki boyutla üç boyutun farkı konularını bilip bilmediklerini ya da bu konularda kavram yanlışları (misconception) olup olmadığını yoklamalıydı. Buna yönelik küçük sorular sorabilir ya da çok çok kısa bir başlangıç etkinliği yapabilirdi. Ama bu konuda pek de düşünmediği konuyu hemen kapatmasından anlaşılıyor...

In the first reflections, more than half of the participants were able to mention this role (8). For example, Participant-15 reflected on the effectiveness of connecting subjects as in below:

[...] After that, they connected the two concepts through the question of 'what would be this object if these rectangles were

squares?’. This helps students not only understand cubes more easily, but also develop their 3D thinking abilities. (P15-R1)

[...] Ardından eğer bu dikdörtgenler yerine kareler olsa ne olurdu bu cisim sorusuyla iki konu arasında bağ yapıldı ki, bu da öğrencilerin hem daha rahat anlamasını sağlar küpleri, hem de 3 boyutlu düşünme yeteneklerini geliştirir.

In terms of the other roles under Curriculum Knowledge, 5 participants mentioned “New curriculum” that is understanding the new curriculum and being able to adopt it; 4 participants talked about “Student levels” that is the suitability of the lessons to the levels of the students; 3 participants mentioned “Being prepared” for the lesson; 3 participants mentioned “Introduction” that is effective introduction to the lesson, stating the aim of the lesson, and providing students with the basics; and 2 reflected on “Student knowledge” that is establishing appropriately sound knowledge foundation. The issue “Challenging mathematics” that is teaching mathematics from simple to complex, not simplifying mathematics too much, and integrating challenging activities was only mentioned by 2. The teacher role “Planning lesson” that is making lesson plans and being flexible in lesson plans was only mentioned by 2 participants in the first interviews, and it was not mentioned in the first reflections.

In the first reflection papers, “being prepared” was noticed by 3; “new curriculum” was noticed by 2, and “student levels” was noticed by only one participant. “Student knowledge”, on the other hand, was not noticed in the first reflections.

The noticed teacher roles related to the Curriculum Knowledge in the first interventions were given above. As stated, the most noticed sub-issue in the first interviews was “materials”. The only sub-issue which was not noticed in the first interventions was “guide book”. In the following part, the teacher roles related to the Content Knowledge are provided.

4.1.1.1.4. The Sub-Issues related to Content Knowledge in the First Interventions

As indicated before, in the first interview 4 out of 15 participants were able to talk about Content Knowledge. There is only one sub-issue under this main issue, namely “subject matter knowledge”. The explanation on this issue is provided in Appendix 3.4.

In terms of frequencies, in the first interview, 4 out of 15 participants mentioned the role “Subject-matter knowledge”. More specifically, only a couple of the participants mentioned teachers’ subject matter knowledge, knowing what to/how to do, being qualified, and not giving wrong examples. For example, Participant-7 criticized the teacher for generating misconceptions because of not having strong subject matter knowledge:

At that moment while students were saying ‘cubes’, the 3D aspect of cubes, the teacher said ‘one minute’. ‘Your friend has a question’ she said. She returned to that student, and she tried to give a concrete example. She gave the example of paper, and she said that the paper was an example to the 2D shapes. She mentioned that to be 3D object, it should also have a height. She said that they could look from 3 different sides. The teacher was, well I didn’t mention it in reflections, the teacher had a misconception while she was explaining 3D, I think. I mean didn’t care much to explain what 3D means, when she told students that they could look from right and left hand sides. (P7-1)

Tam orda küp derken, küpün 3 boyutu falan kelime geçtiği zaman, öğretmen dedi ki, bir dakika dedi. Arkadaşımızın bir sorusu vardı dedi. Ona döndü. Ve orda ona somut örnek vermeye çalıştı. Kâğıdı örnek verdi, işte kâğıt 2 boyutludur dedi. Normalde işte 3 boyutu olduğu zaman bir de yüksekliği olması lazım dedi. 3 yandan bakabiliriz dedi. Bu konuda birazcık işte öğretmen, bu kâğıtta da yazmamıştım, 3 boyutu tanımlarken birazcık herhalde orda bir anlam kargaşası oldu. Yani biraz geçirir gibi oldu 3 boyutlunun ne demek olduğunu. Yandan, sağdan, soldan baktığımız zamandaki gibi.

In the first reflection papers, on the other hand, only one participant was able to mention this role.

The noticed teacher roles related to the Content Knowledge in the first interventions were given above. In the following part, the “Other” teacher roles with respect to the *Methodological Perspective* are provided.

4.1.1.1.5. The Sub-Issues related to the “Other” Role with respect to the Methodological Perspective in the first interventions

As indicated before, in the first interviews 10 out of 15 participants were able to talk about “Other” teacher roles with respect to the *Methodological Perspective*. There are 8 sub-issues under this main-issue, which were briefly provided in the method section. In the first interviews, 5 of these sub-issues were noticed by the participants. The sub-issues related to the “Other” issue are given in detail in Appendix 3.5.

More specifically, there are several “Other” teacher roles related to *Methodological Perspective* that the participants noticed and discussed in the first interventions. For example, participants taught and discussed that a teacher should motivate students, create effective classroom culture, and have students express themselves while praising or criticizing the teacher in the video.

In terms of frequencies, in the first interview, 6 out of 15 participants mentioned the role “Classroom culture”. In other words, some of the participants noticed and discussed that creating classroom culture where students are not afraid of making mistakes and feel comfortable, and preventing students from interfering with each other were among the responsibilities of teachers. For example, Participant-12 pointed that since the teacher didn’t set up the right classroom culture, the students were not able to listen to and respect each other as in the below vignette:

Students were constantly shouting like ‘my teacher, my teacher’. I mean without listening to their friends. The teacher should have warned the students at the beginning of the lesson to listen to each other while she got an answer from a group or should have told them to follow the properties. Well we are like this: As students, we can only focus on what we are going to say as we wait for our turn. We miss the first property since we focus on the third one we would explain. What the teacher’s responsibility at that point is to tell students to stop and listen after they complete their work, and to follow other groups’ answers. She could have told them to make explanations on those properties. (P12-1)

Sürekli arkadan öğretmenim, öğretmenim sesleri geliyordu. Hani arkadaşlarını dinlemeden. Eğer başta öğretmen bunları uyardıysaydı, hani ben bir gruptan söz alırken diğerleri lütfen dinlesin ya da onlar da özellikleri takip etsin. Hani bizde şöyle birşey vardır. Biz öğrenciyken de sıra bize geleceği için biz kendi yapacağımıza odaklanırsınız. Biz de 3. özelliği söyleyeceğiz diye ama 1. özelliği kaçırsınız bu arada. Orda öğretmenin söylemesi gereken, herkes görevini bitirdikten sonra dursun ve dinlesin. Grupların cevaplarını takip edelim. Onlar hakkında açıklamalar yapalım diyebilirdi.

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, participants discussed how a teacher should establish a classroom culture. One of these participants reflected on this issue as in below:

With respect to the classroom culture, the teacher should make an explanation that the students should listen to other students carefully, there shouldn’t be any disturbing reactions to the student on the board, and by that way the students who know it with errors or who don’t know it at all and can’t say it would correct their mistakes. (P1-OD)

Sınıf kültürü adına öğretmenin öğrencilere dersi süresince konuşan öğrenciler dikkatle dinlenecek, tahtaya kalkan öğrenciyi rahatsız edici tepkiler verilmeyecek, bu sayede bilip te yanlış bilen bilmeyip de söyleyemeyen arkadaşlarınız rahatlıkla

hatalarını düzeltebilecekler şeklinde bir açıklama yapması gereklidir.

Another participant reflected on how a classroom culture should be via comparing two different videos:

There is something like this in our culture: The one who makes a mistake is mistreated. We refrain to tell when we don't understand. We all remember the video we watched last semester in professor C.'s class. In that video, the student who made a mistake realized that he did it wrong, but he didn't know where he was wrong, and he shared it with the whole class. In my opinion, this is awesome. He shared his solution on the board and they all discussed it. But when we observe the classroom environment in this video, the students are nervous and afraid of making mistakes. No matter how the teacher tries to seem helpful, she is more like she always expects the right answer from the students. The students, on the other hand, wait for the teacher's approval for each word as they are afraid of making mistakes. (P2-OD)

Bizim toplumumuzda böyle birşey var. Yanlış yapan kötü muamele görüyor. Anlamadım demekten çekiniyoruz. Geçen dönem C hocanın dersinde izlediğimiz videoyu herkes hatırlar. Orda yanlış yapan öğrenci yanlış yaptığının farkına varıyor ama nerde olduğunu bulamıyor ve bunu sınıfla paylaşıyor. Bu bence harika birşey. Tahtaya çıkıp çözümünü sınıfa gösteriyor ve hep beraber tartışıyorlar. Bu sınıf ortamına baktığımızda ise öğrenciler gerginler hata yapmaktan korkuyorlar. Öğretmen her ne kadar yapıcı gözükse de öğrencilerden hep doğru cevabı ister gibi hali var. Öğrenciler de hata yapacağız diye öğretmenin onayını bekliyorlar her kelimedede.

The role "classroom culture" was only mentioned once in the first reflection papers.

Four participants mentioned the effect of "Experience" where only one reflected on it in the first reflection papers. For example, Participant-10 reflected on this role in the first interview via connecting the deficiencies of the teacher to her inexperience as in the below vignette:

I think, she was like what we could be in one or two years. It is because of inexperience. I already wrote about the role of experience in my first reflection. It is all because of inexperience. I think that the teacher was always close to the board during the lesson because of lack of self-confidence and inexperience. It is so obvious that the teacher was a novice one. She didn't have the classroom management skills. She is not aware that she should know her students' names. These are all because of inexperience. If the teacher had more experience, she could construct the lesson better. It would be like the students learn by themselves slowly and through making inferences. The learning would be more permanent. (P10-1)

O bence, tıpkı yani bizim de 1 yıl 2 yıl sonra olabileceğimiz gibiydi. O tecrübe eksikliğinden. Ben zaten ilk yazdığım yazının başına da tecrübe yazmıştım. Hocanın tecrübe eksikliğinden mesela tahtaya çok yakın durması güven eksikliğinden, tecrübe eksikliğinden olduğunu düşünüyorum. Yani o hocanın da yeni olduğu çok apaçık belli. Ve işte classroom management yok mesela. Öğrencilerin isimlerini bilmesi gerektiğini bilmiyor. Bunların hepsi tecrübe eksikliğinden. Eğer hakikaten biraz daha öğretmen tecrübeli olsa hani iyi bir construction şeklinde olacak yani. Böyle yavaş yavaş, hani kendileri sonuç çıkartarak kendilerinin öğrendiği şekilde olacak. Kalıcı olacak.

Parallel to the first interview, in the online discussions, participants reflected on this role. To give an example, during the discussions on the first video watched, Participant-6 reflected on the effects of experience as below:

You mentioned a good point. I liked the lesson in general, but only I had some criticisms in some points, one of which was about the correct use of the board. I think that it was because of the inexperience of the teacher. I believe she will be able to use the board more effectively and correctly in time. (P6-OD)

Çok güzel bir yere değindin bence. Ben genel olarak dersi beğendim sadece bir kaç yerde eleştirim vardı ve bunlardan bir tanesi de tahtayı düzgün kullanabilme adınaydı. Öğretmenin tecrübe eksikliğinden kaynaklandığını düşünüyorum. Zamanla

tahtayı çok daha düzgün ve çok daha verimli kullanabileceği düşüncesindeyim.

Similarly, Participant-10 attributed the teacher's deficiencies to her inexperience as in the below vignette:

I think that the inexperience of the teacher was reflected on what she does in class. For example, after she gets an answer, she turns to the class and asks whether everybody agrees, but if there are students who want to give an answer other than the majority of the class, then they may not be able to share their answer. Especially the students who can't express themselves well don't give their answers. In my opinion this happens because of the fact that the teacher doesn't move around the groups as the students work in groups, and doesn't check who thinks what and whether everyone contributes. If she had moved around the groups she would have known more or less the students who found different answers. As far as I observed, the teacher generally stays close to the board, and I guess this happens because of the inexperience and consequently her lack of self-confidence. (P10-OD)

Ben öğretmenin tecrübe eksikliğinin hareketlerine yansıdığını düşünüyorum. Mesela bir cevap verildikten sonra sınıfa dönüp "herkes katılıyor mu" diyor ama sınıfın çoğunluğu bir cevabı veriyorsa ona katılmayan bir veya bir kaç öğrenci olsa da düşündüğü cevabı vermeyebilir. Hele kendini çok iyi ifade etmediğini düşünen öğrenciler hiç belirtmez cevabını. Bana göre bu da şundan dolayı oluyor öğrenciler grup çalışması yaparken öğretmen yeteri kadar grup aralarında dolaşıp kim ne düşünüyor, herkesin katılı mı var mı diye kontrol etmiyor. Eğer grup aralarında dolaşsaydı farklı cevabı bulanları kendisi az çok bilirdi. Gözlemlediğim kadar öğretmen daha çok tahtaya yakın duruyor. Bu da galiba öğretmenin tecrübe ve bundan dolayı güven eksikliğinden oluyor.

The issue "Self-esteem" that is to develop self-esteem in students was mentioned only by 3 participants, which was only mentioned once in the first reflections. For example, Participant-4 reflected on this role in the first interview as in below:

I give him hints. Actually I have my student do it, but he has the paper and the pencil. He feels he is doing the work. This is so important. I mean for the development of student's self-confidence. Feeling like, 'yes I can do it'. For example, I try to tell my students that the work is not hard; that 'Look you made it. You made it, not me'. It is really important that they feel they can do it. (P4-1)

Ordan ona aslında ipuçları veriyorum. Aslında ben yaptırıyorum ama kağıt ve kalem onun elinde. O kendisinin yaptığını hissediyor. Bu çok önemli. Yani kendisine güveninin gelmesinde. A ben yapabiliyorum. Mesela ben hani şöyle demeye çalışıyorum öğrencilerime. Ya bak, şöyle, a bak zor değilmiş di mi falan. Hani. Bak yapabildin yani. Sen yaptın. Ben yapmadım yani. Bunu yapabildiklerini hissetmesi bence çok önemli.

In terms of other roles, 2 participants mentioned the issue "Effective instruction". In other words, giving an effective instruction and making activities even in negative conditions was not noticed by the most of the participants. Similarly, this issue was mentioned only by one participant in the first reflection papers. Another issue noticed by only 2 participants was "Student expression" which refers to the teacher role mentioned having students express themselves. This sub-issue was not noticed in the first reflection papers.

The noticed "Other" teacher roles related to *Methodological Perspective* in the first interventions were given above. As stated, the most noticed sub-issue in the first interviews was "classroom culture", but by less than half of the participants. The sub-issues which were not noticed in the first interventions were "motivation", "reaching targets", and "technology".

After explaining the noticed sub-issues under the main-issue *Methodological Perspective*, in the following part, the noticed teacher roles related to *Attitudinal Perspective* are provided.

4.1.1.1.2. Sub-Issues related to Attitudinal Perspective in the First Interventions

As indicated before, the *Attitudinal Perspective* was the second main theme. In the first interview, 10 out of 15 participants talked about *Attitudinal Perspective*. There are 10 sub-issues related to this theme, which were briefly provided in the method section. In the first interview, only three of these sub-issues were noticed by the participants. The sub-issues related to this theme are given with their explanations in Appendix 4.

More specifically, there are some issues related to *Attitudinal Perspective* that the participants noticed and discussed in the first interventions. For example, they taught and discussed that a teacher should make students enjoy mathematics, should be comfortable in classroom, and should value student ideas. In terms of frequencies, in the first interview, 4 out of 15 participants mentioned the role “Valuing ideas”. In other words, only couple participants reflected on the teacher roles such as valuing student ideas, listening to them, and trusting them. For example, Participant-3 mentioned that:

Honestly, I liked it a lot. The teacher called a student to the board as she was writing the properties of cube, and asked her the properties. I mean she asked her to tell one property of cube. She wrote it on the board, and she asked the student to confirm it. I mean to repeat what she said. I liked that a lot. Because that student is an individual even if she is a child. I believe that this gives student a sense of confidence. (P3-1)

Açıkçası şey çok hoşuma gitti. Öğretmen küpün özelliklerini tahtaya yazarken bir öğrenciyi kaldırdı ve küpün özelliklerini sordu. Yani bir özelliğini söylemesini istedi. Daha sonra bunu tahtaya yazıyordu ve dönüp öğrenciden bunu tekrar onaylamasını istedi. Tahtaya yazdığı ifadeyi. Bu çok hoşuma gitti. Çünkü karşınızdaki nihayetinde çocuk da olsa bir birey. Ona güven duygusu verdiğini düşünüyorum.

In this vignette, the participant emphasizes that respecting students and listening to them could enhance their self-confidence. Similarly, in the first reflection papers, participants valued that the teachers accept students' opinions. Three participants were able to reflect on this role in the first reflections. For example, the Participant-3 was able to reflect on valuing students' ideas as in below:

I liked the teacher's waiting for confirmation from the student from whom she got an answer as she was writing down the properties of a cube on the board. (P3-R1)

Küpün özelliklerini tahtaya yazarken fikrini aldığı öğrenciden tahtaya yazdığı ifade için onay beklemesi hoşuma gitti.

Three participants mentioned the issue "Mathematics as a fun". This issue refers to the teacher roles such as having students like mathematics lessons, drawing students' attention, warming them up, motivating them, making mathematics fun, and ensuring student participation. In the reflection papers, on the other hand, only one participant reflected on this role. For example, Participant-5 mentioned drawing students' attention and motivating them in the first interview as below:

The teacher captures their attention. I mean they make an interesting activity and they can focus. I didn't see an attitude like 'Let's ignore it, let's do something else'. The students were so into the lesson. I think it was the best part of this teacher's lesson. I mean, as far as I've observed in that video. I think, the teacher doesn't have to say anything else after the students get motivated. The students do the work by themselves. (P5-1)

Hoca dikkatlerini çekiyor. Yani ilginç bir aktivite yapıyorlar. Yoğunlaşabiliyorlar. Hani böyle boşverelim, başka birşey yapalım gibi birşey göremedim. Hani bayağı çocuklar derse yönelmiş durumdaydı yani. A hanımın bence, en güzel yanı da oydu. O videoda yani. Öğrenciler derse artık tamamen motive

olduktan sonra, hiçbirsey söylemese de olur bence yani. Çocuklar işini yapar.

The last issue related to the *Attitudinal Perspective* noticed in the first interview was “Comfort” which refers to being comfortable in a classroom. This issue was mentioned by two participants, where none of the participants reflected on this role in the first reflection papers.

The noticed teacher roles related to the *Attitudinal Perspective* in the first interventions were given above. The sub-issue noticed the most in the first interviews was “valuing ideas”, but by less than one third of the participants. The sub-issues which were not noticed in the first interventions were “enthusiasm”, “positive attitude”, “voice tone”, “knowing students”, “patience”, “student psychology”, and “respect”. In the following part, the “*Other*” teacher roles that the participants noticed are provided.

4.1.1.1.3. Sub-Issues related to the “*Other*” Theme in the First Interventions

The last main theme, other than *Methodological* and *Attitudinal Perspectives*, was the “*Other*” theme. In the first interview, 8 out of 15 participants talked about the “*Other*” theme. There are 3 main-issues under this theme that are Teacher Characteristics, Equity, and Out-of-Class Activities. Among the participants, 2 talked about Teacher Characteristics, 7 talked about Equity, and only 1 talked about Out-of-Class Activities.

In the following part, the main-issues related to the “*Other*” theme that are Teacher Characteristics, Equity, and Out-of-Class Activities are provided respectively with their frequencies and related vignettes.

4.1.1.1.3.1. Sub-Issues related to Teacher Characteristics under the “*Other*” Theme in the First Interventions

In the first interview, 2 out of 15 participants talked about Teacher Characteristics. There were 4 sub-issues under this main-issue, which were briefly provided in the method section. In the first interviews, 2 of them were noticed by the participants. The sub-issues related to this main-issue are given in detail in Appendix 5.1.

In terms of frequencies, in the first interview, only 1 out of 15 participants mentioned the issue “Professional equipment”. In other words, almost none of the participants mentioned being well-equipped and cultured, and having self-assurance. Similarly, only one participant mentioned the issue “Mistakes” referring that teachers should be able to be aware of the fact that they can make mistakes and must correct them. In the first reflection papers, on the other hand, none of the participants reflected on the issue Teacher Characteristics.

The noticed teacher roles related to Teacher Characteristics under the “*Other*” theme in the first interventions were given above. The sub-issues which were not noticed in the first interventions, on the other hand, were “self-improvement”, and “collaboration”. In the following part, the teacher roles related to Equity under the “*Other*” theme are provided.

4.1.1.1.3.2. Sub-Issues related to Equity under the “*Other*” Theme in the First Interventions

In the first interview, 7 out of 15 participants talked about Equity issue. There were 5 sub-issues under this main-issue, which were briefly provided in the method section. In the first interventions, 4 of them were noticed by the participants. The sub-issues related to this main-issue are given in detail in Appendix 5.2.

As stated, there are some issues related to Equity issue in reform-minded teaching that the participants noticed and discussed about in the first interventions. For example, they taught and discussed that a teacher should reach and activate all students, and ensure understanding of all while praising or criticizing the teacher in the video.

In terms of frequencies, in the first interview, 5 out of 15 participants mentioned the issue “Ensuring understanding of all” referring to ensuring all students’ understanding. This role was mentioned only once in the first reflection papers. To give an example, Participant-14 reflected on this role in the first interview where he focused on the teacher’s effort to help students as much as she could in order to assure understanding of all:

I don’t say that the teacher was able to deal with all students perfectly, but I saw her effort to do so. She dealt with each of them as much as she could. She made sure everybody understood it, and what they were dealing with, what a cube was, what it looked like when it was open, and what it would seem like. I believe that, different from doing on the board, the students would accommodate it in their minds as they learned it by doing. (P14-1)

Bütün öğrencileri de mümkün olduğu kadar, hepsiyle yüzde yüz ilgilenebilmiştir demiyorum ama öğretmenin çabasını gördüm ben sınıfta. Hepsiyle birebir, yapabileceği en iyi şekilde ilgilendi. Hepsinin kavramasını sağladı. Gerçekte neyle uğraştıklarını, küpün ne olduğunu, açıldığında neye benzediğini, nelere benzeyebileceğini. Bunu çocuklar yaparak gördüğünden tahtadakinden farklı olarak zihinlerinde yer edecektir bence.

Four participants mentioned the issue “Reaching all”. In other words, few participants talked about addressing to all students, letting students who don’t raise their hands speak, and thus not losing the students who are successful in the classroom but not in the exams. For example, Participant-11 criticized the teacher in the video for not giving any chance to the silent students in the class as in the below vignette:

Well, different things could have been done in this class. The teacher could have thought of giving more roles to different students, to silent students. (P11-1)

Ama belki de bu sınıfta biraz daha şey olabilirdi yani. Farklı öğrencilere, sessiz kalan öğrencilere daha fazla rol verilmesi gibi birşey düşünülebilirdi belki öğretmen tarafından diye düşünüyorum.

This role was mentioned only by 2 participants in the first reflection papers.

Two participants mentioned the role “Addressing to students with different levels”. More specifically, only a few participants reflected on reaching all students with different levels, equally. This issue was not noticed by any of the participants in the first reflections. Similarly, only 2 participants mentioned the role “Activating all” students, which was also mentioned in the first reflections by 2 participants. With respect to the last, Participant-4 pointed that teachers should be able to ensure the participation of all:

[...] Another thing is the participation of all students. To ensure that is also so important [...] (P4-1)

[...] Ondan sonra, işte her öğrencinin derse katılımı. O da çok önemli. Hepsini sağlayabilmek [...]

Similarly, in the first reflection papers, Participant-10 reflected on this role via emphasizing the difficulty of ensuring the participation of all students as in below:

[...] She could not know whether all of the students were engaged and they gave the right answers or not. Maybe only one student in a group did all the work, and the others were talking about some other stuff not related to the lesson. (P10-R1)

[...] Öğrencilerin hepsi ilgili mi, doğru şeyleri söylüyorlar mı bilemez. Belki de grupta her şeyi yapan sadece bir öğrenci vardı ve diğerleri çok ilgisiz şeyler konuşuyorlardı.

The noticed teacher roles related to the Equity issue under the “*Other*” theme in the first interventions were given above. The only sub-issue which was not noticed in the first interventions was “maximum capacity” while the most noticed sub-issue was “ensuring understanding of all” by only one third of the participants.

In the following part, the teacher roles related to the Out-of-Class Activities under the “*Other*” theme are provided.

4.1.1.1.3.3. Sub-Issues related to Out-of-Class Activity under the “*Other*” Theme in the First Interventions

In the first interview, only 1 out of 15 participants talked about Out-of-Class Activity. There were 3 sub-issues under this main-issue, which were briefly provided in the method section. In the first interventions, only one of them was noticed by the participants. The sub-issues related to this main-issue are given in detail in Appendix 5.3.

In terms of frequencies, in the first interview, the only role mentioned was the issue “Preparing students for the future”. This issue refers to preparing students for their future careers, and it was mentioned only once. The Participant-4 reflected on this role as in the below vignette:

For example, I have very curious students. I can see that they have a potential to be engineers or people who may go far in calculations. I'd love to have the students carry out projects which can prepare them for their future careers. Because, in my opinion, to contribute to someone's future, maybe to motivate them, to facilitate their learning, or to shape their life styles is really great.
(P4-1)

[...] Mesela çok meraklı öğrencilerim var. İlerde baktığımda hani bir mühendis olabilecek, ondan sonra bir hesaplmalarda çok ileri gidebilecek. Onlardan mesela ufak ufak onları onlara hazırlayacak projeler yaptırmak benim çok hoşuma gider yani. Çünkü geleceklerinde insanın bir katkınızın olması, belki ona heveslendirmede, yönlendirmede, ondan sonra ona göre hayat şekillerini şimdiden belirlemede bir katkınızın olması çok güzel bence.

As seen from the vignette above, the Participant-4 valued this teacher role and commented that contributing students' futures is a great experience for a teacher.

In the first reflection papers, on the other hand, none of the participants reflected on Out-of-Class Activities.

The noticed teacher roles related to the Out-of-Class Activity under the "Other" theme in the first interventions were given above. In the first interventions, the issues which were not noticed by the participants were "parental support", and "following students".

The noticed issues in the first interviews with the related vignettes from the first reflections as well as the online discussions in the first video were provided above. In the next section, the noticed topics in the second interviews with respect to the teacher roles in reform-minded teaching are documented. Additionally, the frequencies and vignettes are supported by the data both from the second reflection papers and online discussions.

4.1.2. The Main Themes related to Teacher Roles in the Second Interview and the Second Reflection Papers

As indicated previously, there are 3 main themes related to the teacher roles that are *Methodological Perspective*, *Attitudinal Perspective*, and "Other".

Among the 15 participants, data analysis indicated that in the second interviews, all participants were able to talk about *Methodological Perspective*.

On the other hand, 10 participants talked about *Attitudinal Perspective* and 10 reflected on the “*Other*” theme.

In the second reflection papers, on the other hand, all participants were able to talk about *Methodological Perspective*, 11 participants talked about *Attitudinal Perspective*, and 4 reflected on the “*Other*” theme.

In the next section, the main-issues related to the main themes are provided.

4.1.2.1. The Main-Issues related to Teacher Roles in the Second Interventions

In the following part, frequencies of the main-issues related to *Methodological Perspective* are provided in detail. First, the frequencies in the second interviews and then in the second reflection papers are documented with the comparison to the first interventions. Related vignettes from the online discussions are also provided.

4.1.2.1.1. The Main-Issues related to Methodological Perspective in the Second Interventions

As indicated before, among the 15 participants, all participants were able to talk about *Methodological Perspective* in the second interviews. Among those, all of the participants reflected on Pedagogical Content Knowledge and on General Pedagogical Knowledge, 14 mentioned Curriculum Knowledge, 2 talked about Content Knowledge, and 9 talked about the “*Other*” roles with respect to the *Methodological Perspective*.

In the second reflection papers also, all participants were able to reflect on teachers’ Pedagogical Content Knowledge. In terms of other main-issues related to *Methodological Perspective*, 9 reflected on General Pedagogical Knowledge, 13 reflected on Curriculum Knowledge, where only 3 participants mentioned Content Knowledge and about “*Other*” roles.

In the next part, the sub-issues related to Pedagogical Content Knowledge in the second interventions are presented with their frequencies. The related vignettes are also provided.

4.1.2.1.1.1. The Sub-Issues related to Pedagogical Content Knowledge in the Second Interventions

As indicated above, in the second interviews –as in the first interviews– all of the 15 participants were able to talk about Pedagogical Content Knowledge. As mentioned before, there were 21 sub-issues under this main-issue (see Appendix 3.1). In the second interviews, 17 of these sub-issues were noticed by the participants. In the first interventions, on the other hand, 18 of them were noticed.

In terms of frequencies related to Pedagogical Content Knowledge, 13 participants mentioned “Student-centeredness”. That is, the majority of the participants noticed and reflected that teachers should be able to activate students, conduct student-centered lessons, give students opportunities, and not direct students too much and not be the center of the answer/approval process. In other words, prospective teachers noticed that one of the teacher responsibilities was activating students instead of being the center of the class and not interrupting too much. This role was the most popular roles noticed in the second interviews. The number of the participants noticing this sub-issue was 9 in the first interviews. For example, Participant-2 mentioned in the second interview that:

Students have the will to participate. And this is really good actually. It is very important to guide these students effectively. What I mean is that the role of the teacher is very critical at that point. She shouldn't play too big a role in the classroom. She should leave the lesson to the students. (P2-2)

Katılma duygusu isteği var. Ve bu da çok güzel aslında. İşte onları çok güzel yönlendirmek lazım. Yani öğretmenin rolü de burada aslında çok büyük. Yani çok fazla rol almamalı dersin içinde. Öğrencilere bırakmalı diye düşünüyorum.

Parallel to the second interview, in the online discussions, participants were able to reflect on the issue of activating students. To give an example, during the discussions on the third video watched, Participant-5 criticized the teacher for being the center of the lesson and not activating students:

I can't go without saying; why did the teacher explain to other students what the students wrote on the board? In my opinion, it would be better if he asked the student who wrote it on the board to explain it. That way students' expressions and wording would improve. I think that this is a very important issue. Let the students explain their thoughts, what they wrote on the board... (P5-OD)

Söylemeden edemeyeceğim; Neden M Hocam, öğrencilerin tahtaya yazdıklarını diğer öğrencilere kendisi anlatıyor? Yazan çocuktan bunu anlatmasını istese daha güzel olur bence. Çocukların ifade ve anlatımları da gelişir. Çok önemli birşey bence bu durum. Bırak çocuklar anlatsın düşüncelerini, yazdıklarını...

In the second reflection papers, on the other hand, one third of the participants (5 participants) were able to reflect on this role. This number was 4 in the first reflections. To give an example, Participant-5 was able to reflect on activating students as in the below vignette where he also provided suggestions on how to make students more active:

They do activities which draw students' attention and lead them to play active roles... May be the town activity was a little bit dull. He could make students more active through another activity. For example, almost all of the students had something to

say while they were filling the table of the activity that their friends were doing. (P5-R2)

Öğrencilerin dikkatlerini çekecek, onları aktif rol almaya itecek aktiviteler yapılıyor... Belki kasaba örneği biraz sönük oldu. Başka bir örnekle daha fazla öğrenci aktif olabilirdi. Mesela arkadaşlarının rol aldığı etkinlik tablosu doldurulurken öğrencilerin neredeyse herbirinin söyleyecek sözü vardı.

The second most common issue noticed in the second interview was “Representations”. Almost all of the participants (12 participants) mentioned that it is one of the responsibilities of teachers to use multiple instructional methods and multiple representations, select the most appropriate method for student understanding, and use instructional methods and conduct lessons in line with the new curriculum. The number of the participants noticing this sub-issue was not this high in the first interviews. Namely, this issue was noticed by 8 participants in the first interview. For example, Participant-14 mentioned in the second interview that while watching the videos, he focuses on whether the teachers use multiple representations or not:

[...] There is no one way of showing something. There are multiple ways. A student may not understand it in one way, but she may understand in another way. I examine whether the teachers do this or not, whether they focus on one thing. (P14-2)

[...] Birşey göstermenin tek bir yolu yok. Çoklu. Bir çocuk bir yolla anlamayabilir, diğer yoldan anlar. Öğretmenler bunları yapıyor mu yapmıyor mu, tek birşey üstünde mi duruyorlar ona bakıyorum.

Another participant (Participant-6), on the other hand, reflected on this issue from a different perspective, and commented on how the online case-based discussions helped her to pay attention to different representations:

I believe this experience contributed to me in this way. Now when I make my plans, I will think in different dimensions. Not like what I will do in that lesson or what I will tell them, but like how my students receive it, how I can explain it in different ways. I started to look from different dimensions, from a wider perspective. (P6-2)

Bana şöyle bir katkısı oldu diye düşünüyorum. Şimdi ben planımı yaparken artık çok daha farklı boyutta düşüneceğim. Hani o derste ne işlenecek, ne vereceğimden ziyade bunu öğrenciler nasıl alır, ben bunu öğrencilere nasıl farklı yollarla anlatabilirim diye daha artık farklı boyutlarla, daha geniş boyutlarla bakmaya başladım.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the third video watched, Participant-15 focused on the effects of using multiple representations on student understanding as below:

If different ways of problem solving are taught to the students, then they might abandon memorization; because in general they prefer to memorize when they don't understand, and since it is easier of course. If we explain it in different ways, more students can understand. (P15-OD)

Bir işlemi yapmanın farklı yolları öğretilse belki öğrenciler ezberlemekten vazgeçer; çünkü öğrenciler genelde anlamadıklarında ezberlemeye giderler ve o yöntem daha kolay olduğu için elbette. Farklı yollardan anlatırsak daha çok öğrenci anlamış olur.

In addition to the second interviews and online discussions, 8 participants were able to reflect on using multiple representations in the second reflection papers. The number of the participants noticing this sub-issue in the first reflections, on the other hand, was 5. For example Participant-6 gave credit to the teacher for using multiple representations in her lesson which she taught it was in line with the new curriculum:

It was very in accordance with the emphasis on the use of multiple instructional methods in the new curriculum that the teacher gave real life examples on the concept of proportion, he connected it to different concepts, he made students play a game about proportion, he showed pictures of cats and dogs, and he explained the subject both orally and in written form. I appreciated the teacher a lot at that point. (P6-R2)

Öğretmenin oran konusunda günlük hayattan örnekler vermesi, farklı konularla bağlantı kurması, bu konuda oyun oynatması, kedi ve köpekli resim göstermesi, sözlü ve yazılı anlatım yapması yeni müfredatın temel gerekliliklerinden olan farklı anlatım yollarına çok uygundu. Bu konuda öğretmeni çok beğendim.

With respect to another issue related to Pedagogical Content Knowledge, most of the participants (12 participants) mentioned “Activities”. More specifically, the majority of the participants were able to notice and talk about issues such as making activities, familiarize students with the activities, selecting appropriate activities and examples, preventing students with perceiving activities as games, and applying activities appropriately. This role was among the most popular roles noticed in the second interviews when compared to the first interviews (7 participants). For example, Participant-12 gave an example to making activities from her intership as in below:

My mentor teacher, for example, tried to do an activity last week. He couldn't connect it, couldn't control it. I wanted to intervene at that point, but I didn't say anything as he didn't know...He tried to apply it, but it was too hard for him. (P12-2)

Hocam mesela bir tane aktivite yapmayı denedi geçen hafta. Bağlayamadı, toparlayamadı. Ben orda müdahale etmek istedim ama daha önceden haberi olmadığı için çok birşey söyleyemedim... Uygulamayı denedi, çok zorlandı.

Participant-13, on the other hand, connected the issue to the videos watched:

[...] I started to look at whether the activities and the selected examples were appropriate or not...How could the examples given be better. Whether she should have connected it to geometry or selected something else. (P13-2)

[...] Etkinliğin uygun olup olmadığına, derste verilen örneklerin uygun olup olmadığına bakmaya başladım... Verdiği örnekler daha iyi nasıl olabilirdi. Geometriyle bağdaştırmalı mıydı yoksa başka birşey mi seçmeliydi diye.

Parallel to the second interview, in the online discussions, this issue was emerged. To give an example, during the discussions on the third video watched, participants discussed about the activities made in the lesson. One of these participants reflected that selection of activities is important since there might be some problems with applying them appropriately:

The activity of ping pong ball was fun and met the objective, but what if the ball had rolled over to the back corner of the classroom. In that case, all the attention would be distracted and there would be a chaos. We have to consider such situations that might happen during the activities, and we should select materials accordingly. (P12-OD)

Pinpon topu etkinliği ise eğlenceli ve amaca uygundu, ancak ya pinpon topu sınıfın arka köşesine yuvarlansaydı o zaman sınıftaki bütün dikkat dağılır herkes birbirine girerdi. Etkinliklerde oluşabilecek bu tarz durumlar düşünülmeli ona göre materyal seçilmeli diye düşünüyorum.

Another participant, on the other hand, liked the activity in the video with a slight criticism, and praised the teacher for the appropriate selection:

[...] The activity part was appropriate for connecting proportion to experimental probability. Also it was prepared such that it could build connections within other subjects, and it was really nice. The fact that the teacher connected this activity to the ratios in percentages allowed a smooth transition. The only small problem was that the students could not follow it. I don't mean that students couldn't follow the subject, they only couldn't see the shoots... (P3-OD)

[...] Aktivite kısmında da aslında yine orantı konusuyla deneysel olasılık arasında bir ilişki kurulabilecek bir aktiviteydi, yine başka konularla bağlantılı olabilecek şekilde hazırlanmıştı ve güzel bir aktiviteydi ki, yine bu aktiviteyi yüzdedeki oranlara bağlaması çok yumuşak bir geçiş sağladı. Aktivitedeki tek ve küçük sıkıntı öğrencilerin takip edememesi oldu, bu sadece yapılan atışları göremedikleri anlamında yazdığım birşey, yoksa öğrencilerin konuyu takip edemediklerini düşünmüyorum...

In the second reflection papers, 7 participants were able to reflect on this role. The number of the participants noticing this sub-issue was only 2 in the first reflections. For example, Participant-12 reflected on making activities and preventing students perceiving the activity as a game as in the below vignette:

The activity was good, fun and matched the subject well. But if the teacher couldn't have held the ping pong ball, there might have been students in the classroom running after that ball. The activity was good, but the material was dangerous in distracting students. (P12-R2)

Etkinlik güzeldi, eğlenceli ve konuya uygundu. Fakat karşıdan pinpon topunu tutamasaydı, hocam bu sınıfta pinpon topu peşinde koşturana çocuklar olabilirdi. Etkinlik güzel ama materyal dikkat dağıtması açısından tehlikeli.

Another popular issue noticed in the second interview was "Reasoning". Similar to the first interviews, 11 participants mentioned this teacher role where they reflected on issues such as motivating students to think and reason, not letting them memorize, giving the underlying meaning of concepts, letting

students build their own knowledge, making students to reach generalizations, and ensuring long-lasting comprehension. For example, Participant-9 noticed that the teacher in the video did not make students memorize, but helped them understand the logic behind as in the below vignette:

...For example the activity of folding and cutting A4 paper looks like a simple activity, but what remains will be long lasting information. We call it abbreviation of proportions, or proportion constant. We memorized it. Like we divide it, this is equal to that, then we call it a constant. What is it, it is the proportion constant etc. But what did the students do. They divided A4 paper, and saw that there is a fixed number there. Then, I think that, if I make connection saying that 'it is called proportion constant and it doesn't change', the students would remember more easily. (P9-2)

...Mesela A4 kağıdını katlamak kesmek çok basit etkinlik gibi görünüyor ama hani öğrencilerde kalıcı şeyler bırakacak. Sonuçta oranların sadeleştirilmesi, işte orantı sabiti falan diyoruz. Biz ezberledik mesela. Şu şunun, işte bölmüşüm, eşittir eşittir, sonra da k sabiti demişim. Bu nedir, orantı sabiti falan. Ama öğrenciler ne yaptılar. A4'ü bölerek orda hani belirli bir sayı olduğunu görüyorlar. O zaman işte bu da orantının sabitidir, değişmeyenidir şeklinde bir bağlantı yaparsam öğrenci onu daha kolay aklında tutacaktır diye düşünüyorum.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the third video watched, participants reflected on the importance of not letting students memorize and making them understand the rationale behind. One of them reflected that:

I agree too. I believe that to prevent memorization we should ask students story problems. That way, the students can not only follow their own ways of solutions, but also understand that the concept of proportion is not just limited to interior exterior multiplication. (P6-OD)

Ben de kesinlikle katılıyorum ezberi önlemenin yolu öğrencilere story problemler sormaktan geçiyor diye düşünüyorum. Hem bu şekilde öğrenciler kendi yollarını izleyebilir hem de orantı konusunun sadece içler dışlar çarpımından ibaret olmadığını anlayabilir.

While Participant-6 suggested that story problems might be a way to prevent memorization, another participant suggested that in order to prevent memorization, teachers should ask students the meaning of the concepts:

In my opinion, it wouldn't be a big deal that the students do the cross multiplication when they see a similar example if they understood the subject and its relation to the other subjects. What is important is to be able to understand the connection between the subjects and to really understand it. It is very important that the students understand that. It is not a problem to solve a problem with interior exterior multiplication after understanding it and gaining speed. But if we can't receive an answer when we ask them why they solved it that way, then it means that they memorized it. But if the teacher warns the students in advance and tell them what those concepts mean and what to do when they encounter with them in order to prevent memorization, then the students wouldn't identify the numbers and do the multiplication (as we did in the preparation for the university entrance exam), but would have to read the problem carefully. When they read the problem carefully, then they would have to think about the solution. That way, the memorization would be more or less prevented. (P10-OD)

Bence öğrenciler konuyu, konunun mantığını ve diğer konularla ilişkilerini anladıktan sonra çok sorun olmaz ona benzer soruyu gördüklerinde içler dışlar çarpımı yapmaları. Bir konuda bence önemli olan kavramlar arasındaki ilişkileri kurmak ve bu ilişkileri gerçekten anlamak, öğrencinin bunu anlaması çok önemli. Öğrenci bunu anlayıp pratik olacak şekilde hız kazandıktan sonra gördüğü soruyu içler dışlar diye çözmesi çok sorun değil. Ama niye böyle çözdün diye sorup cevap alamıyorsak o zaman ezbere yapmış olur. Belki öğretmenin bu ezberi engellemek için öğrencileri önceden uyarıp sorulardaki kavramların gerçekten ne

anlama geldiğini o kavramları gördüğünde ne yapmaları gerektiği şeklinde uyarırsa öğrenciler sorulara direk sayıları bulup içler dışlar yapmak yerine (bizim öss'ye hazırlıkta yaptığımız gibi) o soruyu dikkatlice okumak zorunda kalır. Soruyu dikkatlice okuyunca çözümü üzerine düşünmesi de gerekir. Böylece ezber az çok engellenmiş olur bence.

Similarly, in the reflection papers, 7 participants were able to reflect on this role. The number of the participants noticing this sub-issue was 6 in the first reflections. For example, Participant-10 mentioned having students think about the rationale behind as in the below vignette:

She wanted students to think about what the numbers they got meant through asking the question what we could say about the A and B towns by using the proportion concept. The key word “what” in proportion concept is very important in getting students to comprehend the rationale behind the subject. (P10-R2)

Buradaki oranı kullanarak A ve B kasabası için ne diyebiliriz sorusuyla öğrencilerden elde edilen sayıların ne anlama geldiğini düşünmelerini istiyor...Oran konusundaki anahtar kelime ne sorusu konunun mantığını kavratma açısından çok önemli bir soru.

In the second interview, 10 out of 15 participants mentioned the role “Facilitation”. In other words, most of the participants noticed and mentioned that one of the teacher roles was facilitating and assisting students, helping them discover, and providing hints when necessary. This role was among the most popular roles that the participants noticed in the second interview as in the first interview (9 out of 15). For example, Participant-7 noticed that the teacher in the video tried to facilitate students and did not give the answer in order to help them discover it on their own:

During teacher G’s teaching, one of the things I noticed was that she was trying to facilitate students’ understanding and help them discover. But, she didn’t answer all of the questions that students

raised. She told them she didn't know the answer. She said she didn't know the answer, and they could figure it out together. (P7-2)

G hocanın çalışmasında işte, ders anlatırken yine mesela dikkat ettiğim şeylerden bir tanesi, öğrencilerle gidip başlarında onlara yol göstermeye çalışıyordu. Öğrencilerin keşfetmesi için. Ama öğrencilerin her sorusuna cevap vermedi. Mesela bazı sorularından sonra bilmiyorum diyor. Bunu bilmiyorum, bunu beraber bulacağız falan diyordu.

In the second reflection papers, on the other hand, only 2 out of 15 participants reflected on this role. Similarly, the number of the participants noticing this sub-issue was 3 in the first reflections.

With respect to another sub-issue related to Pedagogical Content Knowledge, that is "Instructions" referring to using clear and proper instructions and statements, 10 participants were able to reflect on this role. This number was only 2 in the first interviews. For example, one of the participants noticing this sub-issue in the second interview reflected that:

...As a teacher I should use accurate statements. I realized that the statements I use should not cause any doubts on students' minds. (P3-2)

...Hani ben öğretmen olarak çok kesin ifadeler kullanmam gerekiyor. Hani kullandığım ifadelerin öğrencilerin kafasında bir şüphe oluşturmaması gerektiğini fark ettim.

Another participant reflected on this issue where he put himself into students' shoes, and commented that when the teacher do not use clear statements the students have difficulty with understanding what their teachers expect from them:

It happened during the first lesson. Since the teacher couldn't express her expectations from the students clearly, she asked

questions and the students couldn't answer. I put myself into their shoes, I mean what if the teacher had asked me. Could I answer? No, I couldn't. This happened a couple of times. I try to look from their perspectives. Can they express their expectations from them clearly? (P8-2)

Yani ilk derste olmuştum. İlk derste özellikle öğretmen ne istediğini tam açık ifade etmediği için birşey soruyor, öğrenci cevap veremiyor. Ben kendi yerime koydum, yani acaba bana sorsaydı bu şekilde cevap verebilir miyim diye. Yok veremem. Birkaç defa oldu öyle üstüste. Biraz da onların açısından bakmaya çalışıyorum. Kendilerinden beklentileri açık şekilde ifade edebiliyorlar mı.

Similarly, in the second reflection papers, the participants were able to mention this role, but with 4 participants. The number of the participants noticing this sub-issue was 3 in the first reflections. For example, Participant-15 reflected on using appropriate direction and wording where she criticized the teacher for using wrong statements, and provided suggestions as in below:

She used the term *proportion* incorrectly in some sentences. For example, she raised a question like 'what is the proportion of cats to dogs?' Instead, it should have been like 'what is the proportion of the number of the cats to the number of the dogs?' (P15-R2)

Oran kavramını bazı yerlerde yanlış kullandı. Örneğin, kedilerin oranının köpeklerin oranına oranı nedir diye bir soru sordu. Aslında kedilerin sayısının köpeklerin sayısına oranı nedir diye sormalıydı.

The issue "Student understanding" was among the popular teacher roles noticed in the second interviews. Parallel to the first interviews, 10 participants mentioned ensuring student understanding, and using the new curriculum even if it takes more class time. For example, Participant-5 reflected on this role where he discussed that the teacher in the video tried to ensure student understanding via guiding the student with his questions as in the below vignette:

[...] For example, the teacher interpreted it like: 'Then are ratio and fraction the same?'. Instead of that he could have asked, 'is there a relation, a similarity, a difference between these two definitions?'. Is ratio same as what we mentioned?' In my opinion, these questions make students relate the concepts of fraction and ratio. (P5-2)

[...] Mesela orda, demek ki oranla kesir aynı şey mi diyerek bir yorumu var mesela M hocanın. Hani onun yerine öğrencilerden acaba bu iki tanım arasında bir ilişki, bir benzerlik, bir farklılık mı var. Hani acaba oran aslında bahsettiğimiz aynı şey mi. Mesela çocuğun kafasında kesirle oran kavramının tam içiçe oturmasını sağlayacak birşey, bir soru bence.

While the Participant-5 praised the teacher in the video for establishing student understanding, Participant-1 blamed another teacher for not achieving that as in the below vignette:

...In that "N" problem. Ok, the students who knew it could do it but by heart. The female student solved the problem, then she did it like: 'What is N? Why? Will we always put 8 to the place of N?' There was a formula $n(n-1)/2$. There, the student did not really grasp the concept. This is because of the deficiency of the teacher... (P1-2)

...Şu n sorusunda, tamam bilen yapıyor ama ezberden yaptı. Hani ilk kız sorusunu yaptı, sonra kız şey yaptı. N ne ki, niye, n'yi görünce hep yerine 8 mi koyucuz. $n(n-1)/2$ diye formül vardı. Orda hani çocuk n'yi kavrayamamış gerçekten. Hani bu hocanın eksikliğinden kaynaklanıyor...

This role was mentioned by 3 participants in the second reflection papers while it was noticed by 8 participants in the first.

Another issue related to the Pedagogical Content Knowledge, which was noticed in the second interviews, was "Real-life". More specifically, 9 participants reflected on connecting mathematics to real life and teaching solid

mathematics. That is, more than the half of the participants was able to reflect on connecting mathematics to real life. The number of the participants noticing this sub-issue was 5 in the first interviews. To give an example, Participant-3 mentioned this role more than once. In one of her vignettes, she reflected that:

... Take the concept of proportion, for example. The examples the teacher gave were really good. He gave, for example, the example of uncle Ahmet... That connection was really good. Everyone can explain what proportion is, but building a connection like that... In this example, he also asked 'If you pay 1.5 TL tax for 30 TL, what would you pay for 900 TL?'... (P3-2)

...Mesela orantı konusunu. Öğretmenin bulduğu örnekler de çok güzeldi. Mesela Ahmet amca örneği vardı bir tane... Bir kere o bağlantı çok güzeldi. Herkes orantıyı anlatır ama o şekilde bağlantı kurmak... Bunun yanında ifadesel olarak şeyden bahsetti, yine aynı örnekte. 30 ytl ye karşılık, 1.5 ytl vergi verilirse 900 ytl ye karşılık...

Similarly, in another vignette she praised the teacher for providing real life examples during the lesson:

...The examples given were really good. They were related to our daily lives. They were directly connected. Mathematics is not separate from our daily lives. The teacher gave very good examples showing that mathematics is within our lives. (P3-2)

...Verilen mesela, en basitinden başlarsak, örnekler çok güzeldi. Günlük hayatımızla alakalıydı. Direkt bağdaştırılmış şekildeydi. Hani bu havadan, hani matematik başka birşey değil. Hayatımızın içinden birşey olduğu gerçeğini çok güzel ortaya koyan örnekler verdi öğretmen.

Parallel to the second interview, in the online discussions, participants were able to reflect on the issue of connecting mathematics to real life. To give

an example, during the discussions on the third video watched, Participant-4 praised the teacher for being able to connect mathematics to real life:

[...] On the other hand, it was really nice that she gave real life examples and asked for help from the students to solve the problems. That way she not only ensured that the students saw the application of ratio-proportion in real life, but also made students participate in the class through helping their teacher and feel that they could do something. (P4-OD)

[...] Buna karşın konuyla ilgili gerçek hayattan problemler örnekler verip bu problemleri çözmek için öğrencilerden yardım istemesi çok güzeldi. Bu şekilde hem oran-orantının gerçek hayatta uygulanışını görmelerini sağladı, hem de öğrencilerin öğretmenlerine yardım ederek derse katılmalarını ve birşey yapabildiklerini görmelerini sağladı.

Similarly, another participant also praised the teacher, and underlined that real life examples make mathematics enjoyable and draw students' attention:

I think that the examples used were so meaningful since they were from real life. I liked the example "festival in the town" a lot, too. Since it sounded very enjoyable, it motivated students and drew their attention to the lesson. (P10-OD)

Kullanılan örnekler gerçek yaşamdan alındığından dolayı bence çok anlamlıydı. Ben de "kasabada şenlik var" örneğini çok beğendim. Kulağa çok eğlenceli geldiği için konuya ve derse ilgi çekmeyi sağladı.

Parallel to the second interview, in the second reflection papers, 9 participants were able to mention this role, where it was 6 in the first reflections. For example, Participant-1 reflected on connection to real life as below:

It helped long lasting learning when the teacher gave the example of adding 2 glasses of water to 1 glass of rice while cooking rice. (P1-R2)

Öğretmenin pilav yaparkenki 1 su bardağı pirince 2 su bardağı su eklemesi örneği çok kalıcıydı.

About the half of the participants (7 participants) mentioned “Group work”. That is, doing group work and managing it, dealing with students throughout the group work, managing the labor division in group work, activating the communication between students during the group work, and letting students learn from each other via group work were the issues noticed by several participants in the second interview. The number of the participants noticing this sub-issue was slightly higher in the first interviews. Namely, this issue was noticed by 8 participants in the first interview. To give an example, Participant-6 reflected on this role in the second interview where she slightly criticized the teacher for not being able to manage the group work as in below:

Because they were doing group work there. You know, it is very important that the students are in interaction with each other. It is really important that they learn from each other. But the point we found the teachers deficient at was that during the group work... The students knew it, but they weren't active enough. I felt like they only wanted to answer the questions by themselves. I mean they weren't discussing it among themselves either, but they preferred to ask the teacher directly when they found a new thing. So, importance should be given to group work, and interaction among students must be activated. (P6-2)

Çünkü orda grup çalışması yapılıyordu. Hani öğrencilerin birbiriyle iletişimi çok önemli. Birbirlerinden öğrenmeleri çok önemli. Ama G hocanın da hani eksik bulduğumuz yanlarından bir tanesi, herhalde öğrenciler grup çalışmasında... Hani biliyorlardı ama çok böyle aktif değillerdi. Yani sadece kendi cevap vermek istiyorlardı gibi geldi. Yani öğrenciler kendi aralarında tartışmıyorlardı da, hani birşey bulduğunda direkt öğretmene sormayı daha uygun buluyorlardı gibi buldum yani

ben. O yüzden hani grup çalışmasına daha çok önem verip, öğrenciler arasındaki iletişimi daha aktif hale getirmek lazım.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the third video watched, Participant-2 criticized the teacher for not being able to manage the group work:

I think in the activity where they drew a square on the floor and made shoots, there could have been group work. The students could have been asked to discuss what could be understood and what conclusions could be drawn from the table on the board (shoot or hit table). No matter how successful he appeared in student-centered instruction, he ignored a little bit the fact that there were lots of things students could learn from each other... (P2-OD)

Bence sınıfın ortasına çizilen ve atış yaptırılarak verilen örnekte çok güzel grup çalışması yaptırılabilirdi. Çocuklara neleri oranlayabileceğimizi, tahtada oluşturulan tablodan (atış ya da isabet tablosu) hangi sonuçlar elde edilebilirdi diye sorulup tartıştırabilirdi. Her ne kadar öğrenci odaklı dersi işlemede başarılı gözükse de öğrencinin öğrenciden öğrenebileceği çok şey olduğu gerçeğini birazcık da olsa ignore etti gibi...

In the second reflection papers, on the other hand, only one participant was able to reflect on this role. In the first reflections, on the other hand, this number was quite high (10 participants).

The issue “Inquiry”, on the other hand, was mentioned by 7 participants. More specifically, more than half of the participants talked about teacher roles such as asking questions, encouraging students to inquire, asking for reasons and having students explain and justify their answers, and not giving the rules. This number was 5 in the first interviews. For example, Participant-2 reflected on this role more than once in the second interview as in the below vignettes:

[...] Ok, you found this, but where we will use it, how we will do it. These kinds of questions are very useful. They make students think. (P2-2)

[...] *Tamam bunu bulmuşsunuz ama bunu nerede kullanacağız, bunu nasıl yapacağız. Bu tür sorular yani çok hoş sorular. Onları tamamen düşünmeye yönlendiren sorular.*

and

[...] Because seriously, the child have no evidence. But I thought like this: If there are 100 bricks, 100 stairs, there should be more bricks than the stairs. I guess that student also thought that way, and he said 200. Bu we have to ask him why he gave that answer. He might have something to support his argument; I mean something he thought about. But since he gave that answer right away without any thinking, I think that it was a guess [...] (P2-2)

[...] *Çünkü cidden hiçbir kanıt yoktu çocuğun elinde. Ama ben şöyle düşündüm. İşte 100 tuğla varsa dedim, 100 merdiven varsa, 100 merdivenden daha fazla tuğla olacak bu. Herhalde çocuk da yani öyle düşündü, 200 dedi. Ama neden 200 olduğunu ona da sormamız lazım. Belki de desteklediği birşeyler vardır yani düşündüğü birşey vardır. Ama tabii ilk anda söylediği için, düşünmeden söylediği için biraz guess gibi geldi bana [...]*

As seen in the vignettes above, the Participant-2 noticed that it is necessary to ask students questions which let them think and reason, and have them explain and defend their answers. This role was mentioned by 6 participants in the second reflection papers where it was noticed by 8 participants in the first reflections. For instance, Participant-14 paid attention to the questions the teacher raised as below:

She succeeded in asking different kinds of questions. She raised many questions starting from single short answer to long and challenging questions. (P14-R2)

Çok çeşitli sorular sormayı başardı. Tek ve kısa cevaplılardan başlayıp, uzun ve düşündürücü sorulara değin pek çok soru sordu.

Another issue related to Pedagogical Content Knowledge that is “Thinking time” was mentioned by 6 participants. This number was 4 in the first interviews. More specifically, couple participants were able to reflect on giving students enough time to think and not providing answers right away in the second interviews. For example, Participant-7 reflected that one of the responsibilities of a teacher is to let students think so that they can discover instead of waiting to get the right answer from the teacher:

[...] She was trying to guide students. To help them discover. But, she didn't answer all of the questions the students raised. For example, she told them that she didn't know the answer. She was like 'I don't know the answer; we can figure it out together'... The reason for saying that was, I mean if she told, she would have given the answer which students should discover. Then, the activity would have no meaning. For that reason, she was generally saying that she didn't know the right answer or she was telling students to think about it. Or, for example, she waited for students to discover after explaining the first steps. (P7-2)

[...] Öğrencilerle gidip başlarında onlara yol göstermeye çalışıyordu. Öğrencilerin keşfetmesi için. Ama öğrencilerin her sorusuna cevap vermedi. Mesela bazı sorularından sonra bilmiyorum diyor mesela. Bunu bilmiyorum, bunu beraber bulacağız falan diyordu... Orda işte onu demesinin sebebi, zaten hani onu söylese, öğrencilerin keşfetmesi gereken şeyi asıl öğretmen cevap vermiş olacaktı. Dolayısıyla hani aktivitenin bir anlamı kalmayacaktı. Onun için genelde bilmiyorum şeklinde veya işte acaba nasıldır sen düşün bakalım bir de deyip. Veya mesela bir iki basamağı söyleyip daha sonra genellemesini bekleyerek birşeyler yapıyordu.

In the reflection papers, on the other hand, none of the participants reflected on this role where 2 participants were able to talk about this sub-issue in the first reflections.

Similar to the first interviews, 6 participants mentioned the issue “Misconceptions” in the second interviews. That is, couple participants were able to talk about issues such as not generating misconceptions, and preventing misconceptions and wrong and deficient understanding. One of these participants (Participant-12), for instance, reflected on common students misconceptions in proportion concept and on how a teacher can overcome this problem as in below:

For example my mom’s age and my age, ok this is a proportion. It is impossible to have a ratio there. It can be in any kind. I know this from the children. They do subtraction when you ask for ratio. Ok they know that 3 has a ratio to 12. But when you ask what the ratio between them, they are like: ‘Will we subtract it or sum it? Is it 9?’. They are like that. Thus, we could talk about at least that the ratio is shown as division...We could make them ask and write. Like: ‘Why is it like that?’. We could make them just do the opposite. Like: ‘If the ratio of your mom’s age to yours is this, what is the ratio of your age to your mom’s age?’...The new curriculum requires this. Because it is student centered. Students should understand and learn it. (P12-2)

Mesela annemin yaşı benim yaşı, tamam bu orandır. Mümkün değil ordan bir oran çıkması. Her çeşitte olabilir yani. Ben çocuklardan biliyorum. Oran deyince çıkarma yapıyorlar. Tamam biliyorlar şimdi 3ün 12ye bir oranı vardır. Peki, nedir acaba bunun arasındaki oran deyince, işte çıkaracak mıyız, toplayacak mıyız öğretmenim, işte 9 mu falan, öyle bakıyorlar yani. O yüzden oranın en başta bölü olarak gösterildiğinden en azından bahsedebilirdik... Öğrenciyi tekrar tekrar, hani sordurabiliriz yazdırabiliriz. Hani neden böyleydi diye. Tam tersini yaptırabiliriz. Peki, annenin yaşının seninkiyse seninkinin annenin yaşına oranı gibi... Yeni program bunu gerektirir evet. Çünkü çocuk, öğrenci merkezli olduğu için. Öğrencinin bunu anlayıp öğrenebilmesi lazım bir taraftan da.

Parallel to the second interview, in the online discussions, this issue was emerged. To give an example, during the discussions on the third video watched, participants reflected on students' misconceptions and how they could be overcome:

They gave several examples at the beginning of the lesson, but they were not clear. For example, a student gave the example of 'my moms age and my age' for the ratio. The biggest mistake the students make in ratio concept is doing subtraction instead of division. The student may think it as the difference between her moms age and her age. Instead of giving so many examples, I believe that it would be more effective to give examples that are discussed in all aspects. (P13-OD)

Bir de en başta çeşitli örnekler verildi ama net olmadı mesela bir çocuk oran için "annemin yaşı benim yaşı" dedi. Ancak çocukların oran konusunda yaptığı en büyük hata bölme yerine çıkarma yapmak. Çocuk bu oranı annemin yaşı eksi benim yaşı olarak düşünebilir. Çok örnek vermektense her yönüyle tartışılmış örnekler vermek daha uygun olur diye düşünüyorum.

Similarly, in the second reflection papers, 6 participants reflected on this role. This number was only 3 in the first reflections. For example, Participant-1 mentioned a misconception that students may have with a specific example from the video as in the below vignette:

A student replied that the ratio of the city A's area to that of all city was 2 to 3 when they were talking about the ratios between the cities. There was an error there. The teacher thought that it was true, and did not say anything. This might create misconceptions in some students. (P1-R2)

Şehirlerarası oranlar söylenirken A şehrinin alan oranının tüm şehre oranı 3'te 2'si şeklinde cevap verdi bir öğrenci. Burada yanlışlık vardı. Öğretmen bunu doğru zannederek atladi, belki bazı öğrencilerin kafasında misconception oluşabilir.

Another issue related to Pedagogical Content Knowledge that is “Discussion” was only mentioned by 4 participants. In other words, a few participants reflected on teacher roles such as establishing a discussion environment and having students discuss. The number of the participants noticing this sub-issue was 5 in the first interviews. For example, Participant-8 emphasized the responsibility of a teacher in creating the right atmosphere in which students can have healthy and rich discussions as in below:

...Students’ attitudes during the discussions drew my attention, since it was related a little bit to the teacher. If the teacher gives such opportunities, then the students behave accordingly. Here is the student-student dialog. Students can not do it alone, but if the teacher provides such an environment, then the students can object to each others’ ideas properly or they can make interpretations. (P8-2)

...Tartışma ortamında öğrencinin tavırları dikkatimi çekti ama biraz da öğretmene bağlı olduğu için. Eğer öğretmen o türlü fırsat tanıyorsa, öğrenciler de ona uygun hareket ediyorlar. İşte, öğrenci öğrenci diyalogu. Öğrenci tek başına yapamaz. Ama öğretmen o şekilde bir ortam hazırlarsa öğrenciler işte uygun bir şekilde birbirlerinin fikirlerine itiraz edebiliyorlar veya yorum yapabiliyorlar.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the third video watched, participants discussed about the discussion environment in the classroom. One of these participants reflected on this issue via underlying the benefits of discussions on student understanding as in below:

They also came to a conclusion through discussion on ratios. This technique works better than just taking notes on the notebooks, and as a matter of fact the teacher wrote down the important things on the board. The students can build more connections

through discussions and their understanding becomes more permanent (I mean relational understanding). (P15-OD)

Ayrıca oran konusunu tartışarak bir sonuca vardılar ve bu yöntem bir konuyu öğrenirken deftere not almaktan daha çok işe yarıyor ki gerekli yerleri de tahtaya yazdı öğretmen. Öğrenci tartışarak o bilgiyle ilgili daha fazla ilişki kuruyor kafasında ve konu daha kalıcı oluyor (Relational understanding).

Another participant, on the other hand, reflected on the issue via criticizing the teacher in the video for not having students discuss:

The lesson took place in question and -answer form between the teacher and the students. There was no real discussion. (P1-OD)

Zaten ders hep öğretmen öğrenci arasında soru cevap şeklinde gelişti tam olarak bir discussion söz konusu değildi.

Similarly, Participant-9 criticized that there was no discussion environment in the classroom in the video, but she hold the students responsible:

In my opinion, the reason for not having discussion was that the students always wanted to give their answers only to the teacher. Since they were not used to discussion environment, the lesson was in question form instead of discussion. (P9-OD)

Bence discussion olamaması öğrencilerin cevaplarını sürekli olarak öğretmene verme istediklerinden kaynaklanıyordu. Öğrenciler discussion ortamına pek alışkın olmadıklarından discussion değil de questioning havasında oldu ders biraz bence.

This role was mentioned by 3 participants in the second reflections where it was not noticed by any of the participants in the first reflection papers.

Similar to the first interview, only 4 participants mentioned the issue “Evaluation”. In other words, a few participants reflected on teacher roles such as evaluating student understanding, assessing through observation, and arranging lesson flow according to student understanding. The frequency in the

second reflection papers was even lower (2 participants), being parallel to the first reflections. To provide an example, in the second interviews, Participant-1 mentioned how the teacher caught the deficiencies in student understanding and changed the flow of the lesson accordingly:

[...] In fact, a student came to the board, and he couldn't write down the proportion. The teacher said 'ok, good'. He didn't forget any missing points. He told the students that what it meant was 'so, we don't know how to write proportion'. He said lets see together how we write it. You know, he shaped the lesson as the students needed through seeing their deficiencies. So, yes there was a plan, but it was really nice that he focused on the issues that the students didn't understand. (P1-2)

[...] Hatta bir öğrenci kalktı tahtaya, oranı yazamadı. Demek ki arkadaşlar, güzeldir, hiçbir noktayı unutmadı eksik kalan. Demek ki, burda oran yazmayı bilmiyoruz arkadaşlar. Hani nasıl yazılır, hadi şimdi onu görelim dedi. Hani resmen eksiklerini görerek, öğrencilerin yön verdiği şekilde gitti ders. Tamam bir program var hani, bir plan yapmış ama. Hani o şekilde de bilmedikleri noktalara da yönelmesi çok güzeldi.

Parallel to the second interview, in the online discussions, participants were able to reflect on this teacher role. To give an example, during the discussions on the third video watched, participants discussed about the assessment of student understanding. One of these participants reflected that:

In the lesson, there was assessment through observation or questioning. It is not that there was no assessment. This way, the teacher also had some idea on whether the subject was understood deeply or not. But if you mean something like an exam or a test, then that is different. Since this lesson was about teaching subject matter, I would prefer to do assessment through observation and participation as the teacher did. May be after the lesson I would give homework like drills or practices, and also I would give a test to strengthen their understanding before passing to the other subject. I think it is too early for that for now. (P2-OD)

Derste zaten gözlemlerle ya da sorulan sorularla assessment yapılıyor. Yapılmıyor diye birşey yok. M hoca da az çok bir fikir ediniyor böylece derin anlaşılıp anlaşılmadığı konusunda. Ama bahsettiğin sınav ya da test gibi birşey ise konu değişir. Bu ders zaten konu anlatımı olduğu için test yerine hocanın yaptığı gibi sorularla gözlemler ve derse katılımı assessment yapardım ben. Bu dersten sonra driller belki sonra da ev ödevi practicerler verir dersi pekiştirir diğer konuya geçmeden bir sınav yapardım herhalde. Şimdi böyle birşey için erken olduğunu düşünüyorum.

While Participant-2 valued the assessment techniques of the teacher in the video, shared other ways to assess student understanding, and suggested that testing would be inappropriate to assess student understanding in that lesson as above; Participant-9 agreed that the techniques used were enough to make assessment, and testing was not necessary to be employed:

I think that with respect to the assessment, it was enough to assess student understanding in this lesson through observation and questioning. Almost all students were active and willing in the lesson anyway. I believe that an assessment technique like a test would put a strain on students. Also, I think that it would be more effective to do the test assessment after a couple of subjects were taught. (P9-OD)

Assessment konusunda gözlemler ve de questioning ile yapılan assessmentın bu ders için yeterli olduğunu düşünüyorum. Zaten derste hemen hemen tüm öğrenciler aktif ve istekliydiler. Test tarzı bir assessment bu ortamı biraz kasardı diye düşünüyorum ayrıca zaten test tarzı assessment bir kaç konu işlendikten sonra yapılsa daha etkili olur diye düşünüyorum.

The issue “Understanding” that is being able to understand student questions and what they say, being able to answer student questions and providing feedback, and giving concrete answers was only mentioned by 3 participants. Similarly, this role was mentioned by only one participant in the

reflection papers. The numbers of the participants noticing this sub-issue were 1 and 2 in the first interview and in the first reflections respectively.

The issue “Correct terminology” that is using correct mathematical terms in class and having students do likewise was mentioned only by one participant, as in the first interviews. In the second reflection papers, only 2 participants were able to reflect on it while 8 participants mentioned this sub-issue in the first reflections. The only participant reflecting on this role in the second interview focused on letting students first use their own terms before giving formal definitions as in below:

As far as I remember, she let students find the comparison and understand by themselves. The students tried to express it like that. I think that comparison is much easier for students than the concept of proportion... It was a nice strategy, you know, for the students. Before explaining it as a proportion, letting students to understand the subject... I thought then it was good that the students gave a name for it before they formally named it. (P11-2)

Mesela öğrenciye kendi anlayabileceği ve o karşılaştırmayı öğrencilere buldurdu yanlış hatırlamıyorsam. Çocuklar o şekilde ifade etmeye çalışmışlardı. Karşılaştırma isteği öğrenci için, öğrencilere oran kelimesini nazaran çok daha simple gelebilecek birşey diye düşünüyorum ben... Hani güzel bir yöntem olmuş, hani öğrenciye güzel. Bunu oran şeklinde ifade etmeden önce öğrencilerin hani konuyu anlama... Ama isimlendirmeden kendi bir isim koymaları güzel olmuş diye düşünmüştüm ben o zaman.

Another issue noticed was “Explanations”. This issue refers to appropriately explaining the subjects, and it was mentioned only by one participant in the second interview and noticed by 4 participants in the second reflections. The number of the participants noticing this sub-issue was 3 in the first interviews, and it was not noticed in the first reflections.

The noticed teacher roles related to the Pedagogical Content Knowledge in the second interventions were given above. As stated, the most noticed sub-

issues in the second interviews were “student centeredness”, “representations”, “activities”, “reasoning”, “facilitation”, “instructions”, “student understanding”, and “real life”. The sub-issues which were not noticed in the second interventions were “student difficulties”, “alternative solutions”, “not binding”, and “student thinking”. In the following part, the noticed teacher roles related to the General Pedagogical Knowledge in the second interventions are provided.

4.1.2.1.1.2. The Sub-Issues related to General Pedagogical Knowledge in the Second Interventions

As indicated previously, in the second interview, all participants talked about General Pedagogical Knowledge. There were 10 sub-issues under this main-issue, which were briefly provided in the method section (see Table 3.6). In the second interventions, 6 of these sub-issues were noticed by the participants. The noticed sub-issues were “communication”, “management”, “approach”, “pressure”, “student differences”, and “shaping students”.

In terms of frequencies related to General Pedagogical Knowledge, 12 participants reflected on “Management”. More specifically, the majority of the participants noticed and reflected in the second interviews that it was among the responsibilities of teachers to manage the classroom, set up the rules, manage the time, and secure the order. As in the first interviews (14 participants), this role was the most popular role noticed in the second interviews. For example, Participant-15 criticized the teacher in the video for not being able to manage the students well:

To be honest, I didn't like it. Because, I didn't like her attitude during the activity... I mean, she couldn't manage the students well. (P15-2)

Onu pek beğenmedim açıkçası. Çünkü etkinlik yaptırırken takındığı tavrı beğenmedim... Hani öğrencilere çok iyi hakim olamıyordu.

Similarly, in the second reflection papers, the most common role noticed was this role with 7 participants. More specifically, this role was the only role in the second reflections which was mentioned by more than one participant. In the first interview and first reflections, on the other hand, the numbers of the participants noticing this sub-issue were 14 and 10 respectively. For example, Participant-4 reflected in her second reflection paper that:

...There was no time loss at that time. But still she extended the duration of some parts unnecessarily. She could have used the time more effectively. (P4-R2)

...Bu esnada vakit kaybı olmadı. Ama yine de bazı bölümleri uzattı. Zamanı daha iyi kullanabilirdi.

While Participant-4 discussed that the teacher could have been managed the time more effectively as in the above vignette, another participant positively commented on teacher's management skills with some suggestions as below:

The classroom environment was quiet, and the teacher seemed to manage the classroom well. But I would prefer the teacher walk around the desks. She was standing generally close to the board. (P10-R2)

Sınıf ortamı sessiz, öğretmen sınıfa hakim gibiydi. Ama öğretmenin sıralar arasında dolaşmasını tercih ederdim, genelde tahtaya yakın duruyor.

Another issue related to General Pedagogical Knowledge was "Approach" referring to positive approach towards students, giving flexibility, being decent, not controlling too much, not being too harsh, not behaving rude, and not humiliating students. Eight participants were able to reflect on this role while it was noticed by only 4 participants in the first interviews. In the

reflection papers, on the other hand, similar to the first reflections, none of the participants mentioned this role. To give an example, in the second interviews, Participant-5 reflected on this role via comparing the two teachers from two different videos as in below:

In her video, between the students there was really... You know, there is a distance between the students and the teacher. And I thought that this distance sometimes might prevent students from expressing themselves... That distance was more overcome in the other video. Ok, the other teacher let us understand who was the teacher and who was the student, but he was more sincere with his students and he was treating them friendly. He was establishing the formality, but also he was warm. And he could easily get along with the students and establish a good communication. (P5-2)

G hocanın videosunda gerçekten hani öğrenciler arasında bir... Hani öğrenci ve öğretmen arasında belli bir sınır var. Ve bu sınır bazen öğrencilerin kendilerini ifade etmelerini engelleyebilir diye de düşündüm... Bu sınır M hocanın videosunda daha aşılmış durumdaydı. Hani M hoca tamam, öğretmen, öğrenci. Bunu hissettiriyor. Ama yani onlarla daha samimi duruyordu yani hani sıcak davranıyordu. Aradaki resmiyeti kuruyor, bir sıcaklık sergiliyordu. Ve hani öğrencilerden rahat rahat birşeyler alabiliyordu.

Similar to the first interview, in the second interview 7 out of 15 participants mentioned the issue “Communication”. That is, several participants were able to talk about communicating with students, setting up proper relationships, and securing the interaction between the students. For example, Participant-11 mentioned that she found the atmosphere in the classroom pleasant as she thought that the relation and communication between the teacher and the students was decent:

[...] The most important thing drawing my attention is the importance of the relation between the teacher and the students. It

is always important, but lately it took my attention more... Because of this, I found the atmosphere of the classroom more pleasant... I think that the learning environment was more appropriate for that. (P11-2)

[...] Özellikle dikkatimi çeken öğretmenin öğrenciyle iletişiminin önemli olduğu. Yani zaten önemli tabii ki ama sonra daha fazla dikkatimi çekti... Onun için atmosfer daha sevimli geldi bana... Hani öğrenme ortamının da daha bunun için uygun olduğunu düşünüyorum.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the third video watched, Participant-11 focused on the good communication between the teacher and students in the video as below:

I agree that the teacher is good at communication. There is a good rapport between the teacher and the students. The students are neither afraid of the teacher nor they are disrespectful. I think the students are aware that they are valued. (P11-OD)

İletişim konusunda öğretmenimiz gayet iyi görünüyor bence de, öğrencilere karşı düzgün ayarlanmış bir seviye var, ne çok korkuyorlar ne de abartıyorlar. Öğrenciler kendilerine değer verildiğinin farkındalar bence.

In the second reflection papers, on the other hand, none of the participants were able to reflect on communicating with students and building interaction between students, being parallel to the first reflections.

The issue “Pressure” was mentioned by 5 participants where none of the participants mentioned it in the second reflections. This teacher role refers to the issues such as not putting too much pressure on students, and approaching the students who make mistakes positively and providing them opportunities. The numbers of the participants noticing this sub-issue in the first interviews and in the first reflections were 9 and 2 respectively, which were quite high compared

to the second interventions. To provide an example, Participant-11 reflected that teachers should give enough chance to the students who make mistakes instead of giving the word to other students as in the below vignette:

A teacher should continue with that student even the student made a mistake or not. I mean, especially when the student makes a mistake, the teacher shouldn't call any other student, but he should continue with that student [...] (P11-2)

Öğretmen herhangi birşeyi öğrenci söyledikten sonra mesela, yanlış veya doğru olsun, hani o öğrenci üzerine devam etmeli. Hani yanlış olduğunda hele zaten diğer öğrencilere geçmek yerine o öğrenci üzerine devam edilmesi gerektiğini düşünüyorum mesela [...]

Three participants mentioned “Shaping students” that is shaping students, teaching them their roles, and distributing student roles appropriately, which was not mentioned in the second reflections. This sub-issue was noticed by only 2 participants in the first interviews, and it was not noticed in the first reflections. The issue “Student differences” referring to being aware of student differences, and knowing students was mentioned only by 2 participants in the second interviews, and it was not mentioned in the second reflections. This sub-issue was not noticed in the first interventions.

The noticed teacher roles related to the General Pedagogical Knowledge in the second interventions were given above. As stated, the most noticed sub-issues in the second interviews were “management” and “approach”. The sub-issues which were not noticed in the second interventions, on the other hand, were “decision-making”, “competition”, “expectations”, and “engaging”. In the following part, the teacher roles related to the Curriculum Knowledge noticed in the second interventions are provided.

4.1.2.1.1.3. The Sub-Issues related to Curriculum Knowledge in the Second Interventions

As indicated before, in the second interview, 14 out of 15 participants were able to talk about Curriculum Knowledge. There were 11 sub-issues related to this main-issue, which were briefly given in the method section (see Table 3.6). In the second interventions, 8 of these sub-issues were noticed while this number was 10 for the first interventions.

The noticed sub-issues in the second interventions were “materials”, “planning lesson”, “connections”, “wrapping up”, “introduction”, “new curriculum”, “being prepared”, and “student levels”.

In terms of frequencies, the issue “Introduction”, which refers to the effective introduction to the lesson, stating the aim of the lesson, and providing students with the basics, was mentioned by 9 participants in the second interviews, and also it was the most popular role noticed in the second reflections with 13 participants. When compared to the first interview (3 participants) and first reflections (1 participant), it can be seen that the number of the participants noticing this sub-issue highly increased from the first to the second interventions. For example, Participant-14 reflected on this role both in the second interview and in the second reflections. He reflected in the second interview that the teacher told students the object of the lesson and what they need to do, which is one of the roles of a teacher:

He started the lesson through telling the aim of the lesson, and what the students would do. Isn't it already one of the roles of a teacher? We should announce what we're going to do. (P14-2)

Dersin amacının ne olduğunu, bu derste ne yapacağımızı söyleyerek başladı derse. Zaten bu da öğretmen rollerinden bir tanesi değil mi. Bu derste ne yapacağız. Onu söyleyeceğiz çocuklara.

In the second reflections, on the other hand, he reflected on how the teacher effectively started to the lesson and provided a basis first:

He is drawing students' attention to the lesson through the history of mathematics and real life examples. He is warming up the students to the concept of ratio with Fibonacci, golden rate etc. (P8-R2)

Derse matematiğin tarihiyle ve günlük yaşamdan örnekler vererek ilgi çekiyor. Fibonacci, altın oran vs. ile oran konusuna ısındırıyor.

In the online discussions, parallel to the second interview, this issue was emerged. For instance, during the discussions on the third video watched, Participant-11 reflected on how the teacher in the video started to the lesson both through underlying the strong and weak points:

I agree with you on the golden ratio issue. The idea to start to the lesson like that is very effective in drawing students' attention, but as the others said the story was a little bit suspended. Because it was like all the students knew the ratio concept and they were just giving examples. But most probably the students didn't know it. In conclusion, the teacher could have given more information on the golden ratio concept. (P11-OD)

Altın oran konusunda sana katılıyorum gerçekten. Derse bu şekilde bir giriş gayet güzel bir fikir, dikkati çekmek adına, fakat söylendiği gibi hikâye sanırım biraz askıda kaldı, çünkü altın oran herkes tarafından biliniyormuş da bir örnekleme yapılıyor gibi oldu, ama çocuklar bilmiyorlardı büyük bir ihtimal. Sonuç olarak altın oran hakkında daha fazla bilgi verilebilirdi.

In the second interview, 7 out of 15 participants mentioned the issue "Materials". In other words, several participants were able to reflect on issues such as preparing and using correct materials in an accurate way without creating misconceptions, and preventing misconceptions through the use of materials. This role was among popular roles noticed by the participants, which was the

most popular role noticed in the first interviews with 11 participants. To give an example, Participant-1 appreciated the teacher in the video for preparing effective materials and helping students understand the nets of a cube via these materials as in the below vignette:

[...] In the first video, the teacher tried to make students understand the concept of cubes, 3D objects by the materials she prepared. I liked that part a lot. Because the students were touching the materials. And the nets of the cubes were really good. She showed that cubes have more than one net. You know, in the books they always give only one net of cubes that is the classical plus-shaped. She showed very different ones... Through this, the students saw the nets which cannot be closed as cubes. For example, they realized that if the net is straight, it can not form a cube when it is closed. It was quite good in that respect. (P1-2)

[...] İlk videoda kendi yaptığı materyallerle öğrencilere hani küpleri, 3 boyutlu cisimleri kavratmaya çalıştı. O nokta çok güzeldi. Getirdiği... Çünkü dokunarak öğrenciler. Sonra bir de açınımları çok güzeldi. Küplerin farklı farklı açınımlarının olduğunu. Hani kitapta her zaman bir açınım verilir, klasik artı şeklinde. Çok farklı şekilde, dümdüz açılan... Yani bir de hani bu sayede öğrenciler açulamayacak şeyleri de gördü. Mesela dümdüz olsaydı onlar onu birleştiren bir küp olmayacağını da gördüler. Hani o açıdan çok güzeldi.

In the second reflections, on the other hand, only 2 participants were able to reflect on this issue. The number of the participants noticing this sub-issue in the first reflections, on the other hand, was 10.

Seven participants reflected on “Connections” referring to taking students’ preknowledge into account and connecting subjects. The number of the participants noticing this sub-issue was 5 in the first interviews. For example, Participant-3 praised the teacher in the video that she connected proportions to percentages and then to the measurement as in the below vignette:

...They called it ratio of one's shoots to the whole. What I liked is that the teacher connected it to achievement percentage. He didn't talk about just the ratio, but he connected it to the percentage concept as well... For example, in the example of towns, he used a term 3000 square kilometer. I liked it very much that they used terms such as measurement and square kilometers. It was really good that the teacher gave the ratio concept by relating it to other concepts or going back and revisiting and reminding the previous concepts. Not like, 'Ok, we learned the measurement concept, but it was in the past'. But like, 'In the example of ratio, we can use measurement... We can use ratio in any concept'. I liked this. (P3-2)

...Onun işte atabildiklerinin tüm atış sayısına oranı gibi birşey kullandılar. Mesela öğretmen oradan da direkt başarı yüzdesine bağladı. O mesela çok hoşuma gitti. Hani direkt sadece oran değil de yüzdeye geçti, bir anda... Mesela diğer verdiği kasaba örneğinde de işte, 3000 km kare gibi bir ifade kullandı. Orda da mesela ölçümler, km kare ifadesinin geçmesi benim açıkçası çok hoşuma gitmişti. Hani birşeylerle bağdaştırarak, ya da birşeyleri tekrar, nasıl söylesen, geri konulara bağlantı yaparak, dönüş yaparak, hatırlatarak, onları da kullanarak bunu ifade etmesi çok güzeldi. Ha tamam ölçüleri öğrendik, o orda kaldı değil. Mesela bir oran örneğinde de biz ölçümleri... Zaten hani herşeyde var gibi lanse edilmesi güzeldi açıkçası.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. For instance, during the discussions on the third video watched, Participant-12 criticized the teacher in the video for not connecting mathematical subjects:

[...] I believe that it would be more effective to mention units after strengthening their understanding with a couple of different examples. And also the connection to the fractions in the first lesson was deficient, which was really important. As a matter of fact, a fraction model constitutes the finest examples for ratio concept... In the following lesson, the teacher might have done that. (P12-OD)

[...] Farklı bir kaç örnekle pekiştirildikten sonra birimlere değinmek daha etkili olurdu bence. Ve ilk derste kesirlerle ilişkilendirme eksik kaldı ki, bu önemliydi. Bir kesir modeli oran için en güzel örnekleri oluşturuyor aslında... İkinci ders bu konuya değinilmiş de olabilir.

Similar to the first reflections (8 participants), in the second reflections this role was among the popular roles noticed with 10 participants. For example, Participant-8 commented that the teacher in the video connected the subjects in the lesson:

The teacher tries to assess students' basic knowledge on the concept through the questions...He mentions the connection between the concepts. (P8-R2)

Sorularla öğrencilerin konuyla ilgili alt yapısını ölçmeye çalışıyor... Konular arasındaki ilişkiye değiniyor.

With respect to the other issues related to Curriculum Knowledge, 5 participants mentioned "New curriculum" that is understanding the new curriculum and being able to adopt it; 3 participants mentioned "Being prepared" for the lesson; and 7 participants talked about "Student levels" referring to the suitability of the lessons to the levels of the students. With respect to the last role, Participant-10 reflected that the level of the problem in the video was not appropriate for the level of students:

[...] In my opinion, the question was much ahead of students' capacities...I learned it myself when I was in university, and if I didn't, I wouldn't understand anything about it when I watched it in the video. (P10-2)

[...] Zaten soru bence o an kapasitenin üstündeydi... Kendim ben onu üniversitede öğrendim ve üniversitede öğrenmeseydim videoda izlediğimde ben de hiçbirşey anlamazdım.

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To provide an example, during the discussions on the third video watched, Participant-13 discussed whether the level of activities was appropriate for the grade level of the students or not as in below:

Guys, I don't agree with you on the appropriateness of the selected activities. In this lesson there was nothing new the students learned. Most of the students were able to give answers to the teacher's questions raised at the beginning of the lesson. I think they already knew the subject. The activity should have been more challenging in order to build new understandings on what students knew. When I watched the activity, I thought that it was more appropriate for primary grades (third or fourth grades for example). We try to descend to students' level through activities and concrete examples which is very nice, but I believe that the level of this lesson was way too low. What do you think about this? (P13-OD)

Arkadaşlar ben seçilen etkinliklerin uygunluğu konusunda sizlere katılmıyorum. Bu derste öğrencilerin öğrendiği yeni birşey yoktu bence. Derse başlarken M hocanın sorduğu sorulara çoğu öğrenci yanıt verebildi. Bu konuyu zaten biliyorlardı gibi geldi bana. Çocukların oran konusunda bildiklerinin üzerine yeni birşeyler inşa etmek için biraz daha üst düzey bir etkinlik olmalıydı. Bu etkinliği izlediğimde ilköğretim birinci kademe (örneğin 3. ya da 4. sınıflar) için daha uygun olabileceğini düşündüm. Etkinlik yapıp somut örnekler vererek çocukların seviyesine inmeye çalışıyoruz, bu çok güzel ama bu derste birazda çocukların seviyesinin altına inilmiş gibi geldi bana. Siz neler düşünüyorsunuz bu konuda?

The teacher role "Planning lesson" that is making lesson plans and being flexible in lesson plans was mentioned by 4 participants, and it was not mentioned in the second reflections. The number of the participants noticing this sub-issue was 2 in the first interviews, and it was not noticed in the first reflections. For example, Participant-1 reflected on this role in the second interview via commenting on how the teacher changed the flow of the lesson according to students' needs as in below:

The lesson was adjusted according to the students' needs and to the way they directed it. Ok, there is a lesson plan the teacher prepared, but. I mean it was good that the teacher also focused on the issues the students couldn't get. (P1-2)

Hani resmen eksiklerini görerek, öğrencilerin yön verdiği şekilde gitti ders. Tamam, bir programı var hani, bir plan yapmış ama. Hani o şekilde de hani bilmedikleri noktalara da yönelmesi çok güzeldi.

Only one participant mentioned the issue “Wrapping up” the lesson in the second interviews while it was noticed by 6 participants in the first interviews. On the other hand, similar to the first reflections, this role was mentioned by 4 participants in the second reflection papers. For example, Participant-4 mentioned this role in her reflection as in below:

The teacher wrapped up the lesson through an example after the students gave their examples. (P4-R2)

Öğrenciler örnek verdikten sonra kendisi de örnek vererek topladı.

While Participant-4 noticed that the teacher was able to wrap up the lesson, Participant-6 criticized another teacher for not being able to achieve this:

This week, I can not criticize the teacher about not finishing the lesson as I did in the videos we watched in last 2 weeks, because the concept of ratio is long and it can not be covered in an hour. But still, he could have gone over the concept in the last 5 minutes. He could ask what they did in that lesson. We don't know; he might have started the second lesson that way after the break [...] (P6-R2)

Oran konusu uzun ve bir saatte işlenemeyecek bir konu olduğu için 2 haftadır izlediğim videolarda öğretmenin dersin kapanışını yapamaması eleştirilerini bu hafta yapamıyorum. Ancak yine de

belki son 5 dk tekrar gibi birşey yapılabilirdi. Yani bu ders ne işledik denilebilirdi. Belki de tenefüsten sonra 2. derse böyle bir giriş yapılacaktı [...]

Suitability of the lessons to the levels of the students that is “student levels” was mentioned by only one participant in the second reflections where “new curriculum” and “being prepared” were not noticed in the second reflections.

The noticed teacher roles related to the Curriculum Knowledge in the second interventions were given above. As stated, the most noticed sub-issues in the second interviews were “introduction”, “materials”, “connections”, and “student levels”. The sub-issues which were not in the second interventions, on the other hand, were “challenging mathematics”, “student knowledge”, and “guide book”. In the following part, the teacher roles related to the Content Knowledge in the second interventions are provided.

4.1.2.1.1.4. The Sub-Issues related to Content Knowledge in the Second Interventions

As indicated before, in the second interview, only 2 out of 15 participants were able to talk about Content Knowledge, and this frequency was lower than that of in the first interviews (4 participants). In the second reflection papers, on the other hand, again 2 participants mentioned this role, but with a higher frequency than that of the first reflections (1 participant). There is only one sub-issue under this main-issue that is, “Subject matter knowledge”. This issue refers to having subject-matter knowledge, knowing what to/how to do, being qualified, and not giving wrong examples. For example, one of the participants (Participant-10) mentioned that:

In the first video, the teacher was like prepared for the lesson. She brought cubes to the class. She was also mastered in the concept. (P10-2)

İşte mesela ilkinde şeydi hani. Hoca evet derse hazırlıklı gibi gelmiş. İşte yanında küp getirmiş. Konuya da hâkim.

As seen from the vignette above, this role was not only mentioned by only few participants, but also mentioned briefly in the second interventions. The noticed teacher roles related to the Content Knowledge in the second interventions were given above. In the following part, the “Other” teacher roles with respect to the *Methodological Perspective* in the second interventions are provided.

4.1.2.1.1.5. The Sub-Issues related to the “Other” Role with respect to the Methodological Perspective in the Second Interventions

As indicated before, in the second interview 9 out of 15 participants were able to talk about “Other” teacher roles with respect to the *Methodological Perspective*. There were 8 sub-issues related to this main-issue, which were briefly given in the method section (see Table 3.6). In the second interventions, 4 of these sub-issues were noticed by the participants. These sub-issues were “motivation”, “experience”, “reaching targets”, and “classroom culture”.

In terms of frequencies, similar to the first interviews, the most popular issue noticed in the second interviews was “Classroom culture”. That is, 6 participants were able to reflect on creating classroom culture where students are not afraid of making mistakes and feel comfortable, and preventing students from interfering with each other. For example, Participant-14 mentioned that:

The students should be made aware that the true virtue is to help their friends on the board. It is hard. But it can happen in time. (P14-2)

Hâlbuki esas erdemin orda tahtaya kalkan arkadaşlarına yardımcı olmak olduğu bilinci kazandırılmalı. Bu zor. Ama olur yani zamanla.

As seen from the vignette above, Participant-14 discussed that one of the responsibilities of a teacher should be creating a classroom culture where the students help and support each other.

In the second reflection papers, on the other hand, only one participant was able to reflect on this role, being parallel to the first reflections.

In the second interview, the issue “Experience” referring to the effects of teacher experience was mentioned by 3 participants while it was noticed by 4 participants in the first interviews. These two sub-issues were not reflected in the reflection papers. For example, Participant-2 mentioned the effect of teacher experience as in the below vignette:

I believe that it is related to experience a little bit. I mean, it is not like ‘I studied it at home, this is my lesson plan, and I will use it in the class’. Everything changes when you enter the classroom. What I mean is it is very different to put it into practice. (P2-2)

Yani bunun biraz da tecrübeyle alakalı olduğunu düşünüyorum. Yani bu hadi evde çalıştım, bu benim ders planım, getireyim burada uygulayalım dediğim anda işte o iş değişiyor. Yani demek istediğim pratiğe dökmek bu işi çok farklı.

Referring to being able to reach targets, the teacher role “Reaching targets” was mentioned by 2 participants in the second interviews, and was mentioned only once in the second reflections. This sub-issue was not noticed in the first interventions. Similarly, the issue “Motivation” referring to motivating and encouraging students to ask and answer questions, and sharing their ideas was mentioned by 2 participants. This sub-issue was not noticed in the first interventions.

The noticed teacher roles related to the “Other” main-issue in the second interventions were given above. As stated, the most noticed sub-issue in the second interviews was “classroom culture”. The sub-issues which were not noticed in the second interventions were “self-esteem”, “effective instruction”, “technology”, and “student expressions”. Except from the “technology”, the other sub-issues were noticed in the first interventions by 2 or 3 participants.

With the “Other” roles with respect to the *Methodological Perspective*, the noticed teacher roles related to the *Methodological Perspective* are completed. In the following part, the teacher roles related to the *Attitudinal Perspective* in the second interventions are provided.

4.1.2.1.2. The Sub-Issues related to Attitudinal Perspective in the Second Interventions

As indicated previously, the *Attitudinal Perspective* was the second main theme. In the second interview, 10 out of 15 participants mentioned *Attitudinal Perspective*. There were 10 sub-issues related to this theme (see Table 3.6), and in the second interventions 6 of them were noticed by the participants, which was 3 in the first interventions. The sub-issues noticed in the second interventions were “mathematics as a fun”, “enthusiasm”, “valuing ideas”, “knowing students”, “patience”, and “student psychology”.

In terms of frequencies, in the second interview, 5 participants mentioned the issue “Mathematics as a fun”. This issue refers to the teacher roles such as having students like mathematics lessons, drawing their attention, warming them up, motivating them, making mathematics fun, and ensuring student participation. This sub-issue was noticed by 3 participants in the first interviews. To give an example, Participant-15 mentioned that the teacher in the video achieved to make the lesson more fun and engaging for students as in below:

[...] As I said, since he treated students well, he was caring and considerate, the students wanted to participate more in that lesson. The students played a game, for example. These things of course attract students. They enjoy such things. They were all willing to participate. They shouted like ‘I want to join, I want to join’. Since the activity was from real life and the students were interested in it, it was more enjoyable. (P15-2)

[...] Dediğim gibi hani öğrenciye anlayışlı ve böyle sevgi dolu hem de saygılı yaklaştığı için M hocaya çok daha fazla katılmak istediler. Mesela oyun falan oynandı böyle. Bunlar tabi ki öğrenciyi çeken şeyler, hoşuna giden şeyler. Herkes gönüllü olmak istedi. Ben istiyorum, ben istiyorum diye atıldı yani öğrenciler. Ama hem yani o yapılan oyun günlük hayattan olduğu için hem de öğrencilerin de ilgisi olduğu için o aktiviteler daha güzel geçti.

This role was the most popular role noticed in the second reflections while it was noticed only by one participant in the first reflections. That is, ten participants were able to mention drawing students’ attention in the second interviews. For example, Participant-13 reflected on this issue via criticizing that the teacher in the video could not conduct a lesson where the students were engaged and attentive:

Students’ answers to the question what they think the ratio is show students’ interest in the concept. But it looks they lose their interest in the concept later on. I believe that in general the lesson didn’t go well enough to attract the students’ attention all through the lesson. (P13-2)

Oran deyince aklınıza ne geliyor sorusuna çocuklardan gelen yanıtlar başta konuya ilgilerinin olduğunu gösteriyor. Ama sonradan çocukların konuya çok da ilgileri kalmıyor gibi... Genel olarak dersin öğrencilerin ilgisini çekecek seyirde yürümediğini düşünüyorum.

The other roles under *Attitudinal Perspective* were only mentioned by two participants each. More specifically, these roles were “Enthusiasm” that is

enjoying her job, being enthusiastic, being willing to implement the new curriculum; “Valuing ideas” that is valuing student ideas, listening to them, and trusting them; “Knowing students” that is knowing her students and their names; “Patience” that is being understanding and patient toward students; and “Student psychology” that is taking student psychology into account, and giving particular reinforcement to each student. Except from “valuing ideas”, these sub-issues were not noticed in the first interventions.

Among these roles, in the second reflections, 4 participants reflected on the role “Valuing ideas”. For example, Participant-5 reflected that:

Students’ ideas and suggestions are valued. Through the reinforcements such as ‘You know it, you can do it’, they are encouraged. (P5-R2)

Öğrencilerin görüş ve sözleri önemseniyor. Onlara siz bunu biliyorsunuz, yaparsınız imajı pekiştireçler ile veriliyor.

As seen from the vignette above, Participant-5 appreciated that the teacher in the video valued student ideas, and encouraged and trusted them.

The noticed sub-issues related to the *Attitudinal Perspective* in the second interventions were given above. As stated, the most noticed sub-issue in the second interviews was “mathematics as a fun”, but by only one third of the participants. This sub-issue was mentioned in the second reflections by the majority of the participants. The sub-issues which were not noticed in the second interventions were “comfort”, “positive attitude”, “voice tone”, and “respect”. In the following part, the teacher roles related to the “*Other*” theme in the second interventions are provided.

4.1.2.1.3. The Sub-Issues related to the “Other” Theme in the Second Interventions

The last main theme, other than *Methodological* and *Attitudinal Perspectives*, was the “Other” theme. In the second interview, 10 out of 15 participants talked about the issues related to the “Other” theme. There are 3 main-issues related to this theme that are Teacher Characteristics, Equity, and Out-of-Class Activities. In terms of the frequencies, among 15 participants, 6 talked about Teacher Characteristics, 9 talked about Equity, and only one talked about Out-of-Class Activities.

In the following part, the sub-issues related to the main-issues that are Teacher Characteristics, Equity, and Out-of-Class Activities are provided respectively with their frequencies and related vignettes from the second interventions.

4.1.2.1.3.1. The Sub-Issues related to Teacher Characteristics under the “Other” Theme in the Second Interventions

In the second interview, 6 out of 15 participants talked about Teacher Characteristics. There were 4 sub-issues related to this main-issue, and all of them were noticed in the second interventions. These sub-issues were “self-improvement”, “self-assurance”, “mistakes”, and “collaboration”. In the first interventions, on the other hand, only 2 of these sub-issues were noticed by the participants.

In terms of frequencies, the issue “Mistakes” referring that teachers should be able to be aware of the fact that they can make mistakes and must correct them was noticed by only 3 participants with the highest frequency under the issue Teacher Characteristics. This sub-issue was only noticed once in the first interviews. To provide an example, in the second interview, Participant-14 mentioned that a teacher can make a mistake, but what is important is realizing and correcting it:

I do not claim that 3-second-mistake would cause a misconception. Ok, the teacher makes a mistake, she says something wrong, but if she corrects it, then it would not be a problem. Besides, they generally correct it. They notice their mistakes. (P14-2)

Yani o 3sn'lik hata öğrencilerin kavram kargaşasına yol açar demiyorum. Tamam, öğretmen bir hata yapıyor, birşeyi yanlış söylüyor, ama onu düzeltiyorsa bir sorun yok demektir. Ki çoğunlukla düzeltiyorlar. Hata yaptıklarının farkına varıyorlar.

In the second interview, 2 participants mentioned the roles “Self-improvement” referring to being willing to improve oneself and not resisting to innovations; “Self-assurance” referring to being well-equipped and cultured, and having self-assurance; and “Collaboration” referring to being in communication and collaboration with other teachers. Among these sub-issues “self-improvement” and “collaboration” were not noticed in the first interventions while “self-assurance” was only noticed once in the first interview. For example, in the second interview, Participant-14 reflected on the role “self-assurance” as in below:

I look whether the teacher can help students from different perspectives. Like whether she has a lot of things to offer students. (P14-2)

Öğrencilere farklı farklı yönlerden yardımcı olabiliyor mu ya bakıyorum. İşte cebinde, çantasında öğrencilere sunabileceği çok şey var mı.

None of the sub-issues under Teacher Characteristics were mentioned in the second reflection papers.

The noticed teacher roles related to the Teacher Characteristics under the “Other” theme in the second interventions were given above. In the following

part, the teacher roles related to the Equity issue under the “*Other*” theme in the second interventions are provided.

4.1.2.1.3.2. The Sub-Issues related to Equity under the “*Other*” Theme in the Second Interventions

In the second interview, 9 out of 15 participants talked about Equity, which makes it the most popular main-issue noticed related to the “*Other*” theme. There were 5 sub-issues related to this main-issue (see Table 3.6). Similar to the first interventions, 4 of these sub-issues were noticed in the second interventions. These sub-issues were “reaching all”, “ensuring understanding of all”, “addressing to students with different levels”, and “activating all”.

In terms of frequencies, in the second interview, the most popular teacher role noticed by 6 participants was “Reaching all” referring to addressing to all students, letting students who don’t raise their hands speak, and thus not losing the students who are successful in the classroom but not in the exams. The number of the participants noticing this sub-issue was 4 in the first interviews. For example, in the second interview, Participant-4 reflected on this role via praising the teacher in the video for reaching all students as in the below vignette:

Absolutely, yes. She tried to include all students in the lesson. She didn’t work with a specific student group. Besides, she did a group work with whole group...She tried to make all students reach the same point. (P4-2)

Evet kesinlikle. Herkesi derse katmaya çalıştı. Belirli bir öğrenci grubuyla çalışmadı. Zaten bütün grupla birlikte bir grup çalışması yaptı... İşte her öğrencinin ulaşmasını sağlamaya çalıştı aynı şeye.

Another participant also reflected that teachers should reach all and give word to the students who do not raise their hands:

You know, it is always safer to implement the lesson with active students. But I think, it would be better if we give word to the students who don't know the subject, and correct their mistakes. (P6-2)

Hani genelde parmak kaldıran öğrencilerle dersi yürütmek çok daha yani şey... Belki güvenli geliyor. Evet ama bilmeyen öğrencileri de hani kaldırıp onların yanlışlıklarını düzeltirsek çok daha iyi olur diye düşünüyorum.

This role was mentioned only by 2 participants in the second reflections as in the first reflections.

The roles “Ensuring understanding of all” that is ensuring understanding of all students and “Activating all” students were mentioned by 4 participants each, and only the last was mentioned in the second reflections by 2 participants. To provide an examples, with respect to the first, that is “ensuring understanding of all”, Participant-2 reflected in the second interview that:

For example, having students at the board sit down again. I found it really awkward and traditional. I mean it shouldn't be like that anymore. I said that we shouldn't do this. Because we should give a chance to every student, we should assure that all students learn. If we want social achievement instead of individual achievement, this is really important. I mean it is more important that the students who don't get it understand it rather than the ones who understand it already. (P2-2)

Tahtaya kaldırılan öğrencinin yerine oturtulması mesela. Benim çok garibime gitmişti ve çok traditional gelmişti bana. Yani bu artık olmaması gerekir, bunu da yapmayalım demiştim. Çünkü her öğrenciye şans verilmeli, her öğrencinin anlaması sağlanmalı. Bireysel başarı değil de toplumsal başarı istiyorsak, onun için bu çok önemli. Yani soruyu bilen ya da soruyu yapan değil de, yani anlamayanların anlaması bence daha çok önemli.

As seen from the vignette above, Participant-2 noticed how important was to ensure the understanding of all students.

With respect to the second role “Activating all” students, Participant-10 made comments both in the second interviews and in the second reflections. For example, she reflected in the second interview that:

For example, the only thing I didn't like in the third video was teacher's... He only let 4 students play the game, only a few. If I were in that classroom, I would be upset that I didn't play the game. I wish it would be something which involved all students... I wish the teacher either engaged all classroom or he didn't play the game with those 4 students. I wish all students were engaged in the activity. (P10-2)

Mesela ben hocanın, 3.de sadece o şeyi beğenmemiştim. Oyunu birkaç öğrenci, oyun oynatıyor hani 4 kişiye. Mesela ben o sınıfta olsaydım üzülürdüm o oyunu ben de oynamadığıma. Hani keşke böyle bütün sınıfı daha ilgilendiren birşey olsaydı... Hani ya sınıfın hepsini alsaydı ya da o 4 kişiyle oynamasaydı bence. Hani o sınıfın hepsi olsaydı keşke.

While Participant-10 criticized the teacher in the second interview for not activating all students, and put herself into the students' shoes; similarly, in the second reflections she commented on how students would feel when they were not actively involved in the lesson:

I wouldn't want to be in the shoes of the students who were sitting during the game. I would prefer at least that the activity was a group activity. (P10-R2)

Ben oturan öğrencilerin yerinde olmak istemezdim oyun esnasında. Aktivitenin en azından grupça yapılabileceği bir oyun olmasını tercih ederdim.

Parallel to the first interviews, 2 participants mentioned the role “Addressing to students with different levels” referring to reaching all students

with different levels, equally. This role was not mentioned in the second reflections as in the first. One of these participants (Participant-4) for example, reflected on this role in the second interview as in below:

He enters the classroom. But suppose that they are both 6th grades. He teaches a different class. I mean while one of the classes is quiet, the other might be very noisy. Students in different classes may not respond to the teacher's actions in the same way. For example, they may not care even if the teacher warns them and may continue their misbehaviors. Thus, it is up to the nature of the groups. This teacher was lucky that he ended up with a well-behaved group. (P4-2)

Şubeye giriyor. Ama 6. sınıf ikisi de mesela. Farklı bir sınıfa giriyor. Yani bir şubede çok sessizken, diğer şubede acayip olabiliyor yani. Hocanın verdiği aynı tepkiyi öğrenci hiçbir şekilde yani takmıyor. Yani hoca mesela yine uyarıyor ama öğrenci takmıyor ve aynı şekilde hareket etmeye devam edebiliyor. Onun için biraz gruplara da bağlı. M hoca biraz daha şanslı bir gruba denk gelmiş gibi geldi bana.

The noticed teacher roles related to the Equity issue under the “*Other*” theme in the second interventions were given above. The most noticed sub-issue in the second interviews was “reaching all”, and the only sub-issue which was not noticed in the second interventions was “maximum capacity”. This sub-issue was not noticed in the first interventions either. In the following part, the teacher roles related to Out-of-Class Activity under the “*Other*” theme in the second interventions are provided.

4.1.2.1.3.3. The Sub-Issues related to Out-of-Class Activity under the “*Other*” Theme in the Second Interventions

In the second interviews, only one participant talked about the main issue Out-of-Class Activity. There were 3 sub-issues related to this main-issue, which were “preparing students for their future careers”, “parental support”, and “following students”. In the second interviews, only “parental support” was

noticed by the participants. Similarly, only one sub-issue was noticed in the first interventions, but it was “preparing students for the future” in that case.

In terms of frequencies, in the second interview, the only issue mentioned in the second interviews that is “Parental support” was mentioned only once. In the second reflection papers, on the other hand, none of the participants reflected on Out-of-Class Activities.

In the next section, the noticed issues in the third and the last interview with respect to the teacher roles in reform-minded teaching are documented. Additionally, the frequencies and vignettes are supported by the data from the third reflection papers and online discussions.

4.1.3. The Main Themes related to Teacher Roles in the Third Interview and the Third Reflection Papers

As indicated before, there were 3 main themes related to teacher roles that are *Methodological Perspective*, *Attitudinal Perspective*, and “*Other*”.

Among the 15 participants, data analysis indicated that in the third interviews, all participants were able to talk about *Methodological Perspective*. On the other hand, 14 out of 15 participants talked about *Attitudinal Perspective* and 12 participants mentioned the “*Other*” theme.

In the third reflection papers, all participants were able to talk about *Methodological Perspective* and 10 participants reflected on *Attitudinal Perspective*, but only 2 participants reflected on the “*Other*” theme.

In the next part, the main-issues related to the main themes are provided.

4.1.3.1. The Main-Issues related to the Teacher Roles in the Third Interventions

In the following part, frequencies of the main-issues related to *Methodological Perspective* are provided in detail. First, the frequencies in the third interview and then in the third reflection papers are documented with the

comparison to the first and second interventions. Related vignettes from the online discussions are also provided.

4.1.3.1.1. The Main-Issues related to Methodological Perspective in the Third Interventions

As indicated before, among the 15 participants, all participants were able to talk about *Methodological Perspective* in the third interviews. Among those, all of the participants reflected on Pedagogical Content Knowledge, General Pedagogical Knowledge, and Curriculum Knowledge. Additionally, 5 participants talked about Content Knowledge, and 13 mentioned the “Other” roles with respect to the *Methodological Perspective*.

In the third reflection papers also, all participants were able to reflect on teachers’ Pedagogical Content Knowledge. In terms of other main-issues related to *Methodological Perspective*, 12 participants reflected on General Pedagogical Knowledge and Curriculum Knowledge, only one participant mentioned Content Knowledge, and 9 reflected on the “Other” role.

In the next part, the sub-issues related to Pedagogical Content Knowledge in the third interventions are presented with their frequencies. The related vignettes are also provided.

4.1.3.1.1.1. The Sub-Issues related to Pedagogical Content Knowledge in the Third Interventions

As indicated before, in the third interview –as in the first and second- all of the 15 participants were able to talk about Pedagogical Content Knowledge. As mentioned before, there were 21 sub-issues related to this main-issue (see Table 3.6). In the third interventions, all of these sub-issues were noticed by the participants where the numbers of the noticed sub-issues were 18 and 17 in the first and second interventions respectively (see Appendix 7).

The most common issue noticed in the third interviews was “Representations” that is using multiple instructional methods and multiple representations, selecting the most appropriate method for student understanding, and using instructional methods and conducting lessons in line with the new curriculum. All of the 15 participants mentioned this role while 8 and 12 participants noticed it in the first and second interviews respectively. For example, Participant-5 mentioned that there are multiple ways of representations in the new curriculum, and it is a responsibility of teachers to know and use them:

There is not only the use of counters in the new curriculum; there is the number line, different materials, different activities to explain a subject. There are tens of activities. We try to know and learn all of them so that the students can learn it in the way they can easily understand. If this is our target, we have to do this... Not all students learn in the same way. I mean, this is our target [...] (P5-3)

Yeni sistemde sadece counter yok, sayı doğrusu var değişik materyaller var, değişik etkinlikler var aynı konuyu anlatmak için. Onlarca etkinlik var. Bunların hepsini bilmeye, öğrenmeye uğraşıyoruz ki öğrenci hangisiyle rahat anlarsa o şekilde anlansın. Amacımız oysa bunu yapmamız lazım diyorum... Her öğrenci aynı şekilde öğrenmez. Yani amacımız budur [...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this issue. To give an example, during the discussions on the sixth video watched, several participants reflected on the vitality of using multiple representations in a classroom. One of these participants reflected that:

The aim of this lesson was teaching the multiplication in decimal fractions. But this aim was not reached. Because the teacher directly started the lesson by telling the students that they should not consider the commas while doing multiplication in decimal numbers and they should multiply the numbers as if they were

natural numbers. She showed it in an example, and added the commas later. She did not mention why they did it that way, where it came from, where it was useful to use it. So, I think that only the procedural knowledge was developed. She might have given multiple representations, but if you do not build a connection between those multiple representations all those methods would be left unsupported as in this lesson. I think that multiple representations, one of the essentials of the new curriculum, are not independent from each other and I believe that it should be taught to the students. (P6-OD)

Bu dersin amacı ondalık kesirlerde çarpma işlemini kavratmaktı. Ancak amacına ulaşamadı. Çünkü öğretmen derse direk olarak ondalık sayılarda çarpma işlemi yaparken virgülleri görmüyoruz bildiğimiz 2 basamaklı sayılarda çarpma işlemi yapıyoruz dedi bunu bir örnek üzerinde gösterdi ve daha sonradan virgülleri ekledi. Neden bu işlemi böyle yapıyoruz bu nereden geliyor nerelerde kullanmamız bizim işimize yarayabilir bunlardan hiç bahsetmedi. Bu yüzden sadece procedural knowledge oluştu diye düşünüyorum. Farklı yollardan gösterim yapmış olabilir ama farklı gösterimler arasında bağlantı kurulmazsa tüm yöntemler havada kalır bu derste olduğu gibi. Ben yeni müfredatın olmazsa olmazlarından olan farklı gösterim yollarının birbirinden bağımsız olmadığını düşünüyorum ve bunun öğrenciye de kavratılması gerektiğine inanıyorum.

While the Participant-6 discussed above that it is not enough to use different representations alone, but it is also necessary to build a connection between them; another participant commented that the use of multiple representations brings about long-lasting learning, which is one of the critical elements of the new curriculum:

The teacher drew a hundred-block on the board. There were two different representations of 0.7×0.3 . I believe that multiple representations are more long lasting. This is one of the important points to be applied in the new curriculum. (P2-OD)

Tahtadaki tabloda 100'lük blok oluşturuluyor. Burada da yine $0,7 \times 0,3$ 'ün 2 farklı gösterimi yer alıyor. Farklı gösterimler akılda

daha çok kalıcı olur diye düşünüyorum. Bu da yeni müfredat açısından uygulanması gereken bir püf nokta.

Another participant also reflected on this issue, but this time via criticizing the deficient use of multiple representations:

She could have used the hundred-block more effectively. She could have shown the region showing the multiplication of two decimal numbers through the area of rectangle. She couldn't use the material very effectively. (P9-OD)

Yüzlük bloğu çok daha verimli kullanabilirdi. İki ondalık sayının çarpımını gösteren bölgeyi dikdörtgenin alanından yola çıkarak gösterebilirdi. Çok verimli kullanamadı bu materyali.

In the reflection papers, on the other hand, less than half of the participants mentioned this role. More specifically, 7 participants reflected on using multiple representations, which was a higher frequency than the first (5 participants), but slightly lower than the second reflections (8 participants). For example, Participant-13 honoured the teacher in the video that she asked for different ways of solutions from the students:

After showing the solution, she asks for different ways of solutions from the students. (P13-R3)

Çözümü gösterdikten sonra farklı çözüm yollarını öğrencilerden istiyor.

In the third interview, 14 out of 15 participants mentioned the issue “Facilitation” referring to facilitating and assisting students, helping students discover, and providing hints when necessary. This role was among the most popular roles that the participants noticed. The numbers of the participants noticing this sub-issue were 9 and 10 in the first and second interviews respectively. For example, Participant-11 mentioned in the third interview that:

I think the role of the teacher should have to be facilitating student understanding. To let students discover...Teachers' role should be making students think and find the answers by themselves [...] (P11-3)

Ve de öğretmenin rolü de bir yönlendirme şeklinde olması gerekirdi diye düşünüyorum. Hani çocukların kendi birşeyleri keşfetmesi adına... Gerçekten öğretmenin rolü hani orda düşündürmesi gerekirken mesela bazı şeyleri çocuklara buldurmaya [...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To provide an example, during the discussions on the six and the last video watched, Participant-4 reflected on how discovery method should be used in a class as in the below vignette:

To begin with, we shouldn't start a lesson by giving the rules for multiplication. On the contrary, we should give the rules after students discover it. Even we should let students reach the rules themselves. During the discovery part, in my opinion, first the multiplication of natural numbers and then of fractions should be reminded, and by emphasizing that decimal fraction is a type of fractions, the transition to the multiplication in decimal fractions should be made. That way, the students can understand that this rule comes from the multiplication in fractions. In this way, we would connect it to the other subject without leaving it as an isolated topic. I think it is one of the targets in constructivism. (P4-OD)

Bir kere en baştan çarpmanın kuralı verilerek derse başlanmamalı. Aksine en son öğrencilerin keşfetmesi sağlandıktan sonra bu kural verilmeli hatta öğrencilerin kendilerinin ulaşması sağlanmalı. Dersin keşfettirme kısmında da bence önce doğal sayılarda sonra kesirlerde çarpma işlemi hatırlatılarak ve ondalık kesirlerinde bir kesir çeşidi olduğu üzerinde durularak ondalık kesirlerde çarpma işlemine geçiş yapılmalı. Böylece bu kuralın havadan değil de kesirlerde çarpma işleminden geldiği anlaşılır. Biz de böylece kesirlerde çarpma

işlemini ayrı bir konu olarak bırakmaktansa onu bir diğer konuya bağlayarak kullanmış oluruz. Sanırım bu constructivismın temel amaçlarından bir tanesi.

In the third reflection papers, on the other hand, only 3 participants reflected on this role. This number was 3 and 2 in the first and second reflections respectively. For example, in the third reflection paper, the Participant-1 reflected on letting students discover through criticizing the teacher in the video for not achieving this as in the below vignette:

I am not sure how appropriate and how much of discovery approach it was to write $0 < 0.2 < 1$ and ask students whether it was true or not. (P1-R3)

$0 < 0.2 < 1$ şeklinde yazıp, doğru mudur şeklinde soru yöneltmek ne kadar keşfettirmeye yönelik bir yaklaşım, ne kadar doğru anlayamadım.

Another most popular issue noticed in the third interview was “Reasoning”. This issue refers to motivating students to think and reason, not letting them memorize, giving the underlying meaning of concepts, letting students build their own knowledge, making students to reach generalizations, and ensuring long-lasting comprehension. Fourteen participants mentioned this teacher role while it was 11 both in the first and second interviews. To give an example, Participant-15 mentioned that the teacher in the video was not successful at having students reason and understand the rationale behind, and she also suggested alternative ways to teach the subject as below:

She brought a hundred-block. She didn't use a card, but a 10-to-10 block. She showed 0.4 and 0.2. She didn't say anything about where this came from. She said just like ‘this is 0.4 and this is 0.2. Let's multiply it. It is 0.8’. It could even be better if the students counted it. ‘How many cards I took from here, how much is it of the total, come here and show it as a fraction. Let's avert this

fraction into a decimal fraction'. I mean it would be different if she did it that way. (P15-3)

Ondan sonra işte yüzlük kart getirdi. Kart değil de blok kullandı bir tane 10'a 10'luk. Orda 0,4, 0,2yi gösterdi mesela. Yani bunun nereden geldiğini hiç söylemedi. İşte bu 0,4, bu 0,2 falan dedi böyle. Çarpalım 0,8. Onu mesela bir saydırsa bile bir öğrenciye olurdu. Şimdi buradan ben kaç tane kart aldım, bu bütünün ne kadarı ediyor, hadi biriniz gelsin bana bunu kesir olarak göstereyim. İşte şimdi de o kesri bir ondalık kesre çevirelim. Yani hani böyle yapsa, daha farklı olurdu.

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To provide an example, during the discussions on the sixth video watched, several participants criticized that the teacher in the video made students memorize and did not let them reason and discover. One of these participants reflected as below:

As my friends mentioned, the aim of the lesson was to teach multiplication in decimal numbers. But in my opinion, the students learned the algorithm of multiplication, in other words, they actually memorized. Unfortunately, there was no questioning or understanding the rationale. Only stereotyped sentences and new things to memorize were added to students' lives. (P11-OD)

Arkadaşların da söylediği gibi ondalık sayılarda çarpma işlemini kavratmaktı. Fakat öğrenciler bence çarpma işleminin algoritmasını öğrendiler başka deyişle aslında ezberlediler, fakat bir sorgulama ve mantığını kavrama gibi bir durum olmadı maalesef. Kalıplaşmış cümleler ve ezberlenecek şeyler eklendi öğrencilerin hayatına.

Similarly, another participant also criticized the teacher in the video for making students memorize:

The teacher openly insisted on making students memorize. Instead of giving the questions and waiting them to discover, she gave them the rule: when you multiply two decimal numbers

smaller than 1, the product will be smaller than the factors. Instead of directly giving this rule, I wish she would let students discover through examples. Let's accept that she didn't, at least she could have asked WHY after she gave the rule... (P10-OD)

Öğretmen öğrencilerine resmen ezber yapacaksınız diye diretti. Soruları verip öğrencilerin keşfetmesini bekleyeceğine çok güzel bir kural çıkardı verdi onlara: İden küçük ondalık sayıları çarparken sonuç iki çarpandan da küçük olur. Bunu direk söylemek yerine keşke örneklerle keşfettirilseydi, hadi bunu da yapmadı diyelim, bari bu kuralı verdikten sonra NEDEN diye sorsaydı...

Another participant also commented that the teacher in the video did not have students reason, but let them memorize as in the below vignette:

I get angry with that. When a student asks something or when it is needed to go back, telling students “what we talked about” or “we had a rule like this” is equal to the traditional education. It is more correct to explain one more time the rationale behind instead of making them memorize. We multiply and then put the commas after counting the decimal places! But why? For what? After all, if a student asks this, she asks because she didn't understand it from the beginning. It is wrong to ask that student whether she got it or not after telling her the rules and making her memorize. Especially when we are the members of a passive society who imitate that we get it even if we don't. The child says she get it even if she does not. (P2-OD)

Bir de ben bir olaya sinir oluyorum. Bir öğrenci birşey sorduğunda ya da başa geri dönmek gerektiğinde `biz ne demiştik` ya da `şöyle bir kuralımız vardı` demek eşittir traditional eğitim bence. Ezbere dayandırmaktan öte çocuğa tekrar işin mantığını anlatmak daha doğru. Normal çarpıp sonra virgüli basamakları sayıp ona koyuyorduk! Niye neden? Zaten çocuk bu soruyu soruyorsa anlamamış ki baştan, o yüzden soruyor. Ona, buna bu kural şuna bu kural deyip ezberletip tamam bitti anladın mı diye sormak yanlış. Hele de pasif bir toplumun anlasak da anladık taklidi yapan bireyleriysek. Çocuk yine anlamadıysa da anladım diyor.

Similarly, in the reflection papers, 13 participants were able to reflect on this role. The numbers of the participants noticing this sub-issue were 6 and 7 in the first and second reflections respectively. For example, Participant-1 criticized the teacher for giving rote learning instead of discovery as in the below vignette:

It is nothing different than giving a rote-learning instruction to tell students that they didn't have to put the commas one under the other while multiplying because they should calculate it as there was no commas. Neither was there inquiry nor discovery. There was not trace of it during the whole lesson. (P1-R3)

Çarpma işlemi yapılırken virgüller alt alta gelmek zorunda değildir, çünkü virgüller yok gibi işlem yapmalıyız demesi tekrar ezbere öğretim şeklinden başka birşey değil. Ne bir sorgulama, ne bir keşfettirme, hiçbirşeyden eser yoktu bütün ders boyunca.

Most of the participants (13 participants) mentioned "Activities". This issue refers to the teacher roles such as making activities, familiarize students with the activities, selecting appropriate activities and examples, preventing students from perceiving activities as games, and applying activities appropriately. This role was among the most popular roles noticed, which was noticed by 12 and 7 participants in the first and second interviews respectively. For example, Participant-7 reflected on how the teacher in the video let students discover through an activity as in the below vignette:

That teacher, for example, gave the lesson. He couldn't directly make the students discover all. Thus, he gave information first. Then, he assured student understanding through an activity, and he gave concrete examples. (P7-3)

M hoca da mesela dersi anlattı. M hoca direkt herşeyi keşfettiremezdi. O yüzden bazı şeylerin bilgisini verdi. Daha sonra öğrencilere sınıfta bir aktivite yaparak bunu kavramalarını sağladı, somut örnekler verdi.

In the third reflection papers, on the other hand, only one participant was able to reflect on this role. This sub-issue was noticed by 2 and 7 participants in the first and second reflections respectively.

Related to Pedagogical Content Knowledge, 12 participants mentioned the issue “Student-centeredness” in the third interviews, which was noticed by 9 and 13 participants in the first and second interviews respectively. This issue refers to activating students, conducting student-centered lessons, giving students opportunities, not directing students too much, and not being the center of the answer/approval process. Most of the prospective teachers noticed that one of the teacher responsibilities was activating students instead of being the center of the class, and not interrupting too much. This role was among the most popular roles noticed in the third interviews as in the first interviews while it was the most popular role in the second interviews. For example, Participant-2 mentioned in the third interview that:

Especially in the student-base lessons, the teacher tries to make it more student-centered, but still she can't stop herself from being at the center. Ok, she tries to make students active, calls them to the board, asks questions. Still, she gives all the directions. Then she expects the other things from the students. I think, she could give the students more responsibilities. (P2-3)

Ama özellikle student base derslerde öğretmenin biraz daha böyle yani onu student base yapmaya çalışıyor ama yine de kendini ortaya koymadan yapamıyor gibi bir durumlar oldu. Tamam, öğrenciyi aktif hale getirmeye çalışıyor, tahtaya kaldırıyor, sorular soruyor falan. Yine de onlara hep kendisi veriyor directionları. Ondan sonra onlardan istiyor bir takım şeyleri. Yani daha çok şey yapılabilirdi diye düşünüyorum, yani öğrencilere biraz daha rol üstlenilebilirdi.

As seen from the vignette above, Participant-2 was satisfied that the teacher in the video tried to give a student-centered instruction, but still she

criticized the teacher for not activating the students enough and for directing them.

Parallel to the third interview, in the online discussions, participants were able to reflect on this issue. To provide an example, during the discussions on the last video watched, Participant-8 criticized the teacher in the video for not conducting student-centered lessons as below:

What I was trying to explain in that sentence was teacher-centered instruction. The teacher analyzed the new curriculum; she used hundred cards, asked questions even if she answered them, tried to achieve stated objectives, but the students either watched her or tried to follow the lesson through imitating her. What was lacking: Not taking the students into the center, and as a result "blind imitation". (P8-OD)

O nokta devam eden cümlede açıklamaya çalıştığım öğretmen merkezli eğitimdi. Hoca müfredatı incelemiş; 100'lük kartı kullanıyor, her ne kadar kendisi cevaplarsa da sorular soruyor, belirtilen amaçları gerçekleştirmeye çalışıyor ama öğrenciler ya izliyor veya hocayı taklit ederek dersi takip etmeye çalışıyor. Eksiklik: Öğrencinin merkeze alınmaması ve onun bir sonucu olan "blind imitation".

In the third reflection papers, 8 participants were able to reflect on this role which was quite higher than the number of the participants noticed this sub-issue in the first (4 participants) and second reflections (5 participants). For example, Participant-2 reflected on the role activating students via criticizing that the teacher could not make students active, but instead she was the knowledge provider as in the below vignette:

Generally the teacher uses direct-instruction. The students are passive. The teacher speaks on behalf of the students and explains the solutions instead of the students without permitting them to express themselves. I think this was wrong. (P2-R3)

Genelde öğretmen direct instruction kullanıyor. Öğrenciler pasifler. Öğrencilerin kendisini ifade etmesine pek olanak vermeden hemen onlar adına konuşup, onların ağzından soru çözümlerini anlatıyor. Bence bu yanlışti.

The issue “Student understanding”, on the other hand, was among the popular teacher roles. That is, 12 participants mentioned ensuring student understanding and using the new curriculum even if it takes more class time. This sub-issue was noticed by 10 participants both in the first and second interviews. To give an example, Participant-5 reflected on this role as in the below vignette:

[...] They tend to do the things they find easy. They follow the new curriculum if it eases the instruction and facilitates student understanding. But the old curriculum also has conveniences, and so they follow it too. I mean this is not a transition from the old curriculum to the new one. But it is not continuing with the old one either. It is somewhat all in one... They think the way that...They should teach the subjects in a way that students can understand best. Multiplication and division with counters is very difficult, especially the division and multiplication of two negative numbers. They are difficult. So they try to teach it with an easier and long-lasting way which is ‘the enemy of my enemy is my friend’. They want to teach it that way. Because they believe that the students understand better that way...What I told them was the same...I told them like this. If the aim is student understanding, not a single way is enough. In the new curriculum, there are not just counters. There is number line, different materials, and different activities to teach a subject. There are tens of activities. We try to know and learn all of them so that the students can learn it in the way they can easily understand. If this is our target, we have to do this [...] (P5-3)

[...] *Hani bir yerlerde hani kolay olduğunu düşündükleri şeye yöneliyorlar. Zor olanı yani yeni sistem konuyu anlatmayı kolaylaştırıyorsa onu yapıyorlar, öğrencinin anlaması kolaylaşıyorsa. Ama eski sistemin de kolay yönleri var, onu da kullanıyorlar. Yani bu tamamen yeni sisteme tamamen geçiş değil. Ama eski sistemde de kalış değil. Bir yerde arada... Ve bu*

konuda şey düşünüyorlar. Hani öğrenciye en iyi anlayacağı şekilde anlatalım. Counterlarla çarpma bölme zor bir konu, özellikle iki eksi sayının bölümü, iki eksi sayının çarpımı. Onlar zor bir konu. Biz bunu öğrencinin en iyi anlayacağı şekilde ve en kalıcı olacak şekilde düşmanımın düşmanı dostumdur. Bunla anlatalım diyorlar. Çünkü bu öğrencilerde daha rahat anlaşılıyor diyorlar... Benim orda söylediğim şey yine aynı şey oldu... Dediğim şey yani şöyle dedim. Hocam dedim. Amaç öğrencinin öğrenmesiye sadece bir yöntem yeterli olmaz. Yeni sistemde sadece counter yok, sayı doğrusu var değişik materyaller var, değişik etkinlikler var aynı konuyu anlatmak için. Onlarca etkinlik var. Bunların hepsini bilmeye, öğrenmeye uğraşıyoruz ki öğrenci hangisiyle rahat anlarsa o şekilde anlansın. Amacımız oysa bunu yapmamız lazım diyorum[...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the last video watched, several participants criticized the teacher for not ensuring student understanding. One of these participants reflected on this issue as in below:

As far as I observed, the attitude of the teacher was too harsh, and especially when she talked like that she became more scary. If I were a student in that class, I couldn't tell that I didn't understand when I didn't. I would be afraid of being humiliated and I wouldn't ask. That way, as the things I couldn't ask increase, I would leave with just disconnected and meaningless knowledge, and they wouldn't go beyond memorization. Here also, the teachers have a big responsibility, I think. If some of the students still didn't understand, then the teachers should blame themselves. They should think about how to teach a subject differently to reach all students. If they achieve that, still I think it was wrong to say such a thing. (P6-OD)

Zaten gözlemlediğim kadarıyla öğretmenin tavrı çok sert bir de böyle şeyler söylediğinde daha da korkutucu oluyor. Ben olsam mümkün değil anlayamadığım zaman anlayamadım diyemezdim. Küçük düşmekten korkardım ve sormazdım. Böylelikle zaman içinde sormadığım yerler arttıkça benim elimde bir kaç bağlantısız ve anlamsız bilgi kalırdı. Bunlar da tabii ki ezberden öteye geçemezdi. Burda da öğretmene çok büyük bir iş düşüyor

bence, eğer öğrencilerden bazıları hala anlayamamışlar ise bence öğretmen kendinde aramalı suçu. Nasıl daha farklı anlatabilirim ki öğrencilerimin hepsine ulaşabilirim diye düşünmesi lazım. Bunu başarsa bile yine de böyle bir cümle sarfetmenin çok yanlış olduğunu düşünüyorum.

Another participant also commented on the importance of ensuring student understanding where she also provided suggestions:

Even if she didn't understand the question, the teacher should have elaborated on it till she understood. Because maybe some other students also didn't get that. So, interpreting the question right and answering it is very important. The teacher should have directed the question to the classroom instead of skipping. That way, she could see who understood and who didn't, and would assess not only the students but also the subject and herself. If there are lots of students in the class who didn't get it, the teacher should explain it again with simpler examples and emphasize on important parts... (P10-OD)

Öğretmen soruyu anlamasa bile anlayıncaya kadar soru üstünde durmalıydı. Çünkü o soruyu, o kısmı sınıfta birkaç kişi daha anlamamış olabilir. Bu açıdan sorunun doğru bir şekilde yorumlanması ve cevaplanması çok önemli. Öğretmen soruyu geçiştirmek yerine sınıfa yöneltmeliydi. Böylece anlayan anlamayan öğrenciyi görmüş bir nevi assessment yapmış olurdu hem kendini hem konuyu hem de öğrencileri. Sınıfta anlamayan çok öğrenci varsa konu gerekirse gerekli yerden çok basit örneklerle tekrar anlatılmalı, önemli konular üzerinde iyice durulmalıydı...

Additionally, another participant provided specific examples from the video where she criticized the teacher for not ensuring student understanding:

I think that the student wanted to ask whether the zero at the beginning of the number would make the multiplication zero when they multiply 1.4 and 0.2. But he asked 'what if we multiply integers with zero?'. From his question, it is obvious that he didn't wholly understand the subject because he couldn't ask a

reasonable question. However, he was sat down by the teacher without being able to solve the problem in his head. (P1-OD)

Aslında çocuk 1,4 ile 0,2'yi çarparkenki 0,2'deki baştaki sıfırın aslında çarpımı sıfır yapıp yapmayacağını sormak istediğini düşünüyorum ben ama tam sayılarda sıfırla çarparsak şeklinde sordu. Bu sorudan da öğrencinin konuyu tam anlamadığı belli çünkü mantıklı bir soru soramıyor fakat kafasında da olayı çözmeden öğretmen tarafından yerine oturtuluyor.

This role was mentioned by 4 participants in the third reflection papers while it was 8 and 3 in the first and second reflections. For example, Participant-12 reflected that the teacher was deficient in helping the student who got confused and she couldn't ensure student understanding as in below:

A student in the back asked a question. He imagined it as a zero since there was zero at the beginning of decimal fractions and the conception of zero in his head changed. He asked the teacher in order to make it meaningful, but he sat down with a confused mind. Considering that there were again students who did not understand the subject, the teacher did not make any extra effort for these [...] (P12-R3)

Arkada bir çocuk soru sordu. Ondalık kesirlerin başında sıfır olduğu için onu da sıfır gibi hayal etti ve kafasındaki sıfır fikri değişti. Anlamlandırmak için öğretmene sordu fakat yine kafası karışık bir şekilde yerine oturdu. Yine anlamayan çocuklar olduğunu düşünen öğretmen onlar için ek bir çaba göstermedi [...]

With respect to another sub-issue related to Pedagogical Content Knowledge, that is "Instructions" referring to using clear and proper instructions and statements, 9 participants were able to reflect on this role. The numbers of the participants noticing this sub-issue were 2 and 10 in the first and second interviews respectively. To give an example, one of the participants (Participant-

2) mentioned in the third interview about the necessity of using clear directions during group work while criticizing the teacher in the video as in below:

I think what makes group work group work is the directions. The students discuss it, it was vital to create homogenous groups. But the directions are also very important. Ok, the teacher gives some directions like do it this way or that way when the students aim to reach a solution, but I believe they were so short. Although she moved in the classroom a lot, she didn't provide enough feedback. She didn't help them efficiently. She only wanted them to discuss. I don't know, it is hard to balance it of course. I thought the directions were not efficient because the students had so much difficulty doing it. (P2-3)

Bir de grup çalışmasını grup çalışması yapan yönerge bence. Öğrenciler yine bir şekilde tartışıyorlar işte homojen gruplar oluşturmak da önemliydi. Ama yönergeler de çok önemli yani birşeye erişmeye çalıştıkları zaman hocanın ona tamam şu şöyle ama şurda naparsın sen, yine o şekilde yönergeleri var G hocanın ama çok kısa verdiğini düşünüyorum. Çok fazla dolanmasına rağmen çok fazla feedback vermedi, çok fazla yardımcı olmadı, onların hep tartışmasını istedi. Bilmiyorum o dengeyi oluşturmak da zor biraz tabii de. Birazcık eksik gibi gelmişti çünkü çok zorlandılar yapmakta.

Similarly, in the third reflection papers, the participants were able to mention this role, but with only 4 participants. To give an example, Participant-3 reflected on using appropriate direction and wording where she provided a suggestion as in the below vignette:

It would be better if she asked students who wanted to model it instead of asking who would do it in the table on the board. (P3-R3)

Bu işlemi hazırladığım tabloda kim yapacak ifadesi yerine kim modelleyecek gibi bir ifade kullansa daha güzel olurdu.

Another participant (Participant-7) criticized the teacher for using inappropriate wording as in below:

I think that the term “proof” is not generally used in primary schools. (P7-R3)

İspat kelimesinin ilköğretim okulunda normalde kullanılmadığını düşünüyorum.

As seen from the vignettes above, participants reflected on using clear and appropriate statements through criticizing the teachers in the video for not achieving that, and some of them also provided suggestions.

Similar to the second interviews, the role “Real life” that is connecting mathematics to real life and teaching solid mathematics was mentioned by 9 participants. In other words, more than the half of the participants was able to reflect on connecting mathematics to real life. This number was only 5 in the first interviews. For example, Participant-11 mentioned this role via an example from her internship:

For example, she said that it was one of the most appropriate subjects to connect with real life. Why, because we come up with it everywhere. Create a situation. For example, our mentor teacher told us once that we could ask students to visit their apartments, ask people which newspaper they read, and graph it. This was a very nice idea. (P11-3)

Hani günlük hayata bağdaştırılabilecek en kolay, en güzel konulardan bir tanesi demişti mesela onun için. Neden çünkü her yerde görüyoruz. Bir olay yaratın mesela, çocuklara işte ne bilim bizim staj okulumuzdaki hocamız şey demişti, apartmanınızı gezeceksiniz mesela okunan gazetelerin türlerini tespit edip bir grafiğini çizmelerini istemişti. Mesela bu çok güzeldi.

In the reflection papers, none of the participants were able to mention this role. On the other hand, the numbers of the participants noticing this sub-issue were 6 and 9 in the first and second reflections respectively.

The issue “Inquiry” referring to issues such as asking questions, encouraging students to inquire, asking for reasons, having students explain and justify their answers, and not giving the rules was mentioned by 9 participants. This sub-issue was noticed by 5 and 7 participants in the first and second interviews respectively. To provide an example, Participant-12 reflected on this role in the third interview as below:

In that teacher’s video, the teacher always asked students the question ‘why’. ‘Ok this is that, but why’. She always asked the question ‘why’. Ok well she was good at that point. I didn’t have many teachers who asked ‘why’, but I believe that there should be a ‘why’ after each question. Other than that, the other teacher didn’t ask ‘why’ I guess. He didn’t examine the cause-effect relationship. But his students already knew it. Or the teacher G never asked the question ‘why’. I believe that the students didn’t understand what was happening there. Actually I thought that in all videos. I mean whether the teachers asked ‘why’ or not. The teacher G never did. She didn’t connect it to any rationale. (P12-3)

A hocanın videosunda öğretmen sorulara hep neden sorusunu yöneltti. İşte küpün şu kadar şöyledir, peki neden. Öğretmen sürekli neden sorusunu kullandı. Evet, doğru, A hoca bu konuda iyiydi. Neden diye soran öğretmenim çok olmadı aslında ama her sorunun arkasından neden gelmeli. Bunun dışında, M hoca neden demedi sanırım. Bir düşününce çok da sebep sonuç ilişkisine bakmadı. Ama biliyordu M hocanın öğrencileri zaten. Ya da G hoca, asla neden sorusunu sormadı. Orda ne olduğunu bence çocuklar hiç anlamadılar. Aslında bütün videolarda aynı şeyi düşündüm. Neden sorusu soruldu mu sorulmadı mı. G hoca sormadı. Hiç bir nedene bağlanmadı.

This role was mentioned by 6 participants in the third reflection papers as in the second while it was noticed by 8 participants in the first reflections. For

example, in the third interview Participant-4 criticized the teacher for not having students explained their answers:

She was only expecting the students to give the right answers to her questions, and she never asked them the rationale behind their answers. (P4-R3)

Öğrencilerden sorulara sadece doğru cevap vermesini bekliyor ve hiçbir şekilde nasıl bir mantıkla yaptığını sormadı.

More than half of the participants (8 participants) mentioned “Group work” referring to making group work and managing it, dealing with students throughout the group work, managing the labor division in group work, activating the communication between students during the group work, and letting students learn from each other via group work. This sub-issue was noticed by 8 and 7 participants in the first and second interviews respectively. In the third reflection papers, on the other hand, none of the participants were able to reflect on this role while it was noticed by 10 participants in the first reflections. In the second reflections, it was mentioned only once. To give an example, Participant-6 reflected on this role in the third interview as in below:

[...] We didn't discuss student-student interaction, for instance ...But when we talked about how we would explain the subject, we said that we would do group work. We discussed that during the group work the students would interact with and learn from each other. (P6-3)

[...] Hiç öğrenci öğrenci ilişkisini tartışmadık mesela... Hani biz bunu nasıl anlatırdık derken grup çalışması yaptırırdık demiştik. Hani o grup çalışması yaptırırken de dolayısıyla öğrenciler birbiriyle etkileşim içerisinde bulunabilirler ve birbirlerinden birşeyler öğrenebilirler dedik.

As seen from the vignette above, Participant-6 focused on the last aspects of this issue that are activating the communication between students during the group work, and letting students learn from each other via group work.

The issue “Understanding” which refers to being able to understand student questions and what they say, being able to answer student questions and providing feedback, and giving concrete answers was mentioned by 8 participants both in the third interviews and in the reflections. The numbers of the participants noticing this sub-issue were 1 and 3 in the first and second interviews, and 2 and 1 in the first and second reflections respectively. For example, Participant-15 reflected on this role in the interview as in the below vignette:

You have to teach it in a way that all the students can understand. You have to get down to their levels, and the most frightening thing for me is that you have to understand students’ questions and you have to explain it to them. (P15-3)

Her öğrencinin anlayabileceği şekilde anlatmaya çalışman lazım. Onun seviyesine inmen lazım ve benim en korktuğum şey de, öğrencinin sorduğu soruyu anlayabilmen ve ona açıklayabilmen lazım.

The same participant also reflected on this issue in her reflection paper:

The teacher didn’t understand the student’s question. Her interaction with the student was not good. She could have called the student to the board and asked him to write down what he meant, but instead she gave a wrong answer. (P15-R3)

Öğrencinin sorduğu soruyu anlayamadı. Öğrenci ile diyalogu iyi değil. Burada öğrenciyi tahtaya kaldırıp ne anlatmak istediğini yazar mısın diyebilirdi ama bunu yapmak yerine yanlış bir cevap verdi.

Parallel to the third interview and reflection papers, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the sixth video watched, several participants criticized the teacher in the video for not being able to understand and answer student questions. One of these participants reflected that:

I was lost when the student in the back of the class asked about the multiplication of integers and zero. My friends also mentioned that; I mean a teacher can get rid of a student just like this. Besides, when you look at the face of the student, you see that he sat down with an expression like “ok, I didn’t get it but forget about it” in his face. (P5-OD)

Ben bu arka sıralardaki gencin sorduğu tamsayılarla sıfırın çarpılması (12.50) olayında zaten koştum yani. Arkadaşlarım da değinmişti; yani bir öğrenci ancak böyle atlatılır. Zaten çocuğun suratına bakarsanız ben anlamadım neyse salla gitsin dercesine bir bakışla yerine oturdu eleman.

Similarly, another participant pointed on this issue as below:

A student in the video asked a question like ‘what if we multiply a simple decimal fraction and a mixed decimal fraction; we multiply the whole numbers first and it becomes a simple decimal fraction, right?’... First I thought that the teacher didn’t get the question, but then she said that the product would be 0 when they multiply 0 and 1 since 0 was null element... Still I thought that she didn’t understand the question, and she incorrectly guided the student although she was aware that she didn’t get the question. Actually it was true that 0 is null element, but the question the student raised was different... In this case, the student received a wrong answer, and started to think that way... On the other hand, during the exercises the teacher told students to write down a mixed decimal fraction as they asked for it from the beginning. What I understand here is that the teacher actually understood the student’s question, because that student gave the example of multiplication of a mixed number and a simple decimal fraction... Now, what could be the reason for the student to ask a question like that? In my opinion, it is a misconception derived from the rule that the teacher wrote on the board as a note... Another

question is how we could teach/explain it to the students? (P3-OD)

Arkadaşlar videoda bir öğrencinin mesela 0 tamlı ve 1 tamlı bir sayıyı çarparken tamsayı kısımları çarpılır ve o tamlı olur değil mi gibi bir soru sordu... Önce öğretmenin soruyu anlamadığını düşündüm daha sonra evet 0 ve 1'i çarptığımız zaman, 0 yutan eleman olduğundan sonuç 0 olur gibi bir ifade kullandı... Yine de anlamamış olduğunu düşündüm açıkçası ki anlamadığı halde (ki bunun farkındaydı) öğrenciyi yanlış yönlendirdi, aslında 0'ın yutan eleman olduğu tabii ki doğru ama öğrencinin sorduğu soru aslında farklıydı... Şu durumda öğrenci sorduğu sorunun cevabını yanlış aldı ve öyle düşünmeye başladı artık... Fakat alıştırmada ilk öğrenciye ilk işlemi yazdırırken hadi 1 tamlı bir sayı yazalım, deminden beri onu sorup duruyorsunuz gibi bir ifade kullandı, benim buradan çıkardığım sonuç ise aslında öğretmenin öğrencinin sorduğu soruyu anlamış olmasıydı, çünkü o öğrenci 1 tamlı bir ifadeyle o tamlı bir ifadeyi çarpmayı örnek vermişti... Şimdi sizce öğrenciyi böyle bir soru sormaya iten neydi? Bence açıkçası öğretmenin "not" adı altında yazdığı kuraldan kaynaklı bir misconception aslında... Bir de öğrenciye nasıl anlatabilirdik, açıklayabilirdik?

Another participant also commented on the importance of understanding what the students say as in the below vignette:

You are right, because the student didn't sit down in a manner that he understood. Besides there could be other students who didn't understand it either. It is obvious that passing over that matter lightly was wrong. (P1-OD)

Haklısın çünkü öğrenci hiç de anlamış bir şekilde yerine oturmadı üstelik bu soruya takılan belki başka öğrenciler de olabilir, geçiştirmenin yanlış olduğu aşikâr.

Similarly, Participant-9 reflected on this role where she also provided specific suggestions:

It was obvious that the teacher didn't understand what the student meant with his question. I think she didn't elaborate on that since she didn't get it and since there was a camera in the class. In such a case, what to do could be to ask student why he thought that way and to create a discussion in the class or to ask student to come to the board and do the multiplication for 1.4×0.2 and then to reach the correct solution through discussion on the answer. (P9-OD)

Bu soruda öğretmenimizin öğrencinin ne demek istediğini anlamadığı aşikârdı. Anlamadığı için de ve kamera olduğu için geçiştirme ihtiyacı duymuştur diye düşünüyorum. Bu durumda yapılacak şey belki de öğrenciye neden böyle düşündüğünü sorup sınıfta bir discussion yaptırmak ya da öğrenciden $1,4 \times 0,2$ gibi bir çarpma işlemi tahtada yapmasını istemek ve cevap üzerinden tartışarak doğruya ulaşmak olabilir.

Another issue related to Pedagogical Content Knowledge that is “Thinking time” was mentioned by 6 participants, being parallel to the second interviews. More specifically, couple participants were able to reflect on issues like not providing answers right away and giving students enough time to think. For example, Participant-7 reflected that giving students the right answers instead of letting them discover causes them to see their teacher as a knowledge provider:

She was directly giving the right answers for example. I believe it is one of the most important points during the activities. It is a criterion for me. If you give the answer directly, then there is no need to do the activity. Because if you do it that way, the students always want the answers from you. They always ask the teacher, call him and ask. Then they get the answer, and feel like they did it. That way, there is nothing left to do for the students. (P7-3)

G hoca da anlatırken bu şekilde mesela direkt cevabı vermeler var mesela. Burada bence bir etkinlik yaparken en önemli şeylerden birisi o yani, benim için kriter. Zaten cevabı veriyorsan etkinliği yapmanın bir anlamı yok yani. O zaman zaten öğrenci standart olarak sorar, devamlı öğretmene sorar, çağırır sorar.

Ondan sonra cevabı alır, iyi bunu da yaptım. Ondan sonra o şekilde yani kendine, öğrenciye birşey kalmıyor.

In the reflection papers, on the other hand, 4 participants reflected on this role, but this number was only 2 in the first reflections where none of the participants were able to notice this sub-issue in the second reflections.

Parallel to the first and second interviews, 6 participants mentioned “Misconceptions” issue that is not generating misconceptions, and preventing misconceptions and wrong and deficient understanding. For example, Participant-5 criticized the teacher in the video for causing misconceptions, and provided suggestions to maintain student understanding as in below:

[...] Well, for instance, I caught some misconceptions there. The teacher taught the students the right triangle, and she only drew a single shape on the board, only one example. She told them that this was the right triangle and these were the properties. But later, when she asked a student questions after turning the triangle upside down, the student started to confuse its sides. Which one was the hypotenuse? The student could not understand that. If, at least, she made the student interpret it by giving him tangram pieces and explained through the pieces, the student wouldn't get confused when he saw an upside-down-shape on a paper since he could make sense of it by playing with it. I mean either for rotation or for symmetry, the students wouldn't have misconceptions for those. This might be appropriate to the new curriculum, for example, working with those materials I mentioned [...] (P5-3)

[...] Yani mesela orda misconceptionlar yakaladım ben. Öğrenciye dik üçgeni veriyor, bir tane şekil çiziyor tahtaya sadece bir tane. Diyor ki dik üçgen budur, özellikleri budur. Ama ardından dik üçgeni ters çevirip soru sorduğunda çocuk kenarları karıştırmaya başlıyor. Hipotenüs hangisiydi. Bunu oturtamıyor. Ha orda en basitinden, ufak bir, bizim tangram parçalı üçgenler var dik üçgen, onları verip ellerine yorumlattırsaydı, onun üzerinden birşeler anlatsaydı çocuk onu istediği gibi çevirip istediği gibi yorumlayabileceği için kâğıtta herhangi bir ters şekil gördüğünde böyle bocalamaya düşmeyecekti. Yani rotationdı, işte

simetriydi gibi, onlarda kavram karmaşasına düşmicekti mesela. Bu yeni sisteme uygun olabilir mesela, bu bahsettiğim birkaç materyalle çalışma [...]

Similarly, in the reflection papers, 6 participants reflected on this role as in the second reflections. In the first reflections, on the other hand, this frequency was only 3. For example, Participant-10 mentioned preventing misconceptions as in the below vignette:

The teacher didn't try to understand the student's question although she didn't get it, and she gave a wrong answer. This is so wrong. The student may generalize it inappropriately and it might be very difficult to fix it. (P10-3)

Öğrencinin sorusunu anlamadığı halde çok anlamaya çalışmadı ve öğrenciye yanlış cevap verdi. Bu çok sakıncalı. Öğrenci yanlış genelleme yapabilir ve bunu düzeltmek çok zor olabilir.

In terms of another sub-issue, 5 participants reflected on the issue "Not binding". This issue refers that teachers should not limit their students, and should not make them perceive what is right by the teachers' point of view. This sub-issue was not noticed in the first and second interventions. For example, Participant-7 reflected in the third interview that:

[...] Later she tried to show it by using hundred-blocks. Even she told that it was wrong although the student did it right. She told them what she did was right. Since she was more accustomed to the classical system, she preferred to narrate the subject and she used statements like this was the correct and easy way, and learn it this way. Like the easier way of this is that. Like add the numbers considering the commas and write them down etc. [...]
(P7-3)

[...] Sonradan işte bir yüzlük karelerle göstermişti. Hatta öğrenci doğru birşey yapmasına rağmen onun yanlış olduğunu söyledi. Kendi yaptığına falan doğru söylemişti. Daha çok böyle yine

klasik sisteme alışık olduğu için devamlı konuyu anlatmaya yönelik veya devamlı işte doğru yol şudur veya en doğru yol budur, en kolayı budur, bunu öğrenin şeklinde ifadeler kullandı. Mesela işte kolay yolu budur şunun. İşte tutun, kaç tane virgöl varsa toplayın yazın diyecek veya benzeri şeyler kullandı [...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the last video watched, Participant-12 noticed that the teacher in the video didn't accept the student's way of solution and tried to make her adopt teacher's method which was a short cut:

I certainly agree. There is nothing more reasonable than a student's using 0.70 instead of 0.7 where there is a 100-unit square. When you wrote that, I remembered the state of the teacher. Her state which was like she was looking behind of the student as asking what he was doing... It is a shame. Why we are struggling for and what she did not like just because it took long. While we think about different activities to teach decimal fractions, that teacher dares to ignore the students who can learn. But, thank God, at least she didn't tell them that it was wrong. (P12-OD)

Kesinlikle katılıyorum ortada 100 birim kare varken öğrencinin 0,7 yerine 0,70 kullanması kadar mantıklı birşey yok. Sen bunu yazınca öğretmenin o hali geldi. Öğrencinin arkasından "oo bu ne yapıyor" der gibiki hali... Yazık oysa biz neler için uğraşıyoruz, hocam uzun sürdü diye neyi beğenmiyor. Biz ondalık kesir kavramını nasıl kavratırız diye türlü aktiviteler düşünürken, N hoca öğrenenleri de arka plana atma cesaretini gösterebiliyor. Ama Allah'tan yanlış yol demedi.

This role was mentioned by 3 participants in the reflection papers. For example, Participant-11 reflected that:

[...] I don't know what she was afraid of, but when the student wanted to show 0.7 on the board she insisted on his drawing 0.3 instead. To me, this was awful. (P11-R3)

[...] Ne farkı olacak diye korktu bilmiyorum ama çocuk tahtada 0,7'yi çizmek isteyince 0,3 olsun diye ısrar etti. Korkunç oldu bence.

Parallel to the first and second interviews, only 4 participants mentioned the issue “Evaluation” that is evaluating student understanding, assessing through observation, and arranging lesson flow according to student understanding. For example, Participant-8 mentioned in two different vignettes that assessing what students know and do not know is necessary to help them learn and it is the responsibility of the teacher to make that assessment:

The students ask questions. In the previous system, what I would do is to give the answer and not to elaborate on it much. We should examine what the students know in the first place. It is like that a doctor asks the patient to talk. If he gives a prescription without asking, he might give a stomach pill to the patient with a headache. It is useful to make the students to talk in order to be able to diagnose. It is an effective way or let's say a technique. (P8-3)

İşte öğrenciler soru soruyor, ben eski usülde olsa napardım, bunları hiç dinlemeseydim, cevabını verirdim sonra da çok durmazdım üzerinde. Orda öğrenci ne biliyor onu bir konuştururuz ilk önce. Hani bu şeye benziyor, doktor tedaviden önce ne yapar hastayı konuşturur. Yoksa kafasına göre bir ilaç verse adamın başı ağrıyordur işte mide ilacı verir falan. Böyle teşhis için güzel oluyor öğrenciyi konuşturmak. O güzel bir şey, yaklaşım mı diyelim teknik mi.

and

Student understanding is so important for me. The rationale behind their answers is important. Do the students just follow what I do and copy the procedure or they understand the subject? There are levels of understanding. Repeating something, and expressing it in your own words and synthesizing it. Do they just

repeat what I say and imitate what I do or can they express the subjects in their own words. Or do they reach a higher step, build on what was instructed, and analyze and synthesize? I would pay attention to these. Where the students are, what the level of their understanding is. I would try to help them with the points they had deficiencies. (P8-3)

Öğrencinin anlayıp anlamaması benim için önemlidir. Verdiği cevapların sebepleri benim için önemlidir. İşte öğrenci sadece yaptıklarımı mı takip mi ediyor prosedürü takip edip taklit mi ediyor yoksa kendisi birşeyler anlamış, artık böyle, hani anlatmanın seviyeleri var; bir söylenen şeyi tekrarlamak, ondan sonra söylenen şeyi kendi sözleriyle ifade etme yeni terkipler oluşturma falan gibisinden, işte sadece benim söylediklerimi mi tekrarlıyor yapılanları mı taklit ediyor yoksa artık bu anlatılan mevzuları kendisi de ifade edebiliyor mu kendi kelimeleriyle. Veya daha bir üst kademeye geçmiş, kendisi anlatılanların üzerine birşeyler bina edebiliyor, yeni böyle analizler sentezler yapabiliyor. Bunlara dikkat ederdim, öğrenci bunun neresinde, anlama seviyesi hangi derecede, eksikleri varsa o noktada yardımcı olmaya çalışırdım.

Parallel to the third interview, this issue was also emerged in the online discussions. To give an example, during the discussions on the sixth video watched, Participant-6 reflected on assessing student understanding as below:

I agree that it was important that the teacher made assessment during the lesson through observation, because in that way, the teacher can detect where the students have difficulty of understanding. At the same time she can evaluate her own methods. However, she has to be very careful with her statements and acts during those observations. (P6-OD)

Bence de öğretmenin ders sırasında gözlemleyerek değerlendirme yapması çok önemli çünkü bu şekilde öğrenciler nerelerde anlama zorluğu çekiyorlar bunu tespit edebilir aynı zamanda da kendi yöntemini değerlendirebilir. Ancak bu gözlemleri yaparken kullandığı cümlelere hal ve hareketlerine çok dikkat etmek zorunda.

The percentage in the third reflection papers was even lower than that of the third interviews. In other words, only 2 participants were able to mention this role in the third reflections as in the first and second.

Another issue mentioned in the third interview was “Student thinking” that is understanding the ways of student thinking and their thinking structures. Four participants reflected on this role while only 2 mentioned it in the reflections. This sub-issue was not noticed in the first and second interventions. To give an example, Participant-15 reflected on this role in the third interview as in the below vignette:

[...] Now you are trying to understand your student. Thus, it is called student-centered education, I think. What the students are doing, how they think... Well, because if you can't find where they make mistakes, then you don't have the chance to fix it. Even if you explain it fifty times, they will again struggle there and won't be able to perform that operation. Thus, you should try to understand it first. (P15-3)

[...] Şimdi öğrenciyi anlamaya çalışıyorsun yani. O yüzden zaten öğrenci merkezli eğitim deniyor bana kalırsa. Öğrencinin ne yaptığını, hangi metotta düşündüğünü... Orda, yani çünkü nerde yanlış yaptığını bulamazsan düzeltme imkânın yok. Sen istersen elli kere anlat onu, öğrenci gene gelecek orda takılacak, o işlemi yapamayacak. O yüzden önce onu anlamaya çalışman lazım.

“Alternative solutions” that is making students compare and share different solution methods was mentioned by 4 participants while only 2 participants reflected on this role in the third reflections. Three participants reflected on the issue “Student difficulties” referring to taking student difficulties into consideration, where none of the participants mentioned it in the third reflections. This sub-issue was not noticed either in the first or second interventions.

The issue “Correct terminology” referring to using correct mathematical terms in class and having students do likewise was mentioned only by 2 participants, and similarly in the reflection papers, only 2 participants were able to reflect on this role. This sub-issue was noticed only once both in the first and second interviews while it was noticed by 8 and 2 participants in the first and second reflections respectively.

“Discussion” issue which refers to establishing a discussion environment and having students discuss was also mentioned only by 2 out of 15 participants. This frequency was 5 and 4 in the first and second interviews. In the third reflections, this role was mentioned only once. Similarly, the issue “Explanations” that is appropriately explaining the subjects was mentioned only by 2 participants, and in the third reflection papers it was mentioned by 3 participants.

The noticed teacher roles related to the Pedagogical Content Knowledge in the third interventions were given above. There were no sub-issues that were not noticed in the third interventions while the most noticed sub-issues were “representations”, “facilitation”, “reasoning”, “activities”, “student centeredness”, and “student understanding”. In the following part, the teacher roles related to the General Pedagogical Knowledge in the third interventions are provided.

4.1.3.1.1.2. The Sub-Issues related to General Pedagogical Knowledge in the Third Interventions

As indicated previously, in the third interview, all of 15 participants talked about General Pedagogical Knowledge. There were 10 sub-issues related to this main-issue (see Table 3.6), and 7 of them were noticed in the third interventions. In the first interventions the number of the noticed issues was 9 where it was 6 in the second interventions (see Appendix 7).

In terms of frequencies, in the third interview, 10 participants mentioned the issue “Communication” which refers to communicating with students, and setting up proper relationships and securing the interaction between the students. This issue was one of the most popular teacher roles that the participants noticed in the third interviews while it was noticed by 7 participants both in the first and second interviews. For example, Participant-12 mentioned that one of the main roles she noticed first was the relationship between the teacher and the students:

[...] The first thing drawing our attention in the reflections is teachers’ attitudes toward their students. Rather than the lesson. For example, there were teachers who were distant to their students or who were not able to clearly answer students’ questions. This is the most important thing, I think. A teacher is a teacher more than an instructor. I already wrote this for the last video. The teacher should appropriately communicate with students. She should know what they want to explain. This is the first thing coming to my mind. (P12-3)

[...] Öğretmenlerin öğrencilere tavırları bir kere reflectionlarda ilk dikkatimizi çeken. Dersten ziyade. Mesela çok soğuk davranan öğretmenlerimiz vardı ya da öğrencilerin sorularına net karşılık veremeyen. En önemlisi budur bence, ders anlatmaktan çok öğretmen öğretmendir. En son videomda da bunu yazmışım zaten. Çocuklarla net bir iletişim kurabilmeli, onların ne anlatmak istediğini bilmelidir. İlk aklıma gelen bu.

In the third reflection papers, on the other hand, only 2 participants were able to reflect on communicating with students and building communication between students. This sub-issue was not noticed in the first and second reflections.

Another issue related to General Pedagogical Knowledge was “Approach”. This issue refers that teachers should have positive approach towards students, give flexibility and be decent, should not control too much, , not be too harsh, not behave rude, and not humiliate their students. Ten

participants were able to reflect on this role with a higher frequency than that of the first (4 participants) and second interviews (8 participants). In the reflection papers, on the other hand, almost half of the participants were able to mention this role (7 participants) while none of the participants noticed it in the first and second reflections. For example, Participant-12 reflected on this role both in the third interview and in the reflections where she criticized the teacher in the video for being too harsh, and not being able to approach students positively as in the below vignettes respectively:

In her video, I don't know whether I should say humanity before teaching, but this was the thing that I noticed. Forget about getting the children to discover, it was big courage for students even to talk in that classroom. (P12-3)

N hocanın videosunda öğretmenlikten önce gerçekten insanlık mı desem bilmiyorum. Dikkatimi çeken buydu. Bırakın çocuklara keşfettirmeyi, onların söz hakkı alması bile bence büyük cesaretti o sınıfta.

and

She has a very bad manner. If I were her student, I would be afraid of responding to the questions. (P10-R3)

Çok sert bir üslubu var. Ben öğrenci olsam cevap vermeye korkardım.

In terms another sub-issue related to General Pedagogical Knowledge, 9 participants reflected on “Management” referring to managing the classroom, setting up the rules, managing the time, and securing the order. This role was among the popular roles that the participants noticed while it was the most noticed sub-issue in the first (14 participants) and second interviews (12 participants). For example, Participant-4 mentioned that although the teacher in

the video tried to implement the new curriculum, she was ineffective since she couldn't manage the classroom:

I noticed classroom management a lot, for example [...] For example let's go back to the first week. I go back to the first week after 6 weeks. For example, this was one of my first criticisms I made for the teacher A's video. Ok, she used new materials there, she tried to use discovery method. Infact, it is not a method that traditional teachers generally use. Ok, she tried to use it, but since she couldn't manage the time and the classroom and then couldn't instruct well, I mean since she couldn't guide the students effectively, she couldn't achieve her goal. (P4-3)

Sınıf yönetimine çok baktım mesela [...] Mesela ilk haftaya dönelim yani. Ben direkt 6 haftadan sonra ilk haftaya dönüyorum. Mesela A hocada ilk yaptığım eleştirilerden bir tanesi buydu. Direkt olarak mesela orda çok yeni materyaller kullandı tamam, yeni bir discovery yaptırmaya çalıştı, kaldı ki bunu çok fazla yani direkt klasik öğretmenlerin çok fazla yaptırmadığı birşey. Yaptırmaya çalıştı ama süreyi ayarlayamadığı için, sınıfı tam kontrol bence edemediği için, ondan sonra ve tam olarak doğru yerleri veremediği yani rehberliğini tam olarak doğru yapamadığı için amacına ulaşamadı yani.

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the last video watched, Participant-9 reflected on how the teacher in the video managed the classroom as in below:

In my opinion, the teacher was neither succesful nor unsuccessful at classroom management. She was successful since there was an order in the class. As one of our friends mentioned, all the students raised their hands, they didn't jump at the answers. She was unsuccessful since she generally gave turns to the same students, who were the most hardworking students in the class I guess. Additionally, she had a one-to-one dialogue with the student raising a question, and the others remained passive meanwhile. There was not much noise in the classroom because of the bad temper of the teacher. It doesn't show that she was

good at management since there was no noise in the class because of that reason. (P9-OD)

Bence öğretmen sınıf yönetiminde ne başarılıydı ne de başarısız. Başarılıydı çünkü sınıfta bir düzen vardı H'nin de dediği gibi sınıfta herkes parmak kaldırıyordu direkt cevaba atlanmıyordu. Başarısızdı çünkü genelde aynı kişilere söz hakkı veriyordu galiba sınıfın çalışanlarıydı onlar. Ayrıca soru soran öğrenciyle birebir diyaloga giriyor ve diğer öğrenciler bu arada pasif kalıyorlar. Öğretmenin sert mizacından dolayı da sınıfta pek bir gürültü çıkmıyordu. Sınıfta sesin bu sebepten dolayı çıkmaması başarılı olduğunu göstermez bence.

In the third reflection papers, 6 participants reflected on this role while it was 10 and 7 participants in the first and second reflections respectively. For example, Participant-1 reflected that:

Instead of losing time with drawing a 10-to-10 square on the board, she could show it with a prepared shape. So, there wouldn't be a waste of time that much. (P1-R3)

Tahtaya 10x10luk bir kare çizerken kaybettiği zamanı hazır getirilmiş bir şekille gösterebilirdi. Böylece bu kadar zaman kaybı olmazdı.

The issue “Student differences” which refers to being aware of student differences and knowing students was mentioned by 4 participants while it was mentioned by only 2 participants in the second interviews. This sub-issue was not noticed in the first interventions. Similar to the second reflections, this sub-issue was not mentioned in the third reflection papers. For example, Participant-3 reflected on this role in the interviews as in below:

There are 40 different worlds in front of a teacher in a class size of 40... I mean, depending on that, it might be very different what the students create in their minds than what you show them. You

know, at least, I have to act and be aware of it, and behave accordingly. (P3-2)

Bir öğretmenin karşısında 40 kişilik bir sınıfta 40 tane ayrı dünya var... Hani buna bağlı olarak sizin onlara gösterdiğiniz şeylerin onların kafasında oluşturacağı şeyler de çok farklı olabiliyor. Hani en azından bunları bilerek ya da bunun farkında olarak hareket etmem gerektiğini düşünüyorum.

In terms of other roles related to General Pedagogical Knowledge, 4 participants mentioned “Decision-making” that is having a contingency plan at hand, interfering with such situations, and having a pragmatic mind; and 7 mentioned “Shaping students” that is shaping students, teaching them their roles, and distributing student roles appropriately. To give an example, Participants-13 and 14 reflected on these two roles respectively as in the below vignettes:

You know, unexpected situations may occur. There was nothing like that in that lesson. I think that it was the deficiency of the teacher not to have planned the lesson in the first place. Ok, she didn't experience any unexpected situations but... (P13-3)

Yani beklenmedik durumlar bir kere işin içine giriyor. O derste öyle birşey yoktu. Baştan öğretmenin kendi eksikliği bence hiç plan yapmaması. Belki beklenmedik birşeyle karşılaşmadı ama.

and

There are also student roles. I believe that student roles are important. Students should be taught about them. We always say that the students should question, the students' role is to question and investigate the rationale behind, but this should be taught to the students. This is the responsibility of the teacher. First the teacher should teach the students about their roles. (P14-3)

Yani zaten bir de öğrenci rolleri var. Bence öğrenci rolleri önemli. Öğrencinin rolü de öğrenciye öğretilmeli. Hani hep böyle öğrenci sorgulayacak diyoruz, öğrencinin rolü sorgulamaktır, neden niçinini şey yapmaktır. Ama öğrencilere de bu

*öğretilmeli... Öğretmenin görevidir, öğretmenin rolüdür evet.
Önce bir rolünü öğretmeli.*

The issue “Pressure” referring to not putting too much pressure on students, and approaching the students who make mistakes positively and providing them opportunities was only mentioned by one participant while it was noticed by 9 and 5 participants in the first and second interviews respectively. In the third reflections, on the other hand, 3 participants mentioned this role with a higher frequency than that of the first and second reflections. The only participant (Participant-3) reflected on this role in the third interview mentioned that:

In terms of the attitudes toward the students, as I said before, I wouldn't attribute them so much responsibilities or I wouldn't blame them when they make mistakes or when they can't solve. Of course, each student's level will be different. A student may not understand the subject, and you have to accept this [...] (P3-3)

Öğrencilere yaklaşım açısından da dediğim gibi yani çok fazla şey yüklemesdim ya da yanlışlarında ya da yapamamaları durumunda hani onlarda çok fazla şey aramazdım. Tabii ki her bir çocuğun seviyesi farklı olacak. Bir çocuk birşeyi hiç anlamayacak yani bunu da kabullenebilecek şeyde [...]

The noticed teacher roles related to the General Pedagogical Knowledge in the third interventions were given above. As stated, the most noticed sub-issues in the third interviews were “communication”, “approach”, and “management”. The sub-issues which were not noticed in the third interventions, on the other hand were “competition”, “expectations”, and “engaging”. In the following part, the teacher roles related to the Curriculum Knowledge in the third interventions are provided.

4.1.3.1.1.3. The Sub-Issues related to Curriculum Knowledge in the Third Interventions

As indicated before, in the third interview, all participants were able to talk about Curriculum Knowledge. There were 11 sub-issues related to this main-issue (see Table 3.6), and all of them were noticed in the third interventions. In the first interventions 10 of these sub-issues and in the second interventions 8 of them were noticed by the participants (see Appendix 7).

In terms of frequencies, 14 participants mentioned “New curriculum” in the third interview. That is, almost of the participants were able to notice and talk about teacher roles such as understanding the new curriculum and being able to adopt it. This role was the most popular role that the participants noticed in the third interviews when compared to first and second (5 participants each). For example, Participant-4 emphasized the importance of understanding and implementing the new curriculum where she blamed teachers of not improving themselves:

[...] I would test the teachers after the seminars and workshops. I am so strict on that issue. Because I introduce a new curriculum, and you have to implement it. You already have to know it, I don't even mention it. There is also the implementation aspect. Even there is no understanding of it. They are disasters. Besides, the teachers I interviewed were private high school teachers, not teachers teaching in a village school in the eastern part of the country. Maybe those village teachers are more capable of the issue. I exclude such teachers. It is more related with personal development. You can't learn anything if you believe that you know everything. This is so important. I mostly notice this in the school I do my internship [...] (P4-3)

[...] *Ve bunları hatta bu seminerler ve uygulamalardan sonra sınava sokarım, öğretmenleri. O kadar da acımasızım yani. Çünkü ben yeni bir müfredat getirmişim. Sen buna uymakla yükümlüsün. Bilmekle zaten yükümlüsün, onu geçiyorum. Bir de uyma kısmı var. Ya bilme kısmı bile yok hocam yani. Çok felaket durumda insanlar. Kaldı ki benim röportaj yaptığım insanlar yani*

kolej öğretmeni. Hani gidip de ben doğunun bir köyündeki öğretmene sormuyorum. Belki o biliyordur yani. Hani onu istisna tutuyorum. O kişisel gelişimle alakalı birşey bence. Hani ben biliyorum ben biliyorum dersin bence hiçbirşey bilemezsin yani. O çok önemli. Ben o gittiğim okulda en çok bunu görüyorum [...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. For instance, during the discussions on the sixth video watched, participants criticized the teacher in the video for not being able to understand and implement the new curriculum. One of these participants reflected that:

The objective of the lesson was to teach multiplication in decimal numbers. But if you ask how much it reached its objectives, I think it was almost none. Because the teacher gave all the rules from the beginning. Then, she tried to use the area model with the help of a hundred-block and make the results more concrete. But I think the teacher tried to use such a method as she saw it in the guide book. Actually, I think, she was neither aware of the fact that she was using the area model, nor the fact that it was really working. Thus, the students didn't understand. (P4-OD)

Dersin amacı aslında ondalık sayılarda çarpmayı öğretmekti. Ama ne kadar amaca ulaşıldı dersiniz bence hiçe çok yakın. Çünkü öğretmen baştan bütün kuralları verdi. Sonra 100'lük bir tablo hazırlayıp alan yöntemini kullanarak göstermeye ve sonuçları somutlaştırmaya çalıştı. Ama öğretmen sanırım kılavuz kitapta böyle birşey kullanabileceğini görüp uygulamaya çalıştı. Aslında bana göre öğretmen ne alan yöntemini kullandığının ne de ne işe yaradığının farkında. Dolayısıyla öğrenciler de farkına varmadılar.

Another participant reflected that:

I was hopeful when the teacher started the lesson with a summary of the previous lesson. Except for one part, the lesson was more or less in line with the new curriculum. Probably because of the old practices, the teacher was committed to do the responsibilities

of the students (such as doing, realizing, discovering) as if they were hers and excluded the students. She was acting like a pre-programmed robot during the lesson. She tried so hard to instruct the subject matter, but I think she failed in that. I don't know whether such automatic behaviors come from years of experience, but generally teachers with an experience more than 15-20 years act like that. Actually we shouldn't blame them, their minds work that way. I mean it is like driving, dancing etc. Such behaviors started to be coordinated by the spinal cord after a period of time. What I mean by automatic behavior is this. Is it bad? It depends. If the teacher internalized the expectations in the new curriculum and transformed them into behaviors, then we would appreciate and applaud her thinking what a great teacher she was. You know there is a saying "what leaks from a pot is what it has inside". What can we expect from a teacher whose pot is full of things we saw in these videos? We sowed the wind and now we are reaping the whirlwind. (P8-OD)

Hoca derse geçen dersin özetiyle başlayınca biraz ümitlenmiştim. Bir nokta hariç ders içeriği aşağı yukarı müfredata uygun gitti. Herhalde eski alışkanlıklardan olacak, hoca öğrencilerden beklenenleri (şöyle yaptırılır, şu farkettilir, bu keşfettirilir) sanki kendine hitap ediyormuş gibi anlayarak öğrencileri biraz işin dışında tuttu. Hoca dersi anlatırken otomatiğe takmış gibi hareket ediyordu. Az gitti, uz gitti, hatta dere tepe düz gitti ama bir arpa boyu yol alınmadı sanki. Bu otomatik davranışlar yılların verdiği tecrübenin bir yanı mıdır ne genelde 15-20 yılın üzerinde tecrübesi olanlar böyle davranıyor. Aslında onları da suçlamamak lazım vücut böyle çalışıyor. Hani bilirsiniz araba sürmek, dans etmek vs. davranışlar belli bir süre sonra beyinden çok omuriliğin kontrolünde gerçekleştirilir. "Otomatiğe takma" tabirinden kastım bu. Kötü birşey mi? Duruma göre değişir. Eğer hoca yeni müfredatta kendinden beklenenleri özümseyip davranış haline getirseydi o zaman ne muazzam "ne muazzam öğretmen, fevkalade, harikulade" derdik herhalde. Hani bir söz vardır "testide ne varsa dışarıya onu sızdırır" diye. Testisi, zamanında örneklerini videoda gördüğümüz şeylerle doldurulan birisinden ne bekleyebiliriz ki? Zamanında rüzgâr ekmişiz, şimdi de fırtına biçiyoruz.

In the reflections, on the other hand, only 3 participants reflected on this role, but this frequency was higher than that of the first (2 participants) and

second reflections (none of the participants). For example, Participant-15 reflected that:

[...] As it was in the previous week, we again face a teacher in this classroom who want to give the impression that she is implementing the new curriculum by using materials, but actually who can't give up the traditional ways of teaching. This is the common problem of the experienced teachers. (P15-R3)

[...] Yani bu sınıfta da, geçen haftakinde olduğu gibi, sözde materyal kullanarak yeni müfredata uyuyormuş gibi bir izlenim vermek isteyen, aslında bildiği geleneksel yollardan vazgeçemeyen bir öğretmen ile karşı karşıyayız. Eski öğretmenlerin ortak derdi bu.

In the third interview, 12 out of 15 participants mentioned the issue “Materials” which refers to preparing and using correct materials in an accurate way without creating misconceptions, and preventing misconceptions through the use of materials. This role was one of the most popular roles noticed by the participants as in the first (11 participants) and second interviews (7 participants). For example, Participant-10 mentioned that:

I mostly paid attention to whether the teacher brought materials or not [...] The sample bank receipt concerning interest which the teacher prepared and brought was very good, I think. I mean only if it were visualized more clearly. The teacher worked hard for that. But I think it wasn't that effective. (P10-3)

Mesela en çok materyal getirmiş mi getirmemiş mi ona dikkat ettim[...] Şu, faiz, faturasını böyle çizip getirmiş falan. O çok güzeldi bence hani güzel konulsa. Çok güzel emek harcamış orda. Ama böyle çok verimli olamadı bence.

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the last

video watched, participants discussed about the use of materials in classrooms.

One of these participants reflected that:

Yes, we agree on that for sure. It is a situation I encounter in the school where I do my internship: I talked to the teacher, and told him that I needed materials to teach the subject. He brought me 10-15 counters, and told me that they would be enough; I would do the teaching and the students would watch. I guess, the teacher education seminars are not that effective. With respect to the materials, we encounter the same problem in many teachers. (P5-OD)

Evet, bu konuda kesinlikle hemfikiriz. Staj okulunda da karşılaştığım bir durum: Hoca ile görüştük ve materyal gerektiğini söylemişim ders anlatmam için, bana 10-15 tane sayma pulu getirdi ve bunun yeteceğini, benim yapacağımı ve çocukların izleyeceğini söylemişti. Kanımca bu hizmet içi eğitim seminerleri bu bağlamda pek de faydalı geçmiyor. Materyaller konusunda birçok kişide aynı sorunla karşılaşıyoruz.

Another participant commented on this role from a different point of view as in below:

It is encouraging that even if she didn't use the materials effectively, at least she brought a material to the class. If only she let students use it and prepared a useful activity, then she would produce a job to be appreciated. (P15-OD)

Materyali etkili kullanamasa dahi sınıfa bir materyal getirmiş olması bile bir umut ışığı bence. Eğer öğrencinin de onu kullanmasına izin verse ve faydalı bir etkinlik hazırlasa idi, o zaman çok daha takdir edilecek bir iş ortaya koymuş olurdu.

In the third reflections, on the other hand, less than half of the participants were able to reflect on this role (6 participants). This frequency was lower than that of the first reflection (10 participants), but higher than that of the second reflections (2 participants). For example, Participant-14 criticized the teacher for not being able to effectively use the materials as in below:

At the beginning of the lesson, the teacher first gave the algorithm for the classical multiplication and then modelled it. However, if she first discussed it over the models and then generalized it, it would have been better. As she showed the blue and yellow hundred-blocks, she didn't make any explanations like they were to multiply the sides to find the area of the yellow part. (P14-R3)

Dersin başında öğretmen önce klasik çarpma algoritmasını verip, daha sonra modelleme yoluna gitti. Hâlbuki önce modeller üzerinden tartışıp sonra bir genellemeye gidilse daha güzel olurdu. Elindeki mavili sarılı yüzlük kartı gösterirken sarı kısmın alanını bulmak için kenarlarını çarpıyoruz gibi bir açıklama da yapılmadı.

Paralel to the first interventions, the teacher role "Planning lesson" referring to making lesson plans and being flexible in lesson plans was only mentioned by 2 participants, and it was not mentioned in the third reflections. This sub-issue was noticed by 4 participants in the second interviews.

Eight participants mentioned "Being prepared" for the lesson which is a quite high frequency when compared to the first and second interviews (3 participants each). In the third reflections, on the other hand, none of them were able to reflect on this role as in the second reflections. For example, Participant-11 mentioned this role as in the below vignette:

In different sizes... I mean the nets were all different from each other. You know, every detail was planned and prepared thoroughly to paste it to the board. Maybe it is that order and neatness. You see how important it is to foresee the lesson and prepare the things without forgetting anything. Because even a little detail might break down what you have planned in your head. I realized that we should pay attention to that, for example. (P11-3)

Farklı büyüklüklerde... Açılımları tabii ki de farklı bir şekilde konulmuş yani. Sonra ne bilim onu oraya yapıştırmak için herşey yani en ince ayrıntısına kadar getirilmiş, hazırlanmış. Hani o tertip düzen belki de. Daha önceden biraz ileri görüşlü olup, yani

birşeyleri unutmadan hazırlamanın çok önemli olduğunu görüyorsun. Çünkü en ufak bir ayrıntı bile orda yani tamamıyla altüst edecek belki de senin kafanda tasarladığın etkinliği yani. Bunun için ona dikkat edilmesi gerektiğini gördüm mesela.

Seven participants reflected on “Connections” as in the second interviews while it was noticed by 5 participants in the first interviews. This issue refers to taking students’ preknowledge into account, and connecting the subjects. For example, Participant-10 mentioned on how the subjects are connected to each other in mathematics as in below:

[...] Because all the subjects are connected to each other. For example, the decimals are also fractions and percentages at the same time. It is necessary to connect all these like that. (P10-3)

[...] Çünkü bütün konuların hepsi birbirine bağlı. İşte ondalık sayılar aynı zamanda kesir, aynı zamanda yüzdeler falan. Bunların hepsini böyle bağlamak gerekir.

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. For instance, during the discussions on the sixth video watched, Participant-5 reflected on how the teacher in the video could have been connected the subjects in her lesson as in below:

I always remember the calculations based on measuring length. First of all, I would prepare warm ups on integers to help students understand the relation between multiplication and area. I would give that through length and area measurement or real life examples like the area of the classroom. Then, I would give examples to the length with cm instead of meter, and I would do the transition to the decimal numbers from the fractions. (P5-OD)

Benim aklıma hep uzunluk hesaplamaları geliyor. Öncelikle öğrencilere çarpma ve alan ilişkisini kavramaları için tamsayılarla ısınma turları hazırlar, bunları uzunluk ve arazi ölçümü veya sınıf alanı gibi real-life örneklerle kavratırdım. Ardından uzunlukları metre değil de santimetre olan örnekler verir ve ondalıklı sayıların geçişini kesirli sayılardan yapardım.

In the third reflections, this role was noticed by 3 participants with a quite lower frequency than that of the first (8 participants) and second reflections (10 participants). To give an example, Participant-13 reflected that:

It was an effective method to explain the multiplication of decimals through the area of rectangle. (P13-R3)

Ondalık sayıların çarpımının dikdörtgenin alanı ile ilişkili anlatılması güzel bir yol.

Similar to the second interviews, 7 participants talked about “Student levels” that is the suitability of the lessons to the levels of the students. This frequency was 4 in the first interviews. For example, Participant-1 reflected in the third interview that:

She tried to make group work. But she chose a difficult activity. It is really difficult to make students understand the concept of unknown, N. I think that she used a wrong technique. (P1-3)

G hoca grup çalışması yapmaya çalıştı. Yalnız zor bir konuyu seçmişti. N, hani bilinmeyi öğrencilere kavratmak gerçekten çok zor. Biraz yanlış teknik kullandığını düşünüyorum.

Similarly, Participant-12 reflected on this issue as in below:

I learned from that video not to choose a very difficult activity. Because if the students asked why they were doing it I couldn't give an answer in that video. Still I don't like that activity... I think it is too hard for the primary level. (P12-3)

G hocanın videosundan çok zor bir aktiviteyle gitmemeyi öğrendim. Çünkü çocuklar neden bunu yapıyoruz dediğimizde ben G hocanın videosunda cevap veremedim. Hala sevmediğim bir aktivite... Çok ağır buluyorum ilköğretim için.

This role was mentioned by only 2 participants in the third reflections while it was noticed only once both in the first and second reflections.

The issue “Introduction” referring to effective introduction to the lesson, stating the aim of the lesson, and providing students with the basics was mentioned by 7 participants in the third interviews, but it was noticed by only 2 participants in the reflection papers. These frequencies were lower than that of the second interviews (9 participants) and reflections (13 participants), but higher than that of the first interviews (3 participants) and reflections (1 participant). For example, Participant-5 reflected on this role in third interview as in the below vignette:

What was happening in that lesson was telling the students, who thought that they couldn't understand or do it, not to bother with this lesson. But when the teacher started the lesson with a story, I realized what should be done to prepare students for the lesson. (P5-3)

Ne oluyor, ders zaten, anlamayacağım uğraşmayacağım diyen öğrencilere birebir uğraşmayın, anlamayın gibisinden birşey oluyordu. Ama böyle hikâyeyle başlayınca, hani onu fark ettim, hani öğrenciyi derse hazırlamak için ne yapmak lazım.

“Guide book” referring to effects of guide book, use of guide book, and not sticking to the guide books was mentioned by 5 participants, and none of the participants reflected on this role in the third reflection papers. This sub-issue was not noticed in the first and second interventions either. To give an example, Participant-7 reflected that:

Actually because she was using the MoNE's book, she had to conduct many activities. Since she is obliged to ask those kinds of questions in the written exams, she had to instruct that way. (P7-3)

Ama işlediği kitap Milli Eğitimin kitabı olduğu için Milli Eğitim kitabında tamamen aktiviteler falan var. Yazılı sınavda da mecbur hani, o şekilde işliyor olmak için o tip sorular soruyor.

The issue “Student knowledge” referring to establishing a sound knowledge foundation was mentioned by 3 participants in the third interviews, and by only one participant in the reflections. This sub-issue was not noticed in the second interventions, and only noticed by 2 participants in the first interviews. To give an example, Participant-2 reflected in the third interview that:

[...] For example, we have to be very careful with these points, because they are fundamental things we learn in the middle school. Excuse me, I mean in the primary school. If we give these inappropriately, the new knowledge we build on would collapse in the future. (P2-3)

[...] Mesela bunlarda çok dikkat etmemiz gerekiyor, çünkü bunlar temel şeyler ortaokulda alınan. Pardon ilköğretimde alınan. Bunları baştan yanlış verirsek ilerde üstüne koyulacak şeyler çöker yani.

Similar to the first interventions, “Challenging mathematics” which refers to the teacher roles such as teaching mathematics from simple to complex, not simplifying mathematics too much, and integrating challenging activities was only mentioned by 2 participants, and it was not mentioned in the reflections. This sub-issue was not noticed in the second interventions. To give an example, in the third interview, Participant-13 reflected that while it is necessary to start instruction with simple examples, it is also a must to challenge students:

I believe that it is necessary to challenge students a little bit while teaching mathematics. However, we should start with activities and simple examples. I mean without pushing students, we can't

take them above a certain level [...] Thus, I don't agree to make it too much simple. (P13-3)

Yani matematikte, matematik öğretirken ben biraz öğrencileri zorlamak gerektiğini düşünüyorum. Mutlaka etkinliklerle, daha basit örneklerle başlanmalı ama. Yani öğrenci zorlanmadan da belli bir seviyenin üstüne çıkarılamaz [...] Bu yüzden çok çok basitleştirme taraftarı değilim ben.

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. For instance, during the discussions on the sixth video watched, Participant-10 reflected that teachers should start their instruction with a simple example before moving to a more complex one:

I don't think that I could find the answer as a student if the teacher asked me to multiply 0.2 and 0.4. Because it would be a new problem for them. I think, at least she should have shown a simpler example to the students... (P10-OD)

Ben 0,2 ve 0,4 gösterilip hadi çarpımı da siz bulun derse bir öğrenci olarak bulabileceğimi zannetmiyorum. Çünkü bu artık yeni bir soru onlar için. En azından basit bir örneği öğrencilere kesinlikle göstermek gerekir diye düşünüyorum...

Only 2 participants mentioned the sub-issue "Wrapping up" the lesson. This frequency was lower than that of the first (6 participants), but higher than that of the second interviews (1 participant). This role was mentioned by only one participant in the third reflection papers while it was mentioned by 4 participants both in the first and second reflections.

The noticed teacher roles related to the Curriculum Knowledge in the third interventions were given above. As stated, the most noticed sub-issues in the third interviews were "new curriculum", "materials", and "being prepared". There was no sub-issue that was not noticed in the third interventions. In the

following part, the noticed teacher roles related to the Content Knowledge in the third interventions are provided.

4.1.3.1.1.4. The Sub-Issues related to Content Knowledge in the Third Interventions

As indicated before, in the third interview, 5 out of 15 participants were able to talk about Content Knowledge. The number of the participants noticed this issue was 4 and 2 in the first and second interviews respectively. There was only one sub-issue related to this main-issue that is “Subject-matter knowledge”. This issue refers to the teacher roles such as having subject matter knowledge, knowing what to/how to do, being qualified, and not giving wrong examples. For example, Participant-4 mentioned how important is that teachers have enough subject matter knowledge in order to be able to effectively implement the new curriculum:

[...] There are many ways. If a student says he wants to learn in that way, the teacher has to know all the possible ways; thus, she can help the students reach the solution appropriately. Actually, the responsibilities of the teachers in the new curriculum are very loaded... Very loaded. Because there is even no time to blink. I mean if you miss it, then you lose it. Because many students can choose different ways. In the previous curriculum, all students depended on the teacher, there was only one way. It was easier to have the control. But when there are so many ways of solutions, you have to control all of them. I mean, it means that the more students you have the more control you should have on them. I mean it is hard. (P4-3)

[...] Yani mesela bir sürü yol var, ben bu yoldan öğrenmek istiyorum dediyse çocuk, öğretmenin o yolların hepsini çok iyi bilmesi gerekecek; dolayısıyla o yolda onun düzgün bir şekilde, doğruya ulaşabilmesi için yardımcı olacak. Aslında öğretmenin yeni programda görevi çok fazla... Çok fazla. Çünkü hani şey vardır, gözünü kırpmaya gibi bir şansı yok. Yani kaçırdığı an gidiyor. Çünkü birçok öğrenci farklı yolları seçebiliyor. Diğer

türlü bütün öğrenciler size bağlı, ortada tek yol var. O zaman kontrol etmek daha basit. Ama ortada birçok yol olduğu zaman, hepsini ayrı ayrı kontrol etmek gerekiyor. Yani sınıfta ne kadar öğrenci varsa hepsini ayrı ayrı kontrol etmek demek bu. Yani zor.

In the third reflection papers, only one participant was able to mention this role while the frequencies were 1 and 2 in the first and second reflections respectively.

The noticed teacher role related to the Content Knowledge in the third interventions was given above. In the following part, the “Other” teacher roles noticed with respect to the *Methodological Perspective* in the third interventions are provided.

4.1.3.1.1.5. The Sub-Issues related to the “Other” Role with respect to the Methodological Perspective in the Third Interventions

As indicated before, in the third interview 13 out of 15 participants were able to talk about “Other” teacher roles with respect to the *Methodological Perspective*. There were 8 sub-issues related to this main-issue (see Table 3.6). In the third interventions 5 of them were noticed by the participants while 5 and 4 for of them were noticed in the first and second interventions respectively. The noticed sub-issues in the third interventions were “motivation”, “experience”, “reaching targets”, “technology”, and “classroom culture”.

In terms of frequencies, the issue “Experience” referring to the effect of experience was among the most popular roles noticed, and was mentioned by 8 participants. This sub-issue was noticed by only 4 and 3 participants in the first and second interviews respectively. In the third reflections, on the other hand, none of the participants reflected on this sub-issue. For example, Participant-4 reflected on this role as in the below vignette:

[...] I got so much help at the points where I was wondering how I could do it or whether I could explain it... Like how he instructed. Because they had experience for years, they tried and tested how they could instruct better. I focus on how they instruct and how they got down to the students' level. One of the most important points is this for me. (P4-3)

[...] Benim nasıl anlatırım diye çok merak ettiğim ya da ya ben bunu anlatabilir miyim diye düşündüğüm konularda özellikle çok yardım aldım... Hani nasıl anlatıyor. Çünkü kırk, yani kaç yıldır bunu denemişler görmüşler ve nasıl anlatılacağını tahmin ediyorlar. Onu nasıl anlatacaklar, o seviyeye nasıl indirdiklerine bakıyorum. Benim için çok önemli olan şeylerden bir tanesi bu.

Another most popular issue noticed in the third interviews was “Classroom culture”. This role refers to teacher roles such as creating classroom culture where students are not afraid of making mistakes and feel comfortable, and preventing students from interfering with each other. Eight participants were able to reflect on this role. This sub-issue was noticed by 6 participants both in the first and second interviews. For example, Participant-8 criticized the classroom culture in the video as in below:

[...] The teachers in the last videos, especially the one in the last was in a mood like ‘I close my eyes and do my duty’. He was a little bit rude. The students couldn't dare to ask questions. They were hesitating to ask what the teacher meant. Or when the teacher replied, if they didn't understand something, they nodded their heads as if they got it. They were passing it over as if they understood. In the others, there were more relaxed atmospheres. The students were able to ask when they didn't get it. They were able to share their opinions [...] (P8-3)

[...] Son videolarda işte özellikle en son videoda böyle öğretmen gözlerimi kaparım vazifemi yaparım gibisinden böyle bir tavır almıştı. Biraz da sertti üslubu. Öğrenciler çok cesaret edemiyordu, burada ne demek istemiştiniz falan böyle takıla takıla sorular soruyor. Veya iste cevap verince öğretmen, anlamadığı nokta varsa o zaman işte kafayı sallıyor şöyle

anlamasa bile. Anladım gibisinden geçiştiriyor. Kendisini çok rahat hissetmiyordu öğrenciler. Diğerlerinde biraz daha rahat bir ortam vardı. Öğrenci anlamadığı zaman soruyordu açıkça. Daha sonra kendi düşüncelerini söyleyebiliyordu [...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. For instance, during the discussions on the sixth video watched, Participant-4 emphasized the importance of establishing an effective classroom culture as in below:

No, you are not exaggerating at all because it is very important that students feel comfortable in class. If they think that they would be insulted when they made a mistake, then they can't ask questions when they don't get it and they can't actively participate in the lesson. Additionally, I believe that it is also a disadvantage for the teacher, because she can not do periodic assessments to check how much the students understand the subject. She can only notice it in the exam, which would be quite late. (P4-OD)

Hayır, hiç abartmıyorsun bence. Çünkü öğrencinin derste rahat olması çok önemli. Eğer hata yaptığında aşağılanacağını düşünürse anlamadığı yerleri soramaz derse etkin bir şekilde katılamaz. Ayrıca bu öğretmen için de dezavantaj bence çünkü bu şekilde anlattığı konunun ne kadar anlaşıldığını ara ara ölçemez. Sadece sınavlarda görür ki bu çok geç olur.

In the third reflection papers, 5 participants were able to reflect on this role while it was noticed only once both in the first and second reflections. For example, Participant-12 reflected that:

Not only the other students reacted to the student on the board when he made a mistake, but also the teacher criticized him with the others. Actually, being on the board is such a stressful situation for a student. (P12-R3)

Öğrenciler tahtaya kalkıp yanlış yapınca sınıf tepki verdiği gibi, hoca da sınıftakilerle bir olup tahtadaki öğrenciyi eleştiriyor. Oysa tahtaya kalkmak öğrenci için oldukça stresli bir durum.

In the third interview, the issue “Motivation” which refers to motivating and encouraging students to ask and answer questions, and sharing their ideas was mentioned by 5 participants. This issue was mentioned by 2 participants in the second interviews and not noticed in the first interventions. In the third reflections, 4 participants were able to notice this sub-issue while it was not noticed in the second reflections. For example, Participant-14 reflected on this role both in the third interviews and in reflections respectively as in the below vignettes:

[...] He was always expecting us to raise questions. Even if our questions were nonsense, he wanted us just to ask them. If you wanted that, of course we would...An environment to be able to ask questions should be created [...] (P14-3)

[...] İşte şey böyle hep bizden soru sormamızı ister, soru sormamızı beklerdi. İşte saçmasapan olsun uyduruk olsun yeter ki soru sorun. Sen böyle dedikten sonra sorulmaz mı... Şimdi soru sorulacak bir atmosfer yaratılmalı [...]

and

The fact that the teacher asked whether there were anyone who didn't understand may cause students who didn't really get it to feel scared to react. (P1-R3)

Hala anlamayanlar mı var şeklinde bir sorunun öğretmen tarafından gelmesi, anlamayan öğrencilerin tepki vermede korkmasına neden olabilir.

The teacher role “Reaching targets” which refers to being able to reach targets was mentioned by 3 participants, and it was not mentioned in the third

reflections. Similarly, the issue “Technology” referring to benefiting from technology and technological resources was only mentioned by 3 participants, and only one participant reflected on this role in the third reflections. On the other hand, this sub-issue was not noticed in the first and second interventions.

The noticed teacher roles related to the “*Other*” roles under the *Methodological Perspective* in the third interventions were given above. As stated, the most noticed sub-issues in the third interviews were “experience” and “classroom culture”. The sub-issues which were not noticed in the third interventions were “self-esteem”, “effective instruction”, and “student expression”. These sub-issues were only noticed in the first interventions.

To sum up the issues noticed related to the *Methodological Perspective*, all of the participants were able to reflect on teacher roles related to this main theme both in the three interviews and in the reflections. More specifically, in the *Methodological Perspective*, the only main-issue that the participants noticed in all interviews was teachers’ Pedagogical Content Knowledge. General Pedagogical Knowledge and Curriculum Knowledge were also among the mostly noticed main-issues with an increase from the first to the last interviews. The teacher role related to Content Knowledge, on the other hand, was only noticed by few participants throughout the three interventions. With respect to the “Other roles” related to *Methodological Perspective*, the participants mostly noticed the effect of “Experience”, and “Classroom culture”.

In the following part, the teacher roles related to *Attitudinal Perspective* in the third interventions are provided.

4.1.3.1.2. The Sub-Issues related to Attitudinal Perspective in the Third Interventions

As indicated before, the *Attitudinal Perspective* was the second main theme. In the third interview, 14 out of 15 participants mentioned the *Attitudinal Perspective*. There were 10 sub-issues related to this theme (see Table 3.6). In

the third interventions, 7 of these sub-issues were noticed by the participants where it was 3 and 6 in the first and second interventions respectively (see Appendix 7).

In terms of frequencies, in the third interview, 12 participants mentioned the issue “Mathematics as a fun”. In other words, most of the participants noticed and mentioned teacher roles such as having students like mathematics lessons, drawing their attention, warming them up, motivating them, making mathematics fun, and ensuring student participation. This role was the most popular role noticed in the third interview while it was noticed by 3 and 5 participants in the first and second interviews respectively. For example, Participant-9 mentioned that:

The students participate in the lessons when there is an activity. It is not that hard to engage them. They learn in such a more enjoyable way. Everyone has something to say, which means that they all understand something. Now, I have an idea to make mathematics more enjoyable. (P9-3)

İşte direkt şey böyle etkinlik falan olduğu zaman, öğrenciler katılıyorlar. Çok da zor olmuyor mesela onları katmak. İşte daha eğlenceli bir şekilde öğreniyorlar. Herkesin söyleyecek birşeyi oluyor muhakkak. Ki o da kafasında birşey oturtur. Hani matematiği daha zevkli hale getirme açısından birşeyler oluşturu kafamda.

This role was only mentioned by one participant in the third reflections as in the first, but it was noticed by 10 participants in the second reflections.

Five participants reflected on the issue “Positive attitude” that is having a smiling-face, having students like her, and being tolerant, which was mentioned only once in the reflections. This sub-issue was not noticed in the first and second interventions. For example, Participant-12 reflected on this role in the third interviews that when students do not like their teacher it may also affect their attitude toward mathematics:

That teacher, we were all surprised, was so rude. The students in the classroom were scared. I believe that, first of all, a teacher should be a good teacher, should be able to make her students like her. I mean, if not, the children would dislike mathematics automatically. (P12-3)

N hoca, hepimiz çok şaşırđık. Çok kabaydı. Sınıfta çocuklar korkuyordu. Ya bir kere öğretmenin böyle herşeyden önce iyi bir öğretmen olmak, kendini sevdirebilmek bence. Yani sevdirmezse çocuk direkt olarak matematikten soğuyacak zaten.

The issue “Comfort” that is being comfortable in classroom was mentioned by 4 participants, which was not mentioned in the reflections. The issue “Voice tone” referring to not speaking too loud, and being careful with the tone of voice and mimicry was mentioned by 3 participants, and was mentioned by 7 participants in the third reflection papers. This sub-issue was not noticed in the first and second interventions. To give an example, Participant-6 reflected on this role both in the third interview and in the third reflections respectively as in below:

[...] For example, in the last video, the voice, the teacher’s use of her voice and her mimics were much criticized. I believe that we were right. I mean I was so scared when I watched it. (P6-3)

[...] Mesela son videoda ses, öğretmenin ses tonunu kullanması, mimikleri çok eleştiri aldı. Bence haklıydık da, bana göre. Yani çok korkmuştum ben izlerken.

and

Her tone of voice was so scary. This might prevent students from sharing their ideas. (P6-R3)

Ses tonu çok korkutucuydu. Bu durum öğrencilerin fikirlerini paylaşmalarına engel olabilir.

Another participant (Participant-1) reflected on this role in the third reflections as in the below vignette:

It was so irritating that she didn't pay attention to rising and falling in her tone of voice. The students couldn't understand whether the teacher was emphasizing or reacting to something. (P1-R3)

Ses tonunu kullanırken, sesinin yükselip alçalmasına dikkat etmeyerek konuşması iticiydi. Öğrencilerin hocanın vurgu mu yoksa başka bir tepki mi verdiği anlaşılmıyordu.

The issues “Enthusiasm” that is being concerned and enthusiastic, enjoying her job, being willing to implement the new curriculum; and “Respect” that is being respectful were mentioned by 3 participants each, and only the first was mentioned in the reflections by one participant. The sub-issue “respect” was not noticed in the first and second interventions. To give an example, Participant-11 reflected on this role in the third interview as in the below vignette:

The students themselves. Their attitudes were changing. According to what? According to the teachers' acts. For this, in order to specify her expectations from the students, I mean to be respectful towards them... I think that the teachers should be very careful while selecting their expressions. (P11-3)

Hani öğrencilerin kendileri itibariyle. Fakat davranışları değişiyordu. Neye göre, öğretmenin davranışlarına göre. Onun için, hani çocuklardan beklentilerin belirtilmesi noktasında, hani onlara saygılı... İfadelerin seçilmesi noktasında falan çok dikkat edilmesi gerektiğini düşünüyorum artık.

The only role that was not mentioned in the interviews, but in the reflections was “Valuing ideas”. This role refers to the teacher roles such as

valuing student ideas, listening to them, and trusting them. Three participants were able to reflect on this role in the third reflections. For example, Participant-3 reflected on this role where she criticized the teacher in the video for not trusting her students:

The expression “I give you the floor for the exercises” shows that the teacher has a little bit disbelief in her students. (P3-R3)

Uygulamalarda da sizi kaldırıyorum artık ifadesi aslında bana az da olsa öğrencilere karşı güvensizlik duygusu taşındığını belirtiyor.

The noticed teacher roles related to the *Attitudinal Perspective* in the third interventions were given above. As stated, the most noticed sub-issue in the third interviews was “mathematics as a fun”. The sub-issues which were not noticed in the third interventions were “knowing students”, “patience” and “student psychology”. These sub-issues were only noticed in the second interventions.

To sum up the sub-issues noticed related to the *Attitudinal Perspective*, for the several sub-issues, the frequency of participants’ noticing increased from the first to the last interventions. The most increase was shown in the issue “Mathematics as a fun”. The other issues noticed were “Comfort”, “Positive attitude”, “Voice tone”, “Enthusiasm”, and “Respect”; although their frequencies were not as high as in “mathematics as a fun”.

In the following part, the other teacher roles, which were grouped under the “*Other*” theme, are provided.

4.1.3.1.3. The Sub-Issues related to the “Other” Theme in the Third Interventions

The last main theme, other than *Methodological* and *Attitudinal Perspectives*, was the “Other” theme. In the third interview, 12 out of 15 participants talked about the “Other” theme. There were 3 main-issues related to this theme; Teacher Characteristics, Equity, and Out-of-Class Activities. In terms of the frequencies, among 15 participants, 5 talked about Teacher Characteristics, 11 talked about Equity, and only one talked about Out-of-Class Activities.

In the following part, the sub-issues related to the main-issues that are Teacher Characteristics, Equity, and Out-of-Class Activities are provided respectively with their frequencies and related vignettes.

4.1.3.1.3.1. The Sub-Issues related to Teacher Characteristics under the “Other” Theme in the Third Interventions

In the third interview, 5 out of 15 participants talked about Teacher Characteristics. There were 4 sub-issues related to this main-issue (see Table 3.6), and similar to the first interventions, only 2 of them were noticed in the third interventions. In the second interventions, on the other hand, all of these sub-issues were noticed. The sub-issues noticed in the third interventions were “self-improvement” and “self-assurance”.

In terms of frequencies, in the third interview, 4 participants mentioned the role “Self-improvement” referring to be willing to improve oneself and not resisting to innovations. This sub-issue was not noticed in the first interventions, and noticed by only 2 participants in the second interviews. For example Participant-2 reflected that rather than being experienced, what is important for a teacher is to be open to developing oneself:

Learning more, observing more, I mean what I can do more and how. I think that I will have more experience as such things consistently happen. I realized that the years are not important. Years and experience; ok, they might be related, but the more important thing is to read more, and to improve and update yourself. (P2-3)

Yani daha fazla öğrenmek daha fazla izlemek, daha fazla hani nerde nasıl yapabilirim, bunlar sürekli oldukça daha çok tecrübe edineceğimi düşünüyorum yani ben şunu gördüm. Yıllar önemli değilmiş, yıla deneyim tamam biraz daha tamam ilişkili olması beklenen birşey ama daha fazla okumak geliştirmek kendini update etmek daha önemli bence.

With respect to another sub-issue, similar to the second interviews, 2 participants mentioned “Self-assurance” that is being well-equipped and cultured, and having self-assurance. None of the sub-issues related to Teacher Characteristics were mentioned in the third reflection papers as in the first and second.

The noticed teacher roles related to the Teacher Characteristics in the third interventions were given above. The sub-issues which were not noticed in the third interventions were “mistakes” and “collaboration”. In the following part, the noticed teacher roles related to the Equity in the third interventions are provided.

4.1.3.1.3.2. The Sub-Issues related to Equity under the “Other” Theme in the Third Interventions

In the third interview, 11 out of 15 participants talked about Equity, which makes it the most popular main-issue noticed related to the “Other” theme. There were 5 sub-issues related to this main-issue (see Table 3.6), and all of them were noticed in the third interventions. In the first and second interviews, on the other hand, 4 of these sub-issues were noticed by the participants. The sub-issues noticed in the third interventions were “reaching

all”, “ensuring understanding of all”, “maximum capacity”, “addressing to students with different levels”, and “activating all”.

In terms of frequencies, in the third interview, the most popular role noticed by 5 participants was “Reaching all” referring to addressing to all students, letting students who don’t raise their hands speak, and thus not losing the students who are successful in the classroom but not in the exams. This sub-issue was noticed by 4 and 6 participants in the first and second interviews respectively. For example, Participant-12 reflected on this role as in the below vignette:

The students who can give exact answers were raising their hands. But what took our attention was that the teacher didn’t give a chance to the students who didn’t raise their hands. He wasn’t interested in them. None of them did that... They all dealt with the students who were raising hands. For example, in the teacher M’s video, we didn’t see the right side of the class. We didn’t even see who were in the back of the right side. No student stood up from that side. All the teachers in the videos were interested in the active students. Both the experienced and inexperienced teachers. (P12-3)

Net cevaplar verebilecek çocuklar parmak kaldırıyor. Ama hepsinde dikkatimizi çeken, neden parmak kaldırmayan çocuklara cevap verilmiyor. Onlarla ilgilenilmiyor. Hiçbirisi de bunu yapmadı... Hep parmak kaldıran çocuklarla ilgilendiler. Mesela M hocanın sınıfında sınıfın sağ tarafı yoktu. Sağ tarafın arkasında kim vardı görünmüyordu bile. Hiç kalkan bir çocuk da olmadı. Bütün öğretmenlerim parmak kaldıranlarla ilgileniyor. Yine deneyimli öğretmenlerim olsun, deneyimsizler olsun.

Another participant reflected on this role as below:

There are students who are silent in the class or who are active in the class but unsuccessful in the exams. There are students who participate in the activities, but can’t do anything in the exams

because of excitement. The teacher didn't pay attention to these. In that respect, the teacher was deficient. (P14-3)

Halbu ki, sınıfta böyle işte fazla sesini çıkarmayan ya da sınıfta etkili olup da sınavda düşük olan öğrenciler var. İşte bu etkinliklere katılan ama sınavda işte heyecandandır birşeydendir yapamayan çocuklar var. Bunlara dikkat etmiyor yani bu bağlamda bizim öğretmen şeydir, eksik kalıyordur.

This role was mentioned only once in the third reflections while it was noticed by 2 participants both in the first and second reflections.

“Activating all” students was the second most common role noticed in the third interviews with only 4 participants. For example, Participant-13 praised the teacher in the video for being able to activate all students as in below:

For example, in that video, there was a group work and I believe that all of the students were active. I don't remember any students sitting there quietly. All of the groups were recorded on the video. They were all doing something. I am sure not all of the students were in the same level. Maybe some of them didn't like mathematics or their mathematics teachers, but the teacher in that video achieved it. (P13-3)

Mesela G hocanın videosunda bir grup çalışması yapıldı ve her öğrenci bence aktıfti. Orda böyle sessizce oturan bir öğrenci hiç hatırlamıyorum ben videoda. Tamamı görüntülenmişti tek tek gruplar sırayla. Hepsi birşeler yapıyordu gerçekten. Mutlaka o sınıftaki öğrenciler aynı seviyede değiller. Belki hepsi de matematiği ya da öğretmenlerini çok sevmiyorlar ama bir şekilde G hoca bunu başarmıştı.

The issue “Ensuring understanding of all” which refers to ensuring the understanding of all students was mentioned by 3 participants, and it was mentioned only once in the third reflections.

The issues “Maximum capacity” that is developing students' capacity to maximum level, and “Addressing to students with different levels” that is

reaching all students with different levels equally were mentioned by 2 participants each. The sub-issue “maximum capacity” was not noticed in the first and second interventions. To give an example, Participant-3 reflected on this issue as in below:

Of course, the levels of the students would be different than each other. A student may not understand anything, and the teacher should accept this... I don't believe that everyone should understand everything or everyone should be the best. We, eventually, know the effect of intelligence. But as I said, I would do everything I could to make them reach the best, go one step further. (P3-3)

Tabii ki her bir çocuğun seviyesi farklı olacak. Bir çocuk birşeyi hiç anlamıcak yani bunu da kabullenebilecek şeyde... Yoksa herkes herşeyi anlayacak ya da herkes en iyi olacak diye de birşeyim yok açıkçası. Sonuçta zekânın, işte bunların etkisini biliyoruz. Ama dediğim gibi hani en iyiye, ileriye ulaşmaları için elimden geleni herşeyi yapardım.

The noticed teacher roles related to the Equity in the third interventions were given above. As stated, the most noticed sub-issue in the third interviews was “reaching all”, but by only one third of the participants. In the following part, the noticed teacher roles related to Out-of-Class Activities in the third interventions are provided.

4.1.3.1.3.3. The Sub-Issues related to Out-of-Class Activity under the “Other” Theme in the Third Interventions

In the third interview, only one participant talked about Out-of-Class Activity. There were 3 sub-issues related to this main-issue (see Table 3.6), of which two were noticed in the third interviews. That is, in the third interview, only one participant talked about this main-issue, but she was able to notice two of the sub-issues related to the Out-of-Class Activities. The noticed sub-issues were “preparing students for the future” and “following students”.

In terms of frequencies, in the third interview, “Preparing students for the future” referring to preparing students for their future careers and “Following students” out of class were mentioned only once, and none of the participants reflected on them in the third reflection papers.

The sub-issue which was not noticed in the third interventions was “parental support”, and it was noticed only in the second interventions by one participant.

To sum up the issues noticed related to the “*Other*” theme, for several sub-issues the participants noticed more on the sub-issues under this theme from the first to the last interviews as they watched and discussed more on the videos. The highest increase was shown in the main-issue Equity while there was less or no improvement in noticing the roles related to the Teacher Characteristics and Out-of-Class Activities respectively.

In the next section, the noticed topics in the first, second, and third interviews with respect to the teacher roles in reform-minded teaching are summarized and compared with the data from three reflection papers and also from the online discussions.

4.1.4. Summary of the Noticed Topics related to Teacher Roles

One of the aims of this study was to investigate the changes on what the prospective elementary mathematics teachers noticed with respect to the teacher roles in reform-minded teaching as they watched video cases and discussed the videos online. As indicated above, all of the participants were able to reflect on teacher roles related to *Methodological Perspective* both in the interviews and in the reflection papers (100%). From the *Attitudinal Perspective*, the percentage of noticing increased from the first (66.7%) to the last interview (93.3%) as in the first (42.8%) to last reflection papers (66.7%). Similarly, the participants noticed more on “*Other*” teacher roles from the first (53.3%) to the last interview (80%) as they watched and discussed more on the videos.

To give more detail, in the *Methodological Perspective*, the only main-issue that the participants noticed in all interviews was teachers' Pedagogical Content Knowledge (100%). Both in the three interviews and reflections, participants were able to discuss several teacher roles related to this knowledge. Among these, the roles "Facilitation" that is facilitating and assisting students, helping students discover, and providing hints when necessary; "Reasoning" that is motivating students to think and reason, not letting them memorize, giving the underlying meaning of concepts, letting students build their own knowledge, making students reach generalizations, and ensuring long-lasting comprehension; "Representations" that is using multiple instructional methods and multiple representations, selecting the most appropriate method for student understanding, using instructional methods and conducting lessons in line with the new curriculum; "Activities" that is making activities, familiarize students with the activities, selecting appropriate activities and examples, preventing students from perceiving activities as games, and applying activities appropriately; "Understanding" that is being able to understand student questions and what they say, being able to answer student questions and providing feedback, and giving concrete answers; "Inquiry" that is asking questions, encouraging students to inquire, asking for reasons and having students explain and justify their answers, and not giving the rules; "Student understanding" that is ensuring student understanding, and using the new curriculum even if it takes more class time were noticed more from the first to third interviews as the participants had the chance to discuss these roles during the online discussions. The other issues such as "Thinking time", "Group work", and "Misconceptions" related to Pedagogical Content Knowledge were either mentioned less, or the increase in the percentages of their noticing was not linear.

General Pedagogical Knowledge (93.3% to 100%) and Curriculum Knowledge (73.3% to 80%) were also among the most noticed main-issues with

an increase from the first to the last interviews. In terms of General Pedagogical Knowledge, the most noticed issues showing an increase in the percentages throughout the interviews were “Communication” referring to communicating with students, setting up proper relationships and securing the interaction between the students; “Approach” referring to positive approach towards students, not controlling too much, giving flexibility, not being too harsh, not behaving rude, not humiliating, and being decent; and “Shaping students” referring to shaping students, teaching them their roles, and distributing student roles appropriately. The other roles related to General Pedagogical Knowledge were either noticed less or their increase in the percentages was not that high. One interesting point is that the percentages of noticing of the issues “Management” that is managing the classroom, setting up the rules, time management and securing the order, and “Pressure” that is not putting too much pressure on students, and approaching to the students who make mistakes positively and providing them opportunities decreased through the interviews.

With respect to the noticed teacher roles related to Curriculum Knowledge, the most interesting increase was seen in the issue “New curriculum” referring to understanding the new curriculum and being able to adopt it. While this role was noticed by only about one third of the participants during the first and second interviews (33.3%), it increased to almost hundred percent in the last (93.3%). The other roles showing increase throughout the interviews were “Being prepared” for the lesson; “Student knowledge” that is establishing a sound knowledge foundation; and “Guide book” that is the effects of guide book, use of guide book, and not sticking to the guide books. Additionally, the issues “Materials” referring to preparing and using correct materials in an accurate way without creating misconceptions, and preventing misconceptions through the use of materials; “Introduction” referring to effective introduction to the lesson, stating the aim of the lesson, and providing students with the basics; and “Student levels” referring to the suitability of the

lessons to the levels of the students were among the most noticed roles related to this main-issue.

The teacher role related to Content Knowledge was only noticed by few participants throughout the three interventions. In other words, at most one third of the participants noticed this role in the last interview (33.3%). More specifically, although the percentage of participants' noticing increased from the first to the last interview; the percentages were quite low in the first and second interviews, and also in three reflections.

With respect to the "Other roles" related to *Methodological Perspective* (66.7% to 86.7%), the participants mostly noticed the effect of "Experience", and "Classroom culture" referring to creating classroom culture where students are not afraid of making mistakes and feel comfortable, and preventing students from interfering with each other. They were also able to discuss "Motivation" that is motivating and encouraging students to ask and answer questions, and sharing their ideas; "Reaching targets" that is being able to reach targets; and "Technology" that is benefiting from technology and technological resources. The frequency of the noticing of these sub-issues increased linearly throughout the three interviews, but still they were noticed with lower percentages than that of the sub-issues "experience" and "classroom culture" in all interviews.

The participants noticing with respect to the *Attitudinal Perspective* increased throughout the interviews (66.7% to 93.3%). The most increase was seen in the issue "Mathematics as a fun". This issue refers to the teacher roles such as having students like mathematics lessons, drawing their attention, warming them up, motivating them, making mathematics fun, and ensuring student participation. While 20 to 30% of the participants noticed this role in the first and second interviews, the percentage increased to 80% in the last. The other issues noticed were "Comfort" referring to being comfortable in classroom; "Positive attitude" referring to having a smiling-face, having students like her, and being tolerant; "Voice tone" referring to not speaking too loud, and

being careful with the tone of voice and mimicry; “Enthusiasm” referring to being concerned and enthusiastic, enjoying her job, and being willing to implement the new curriculum; and “Respect” referring to being respectful, but with relatively lower percentages. Although the frequencies of noticing of these sub-issues increased from the first to the last interviews, these frequencies were not as high as in the sub-issue “mathematics as a fun”.

With respect to the “*Other*” theme, there was also an increase in participants’ noticing throughout the interviews (53.3% to 80%). The highest increase was seen in the role Equity (46.7% to 73.3%) while there was less or no improvement in noticing the roles related to the Teacher Characteristics (13.3% to 33.3%) and Out-of-Class Activities (6.7%) respectively. In terms of the roles related to Equity, the most noticed roles were “Reaching all” that is addressing to all students, letting students who don’t raise their hands speak, and thus not losing the students who are successful in the classroom but not in the exams; “Ensuring understanding of all” students; and “Activating all” students.

The percentages of noticed issues related to each perspective can be seen in the Appendix 7.

4.2. Noticed Topics about Student Roles in Reform-Minded Teaching and Learning

In addition to the teacher roles, the other aim of this study was to investigate the changes on what the prospective elementary mathematics teachers noticed with respect to the student roles in reform-minded teaching as they watched video cases and discussed the videos online. In the next section, the noticed topics with respect to the student roles in the three interviews and three reflection papers are presented. Related texts from the online discussions are also provided in order to shed more light on what the prospective teachers noticed with respect to the student roles.

4.2.1. The Main Themes related to Student Roles in the First Interview and the First Reflection Papers

The main themes, and main and sub-issues with respect to the student roles in the reform-minded teaching were briefly given in the method section (see Table 3.7). In main titles, there were 4 main themes related to student roles that are *Methodological Perspective*, *Attitudinal Perspective*, *Classroom Culture*, and “*Other*”.

Among the 15 participants, data analysis indicated that in the first interview, 12 participants were able to talk about *Methodological Perspective*, 13 participants talked about *Attitudinal Perspective*, 10 participants were able to talk about *Classroom Culture*, and only 2 participants reflected on the “*Other*” theme.

In the first reflection papers, 10 out of 14 participants were able to talk about *Methodological Perspective*, and 5 participants talked about *Attitudinal Perspective* where none of the participants talked about *Classroom Culture* and the “*Other*” themes.

In the next section, the sub-issues related to the main themes in the first interventions are provided.

4.2.1.1. The Sub-Issues related to Methodological Perspective in the First Interventions

As indicated before, in the first interview, 12 participants were able to talk about *Methodological Perspective*. There were 9 sub-issues related to this theme, which were briefly provided in the method section (see Table 3.7). The detailed explanations on these sub-issues are given in the Appendix 6.1. In the first interventions, only 3 of these sub-issues were noticed by the participants. The noticed sub-issues were “discovery”, “inquiry”, and “group work”.

In terms of frequencies, in the first interview, 11 out of 15 participants mentioned the issue “Group work”. This issue refers to student roles such as being able to do group work, cooperating with others, fulfilling their responsibilities, and learning from each other through communication. This role was the most popular role that the participants noticed in the first interview. For example, Participant-6 noticed that the students in the video were used to group work and they knew their responsibilities as in the below vignette:

As far as I observed, the students did group work before. I wrote this here too. I mean I thought that they knew how to behave during group work, how to collaborate etc. Because they adapted very quickly. Besides, they worked with the ones who were just next to them, I mean they worked in groups of 4. They worked well [...] (P6-1)

Öğrenciler daha önceden gözlemlediğim kadarıyla grup çalışması yapmışlar. Burda da yazdım onu. Yani grup çalışmasında nasıl davranılır, birlikte nasıl çalışılır, bunları biliyorlar diye düşündüm. Çünkü hani çok çabuk adapte oldular. Üstelik hani hemen yanındakiyle, yani 4lü gruplar halinde çalışıyorlardı. Güzel çalıştılar [...]

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, participants noticed that the students were used to do group

work, but on the other hand they were still deficient in some points. One of the related vignettes is as below:

The students were far from sharing and producing a joint product. Because almost all of the students who wanted to talk were disposed to get their answers accepted by their teacher. On the other hand, they were meeting the requirements of group work. They were sharing their knowledge, comparing what they have found. They knew what the problem was and what they wanted to reach. In other words, they were trying to discover the properties of cubes [...] (P14-OD)

Öğrenciler paylaşımından ve ortak bir ürün ortaya koymaktan uzaktı. Çünkü söz isteyenlerden hemen hemen hepsi kendi cevabını öğretmene kabul ettirmek hevesi içerisindeydiler. Öte yandan grup çalışmasının gereklerini yerine getiriyorlardı. Bilgilerini paylaşıyorlar, bulduklarını karşılaştırıyorlardı. Problemin ne olduğunu anlamışlar, neye ulaşmak istediklerini biliyorlardı. Yani küpün özelliklerini keşfetmeye çalışıyorlardı [...]

As seen from the vignette above, while the Participant-14 was criticizing the students that they did not have the spirit of group work, they were somehow be able to solve the problem together as a group. Similarly, another participant criticized the students in the video that they were not sharing the load, instead only one of the group members was doing the job:

[...] It seems like there was a leader in some of the groups during the group work. For example, in the last group caught on the camera, there was a cube in front of a student and he was writing down its properties. But the girl opposite him pretended she had already been writing when she realized that the camera was there. I felt like she actually didn't contribute much [...] (P3-OD)

[...] Grup çalışması yapılırken aslında bazı gruplarda bir lider var gibi görünüyor, mesela kameranın çektiği son grupta bir çocuğun önünde küp vardı ve özelliklerini yazıyordu fakat

karşısındaki kız kamerayı görünce yazıyor gibi yapmış, aslında çok da bir katkısı yokmuş gibi hissettim [...]

In another vignette on group work, on the other hand, the focus was on the teacher in the video where the Participant-9 criticized the teacher for not being able to handle the group work:

[...] There was so much noise during the group work and the teacher didn't do any warning to prevent it. (P9-OD)

[...] Grup çalışması yaparken çok fazla gürültü çıktı ve öğretmen bunu engellemeye yönelik bir uyarı da bulunmadı.

The first reflection paper also supports this idea. Although the participants did not reflect on issues as much detail as in the interviews, they were still able to mention a variety of roles including this role (4 participants). In other words, parallel to the first interview, the participants were able to reflect on group work. To give an example, Participant-2 reflected that:

The teacher formed groups and wanted them to write down the properties of the shapes. The students wrote as many properties as they could. It was a good example of group work. The students were writing down the properties through discussion and exchanging of ideas. (P2-R1)

Gruplar oluşturularak gruptan şekillerin özelliklerinin yazılması isteniyor. Öğrenciler yazabildikleri kadar çok özellik yazıyorlar. Grup çalışmasının güzel bir örneği görülüyor. Öğrenciler tartışarak, fikir alışverişi yaparak özellik yazıyorlar.

In the vignette above, the participant was praising that the students in the video were able to do group work as they were sharing their ideas and discussing.

With respect to another sub-issue related to *Methodological Perspective* that is “Inquiry”, 5 participants were able to reflect on this role. In other words, couple participants noticed and talked about student roles such as questioning, and inquiring instead of memorizing, and thinking and asking oneself why one is learning. One of these participants (Participant-5) mentioned this role as in below where he criticized the students in the video through focusing on the fact that they were doing memorization:

What I noticed from the discussions with respect to student roles for example. S mentioned I guess. She mentioned a couple of things about memorization. I noticed when she told. The students were like focusing more on memorization. They were like they always memorized but they were sorry that not that day [...] I noticed this when S mentioned. I mean it was like it always happened. The students always do memorization, but not that day. S’s comments really changed my point of view. I mean I guess the students always did memorization and they didn’t memorize that day. Actually I want to watch the video again. I will try to catch more details on that by watching that part again. (P5-1)

Tartışmalardan farketdiğim öğrenci rolleri mesela. Öyle, S demişti herhalde. Bu ezber konusunda birkaç birşey demişti de yani. Orda deyince fark ettim. Çocuklar sanki hani ezberlemek üzerine yoğunlaşmış gibi. Böyle hep ezberliyorduk, bugün ezberleyemedim hocam kusura bakmayın gibi bir halleri vardı [...] Bunu S deyince fark ettim. Hani normalde, olur öyle. Çocuklar, hep ezberliyorduk ama. S'nin yorumu gerçekten bu konuda bakış açımı değiştirdi. Hani gerçekten herhalde çocuklar hep ezberliyordu. Bugün ezberleyemediler gibi birşey hissettim. Öyle, tekrar izlemeyi düşünüyorum aslında. O kısmı tekrar izleyip, daha detaylı birşeyler yakalamaya çalışacağım açıkçası.

Similarly, another participant (Participant-14) also reflected on this issue via criticizing the student in the video for doing memorization as in below:

I guess what drew my attention in the online discussions was. What I didn’t notice here. I mean we always say like that. There

shouldn't be memorization type of learning. It should be learning mathematics. One of my friends mentioned it. The teacher asks a student how many edges and sides a cube has. It is a very short part in the video. The student says that he didn't memorize since he was sick [...] I mean, in that class, they didn't understand that they shouldn't do memorization. They just couldn't surpass it. The student doesn't feel comfortable while he could tell the properties of the cube by using the cube he was holding without looking at the book or doing memorization [...] (P14-1)

Şey dikkatimi çekmişti online tartışmada. Benim burada farketmemiş olduğum. Hani hep deriz iste, ezbere dayalı eğitim olmasın. Matematikte öğrenerek olsun. Bir arkadaşım değinmiş orda. Öğretmen çocuğa soruyor işte, küpün kaç köşesi vardır kaç kenarı vardır diye bir yer soruyor. Çok kısa bir yer. Çocuk da hasta olduğum için ezberleyemedim diyor. [...] İşte hala yani o sınıfta şey aşılammış, ezberlememe gerektiği. Aşılammış yani. Çocuk kitaba bakmadan ya da ezberlemesine gerek olmadan elinde küple özelliklerini söyleyebilecekken kendini rahat hissetmiyor [...]

In the first reflection papers only one participant reflected on this issue. Parallel to the first interview, this participant (Participant-9) also reflected on this role through criticizing the student in the video for doing rote memorization as in the below vignette:

[...] Something attracted my attention at the beginning of the lesson. One student told that he couldn't memorize the properties of prisms since he was sick. I couldn't understand whether it was an assignment or it was a habit of that student. (P9-R1)

[...] Dersin başında birşey dikkatimi çekti, öğrenci hasta olduğu için prizmaların özelliklerini ezberleyemediğini söyledi. Bu, bu dersle alakalı bir ödev miydi yoksa öğrencinin bir alışkanlığı mıydı çözemedim.

The issue "Discovery" referring to long lasting learning by doing and experiencing, and learning through discovery with activities was mentioned only

by 2 participants. To give an example, Participant-14 mentioned that the teacher in the video let students learn through discovery instead of rote memorization which made learning long-lasting:

I have the opinion that the teacher was giving a modern instruction. She was giving proper instruction. It was in line with what we learn here. The students were learning by doing [...] Learning by doing, learning by knowing... I mean she could easily draw a cube on the board, and then wrote down the properties and started doing examples. She didn't do that [...] What the students were dealing with, what a cube was, what it looked like when it was opened, what it would look like. Since the students saw all these by doing it, I believe that it would leave some residue different than doing it on the board. In the other case, as in the anecdote of memorization, the student would memorize. I mean he would tell that a cube had 8 vertices and 6 faces. But here he counts, he looks at. I mean he says that there are 6 [...] From now on; I think they can easily build the knowledge of all prisms, pyramids on it [...] In my opinion, they can only talk about cubes for two hours of class. That way the students could understand all the prisms better. (P14-1)

Şey kanısına vardım. Çağdaş bir eğitim yapıyor öğretmen. Doğru da bir eğitim yapıyor. Bizim şu anda öğrendiğimiz yönde bir eğitim. Çocuklar yaparak öğreniyorlar [...] Yapararak öğrenme, fark ederek öğrenme... Yani kolaylıkla tahtaya da bir tane küp çizip, yanına özelliklerini yazıp işte örnekler çözmeye başlayabilirdi. Bunu yapmadı [...] Gerçekte neyle uğraştıklarını, küpün ne olduğunu, açıldığında neye benzediğini, nelere benzeyebileceğini. Bunu çocuklar yaparak gördüğünden tahtadakinden farklı olarak zihinlerinde yer edecektir bence. Öbür türlü, o ezberleme örneğinde olduğu gibi çocuk ezberleyecek yani 8 tane köşesi vardır, 6 tane de yüzeyi vardır diyecek. Ama elinde sayıyor, bakıyor. İşte 6 tane var diyor [...] Artık bunun üstüne bütün prizmaları, piramitleri koyabilirler bence rahatlıkla [...] Ya bence 2 ders sadece bu küple geçsin, çocuklar daha iyi anlayacaktır gerçekten bütün prizmaları.

In the first reflection papers, on the other hand, none of the participants were able to focus on this student role.

The other roles related to the student roles were excluded since they were mentioned only by one participant each.

The noticed student roles related to *Methodological Perspective* in the first interventions were given above. As stated, the most noticed sub-issue in the first interview was “group work”. The sub-issues which were not noticed in the first interventions were “using materials”, “real life”, “constructing one’s own knowledge”, “connection”, “discussions”, and “new curriculum”. In the following part, the student roles related to the *Attitudinal Perspective* in the first interventions are provided.

4.2.1.2. The Sub-Issues related to Attitudinal Perspective in the First Interventions

As indicated previously, in the first interview 13 out of 15 participants talked about the issues related to *Attitudinal Perspective*. There were 4 sub-issues related to this theme, which were briefly provided in the method section (see Table 3.7). The sub-issues related to *Attitudinal Perspective* are given with their explanations in Appendix 6.2. In the first interventions, 3 of these sub-issues were noticed by the participants. These noticed sub-issues were “active participation”, “being relaxed”, and “excitement”. More specifically, participants taught and discussed that a student should be interested in lessons, be relaxed, and enjoy mathematics.

In terms of frequencies, in the first interview, 11 participants mentioned the role “Active participation”. This role refers to being willing and enthusiastic about lessons, participating actively and equally, and being willing to learn mathematics, and it was the most common noticed issue in the first interviews. For example, Participant-7 praised the students in the video for being active and willing to participate in the lesson as in the below vignette:

For example, at the beginning, at the very beginning, when the teacher asked a simple question, all of the students wanted to solve it and were willing to answer. What we mean by active participation is this. All of them tried to participate in the lesson; they all wanted to answer [...] (P7-1)

Mesela ilk başta, en başta öğretmen en ufak bir soru sorduğu zaman öğretmenim ben cevaplayabilir miyim falan şeklinde hepsi birden çözmeye çalışıyordu. Zaten aktif dediğimizde bunu kastediyoruz. Hepsi derse katılmaya çalışıyordu, hepsi cevap vermeye çalışıyordu [...]

Similarly, another participant (Participant-3) reflected on this student role through giving credit to students for being active and willing:

When we look at the matter in the perspective of student roles. I honestly felt that they also were aware of what they were supposed to do. For example, the facts that they were willing, they wanted to participate, they worked and played with the materials. I mean they wanted to do something. In my opinion, I think that they were willing, and they fulfilled their roles not perfectly but correctly. (P3-1)

Öğrenci rolleri açısından baksak. Onlar da aslında ne yapmaları gerektiğinin farkındalar diye hissettim ben açıkçası. Mesela hevesli olmaları, katılmak istemeleri, ellerindeki materyalle uğraşmaları, oynamaları. Yani birşeyler yapmaya çalışmaları. Bence bu açıdan hevesli, istekli olduklarını ve rollerini, tam olarak değil de hani mükemmelliğe yaklaşmak açısından hani doğru yaptıklarını düşünüyorum açıkçası.

In the first reflection papers, on the other hand, 4 participants were able to reflect on this student role. To give an example, one of these participants (Participant-6) reflected that it was the best part of the lesson that the students were active and willing:

[...] The part of that lesson I liked most was that the students were enthusiastic, they participated in the lesson, and they were

able to explain the rationale behind of the operations they did.
(P6-R1)

[...] Dersin en beğendiğim yanı, öğrencilerin hevesli olması, derse katılmaları ve yaptıkları işlemlerin nedenini açıklayabilmeleridir.

With respect to another issue that is “Being relaxed” that is not hesitating or being afraid, being able to ask questions freely, and having self-confidence, 8 participants were able to reflect on this student role. This role was the second most popular role that the participants noticed in the first interviews. For example, Participant-1 mentioned about this role where she criticized one of the students in the video for not having self-confidence:

They were so brave. The students in the video were able to say whatever they wanted, but of course the shy students became apparent. For example, the student who said that he couldn't memorize bended. He both talked while looking at the book and also there was a note in his hand. He took the cube, he imitated like he was looking at the cube [...] I mean, I thought that the student had no self-confidence at all [...] (P1-1)

Çok cesurdular. Videoda öğrenciler istediklerini söyleyebiliyorlardı ama tabii bazı içe kapanık öğrenciler belli ediyor orda kendini. Mesela o ezberleyemedim diyen çocuk eğildi. Hem kitaba bakarak söyledi, hani elinde bir not var. Eline küpü aldı, hem küpe bakıyormuş gibi [...] Yani çocuk hiçbir şekilde kendine güvenmiyor diye düşünüyorum [...]

Another participant (Participant-7), on the other hand, also reflected on this issue, but this time he mentioned that the students in the video were relaxed, and they were not shy or hesitating in front of the class:

[...] The students didn't, for example, refrain from the teacher and hesitate to ask questions or coming to the board [...] They were comfortable, I mean. They were relaxed in the classroom

environment [...] They all tried to participate in the lesson, answer the questions. Normally, for example, if they were not like that, if they didn't feel close to their teacher, they would be hesitated a little bit to answer. They would hesitate to participate. I mean they would do just with listening. I noticed that. (P7-1)

[...] Öğrenciler mesela öğretmenlerden çekinip de işte çekindikleri için soru sormayayım veya işte tahtaya kalkmayayım demiyorlardı [...] Rahatlardı yani. Sınıf ortamında rahatlardı. [...] Hepsi derse katılmaya çalışıyordu, hepsi cevap vermeye çalışıyordu. Normalde mesela böyle birşey olmasa, öğretmene kendilerini yakın hissetmeseler biraz cevap vermeye çekinirler. Derse katılmaktan çekinirler. Yani sadece dinlemeyle kalmaya çalışırlar. Buradan fark ettim.

Parallel to the first interview, in the online discussions, participants reflected on this role. To give an example, during the discussions on the first video watched, Participant-15 emphasized on this issue through explaining the responsibilities of teachers as in below:

[...] According to the equity principle in the standards, a teacher should have equal expectations from each student [...] If she applies this and makes students feel it, none of the students will be shy to answer. (P15-OD)

[...] Standartlardaki eşitlik prensibine göre öğretmenin her öğrenciden eşit derecede beklentisi olmalı [...] Eğer bunu uygular ve öğrencilere de hissettirsek hiçbir öğrenci cevap vermeye utanmaz.

In the vignette above, the Participant-15 was reflecting on the issue through underlining that it is the responsibility of the teacher to make students feel relaxed and share their ideas without any hesitation.

In the first reflection papers, none of the participants were able to reflect on this issue.

The last issue discussed in the first interview was “Excitement” referring to getting excited during the lesson. Only 2 participants were able to reflect on this role where none of the participants mentioned it in the reflections. To give an example, Participant-15 reflected on this role while she was talking about classroom management, and favored the students that they might get excited during the activities:

[...] Because I watched the video astonished at how the teacher ensured the classroom management. I mean no matter how much perfectionist a person, a child is a child. They are also children and they get excited when they do activities. They feel the desire to talk, shout I mean [...] (P15-1)

[...] *Nasıl sağlamış sınıf hâkimiyetini diye bayağı şaşırarak izledim videoyu çünkü. Yani insan istediği kadar mükemmeliyetçi olsun, çocuk çocuktur yani. Onlar da çocuk ve hani heyecanlanıyorlar böyle etkinlik yaparken. Konuşma, bağırma isteği hissediyorlar yani [...]*

The noticed student roles related to the *Attitudinal Perspective* in the first interventions were given above. The only sub-issue which was not noticed in the first interventions was “enjoying mathematics” while the most noticed sub-issues in the first interviews were “active participation” and “being relaxed”. In the following part, the student roles related to the *Classroom Culture* noticed in the first interventions are provided.

4.2.1.3. The Sub-Issues related to Classroom Culture in the First Interventions

As indicated before, in the first interview 10 participants were able to talk about *Classroom Culture*. There were 7 sub-issues related to this theme, which were briefly provided in the method section (see Table 3.7). These sub-issues are also given in detail in Appendix 6.3. In the first interventions, 6 of these sub-

issues were noticed by the participants. These sub-issues were “responsibilities”, “aiming to understand”, “following rules”, “being respectful”, “expressing themselves”, and “mistakes”.

In terms of frequencies, in the first interview, 7 out of 15 participants mentioned the issue “Being respectful”. This issue refers to the student roles such as not interfering with friends’ learning, giving them chances to practice and learn, being respectful toward them, listening to friends, and establishing good relationships with their friends. This issue was the most popular role noticed by the participants in the first interviews. For instance, Participant-11 mentioned this role as in below where she criticized the students in the video for interfering and not listening to their friends on the board:

I think that was not nice. You know, a student wrote it wrong. I mean while trying to draw a square, there were students who were steadily drawing rectangles, and the others were disturbing them by saying that they wanted to do it. This is actually a good thing to attain. You know, waiting for their friends on the board etc. [...] I mean students should be conscious that their friend is doing something on the board. Especially while he is in panic or rather while he can’t draw it, like saying that he incorrectly drew it. It was not nice that they jumped like ‘I want to do it, I want to do it’. Eventually they should have gained that nice behavior considering that they could be there too. I mean waiting silently... As classroom culture. (P11-1)

Şey çok hoş olmadı diye düşünüyorum. Hani bir tane öğrenci yanlış yazdı. Yanlış yazdı derken, bir kare çizeceğim diye uğraşırken durmadan dikdörtgen çizen öğrenciler vardı ve diğer öğrenciler durmadan ben yapayım diye rahatsız ediyorlardı yani. O da kazanılması gereken güzel birşey aslında. Hani öğrencileri, yani tahtaya çıkan öğrencileri arkadaşlarının bekleyebilmeleri vs [...] Yani öğrencinin orada hani bilincinde olması gerekiyor bir arkadaşı tahtada birşey yaparken. Yani özellikle de onu panik halinde, yani panik halindeyken daha doğrusu, hani çizemiyorken, hani yanlış çizdi falan şeklinde. Ben yapayım ben yapayım falan diye atlamaları çok hoş değildi yani. Sonuçta orda kendileri de olabileceğini biraz hesaba katarak hani o güzel

davranışı kazanmış olmaları gerekirdi. Sessiz beklemeyi diye düşünüyorum yani... Sınıf kültürü olarak.

In the first reflections, on the other hand, none of the participants were able to reflect on this role.

Another issue that is “Following the rules” referring to exhibiting good behaviors, being respectful and silent, and raising hands to talk was mentioned by 4 participants. This issue was not mentioned in the first reflections. To provide an example, Participant-3 reflected that the students in the video were trying to follow the classroom rules as much as they could:

[...] The students by raising their hands... Although it was hard for them to, they were actually trying to speak by raising their hands. (P3-1)

[...] Öğrenciler parmak kaldırarak... Aslında çok fazla kendilerini tutamaları da öyle konuşmaya çalışıyorlardı.

Three participants reflected on student role “Expressing themselves” which refers to being able to express their ideas and thinking as students. One of these participants (Participant-2) commented that the students in the video were comfortable enough to express themselves as in the below vignette:

[...] Because at that early age students were shy, they can't do many things. But they were quite nice towards the intern teacher. They could tell their opinions or when they talk they were, I don't know, with the teacher... They were the type of student who could ask the teacher things or could talk. In that respect, I think the atmosphere was nice [...] (P2-1)

[...] Çünkü o küçük yaşlarda öğrencilerde birazcık utangaçlık olur, pek şey yapamazlar. Ama yani stajyer öğretmene karşı gayet yani şeylerdi. Düşüncelerini söyleyebilen ya da kalktıklarında ne bilim öyle öğretmenle... Öğretmene şunu sorup ya da onunla

konusup tarzda öğrencilerdi. O yönden yani o atmosfer güzeldi bence [...]

Parallel to the first interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the first video watched, Participant-10 focused on this issue where she commented that students who think they are not good at expressing themselves may not be able to share their answers with the whole class:

[...] but if there are students who want give an answer other than the majority of the class, then they may not be able to share their answer. Especially the students who can not express themselves do not give their answers [...] (P10-OD)

[...] ama sınıfın çoğunluğu bir cevabı veriyorsa ona katılmayan bir veya birkaç öğrenci olsa da düşündüğü cevabı vermeyebilir. Hele kendini çok iyi ifade etmediğini düşünen öğrenciler hiç belirtmez cevabını [...]

In the first reflections, on the other hand, none of the participants reflected on this role.

The other issues that are “Responsibilities” that is fulfilling their responsibilities, doing what their teacher expected, cooperating with their teacher, and understanding teacher directions; “Aiming to understand” that is trying to understand and learn during the lesson; and “Mistakes” that is not being afraid of making mistakes were only mentioned by 2 participants each. For example, Participant-8 reflected on “Responsibilities” and “Mistakes” respectively as in the below vignettes:

[...] The students generally did what was expected of them [...] (P8-1)

[...] Öğrenciler genellikle kendilerinden istenenleri yaptılar [...]

and

They didn't look like they were afraid of making mistakes. Even, they were quite brave. They were shouting like 'teacher, teacher'. They were generally cautious [...] (P8-1)

Yanlış yapmaktan çok korkar bir halde gözükmüyorlardı. Hatta çok cesur davranıyorlardı. Bağırıyorlardı falan öğretmenim öğretmenim gibisinden. Dikkatliydiler genelde [...]

As seen from the vignettes above, Participant-8 noticed that students were fulfilling their responsibilities, and they were not afraid of making mistakes in the classroom.

In the online discussions, participants were also able to reflect on the last role, that is "mistakes". To give an example, during the discussions on the first video watched, Participant-2 noticed and criticized that the students in the video were afraid of making mistakes:

There is something like this in our culture: The one who makes a mistake is mistreated. We refrain to tell when we don't understand. We all remember the video we watched last semester in Dr. C's class. In that video, the student who made a mistake realized that he did it wrong, but he didn't know where he was wrong, and he shared it with the whole class. In my opinion, this is awesome. He shared his solution on the board and they all discussed it. But when we observe the classroom environment in this video, the students are nervous and afraid of making mistakes. No matter how the teacher tries to seem helpful, she is more like she always expects the right answer from the students. The students, on the other hand, wait for the teacher's approval for each word as they are afraid of making mistakes. (P2-OD)

Bizim toplumumuzda böyle birşey var. Yanlış yapan kötü muamele görüyor. Anlamadım demekten çekiniyoruz. Geçen dönem C hocanın dersinde izlediğimiz videoyu herkes hatırlar. Orda yanlış yapan öğrenci yanlış yaptığının farkına varıyor ama nerde olduğunu bulamıyor ve bunu sınıfla paylaşıyor. Bu bence harika birşey. Tahtaya çıkıp çözümünü sınıfa gösteriyor ve hep beraber tartışıyorlar. Bu sınıf ortamına baktığımızda ise

öğrenciler gerginler, hata yapmaktan korkuyorlar. Öğretmen her ne kadar yapıcı gözükse de öğrencilerden hep doğru cevabı ister gibi hali var. Öğrenciler de hata yapacağız diye öğretmenin onayını bekliyorlar her kelimedede.

In the vignette above, Participant-2 was not only criticizing the students in the video, but also encumbering the teacher.

In the first reflection papers, on the other hand, none of the student roles related to “responsibilities”, “aiming to understand”, and “mistakes” were mentioned.

The noticed student roles related to the *Classroom Culture* in the first interventions were given above. The only sub-issue which was not noticed in the first interventions was “following the lesson” while the most noticed sub-issue in the first interviews was “being respectful”. In the following part, the “*Other*” student roles that the participants noticed in the first interventions are provided.

4.2.1.4. The Sub-Issues related to the “*Other*” Role in the First Interventions

As indicated before, in the first interview, only 2 participants were able to talk about the “*Other*” theme. There was only one sub-issue related to this theme that is “Imagination” referring to having imagination, and perceiving differently.

In terms of frequencies, in the first interview, 2 participants mentioned the issue “Imagination”. One of these participants reflected on this issue as below:

We actually should think about it. Because sometimes when we think that they might perceive it with difficulty, they may get it very easily. The opposite is also possible [...] (P1-1)

Aslında düşünmemiz gerek. Çünkü bazen bizim çok zor algılayacaklarını düşündüğümüz anda onlar çok basit bir şekilde algılayabiliyor. Tam tersi de olabiliyor [...]

While Participant-1 reflected that what students perceive as difficult or easy might be different than that of the teacher, the other participant connected it to the fact that children have different imagination:

[...] Because they are children, I mean their world is different and they can associate it to various things [...] (P3-1)

[...] Çünkü karşınızdaki çocuk, hani çok farklı bir dünyası var ve çok farklı şeylerle ilişkilendirebiliyor [...]

In the first reflection papers, on the other hand, none of the participants mentioned this role.

In the following part, the noticed student roles in the second interview and in the reflection papers are provided with the related vignettes. Additionally, vignettes from the online discussions are provided.

4.2.2. The Main Themes related to Student Roles in the Second Interview and the Second Reflection Papers

As indicated before, there were 4 main themes related to the student roles that are *Methodological Perspective*, *Attitudinal Perspective*, *Classroom Culture*, and the “*Other*”.

Among the 15 participants, data analysis indicated that in the second interviews, all participants were able to talk about *Methodological Perspective*, 12 participants talked about *Attitudinal Perspective* and *Classroom Culture*, and only one reflected on the “*Other*” theme.

In the second reflection papers, 8 participants talked about *Methodological Perspective*, 4 participants talked about *Attitudinal Perspective*, and 6 mentioned *Classroom Culture*. None of the participants reflected on the “*Other*” theme.

In the next section, the sub-issues related to the main themes are provided.

4.2.2.1. The Sub-Issues related to Methodological Perspective in the Second Interventions

As indicated previously, in the second interview all of the 15 participants were able to talk about *Methodological Perspective*. As mentioned before, there were 9 sub-issues related to this theme (see Table 3.7). In the second interviews, all of these sub-issues were noticed by the participants while only 3 of them were noticed in the first interventions.

In terms of frequencies of the sub-issues, in the second interview, 10 participants mentioned the issue “Group work”. This role refers to being able to do group work, cooperating with others, fulfilling their responsibilities, and learning from each other through communication. It was the most popular role that the participants noticed in the second interview as in the first interview (11 participants). For example, Participant-1 mentioned the group work and how students learn from each other as in the below vignette:

[...] There was group work in the first two videos. I mean I always saw this. The best students carry the lesson. You know, the ones who don't know anything somehow make themselves unnoticed, especially during group work. They are like, in any case we did it in groups, I have the same on my notebook [...]
(P1-2)

[...] İlk iki videoda grup çalışması vardı. Yani hep şeyi gördüm. Çok iyi öğrenciler götürüyor birşeyleri. Hani bilmeyenler bir şekilde kendilerini grup çalışması olunca hele, kaynatabiliyorlar arada. Nasıl olsa hani grupça yaptık, benim defterimde de var aynısı şeklinde [...]

While Participant-1 pointed that some of the students may carry the load of group work as above, she also commented on this role in another vignette where she gave a good example to group work as below:

Yes. Very good. It was his last question and it was very good. He couldn't do it anyway, I observed the student sitting next to me. They ask very good questions to each other... Yes. For example, if one can't do it, another friend comes and does it [...] (P1-2)

Evet. Çok güzel. Son sorusuydu ve çok güzeldi. Yapamadı zaten, yanımda oturan öğrenciyi gözlemledim. Birbirlerine çok güzel sorular soruyorlar hocam... Evet. Mesela birisi yapamıyorsa diğer arkadaşı geliyor yapıyor [...]

In the second reflection papers, on the other hand, none of the participants reflected on this role while 4 participants noticed it in the first reflection papers.

The issues “Discovery” that is long lasting learning by doing and experiencing, and learning through discovery with activities, and “Constructing one's own knowledge” that is not waiting for the answer and the explanations to be given by the teacher, building and constructing one's own knowledge, being responsible for one's learning, being involved, giving the expected reactions, and being at the center were mentioned by 5 participants each. In the first interviews, on the other hand, while the first was noticed by 2 participants, the latter was not noticed by any. To give an example, in the second interview Participant-14 mentioned learning through discovery as in the below vignette:

Now, in the video of teacher M, students learn by doing. I mean there was a basketball activity. They were doing something there. They were active in it. They envisioned what the concept of ratio was. They connected it to real life. They find it rational. After they find it logical, they can envision themselves that there is a ratio between this and that and this and that [...] (P14-2)

Şimdi M hocanın videosunda çocukların yaparak öğrenmesi var. Yani bir basketbol etkinliği var. Orada birşeyler yapıyorlar. Kendileri için içerisinde aktifler. Oran kavramının ne olduğu kafalarında canlanıyor. Günlük hayatla ilişkilendiriliyor. Mantıklı geliyor. Birşey mantıklı geldikten sonra bunla bunun arasında bir oran var, bunla bunun arasında da bir oran var falan diye kendileri canlandırıcaklardır [...]

As seen from the vignette above, Participant-14 reflected that the students in the video were learning via doing and experiencing.

With respect to the second role that is “constructing one’s own knowledge”, Participant-15 reflected on this issue where she criticized the students for not trying to build their own knowledge, but instead waiting for the teacher to direct them to the answer:

[...] You know, they always expect things from their teacher. They do when they are told. Like they don’t know anything. This is given to me, but I don’t know what to do with that. They are always in that mood. (P15-2)

[...] Hani sürekli hocadan birşeylerin gelmesini bekliyorlar. Bana söylensin yapayım. İşte ben bilmiyorum yani. Bu elime verildi ama napacağımı bilmiyorum bununla. Sürekli öyle bir şeydeler.

Similarly, Participant-14 commented on this issue via underlying the importance of constructing knowledge, and criticizing students for waiting answers from their teachers instead:

What we say in the new curriculum. The students construct their own knowledge. The teachers facilitate in all aspects as much as they can [...] In other words, students can interpret why the formula for the sum of the numbers from 1 to N is like that. I mean it is a little bit up to the students. The teachers can not do everything. If the students think, I mean they construct their own knowledge. Like the formula for the sum of the numbers from 1 to $2N+1$ is this. They should deal with it to understand where it comes from [...] I mean students have responsibilities anytime... Do they construct their own knowledge... When I go over the

videos again. When I think about the lessons in the videos. In the cube activity. The teacher helps for sure. But as I said before, there are practices coming from the traditional instructional methods. We can't abolish them completely. It is like that... Now we also go to the internship schools, I observe there. The students, in any case, want the easiest way and expect it from their teachers. They want the formulas from the teacher. They want their teacher to explain the easiest ways of forming an equation. They always want to learn the formulas [...] (P14-2)

Yeni programda ne diyoruz. Öğrenci kendi bilgisini kendisi inşa edecek. Öğretmen de yardımcı olabileceği kadar yardımcı olacak her yönden [...] Yani çocuk neden 1'den N'ye kadar olan sayıların toplamının formülünün o olduğunu kafasında canlandırabiliyor artık. Yani biraz da öğrenciye bağlı. Herşeyi öğretmen yapacak değil. Üstüne çocuk düşünabiliyorsa, yani kendi bilgisini inşa edecek. 1den $2N+1$ e kadar olan tek sayıların toplamı formülü de buymuş. Acaba bu buradan mı geliyor diye kendisi de uğraşacak [...] Yani öğrencinin sorumluluğu her zaman var... Kendi bilgilerini inşa ediyorlar mı... Şöyle videoları bir canlandırdığım zaman gözümün önünde. Yani yapılan dersleri de düşündüğümde. Küp etkinliğinde. Yani yardımcı oluyordur muhakkak. Ama dediğim gibi klasik yöntemden gelen alışkanlıklar var. Onları tamamen de silemeyiz. Ya ben de öyle... Şimdi staj okullarına da gidiyoruz, görüyorum. Öğrenciler illa istiyorlar ki işin bir kolayı olsun, öğretmen bize onu versin. Bir formülü olsun sorunun çözümünün, onu versin. Denklem kurmanın bir kolayı olsun, onu anlatsın istiyorlar. Sürekli formül istiyorlar [...]

In the second reflection papers, on the other hand, none of the participants were able to mention this role.

The issue "Inquiry" referring to questioning, and inquiring instead of memorizing, and thinking and asking oneself why one is learning was mentioned by 4 participants in the second interviews. This sub-issue was noticed by 5 participants in the first interviews. To give an example, Participant-2 mentioned this role where she pointed that students generally do not question, but in the video she watched they were inquiring:

[...] I thought very very good things. Yes, if it goes like that I believe there will be all productive minds. Creative, productive. I mean there will be students who do not memorize, try to understand, and question. Because there is something in our culture. For example, I will mention a point I remember now with respect to classroom culture. For example, the teacher explains something, but our students do not object to anything. They are always like saying yes. You know, this is also not good. They don't ask their teacher why that happened. For example, in the ratio concept, when the teacher was explaining the subject, one of the most common words the teacher used was "isn't it?". But there was no reaction or response from the students. This is also not nice. It is in our culture. I mean let's say yes, and let it go. This is not good [...] (P2-2)

[...] Yani çok çok güzel şeyler düşündüm. Evet, eğer böyle giderse ciddi hep üretici beyinler olacağını düşünüyorum. Yaratıcı, üretici. Yani ezberlemeyen, tamamen anlamaya çalışan, sorgulayan öğrenciler olacağına, yetişeceğine inanıyorum. Çünkü bizde bir de şey var. Mesela sınıf kültüründe yine aklıma gelen bir nokta söyleyeyim. Mesela öğretmen birşeyler anlatıyor ama hiç itiraz yok bizim öğrencilerde ya da şey yok. Sürekli evet var. Yani bu olay da çok hoş bir olay değil. Niye böyle oldu hocam yok. Mesela oran olayında da yani, hoca anlatırken, mesela hocanın en çok kullandığı kelimelerden birisi "değil mi?". Ama öğrencilerden bir tepki yok ya da yanıt yok. Bu da mesela hoş birşey değil. Bizim kültürümüzde olan birşey. Yani hadi kafayı sallayalım, tamam geçsin öyle falan, bu hoş değil [...]

Another participant also reflected on this issue where he criticized the students in the video that they preferred memorization instead of understanding the rationale behind the subject:

[...] There was an example of cross multiplication. I talked about that during the discussions. The teacher insisted that they reach the solution through expanding the denominator. He was saying that if they expand the denominator from 60 to 900, then they also should expand the numerator that much in order to make them equal. The students, on the other hand, already learned the easy

way. They were like why we should lose time with expanding denominators when we have cross multiplication [...] (P14-2)

[...] İçler dışlar çarpımı örneği vardı, tartışmalarda da konuştum ben bunu. M hoca ısrarla paydayı genişleterek ulaşalım sonuca, işte bak payda 60 iken biz bunu 900e getirirsek payı da o kadar genişleteceğiz ki ona eşit olsun diyor. Çocuklar zaten işin kolayını öğrenmişler. İçler dışlar çarpımı varken ne uğraşacağım paydayı genişletmekle diyorlar [...]

In the second reflections, none of the participants reflected on this issue while it was noticed once in the first reflections.

The issues “Using materials” referring to using materials appropriately, and improving one’s motor skills through material use, and “New curriculum” referring to understanding the new curriculum, and being able to adopt it were mentioned by 3 participants each. These sub-issues were not noticed in the first interventions. For example, Participant-10 focused on using materials where she noticed that the students were not using the materials although they were provided:

[...] For example, he brought materials, but the students didn’t use them as far as I observed. Even you know, one of the students was trying to find it by drawing a block... (P10-2)

[...] Mesela hani manipulative götürmüştü ama öğrenciler çok hani onu kullanmaya çalıştığını ben görmedim. Hatta hani öğrencinin biri blok çizerek bulmaya çalışmıştı şeyde...

Another participant, on the other hand, mentioned “using materials” and “new curriculum” together where she reflected that the students in the video couldn’t use the materials appropriately as they were not used to do so and were not adapted to the new curriculum:

[...] It is because the students were not used to the new curriculum. Because, I guess, it was in the first video. Yes. A student was like I couldn't memorize... Because why? The student always did memorization so far. You know, the properties of cubes. Of course without memorization, somehow through touching... He knows about vertices, knows about edges... There is a material in his hands. He could count the faces, I mean, he could find all of them through counting one by one. [...] (P1-2)

[...] Hani öğrenciler bu sisteme alışık olmadıklarından kaynaklanıyor. Çünkü ilk videoydu galiba. Evet. Hocam ezberleyemedim şeklinde... Çünkü neden, öğrenci daha öncesinden ezberleyerek gelmiş bir yere kadar. Hani küpün özelliklerini. Tabii ki ezberlemeden, eline dokunarak da bir şekilde... Köşeyi biliyor, kenarı biliyor... Elinde materyal var. Yüzlerini sayabilir hani bir bir sayma yaparak hepsini bulabilirdi. [...]

In the reflection papers, on the other hand, only the latter was mentioned, but only by one participant.

The issues “Real life examples” that is being able to give real life examples; “Connection” that is connecting knowledge to previously learned subjects, being able to use pre-knowledge, and reasoning; and “Discussion” that is being able to participate in discussions, not giving the answers without discussing them first, answering their friends first instead of their teacher, and learning through discussions were mentioned by 2 participants each. These sub-issues were not noticed in the first interventions. To provide an example, Participant-7 reflected on the first role that is “real life examples” where he mentioned how different students provided different real life examples as below:

[...] I mean if we make a generalization from here, for example, if you ask a student from a village he would give an example of sheeps, a students from a city would give an example of cars. I mean they give examples from their own life [...] But you know, the teacher M asked his students like you can give an example,

you can also. They all gave examples unique to themselves. All of the examples were from their real lives actually. (P7-2)

[...] Yani mesela buradan da genelleyecek olursak mesela bir hani, denir ya köydeki bir öğrenci sorduğunuz zaman işte koyunları örnek verir, şehirdeki bir öğrenci örnek verdiğiniz zaman arabalı örnek verir. Yani tamamen kendi dünyaları neyse ona göre örnek vermiş oluyor [...] Ama işte M hoca öğrencilere sordu, sen de örnek verebilirsin, sen de örnek verebilirsin diye. Hepsi kendilerince bir örnek verdiler. Hepsi aslında kafalarında gerçek hayatta olan örneklerdi.

With respect to the “discussion” issue, Participant-9 reflected that the students in the video were not used to discussion environment as in the below vignette:

[...] You know, they were generally giving answers. But they were not used to the environment. They couldn't do things like that. They couldn't answer each other like you think that way but I don't. I mean they couldn't express when something was wrong [...] (P9-2)

[...] Hani genel olarak cevap veriyorlardı. İşte ama hani ortama tam alışkın değiller. Birbirlerini şey yapamıyorlar böyle işte. Sen böyle düşünüyorsun ama ben böyle düşünmüyorum tarzında birbirlerine cevap veremiyorlar. Hani o yanlıştır diye ifade de edemiyorlar [...]

In the reflection papers, 4 participants reflected on “real life examples”, and 2 mentioned “connection” while none of the participants talked about “discussion”. For example, with respect to the sub-issue “real life examples”, Participant-1 and Participant-10 mentioned in their second reflection papers about how students provided real life examples:

I really like that the students gave very good examples when they were asked to provide examples related to the concept of ratio. (P1-R2)

Daha sonra öğrencilerden oran konusunda örnek vermeleri istendiğinde çok güzel örnekler vermeleri hoşuma gitti.

and

[...] The examples the students gave were good and related to real life [...] (P10-R2)

[...] Öğrencilerin verdikleri örnekler güzel ve günlük hayatla ilgili [...]

The noticed student roles related to the *Methodological Perspective* in the second interventions were given above. As stated, the most noticed sub-issue in the second interviews was “group work”. In the following part, the student roles related to the *Attitudinal Perspective* in the second interventions are provided.

4.2.2.2. The Sub-Issues related to Attitudinal Perspective in the Second Interventions

As indicated previously, in the second interview, 12 out of 15 participants talked about issues related to *Attitudinal Perspective*. There were 4 sub-issues related to this theme (see Table 3.7). While 3 of these sub-issues were noticed in the first interventions, in the second interventions only 2 of these sub-issues were noticed; “active participation” and “being relaxed”.

In terms of frequencies, in the second interview, 9 participants mentioned the role “Active participation” while it was noticed by 11 participants in the first interviews. This role refers to being willing and enthusiastic about lessons, participating actively and equally, and being willing to learn mathematics. For example, Participant-2 mentioned that the students in the three videos watched were so active and participating:

[...] I see that the students were all hyperactive in three videos. They had enthusiasm because of their age; they had the will to participate. And this is actually very nice [...] I see that the students were also very. For example, in the teacher G's class, they were studying, trying to solve, consulting their teacher [...] (P2-2)

[...] Ben 3 derste de öğrencilerin hiperaktif olduklarını görüyorum. Yaşlarından dolayı da böyle bir istek var, böyle bir katılma duygusu isteği var. Ve bu da çok güzel aslında [...] Öğrencilerin de mesela çok şey olduğunu görüyorum. Mesela G hocanın dersinde sürekli uğraşıyorlar, yapmaya çalışıyorlar falan, gidip soruyorlar [...]

Parallel to the second interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the third video watched, Participant-14 praised the students in the video for actively participating in the lesson:

[...] When I look at the lesson as a whole, I can say that it reached its target totally. Through the active participation of most of the students, they understood what ratio was without any misconceptions [...] (P14-OD)

[...] Derse bir bütün olarak baktığımda %100 amacına ulaşmıştır diyebilirim. Çoğu öğrencinin aktif katılımıyla kavram karmaşası yaşamaksızın oranın ne olduğunu anlaşıldı [...]

In the second reflection papers, on the other hand, 4 participants were able to reflect on this issue as in the first reflections. To provide an example, Participant-2 gave credit to the students in the video for being active in the class:

[...] The students are interested in the subject [...] They really are active in the lesson [...] (P2-R2)

[...] Öğrenciler ilgililer konuyla [...] Öğrenciler gayet dersin işleyişinde yer alıyorlar [...]

In terms of another role related to *Attitudinal Perspective* that is, “Being relaxed” that is not hesitating or being afraid, being able to ask questions freely, and having self-confidence, only 3 participants reflected on this role. This sub-issue, on the other hand, was noticed by 8 participants in the first interviews. For example, Participant-14 mentioned in the second interview that the students in the class where he did his internship were relaxed, and were not shy to raise questions:

[...] They feel comfortable, I mean I observe the 7th and 6th grades. They can easily ask any questions which I would hesitate to ask when I was in 6th and 7th grades. They can talk as they are talking with their friends. I mean there is a good learning environment although it is in traditional methods [...] (P14-2)

[...] *Kendilerini rahat hissediyorlar yani ben 7lere ve 6lara gidiyoruz. Ben 6 ve 7. sınıftan öğretime sormaya çekindiğim pekçok şeyi rahatlıkla soruyorlar öğretime. Arkadaşla konuşur gibi konuşabiliyorlar. İyi bir öğrenme ortamı var yani klasik yöntem de olsa [...]*

In the second reflection papers, on the other hand, none of the participants were able to notice this role as in the first reflections.

Other issues related to the *Attitudinal Perspective* are excluded as they were mentioned in the second interviews only by one participant each. These roles were not mentioned in the second reflections.

The noticed student roles related to the *Attitudinal Perspective* in the second interventions were given above. The most noticed sub-issue in the second interviews was “active participation”. The sub-issues which were not noticed in the second interventions, on the other hand were “enjoying mathematics” and “excitement”. In the following part, the student roles related to the *Classroom Culture* in the second interventions are provided.

4.2.2.3. The Sub-Issues related to Classroom Culture in the Second Interventions

As indicated before, in the second interview, 12 out of 15 participants were able to talk about the issues related to *Classroom Culture*. There were 7 sub-issues related to this theme (see Table 3.7). Similar to the first interventions, in the second interventions 6 of these sub-issues were noticed by the participants. The noticed sub-issues were “responsibilities”, “following the lesson”, “aiming to understand”, “following rules”, “being respectful”, and “expressing themselves”.

In terms of frequencies, in the second interview, 6 participants mentioned the student role “Being respectful”. This issue refers to the student roles such as not interfering with friends’ learning, giving them chances to practice and learn, being respectful toward them, listening to friends, and establishing good relationships with their friends. This role was the most popular role noticed in the second interviews as in the first interviews (7 participants). To give an example, in the below vignette Participant-12 criticized the students in the video for suppressing and not listening to each other:

They don’t pick on each other, but for example when one of them tries to do something the other one is shouting. No, it is not like that, it should be like this. Or when one of them tries to say something the others shout at their seats. No no it is like this. I mean it was not like that in the second video, because there was a group activity there. Ok there was a little bit, but it was more dominant in the others. Because all of them wanted to answer since it was question-answer type. The students a little bit oppressed each other naturally. (P12-2)

Birbirleriyle uğraşmıyorlar ama birisi yapmaya çalışırken diğeri oturduğu yerden bağıyor mesela. Hayır, öyle değil, böyle böyle olacak. Ya da birisi söylemeye çalışırken oturduğu yerde diğer öğrenciler bağıyor. Hayır hayır böyle. Yani 2. videoda bu yoktu, çünkü grup aktivitesiydi. Vardı gerçi ama diğerlerinde daha baskındı tabii. Çünkü soru cevap şeklinde olduğu için herkes

cevap vermek istedi. Çocuklar da arkadaşlarını ezdiler tabii biraz burada.

In the second reflection papers, on the other hand, this role was noticed by 2 participants while it was not noticed in the first reflections. To provide an example, Participant-11 reflected on how the students in the video were listening to each other without interfering:

[...] I found the classroom culture quite positive. All students listen to each other's answers, no one interferes with the others [...]. (P11-R2)

[...] Sınıf kültürü bana gayet pozitif geldi. Herkes birbirinin cevabını dinliyor, müdahale edilmiyor kimseye [...]

The issues "Responsibilities" that is fulfilling their responsibilities, doing what their teacher expected, cooperating with their teacher, and understanding teacher directions; "Following the lesson" that is answering teachers' questions, following the lesson, not losing interest in the lesson, concentrating on the subject, and not asking irrelevant questions; and "Following the rules" that is exhibiting good behaviors, being respectful and silent, and raising hands to talk were mentioned by 5 participants each, while only the last was mentioned in the second reflections by 4 participants. For example, Participant-8 reflected on "following the rules" both in the second interview and the second reflection as in the below vignettes:

There was a very crowded classroom in the first video. The habit of raising hands was not set in the students. Or the habit of objecting to one's ideas. They were shouting etc., they were talking without asking for permission. It was better in the others. Especially in the video of the teacher M. The students were really, I don't know actually, may be they were warned beforehand. They knew how to take turns in the class. They knew how to give

answers or they were asking for permission before objecting to someone's idea. They didn't say anything before [...] (P8-2)

Birinci videoda çok kalabalık bir ortam vardı. Öğrencilerin böyle işte söz alma davranışı çok yerleşmemişti. Veya birinin fikrine itiraz etme. Böyle işte bağıyorlardı falan, izin almadan konuşuyorlardı. Diğerlerinde daha iyiydi. Özellikle M hocaninkinde öğrenciler gerçekten, artık bilmiyorum tabii önceden bir uyarı almışlar mı. Söz almasını biliyorlardı. Cevap vermesini biliyorlardı veya birine itiraz edecekken ilk önce söz alıyorlardı. Öncesinde herhangi birşey söylemiyorlardı [...]

While in the second interview Participant-8 compared the videos in terms of the level that the students followed the rules, in the second reflections he gave credit to the students that they were respectful and raising hands to talk:

The habits of raising hands and objecting to someone were set in the students. They were listening to each others' answers. When one of them made a mistake or got stuck the others were not objecting without asking for permission, they were raising hands. (P8-R2)

Öğrencilerde söz alma ve itiraz etme, cevap verme davranışları yerleşmiş. Birbirlerinin cevaplarını dinliyorlar, biri yanlış yaptığında veya takıldığında diğerleri söz almadan itiraz etmiyor, el kaldırarak söz istiyor.

Two participants reflected on the roles "Aiming to understand" during the lesson, and trying to learn; and "Expressing themselves". These sub-issues were noticed by 2 and 3 participants respectively in the first interviews. For example, while talking about group work, Participant-14 reflected on the first role where he criticized the students in the video for not aiming to learn in the lesson:

[...] Some of them were feeling like group work was a game. You know, they were far from the consideration that there was an aim of what they were doing and they would learn and get something at the end [...] (P14-2)

[...] Böyle grup çalışması sanki kimisine oyun gibi geliyor. İşte bu yaptığımız işin bir amacı var, biz bunun sonucunda birşey öğreneceğiz, elde edeceğimiz düşüncesinden uzaklar [...]

Another participant (Participant-3), on the other hand, reflected on the second role, that is “expressing themselves” that the students in the video knew how to express themselves and their ideas as in below:

[...] There was a more quiet classroom environment in the 3rd video, but it was not because they didn't know anything. I think it was a class who knew how to reflect and how to make explanations [...] (P3-2)

[...] Ama 3. videoda da yine sakin bir sınıf sözkonusuydu ama bu sakinlik hani birşey bilmemekten kaynaklanan bir sessizlik değildi. Neyi nasıl ifade etmeleri ve nasıl açıklamaları gerektiğini bilen bir sınıftı bence [...]

In the second reflections, these roles were not mentioned by any of the participants.

The noticed sub-issues related to the *Classroom Culture* in the second interventions were given above. The only sub-issue which was not noticed in the second interventions was “mistakes” while the most noticed sub-issue in the second interviews was “being respectful”. In the following part, the “*Other*” student roles noticed in the second interventions are provided.

4.2.2.4. The Sub-Issues related to the “*Other*” Theme in the Second Interventions

In the second interview, only 1 out of 15 participants were able to talk about the issue related to the “*Other*” theme which was not mentioned in the second reflections. There was only one sub-issue related to this theme that is, “Imagination” referring to having imagination, and perceiving differently. This

issue was mentioned by 2 participants in the first interviews, and was not mentioned in the first reflections. To give an example, the only participant mentioning this role (Participant-3) reflected that:

For example, as I said just before, 10th decimal place, 100th decimal place. I mean actually the student shouldn't think that way according to the directions you provided. You know, rather the student discovers a relation according to the directions I plan to give. But the student, ok as a relation between 10 and 100, I mean there is a 10 times relation, he may interpret it differently then. His perception might be very different. Because, I think this way that, not only mathematically, there are 40 different worlds in front of a teacher in a class size of 40. Forty different minds, I mean in early ages students' imagination is so much richer. I mean they are so much wider. I mean, depending on that, what you show them might be very different from what the students create in their minds [...] (P3-2)

Mesela az önce de söyledim ya, 10'la, 10 basamaklı 100 basamaklı. Hani ben, aslında normalde sizin verdiğiniz yönergelere göre çocuğun öyle birşey düşünmemesi lazım. Hani daha doğrusu benim vereceğimi düşündüğüm yönergelere göre bir ilişki keşfedecek. Ama çocuk ilişki olarak evet 10'la 100 arasında, hani 10 katı bir ilişki var, o zaman çok farklı yorumlayabilir. Bu, onun algılayışı hani çok farklı olabilir. Çünkü bir de ben şöyle düşünüyorum hani, sadece mathematical olarak değil de, bir öğretmenin karşısında 40 kişilik bir sınıfta 40 tane ayrı dünya var. 40 tane ayrı kafalarında bir de, hani küçük yaşlarda çocukların hayal gücü çok daha fazla gelişmiş oluyor. Yani çok daha fazla geniş oluyor. Hani buna bağlı olarak sizin onlara gösterdiğiniz şeylerin onların kafasında oluşturacağı şeyler de çok farklı olabiliyor [...]

As seen from the vignette above, Participant-3 pointed that what the teacher expects might be different than what the students perceive since students' imagination plays a role on their perceptions and thinking.

In the next part, the noticed issues related to student roles in the third interview and in the reflection papers are explained. Related vignettes from the online discussions are also provided.

4.2.3. The Main Themes related to Student Roles in the Third Interview and the Third Reflection Papers

As indicated before, there were 4 main themes related to student roles that are *Methodological Perspective*, *Attitudinal Perspective*, *Classroom Culture*, and “*Other*”.

Among the 15 participants, data analysis indicated that in the third interviews, 12 participants were able to talk about *Methodological Perspective* and *Attitudinal Perspective*, 10 mentioned *Classroom Culture*, and only 1 mentioned the “*Other*” theme.

In the third reflection papers, 3 participants mentioned *Methodological Perspective*, 4 participants reflected on *Attitudinal Perspective*, and 2 of them talked about *Classroom Culture*. None of the participants mentioned the “*Other*” theme in the third reflections.

In the next section, the sub-issues related to the main themes are provided.

4.2.3.1. The Sub-Issues related to Methodological Perspective in the Third Interventions

As indicated previously, in the third interview 12 participants were able to talk about *Methodological Perspective*. There were 9 sub-issues related to this theme, which were briefly provided in the method section (see Table 3.7). In the third interventions, 5 of these sub-issues were noticed by the participants while it was 3 and 9 in the first and second interventions respectively (see Appendix 7). The noticed sub-issues in the third interventions were “inquiry”, “using

materials”, “group work”, “constructing one’s own knowledge”, and discussion”.

In terms of frequencies of the sub-issues, in the third interview, 7 out of 15 participants mentioned the issue “Group work”. This issue refers to student roles such as being able to do group work, cooperating with others, fulfilling their responsibilities, and learning from each other through communication. This role was the most popular role that the participants noticed in the third interviews as in the first (11 participants) and second interviews (10 participants). For example, Participant-1 mentioned in the below vignette that not all of the students were engaging and cooperating in the group work in the video:

[...] Even during the group work, only one or two students were talking and thinking on their own as they were playing with the cubes and the other materials. The others were only looking at them. When you watch, you can easily see that [...] (P1-3)

[...] Hatta grup çalışmalarında da bir öğrenci iki öğrenci kendi arasında almışlar birim küpleri, diğer materyalleri, konuşuyorlardı düşünüyorlardı falan. Diğerleri onlara bakıyordu sadece. İzleyince de gayet görünüyor [...]

Another participant (Participant-12) also reflected on this issue, but this time she made her criticism over the teacher:

There was no communication with other students. Both in the videos and also in the lessons that taught during the internship. The students don’t want to explain anything to their friends who are sitting next to them. They should, but their teacher should also encourage them to do so. In my opinion, in none of the videos, we could observe that the students were able to achieve this since their teacher had not enabled to do so. (P12-3)

Arkadaşlarıyla iletişim olmadı. Gerek videolarda, gerek ben stajda da ders anlattım. Çocuklar yanındakine birşey anlatmak istemiyorlar. Anlatmaları gerekir, öğretmenleri de buna

yönlendirmesi gerekir. Hiçbirinde öğretmen bunu sağlamadığı için çocuklar da sağlayamadı bence.

In the third reflection papers, none of the participants were able to reflect on this role as in the second reflections. In the first reflections, on the other hand, this sub-issue was noticed by 4 participants.

With respect to another sub-issue related to *Methodological Perspective*, that is “Constructing one’s own knowledge”, 4 participants were able to reflect on this role. In other words, only couple participants noticed and talked about student roles such as not waiting for the answer and the explanations to be given by the teacher, building and constructing one’s own knowledge, being responsible for one’s learning, being involved, giving the expected reactions, and being at the center. This sub-issue was noticed by 5 participants in the second interviews, which was not noticed in the first interventions. To give an example, one of the participants (Participant-7) mentioned this issue where he criticized that students in the video did not have a chance to build their own knowledge, but instead waited for the answers to be given by their teacher during the activity:

[...] I believe it is one of the most important points during the activities. It is a criterion for me. If you give the answer directly, then there is no need to make the activity. Because if you do it that way, the students always want the answers from you. They always ask the teacher, call him and ask. Then they get the answer, and feel like they did it. That way, there is no residue left behind for the students. No matter how much the teacher tries to make an activity. (P7-3)

[...] Burada bence bir etkinlik yaparken en önemli şeylerden birisi o yani, benim için kriter. Zaten cevabı veriyorsan etkinliği yapmanın bir anlamı yok yani. O zaman zaten öğrenci standart olarak sorar, devamlı öğretmene sorar, çağırır sorar. Ondan sonra cevabı alır, iyi bunu da yaptım. Ondan sonra o şekilde yani

kendine, öğrenciye birşey kalmıyor. Ne kadar etkinlik yapmaya da çalışsa.

The issue “Inquiry” referring to questioning, and inquiring instead of memorizing, and thinking and asking oneself why one is learning was mentioned by 3 participants in the third interviews and was not mentioned in the third reflections. This sub-issue was noticed by 5 and 4 participants in the first and second interviews respectively. For example, Participant-14 mentioned that it is the responsibility of the students to question and inquire while it is also up to their teacher:

[...] We always say that the students should question everything, the students’ role is to question and investigate the rationale behind the subjects, but this should be taught to the students. We can’t blame students for not inquiring if we don’t teach them how to. (P14-3)

[...] Hani hep böyle öğrenci sorgulayacak diyoruz, öğrencinin rolü sorgulamaktır, neden niçinini şey yapmaktır. Ama öğrencilere de bu öğretilmeli. Öğretilmediği halde öğrenci niye sorgulamıyor diye kızmak olmaz.

The issues “Using materials” that is using materials appropriately, and improving one’s motor skills through material use; and “Discussion” that is being able to participate in discussions, not giving the answers without discussing them first, answering their friends first instead of their teacher, and learning through discussions were mentioned by only 2 participants each. These sub-issues were not noticed in the first interventions where they were noticed by 3 and 2 participants in the second interviews respectively. To give an example, Participant-9 reflected on “discussion” as in the below vignette:

[...] For example, how do the students in the classroom behave? For instance, like the ones in the video. I mean it is the same,

students sit in the classroom. The teacher writes down the question on the board, they solve it etc. Similarly, there is no communication between them either. They raise their hands just to answer their teacher. I mean there was no discussion environment in that class, I observed. (P9-3)

[...] *Mesela sınıftakiler nasıl davranıyor. Mesela şeydekiler, videodaki gibi. Yani aynı, sınıfta çocuklar oturuyorlar. Öğretmen işte tahtaya soruyu yazıyor, çözüyorlar falan böyle. Onların arasında da yine aynı şekilde hiçbir iletişim yok. Direkt öğretmene parmak kaldırılıyor falan. Yani sınıfta hiç böyle bir discussion ortamı falan olmadı, dikkat ettim.*

In the third reflection papers, on the other hand, none of the student roles related to *Methodological Perspective* was mentioned.

The noticed student roles related to the *Methodological Perspective* in the third interventions were given above. As stated, the most noticed sub-issue in the third interviews was “group work” while the sub-issues which were not noticed in the third interventions were “discovery”, “real life”, “connection”, and new curriculum”.

To sum up the issues noticed related to the *Methodological Perspective*, most of the participants were able to reflect on student roles related to this main theme throughout the three interventions. The sub-issue mostly noticed in all interviews related to *Methodological Perspective* was “Group work”. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues.

In the following part, the student roles related to the *Attitudinal Perspective* noticed in the third interventions are provided.

4.2.3.2. The Sub-Issues related to Attitudinal Perspective in the Third Interventions

As indicated previously, in the third interview, all of the 15 participants talked about issues related to *Attitudinal Perspective*. There were 4 sub-issues related to this theme (see Table 3.7). Parallel to the first interventions, in the third interventions 3 of these sub-issues were noticed by the participants. In the second interventions, on the other hand, only 2 of these sub-issues were mentioned by participants (see Appendix 7). The noticed sub-issues in the third interventions were “active participation”, “being relaxed”, and “enjoying mathematics”.

In terms of frequencies, in the third interview, 10 participants mentioned the role “Active participation”. In other words, most of the participants reflected on student roles such as being willing and enthusiastic about lessons, participating actively and equally, and being willing to learn mathematics. This role was the most popular role that the participants noticed in the third interview as in the first (11 participants) and second interviews (9 participants). For example, Participant-4 mentioned that students should be active and willing to learn mathematics while criticizing the students in the video for not being interested in lessons as in below:

[...] I really get surprised when I look around. I saw it in some students in 6th grade, but only in a few students. But in 7-8th graders, no. I remember myself as an enthusiastic student in mathematics lessons, I wasn't like that. You know, you want to see them like, more interested in mathematics, willing to come to the board. I don't know whether you were like that, I was. (P4-3)

[...] Çok şaşıyorum yani bakınca. 6. sınıfta birkaç öğrencide yine gördüm, birkaç öğrencide ama sadece. 7-8, cık. Ya ben kendimi hatırlıyorum matematik derslerinden, yok yani. Hani böyle şey görmek istiyor insan ya, böyle daha matematiğe hakikaten çok ilgi duyan, böyle tahtaya atlama meraklısı öğrenciler vardır ya. Bilmiyorum siz öyle miydiniz, ben öyleydim.

Another participant also commented on this issue, but this time she blamed her internship teacher for getting down the students although they were so willing and participating:

I generally observe which students participate in the lesson and which don't. I mean there are 2-3 successful students, in spite of the teacher. They are trying to learn. For instance the teacher... They actually look very interested; I mean they could do better if it could be done better. The teacher let them to do the problems on their own when he doesn't ask questions on the board. The students immediately solve it and took their solutions to their teacher. He looks at some of them a little bit, then he gets angry that they act like primary school students. But in spite of all these, the students are still going to the teacher. Or they ask me. Whether what they did was right or wrong. They look very enthusiastic. Although it was a public school, the students were quite enthusiastic, but the teacher was so unwilling. (P10-3)

Öğrencilerden genelde yani inceliyorum hani dersle kim ilgili kim ilgisiz. Yani 2-3 tane başarılı öğrenci var, öğretmene rağmen. Böyle öğrenmeye çalışıyor. Mesela şey hoca... Çok hevesli de görünüyorlar aslında böyle hani iyi yapınca çok daha başarılı olabilecek öğrenci. Öğretmen tahtaya soru sormazsa, hani siz kendiniz yapın diyor. Hemen öğrenciler yapıp çözümü hemen hocaya götürüyorlar. Böyle bir iki bakıyor, bir tanesine bakıyor iki tanesine, sonra hani siz ilkokul çocuğu musunuz oturun falan diyor kızıyor. Ama ona rağmen yine de öğrenciler gidiyor. Olmadı bazen bana soruyorlar. Abla doğru yapmış mıyım falan diye. Çok istekli görünüyorlar. Devlet okulu olmasına rağmen öğrenciler çok istekli ve öğretmen de çok isteksiz.

In the third reflection papers, on the other hand, this role was only mentioned once while it was mentioned by 4 participants both in the first and second reflections.

In terms of another issue related to *Attitudinal Perspective*, as in the first interview, 8 participants reflected on “Being relaxed” referring to not hesitating

or being afraid, being able to ask questions freely, and having self-confidence. This role was the second popular student role that the participants noticed in the third interviews. In the second interview, on the other hand, it was noticed by only 3 participants. To provide an example, Participant-13 mentioned in the third interview that it is very important for students to be relaxed and to be able to ask questions freely in a classroom environment:

I mean the students should be comfortable in the class and they should be aware of what they learn and don't learn. I mean it is more important than any other things that they learn how to ask questions. It is like that for all lessons. Not only for mathematics. (P13-3)

Yani öğrenciler mutlaka sınıfta rahat olmalılar ve ne öğrendiklerinin, ne öğrenemediklerinin farkında olmalılar. Yani soru sormayı öğrenmeleri bence herşeyden önemli. Her ders için bu böyle. Sadece matematik için değil.

Another participant (Participant-5), on the other hand, reflected on this issue where he provided examples to the environments in which students feel relaxed and under pressure via comparing the teachers in two different videos:

[...] For example, the students were able to raise their hands and answer the questions freely in teacher M's class. They could easily make contact with their teacher in that class as you can remember from that video. But in teacher N's class there were not many students talking too much. I mean they couldn't say anything [...] (P5-3)

[...] Mesela M hocamın sınıfında çocuklar çok rahat el kaldırıp cevabı söyleyebiliyorlardı. M hocayla, o videoda hatırlarsanız, çok rahat iletişime geçebiliyorlardı. Ama hani N hocamın sınıfında mesela çok fazla konuşan öğrenci yoktu hani birşey diyemiyordu [...]

Parallel to the third interview, in the online discussions, participants were able to reflect on this role. To give an example, during the discussions on the last video watched, Participant-4 pointed that it is very important that the students are relaxed in a classroom environment, and they should be able to ask their questions freely in order to learn as in the below vignette:

No, you are not exaggerating at all. Because it is very important that students feel comfortable in a class. If they think that they will be insulted when they make a mistake, then they can't ask questions when they don't understand something and they can't actively participate in the lesson. Additionally, I believe that it is also a disadvantage for the teacher, because she can not do periodic assessments to check how much the students have learned the subject. She can only realize it in the exam, which would be quite late. (P4-OD)

Hayır, hiç abartmıyorsun bence. Çünkü öğrencinin derste rahat olması çok önemli. Eğer hata yaptığında aşağılanacağını düşünürse anlamadığı yerleri soramaz derse etkin bir şekilde katılamaz. Ayrıca bu öğretmen için de dezavantaj bence çünkü bu şekilde anlattığı konunun ne kadar anlaşıldığını ara ara ölçemez. Sadece sınavlarda görür ki bu çok geç olur.

Participant-6, on the other hand, mentioned this issue through criticizing the teacher for not letting students be relaxed in classroom environment:

As far as I observed, the attitude of the teacher was very harsh, and especially when she talked like that she became more scary. If I were a student in that class, I couldn't ask the teachers what I couldn't understand. I would be afraid of being humiliated and I wouldn't dare to ask any questions. That way, as the things I couldn't ask increase, I would be left with just isolated and meaningless pieces of information. I wouldn't go beyond memorization [...] (P6-OD)

Zaten gözlemlediğim kadarıyla öğretmenin tavrı çok sert bir de böyle şeyler söylediğinde daha da korkutucu oluyor. Ben olsam mümkün değil anlayamadığım zaman anlayamadım diyemezdim.

Küçük düşmekten korkardım ve sormazdım. Böylelikle zaman içinde sormadığım yerler arttıkça benim elimde bir kaç bağlantısız ve anlamsız bilgi kalırdı. Bunlar da tabii ki ezberden öteye geçemezdi [...]

Another participant also mentioned this issue, and shared her idea that students can feel relaxed in a classroom environment only if their relationship with their teacher is good:

In such situations, I think that other than what you said, we should also make this a principle. If the relationship between the students and the teacher is good, then the students can feel comfortable and can ask questions when they don't understand. The teacher then explains it, and explains again if they don't get it. Until they understand it... Otherwise, it becomes more difficult for the teacher to understand whether the students understand it or not, and this makes it more difficult for students to understand the other subjects. (P2-OD)

Böyle durumlarda senin söylediklerinden başka şunu prensip edinmek lazım diye düşünüyorum. Öğrenci ve öğretmen ilişkisi iyi olursa öğrenci kendini derste rahat hisseder ve anlamadığını sorar. Öğretmen de onun bu sorusunu anlatır anlamazsa tekrar anlatır. Taki anlayıncaya kadar... Aksi takdirde öğrencinin anlamadığını anlayabilmesi zorlaşır ve diğer konuları anlaması zorlaşır.)

In the third reflection papers, also, this role was the only role mentioned by more than one participant. In other words, 3 participants reflected on this role, which was not noticed in the first and second reflections. For example, Participant-4 reflected in the third reflections that:

[...] I guess the students who thought that their answer was wrong couldn't answer as they were afraid of their teacher [...] (P4-R3)

[...] Sanırım öğrenciler öğretmenlerden korktukları için yanlış olduğunu düşünenler cevap veremediler sorulara [...]

Another participant also commented that the students in the last video were reluctant to talk because of their teacher:

The students were hesitant to answer questions (teacher's attitude was the main reason for that) [...] The student who had doubts on how to multiply 1.4×0.2 asked his question after gathering all his courage [...] (P8-R3)

Öğrenciler soruları cevaplama da çekingen davranıyorlar (öğretmenin üslubu bunun en büyük sebebi) [...] 1.4×0.2 çarpımının nasıl yapılacağına dair şüpheleri olan öğrenci bütün cesaretini toplayarak sorusunu sordu [...]

The last role mentioned was “Enjoying mathematics” referring to learning mathematics with fun. This issue was noticed and mentioned by only 2 participants in the third interviews, while it was not noticed in the first and second interventions. For example, Participant-3 reflected in the third interview that the new curriculum makes mathematics more enjoying for students:

[...] They are, for example, everything is so nice in the new curriculum. But we are not aware of it. I mean making students interested, drawing their attention; you know new curriculum is all intended for these if you really implement it. Because at that age, the pride of achieving something is a very different feeling and it can be one of the influences in shaping their lives. For example, I remember myself, when I was in 7th grade, our teacher treated the students like that. The student who solved it first would go to the board, and similarly the second student would also solve the problem on the board too. The others would follow suit. This would form a line of students waiting to solve the problem on the board. Our teacher then would check our answers in our notebooks. You know, being on the board first was a great feeling. Great feeling. Because you are doing something, you are achieving before all others. I mean I don't say that it is the way it should be but... It was motivating. Actually the new curriculum is also like that. I believe that the new curriculum will give pleasure

and encouragement to the students since it is intended for student discovery, and student activation [...] (P3-3)

[...] Onlar mesela bu yeni müfredatta hani herşey aslında o kadar güzel ki. Ama bunun farkında değiliz. Yani öğrencinin hani heveslendirmek dedim, onların ilgisini çekmek dedim, hani o kadar aslında buna yönelik ki, yani gerçek anlamda uygularsanız. Çünkü o yaşta birşeyler başarabilmenin verdiği onlardaki gurur çok farklı bir his ve onları ciddiye hayatlarına yönlendirebilecek etkenler olmuş. Mesela kendimden hatırlıyorum, orta ikideyken öğretmenimiz soruları çözene, böyle tahtada, hani ilk çözene, ilk çözen giderdi tahtaya daha sonra işte devam ederdi, böyle bir sıra oluştururduk. Öğretmen daha sonra cevaplara bakardı defterimizden. Hani oraya ilk çıkabilmek ah muhteşem bir şey. Muhteşem bir duygu. Çünkü birşeyler yapıyorsunuz, herkesten önce yapıyorsunuz. Hani bu, bunun yapılması anlamında söylemiyorum ama... Motive edici birşeydi. Burada aslında bütün müfredat öyle. Bütün müfredat öğrencinin birşeyleri keşfetmesi, birşeyleri yapabilmesine yönelik olduğu için hepsine ayrı bir haz verecek yani ayrı bir istek verecek diye düşünüyorum [...]

The other roles related to *Attitudinal Perspective* were not mentioned in the third interview even once.

The noticed student roles related to the *Attitudinal Perspective* in the third interventions were given above. The most noticed sub-issues in the third interviews were “active participation” and “being relaxed”. The only sub-issue which was not noticed in the third interventions was “excitement”, which was only noticed in the first interventions.

To sum up the issues noticed related to *Attitudinal Perspective* throughout the three interventions, most of the participants were able to reflect on student roles related to this main theme in the three interviews. More specifically, the student roles that the participants noticed in all interviews were “Active participation” and “Being relaxed”. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues.

In the following part, the student roles related to the *Classroom Culture* noticed in the third interventions are provided.

4.2.3.3. The Sub-Issues related to Classroom Culture in the Third Interventions

As indicated before, in the third interview, 10 participants were able to talk about *Classroom Culture*. There were 7 sub-issues related to this theme (see Table 3.7). While 6 of these sub-issues were noticed by the participants both in the first and second interventions, only 4 of them were noticed in the third interventions (see Appendix 7). These sub-issues were “responsibilities”, “following the lesson”, “following rules”, and “being respectful”.

In terms of frequencies, in the third interview, 6 out of 15 participants mentioned the role “Following the lesson”. This role refers to the student responsibilities such as answering teachers’ questions, not losing interest in the lesson, concentrating on the subject, and not asking irrelevant questions; and it was the most popular role noticed by the participants in the third interview while it was among the popular roles in the second interview (5 participants) but not noticed in the first interview. For example, Participant-11 mentioned in the third interview that she realized how some students were separated from the lesson and how they didn’t follow the teacher as in the below vignette:

There is something in them, in the students. They have so much difficulty in following the things in the lesson. I recently noticed it. I was thinking before that the teachers teach and the students write on their notebooks or you know they follow the parts they miss and the solutions on the board. But there is nothing like that. I realized that. I mean the teacher assumes it like that standing in the front of the class, but when you move around the students... Some of them deal with something else, some others give notes to each others, write. It is like that. You know the model of a student at first... Eventually this is the expected behavior. Students listen, follow the lesson, write things on the board etc. Some of their

notebooks were not complete, I mean they were incomplete. I realized these over time. Eventually they... They are so little, they are children after all. I mean you can't expect a great performance from them. If the teacher turns her back and starts writing on the board, of course they would socialize. But before I wouldn't think that it was this much. They were not even writing down on their notebooks for instance [...] (P11-3)

Onlar da, çocuklarda şöyle bir şey var ya. Sınıftaki şeyi takip etmelerinde çok zorlanıyorlar öğrenciler. Ben bunu hani yeni yeni fark ettim zaten. Zannedirdim ki öğretmen anlatır, öğrenciler de güzelce defterine yazar veya işte hani eksik kalan kısımlara, soru çözümlerine bakarlar oradan takip ederler tahtadan. Ama öyle birşey yokmuş. Ben onu fark ettim. Hani öğretmen orda tahtada gerçekten o şekilde görüyor ama o çocukların arasında sen bakıp dolanıyorsun mesela bazen böyle. Kimisi başka şeyle uğraşiyor, kimisi birbirine not alıp veriyor, yazıyor falan, bazı şeyler var böyle. Hani ilk zamanki o öğrenci modeline... Sonuçta bu beklenen davranıştır, öğrenci dinler takip eder tahtadakini yazar falan böyle, kimi öğrencilerin defteri tam değil yani eksik eksik böyle defterleri. Hani onları fark ettim yani zaman içerisinde. Sonuçta onların... Çok küçükler, çocuklar zaten. Hani çok süper bir performans bekleyemezsiniz ondan. Tahtada hoca zaten arkasını dönüp birşeyler yazmaya başladıysa tabii ki de onlar kendi aralarında kaynaşacaklar ama ben hani bu şey, bu denli olduğunu düşünmezdim önceden yani. Defterlerine yazmıyorlarmış bile mesela [...]

In the third reflections, on the other hand, this role was mentioned only once while it was not noticed in the second reflections.

The second issue the participants reflected on with respect to the *Classroom Culture* was "Following rules" referring to exhibiting good behaviors, being respectful and silent, and raising hands to talk. As in the first interventions, this sub-issue was noticed by 4 participants in the third interview while it was not mentioned in the third reflections. With respect to the second interventions, it was noticed by 5 participants in the second interview and noticed by 4 participants in the second reflections. To give an example,

Participant-2 reflected on this issue in the third interview through commenting on students' respect towards their teacher:

[...] The students are very respectful toward their teacher. As a matter of fact, there is something like that in our culture. I mean teachers are beloved ones because of Ataturk. You know, since he was our headmaster. There was no disrespect at all [...] (P2-3)

[...] Öğrenciler gayet saygılılar öğretmene. Zaten ülkemizde de böyle birşey var yani öğretmen işte baş tacıdır, yani Atatürk'ten dolayı. İşte başöğretmenimiz o olduğundan dolayı. Bir saygısızlık falan gözükmüyor [...]

The other two issues noticed with respect to the *Classroom Culture* were “Responsibilities” that is fulfilling their responsibilities, doing what their teacher expected, cooperating with their teacher, and understanding teacher directions; and “Being respectful” that is not interfering with friends' learning, giving them chances to practice and learn, being respectful toward them, listening to friends, and establishing good relationships with their friends. These issues were mentioned by 2 participants each in the third interviews, but they were not reflected in the third reflection papers. For example, Participant-6 reflected on the first role about student responsibilities as in the below vignette:

[...] I mean, you know, if the students come to the classroom without studying, without overviewing the subject or you know if they don't do the exercises, don't listen to us during the lesson. I mean if there is a problem with the students, no matter what the teacher does, I don't think that it would be effective [...] (P6-3)

[...] Yani hani eğer öğrenci de hiç çalışmadan, yani çalışmadan gelmek dediğim hani konuya bakmadan geliyorsa ya da hani verdiğimiz alıştırmaları yapmıyorsa, ders içerisinde bizi dinlemiyorsa, hani eğer öğrencide bir problem varsa öğretmen ne yaparsa yapsın hani çok etkili olacağını düşünmüyorum [...]

As seen from the vignette above, Participant-6 underlined that it is important that the students fulfill their responsibilities.

Participant-12, on the other hand, reflected on being respectful via criticizing the students for interfering each other:

[...] When their friends on the board made a mistake, the students were like running to the board, asking them to sit and do it themselves, and shouting that they were doing wrong. Or it is really bad that the students shout like ‘it is wrong, wrong’ when a student writes down something on the board [...] (P12-3)

[...] *Çocuklar sürekli tahtada arkadaşları çözemediğinde, tahtaya zıplayan çocuklar, hayır kalksın, o otursun, ben yapayım, yanlış oldu yanlış oldu. Ya da, bu çok kötüdür, çocuk bir şeyi yazarken arkadan çocukların hayır hayır yanlış demesi [...]*

The noticed student roles related to the *Classroom Culture* in the third interventions were given above. The most noticed sub-issue in the third interviews was “following the lesson” while the sub-issues which were not noticed in the third interventions were “aiming to understand”, “expressing themselves”, and “mistakes”.

To sum up the issues noticed related to *Classroom Culture* in the three interventions, most of the participants were able to reflect on student roles related to this theme in the three interviews. More specifically, with respect to this main-theme, the issues noticed in all interviews were “Responsibilities”, “Following the rules”, and “Being respectful”. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues.

In the following part, the “*Other*” student roles noticed in the third interventions are provided.

4.2.3.4. The Sub-Issues related to the “Other” Theme in the Third Interventions

In the third interviews, only one participant reflected on the “Other” theme which had one sub-issue that was “Imagination” referring to having imagination, and perceiving differently. This issue was not reflected in the third reflections. With respect to the first and second interventions, this issue was noticed by 2 participants in the first and one participant in the second interviews while it was not mentioned in either of the reflection papers.

To sum up the issues related to the “Other” theme in all interventions, this theme was not among the themes noticed in the three of the interviews. In the reflection papers, on the other hand, this theme was not noticed at all.

4.2.4. Summary of the Noticed Topics related to Student Roles

As indicated above, most of the participants were able to reflect on student roles related to the themes *Methodological Perspective*, *Attitudinal Perspective*, and *Classroom Culture* in the three interviews. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues. With respect to the “Other” theme related to student roles, on the other hand, only one or two participants reflected on it in the interviews where none of the participants mentioned it in the reflections.

The participants mostly noticed the student roles related to *Methodological Perspective* in the first and second reflection papers where it showed a small decrease in the last reflections. The frequencies in the *Attitudinal Perspective* and *Classroom Culture* were relatively lower in the reflections. In other words, the frequency of participants’ noticing showed inconsistency in their reflection papers.

To give more detail, related to *Attitudinal Perspective*, the student roles that the participants noticed in all interviews were “Active participation”

referring to being willing and enthusiastic about lessons, participating actively and equally, and being willing to learn mathematics; and “Being relaxed” referring to not hesitating or being afraid, being able to ask questions freely, and having self-confidence. The issue mostly noticed in all interviews related to *Methodological Perspective*, on the other hand, was “Group work” that is being able to do group work, cooperating with others, fulfilling their responsibilities, learning from each other through communication. With respect to the main-theme *Classroom Culture*, the issues noticed in all interviews were “Responsibilities” referring to fulfilling their responsibilities, doing what their teacher expected, cooperating with their teacher, and understanding teacher directions; “Following the rules” referring to exhibiting good behaviors, being respectful and silent, and raising hands to talk; and “Being respectful” referring to not interfering with friends’ learning, giving them chances to practice and learn, being respectful toward them, listening to friends, and establishing good relationships with their friends. As indicated above, the theme “*Other*” was not among the themes noticed in the three of the interviews. In the reflection papers, on the other hand, this theme was not noticed at all.

Different than the noticed themes related to teacher roles, the sub-issues under each themes related to student roles were not noticed more from the first to third interviews in either interviews or in reflection papers. In other words, the frequencies were either decreased or the increase in their noticing was not linear. Some of the sub-issues were noticed only in one or two of the interviews and reflection papers, some of which were noticed by only 2 or 3 participants. On the other hand, there were several issues which were not noticed during the first interventions, but a couple of participants mentioned in the second and/or third interventions. To give an example, the issues related to *Methodological Perspective* that are “Using materials” and “Constructing one’s own knowledge” were noticed both in the second and the third interviews by several participants although they were mentioned by only one participant each in the first

interviews. Similarly, the role related to *Classroom Culture* that is “Following the lesson” was not noticed in the first and second reflections while it was noticed by one participant in the last reflection papers.

4.3. Summary of the Noticed Topics related to both Teacher and Student Roles

The aim of this study was to investigate the changes on what the prospective elementary mathematics teachers noticed with respect to the teacher and student roles in reform-minded teaching and learning during their video case-based teacher education.

With respect to the teacher roles, all participants were able to reflect on the issues related to *Methodological Perspective* both in the interviews and in the reflection papers. From the *Attitudinal Perspective*, the percentage of noticing increased throughout the interviews. Similarly, the participants noticed more on “*Other*” teacher roles as they watched and discussed on more videos.

To give more detail, in the *Methodological Perspective*, the only teacher role that the participants noticed in all interviews was teachers’ Pedagogical Content Knowledge. Both in the three interviews and reflections, participants were able to discuss several teacher roles related to this knowledge. General Pedagogical Knowledge and Curriculum Knowledge were also among the mostly noticed teacher roles with full percentages in the last interviews. One point to underline is that the percentages of noticing of some roles such as “discussion” under PCK, and “management” and “pressure” under GPK decreased throughout the interviews.

With respect to the teacher roles under Curriculum Knowledge, there were several issues showing increase throughout the interviews. The teacher role related to Content Knowledge, on the other hand, was only noticed by at most one third of the participants throughout the interviews.

The participants noticing with respect to the *Attitudinal Perspective* increased throughout the interviews. Similarly, with respect to the “*Other*” teacher roles, there was also an increase in participants’ noticing throughout the interviews. The highest increase was shown in the role Equity while there was less or no improvement in noticing the roles related to the Teacher Characteristics and Out-of-Class Activities respectively.

In terms of the issues related to student roles, most of the participants were able to reflect on student roles related to the themes *Methodological Perspective*, *Attitudinal Perspective*, and *Classroom Culture* in all interviews. With respect to the “*Other*” theme related to student roles, on the other hand, only one or two participants reflected on it in the interviews where none of the participants mentioned it in the reflections.

The participants mostly noticed the student roles related to *Methodological Perspective* in the first and second reflection papers where it showed a decrease in the last reflections. The frequencies in the *Attitudinal Perspective* and *Classroom Culture* were relatively lower. In other words, the frequency of participants’ noticing showed inconsistency in their reflection papers. As indicated, the theme “*Other*” was not among the themes noticed in the three of the interviews. In the reflection papers, on the other hand, there was no theme noticed in either of the reflections.

Different than the noticed themes related to teacher roles, the sub-issues under each themes related to student roles were not noticed more from the first to third interviews in either interviews or in reflection papers. In other words, the frequencies were either decreased or the increase in their noticing was not linear. Some of the sub-issues were noticed only in one or two of the interviews and reflection papers, some of which were noticed by only 2 or 3 participants. On the other hand, there were several issues which were not noticed during the first interview, but a couple of participants mentioned in the second and/or third interviews such as “using materials”, “constructing one’s own knowledge”,

“discussion” under *Methodological Perspective*; and “following the lesson” under *Classroom Culture*.

To conclude, the results of this study indicated that the prospective teachers were able to notice several issues on the teacher roles in reform-minded teaching, and enhanced their analyses of videos both with respect to teacher and student roles in the new elementary mathematics curriculum. The increase in the number of the participants who noticed issues related to reform-minded teaching from the beginning to the end of the study as well as the increase in the number of the noticed issues suggested that as the online discussions took place over time, prospective teachers became more competent in what to notice and focus on; especially in terms of teacher roles in reform-minded teaching. The increased quality of the content of the messages also pointed that they were able to interpret classroom situations better.

In the next part, the discussion on the findings of the study will be presented.

CHAPTER V

DISCUSSION and CONCLUSION

“...there is little research that confirms whether preservice teachers attend to the aspects of the video(s) that teacher educators anticipate or desire” (Star & Strickland, 2008, p. 107).

This chapter presents the discussion of the findings of the research study. More specifically, it covers the discussion on noticed issues with respect to reform-minded teaching and learning in two main sections; the discussion on noticed issues related to teacher roles, and the discussion on noticed issues related to student roles in reform-minded teaching and learning. Implications for teacher education are explained, and limitations of the study and recommendations for future research are provided.

5.1. Discussion on Noticed Issues with respect to Reform-Minded Teaching and Learning

The aim of this study was to examine the possible change and/or improvement in prospective teachers' noticing abilities with respect to the teacher and student roles in reform-minded teaching and learning when video case-based methodology was employed. Literature indicates that case-based instruction fosters the individual and social constructivist models of teaching and learning via taking learning as an active process (Mayo, 2004). This view point as to the use of cases is believed to have the potential to model reformed curriculum for teachers that they might learn to appreciate the new understanding of teaching and learning the reform requires. More specifically,

providing teachers with case learning opportunities that mirror reform requirements might help them implement what the reform necessitates from them as the new elementary mathematics curriculum in Turkey demands teachers to create learning environments in which the learning is active (TTKB, 2006).

As indicated previously in the results section, the participants noticed several issues related to both teacher and student roles in reform-minded teaching. More specifically, they were able to reflect on issues about *Methodological* and *Attitudinal Perspectives* as well as “*Other*” roles related to teacher roles. With respect to the issues related to teacher roles, the participants mostly focused on the sub-themes that are teachers’ Pedagogical Content Knowledge, General Pedagogical Knowledge, and Curriculum Knowledge under the main theme *Methodological Perspective*. The issues related to teachers’ Content Knowledge, on the other hand, was not noticed by most of the participants. With respect to the *Attitudinal Perspective* and the “*Other*” themes, it was found that the participants’ noticing increased throughout the three interviews.

In terms of the issues related to student roles, most of the participants were able to reflect on issues related to the themes *Methodological Perspective*, *Attitudinal Perspective*, and *Classroom Culture* in all interviews. More specifically, at least two third of the participants noticed the student roles related to the three main-themes in all interviews.

These findings indicate that prospective teachers started to notice new aspects of classroom interactions during the video-case-based discussions. In other words, as the online discussions took place over time, prospective teachers became more competent in what to notice and focus on; especially in terms of teacher roles in reform-minded teaching. More specifically, they were able to notice more on the teacher roles in reform-minded teaching, and enhanced their

analyses of videos both with respect to teacher and student roles in the new elementary mathematics curriculum. A parallel result was found by van Es and Sherin (2008). In their study with in-service teachers, van Es and Sherin (2008) concluded that through the use of cases in teacher education it might be possible to help teachers notice new aspects of classroom interactions; in their case noticing and interpreting student thinking.

Considering to the increase in prospective teachers' noticing, different factors influencing such an improvement should be taken into account. First of all, prospective teachers started to see new points of views and gained new perspectives on reform-minded teaching as they participated in video case-based discussions and interacted with each other. They had an opportunity to see different classroom instructions and to discuss them together. Through collaborative learning and interaction during the online discussions with the facilitation of a moderator, they had a chance to get accustomed to the learning environment. Prospective teachers started to motivate each other and to focus more on the shared target. They improved their awareness on the issues related to reform-minded teaching and learning with the moderation of the facilitator.

As indicated in the literature, through dialogue on critical aspects of cases and on the similarities and differences between cases, reasoning from one case to another, and creating a knowledge base out of cases, teachers might learn important points on effective teaching (Jay, 2004), and might get prepared for the realities of teaching (Butler et al., 2006) through understanding what happens in a classroom (Lundeberg & Levin, 2003; Lundeberg et al., 1999; Shulman J., 1992). The context in this study promises such opportunities for prospective teachers in the sense that the participants had chances to analyze different mathematics videos, interpret classroom interactions, and get ready for real classrooms. Additionally, they had opportunities to connect videos to their own experiences and share anecdotes during the online discussions. As pointed in the literature, through the discussions around cases, prospective teachers are

expected to construct knowledge, discover new knowledge, improve their awareness, and gain new and different perspectives (Barnett & Tyson, 1999). Especially, when cases necessitate extra readings, dialogue may become more reflective (Shulman, L., 1992), and when teachers share their anecdotes it becomes learning with reasoning (Kleinfeld, 1992).

5.1.1. Possible Influence of the Teaching Methods Course and the Internship Experiences

While it is suggested that prospective teachers connect videos to their own experiences, it should also be considered that the courses prospective teachers took during this study might have an influence on what they get from the whole experience. As stated before, the opportunities for prospective teachers to get prepared for the challenges of the new movement are limited to their formal education. They can learn about the reform movement through taking Teaching Methods Courses and going to schools for field experience to observe teachers, but these may not be sufficient alone to educate teachers (Olkun, Altun, & Deryakulu, 2006). At this point, the use of cases in teacher education comes to the fore. However, while the use of cases influences what prospective teachers get from their teacher education, it should also be anticipated that the opposite is also true. In other words, the possible effects of the use of cases in teacher education might also be influenced by the courses taken during that period.

It should be taken into account that such an effect of the courses taken and the internship and personal experiences on the video-case based discussions might be explained with antagonist relation, which makes it uneasy to separate the possible reasons for the development on prospective teachers' noticing skills. In our case, the fact that the prospective teachers were taking Teaching Methods and Guidance Courses and were doing their internships possibly had an

influence on what they noticed and what they got from the video-case based instruction.

In the Teaching Method Course, the prospective teachers were learning issues such as how to teach mathematics, how a qualified teacher should be, and what kind of misconceptions students might have. They were receiving instruction to improve especially their pedagogical content knowledge. Thus, I can deduce from my observations that what prospective teachers learned during the course period had possibly affected the flow of the online discussions. When I look at the issues the participants noticed with respect to the PCK, I can see such reflections. I see that prospective teachers mention teacher roles related to PCK such as facilitating student understanding, helping students reason, conducting student-centered lessons, and making use of multiple representations as they exactly learned in the Teaching Methods Course. The online video-case based discussions eventually became a place to discuss what they had learned during the courses they received. I believe that through those discussions, they enriched their knowledge for teaching. The Guidance course they took might have a similar effect on their general pedagogical knowledge as they were receiving instruction on classroom management techniques, knowledge of learners and educational contexts, school politics, and educational purposes which were explained under the general pedagogical knowledge needed for teachers by Shulman (1986).

It should also be considered that the observations they made during their internship might have influenced the flow of the online discussions on video cases. While reflecting on the videos watched, I observed that the prospective teachers referred to the experiences they had in internship schools, and connected the classroom interactions they observed in videos to that of the classrooms in their internship schools. As I observed their internship practices, I can deduce that prospective teachers discussed very similar issues they experienced both in their internship and online discussions. They gave specific

examples from their internships while talking about situations in the videos, and made comparisons between the teachers in both.

An alternative explanation might be that prospective teachers' private teaching experiences also had an influence on what they got from the whole experience. As stated before, some of the participants had private teaching experiences during their teacher education. In other words, during the online video-case based discussions, I observed that the prospective teachers who taught in test preparation centers or gave private lessons shared their experiences through connecting them to the videos.

In the next part, the results are discussed more in detail under two main headings that are the discussion on noticed issues related to teacher roles and the discussion on noticed issues related to student roles.

5.1.2. Discussion on Noticed Issues related to Teacher Roles in Reform-Minded Teaching and Learning

The results of this study indicated that prospective teachers noticed and talked about several issues related to the teacher roles in reform-minded teaching throughout the video case-based discussions. Except from the teacher roles that were discussed slightly across the discussions as well as the ones showing a decrease in terms of frequency, the main roles the prospective teachers noticed reveal how they started to notice new roles and to talk about teacher roles in the new elementary mathematics curriculum.

The teacher roles showing a constant increase in terms of the frequency from the first to the last interviews were "facilitation", "representation", "activities", "understanding", "inquiry", and "student thinking" related to PCK; "approach", "student differences", and "shaping students" under GPK; "guide book" related to CK; "motivation", "reaching targets", and "technology" under the "Other" roles related to *Methodological Perspective*; "mathematics as a fun", "enthusiasm", and "respect" under *Attitudinal Perspective*; and "self-

improvement” related to Teacher Characteristics under the “*Other*” theme. There were also some other roles which were noticed with the same frequency in the first and second interviews, but showed a higher frequency in the last; which showed an increase from the first to the second interviews, and then fixed in the last; and showed a decrease from the first to the second interview, but then increased.

The teacher roles showing a constant decrease, on the other hand, were “discussion” related to PCK; “management” and “pressure” under GPK; “valuing ideas” related to *Attitudinal Perspective*; and “understanding of all” related to *Classroom Culture*. The teacher role related to “management” under GPK was noticed by several participants in all interviews although its frequency decreased from the first to the last interview.

What these results reveal is that with the employment of the video-case based discussions, prospective teachers’ noticing shifted from general teacher roles to the ones related more to the reform-minded teaching. More specifically, instead of focusing only on issues such as managing the classroom and the time, setting up the rules, and securing the order; wrapping up the lesson; teaching mathematics from simple to complex and not reducing mathematics to the simple, not making too challenging activities; valuing student ideas; knowing her students; and appropriately explaining concepts; the participants began to notice and talk about other teacher roles that were more closely related to reform-minded teaching. Via interacting with each other through the discussions and making use of educational sources such as courses, books, and the internet, the participants started to focus and talk more about teacher roles related to reform-minded teaching such as facilitating student understanding and helping students discover; connecting mathematics to real life; motivating students to think and reason, and letting students build their own knowledge; conducting student-centered lessons; using multiple instructional methods and representations; doing activities; being able to understand student questions and

what they say; having students explain and defend their answers; ensuring student understanding; showing positive approach towards students; making mathematics fun; creating classroom culture where students are not afraid of making mistakes; understanding the new curriculum and being able to adopt it; and preventing misconceptions through the use of materials. As indicated before, these teacher roles emphasize the important responsibilities of the teachers that they have to carry out in the new elementary mathematics curriculum (TTKB, 2006).

This result is consistent with several studies in the literature that through the use of cases, it might be possible to help teachers notice more about classroom interactions, and be able to interpret and analyze several features of reform-minded teaching and learning through interacting with each other (Baran, B., 2007; Lloyd, 1999; Rosaen et al., 2008; Sowder, 2007; van Es & Sherin, 2002, 2008; Walen & Williams, 2000). In the present study, as the interview results, reflections, and online discussions indicated, the participants were able to analyze classroom situations from different perspectives, tried to understand teacher moves, and interpreted classroom situations. Participants had a chance to look at issues from different perspectives through interaction as in the participants did so in Yadav et al.'s (2007) study. Prospective teachers also had an opportunity to develop multiple instructional perspectives, and became aware of different ways of looking at teaching and learning via using each other as learning resources (Arellano et al., 2001). Through peer interaction and discourse, prospective teachers started to develop professional knowledge (Manouchehri, 2002). Via critical reflection, prospective teachers were able to see each others' perspectives, justify their interpretations, and extend their knowledge. They were able to explore curriculum innovation through interaction and collaborative analysis of teaching. In an environment where they engaged in video case-based discussions, participants had a chance to appreciate the new understanding of teaching and learning the reform requires.

As indicated before, “videos and cases are particularly appealing teacher education tools because they offer detailed images of what reformed mathematics teaching and student learning can look like” (Lloyd, 1999, p. 249). Through case-based discussions, teachers can analyze practices with successes and difficulties of the teachers in those cases. In the present study, consistent with the findings of Walen and William’s (2000) study where the teachers using innovative mathematics curriculum enhanced their knowledge on reform, the prospective teachers had an opportunity to discuss and enhance their knowledge on reform-minded teaching. Throughout the video-case based discussions, prospective teachers reflected on the responsibilities of teachers and students in the new curriculum, and discussed the effective and non-effective parts of the videos with respect to the reform-minded teaching. They also provided suggestions to improve the quality of the lessons in the videos as they became more competent in the new curriculum. Even, one of the participants felt the courage in herself to judge in-service teachers for not adopting the new curriculum, and suggested ways to force them to do so.

The use of cases also contributed that through video case-based discussions, prospective teachers’ noticing with respect to the teacher roles related to *Methodological Perspective* was increased. Especially, the highest increase was seen in the main-issue Pedagogical Content Knowledge. A similar result was found in Barnett and Tyson’s (1999) study. In that study, prospective teachers were able to notice and talk about the use of manipulative in classrooms and how they might help students learn or may cause deficiencies in their learning. To state differently, they started to focus more on student understanding and learning, and how teachers can facilitate it. Thus, I assume that in the present study, the employment of video case-based discussions in teacher education provided prospective teachers with opportunity to improve their pedagogical content knowledge related to reform-minded teaching and learning.

At this point, the fact that prospective teachers increased their pedagogical content knowledge through the video-cased based discussions might be explained with the possibility that they started to perceive themselves as teachers with the use of video-based cases. As they discussed on videos, prospective teachers developed empathy for teacher responsibilities, and their awareness on teacher qualifications improved. This implies that they started to think like an in-service teacher. From here, I might deduce that as they completed all their course work at the university, they started to characterize the ideal teacher in their minds, which eventually affected what they noticed related to teacher and student roles in reform-minded teaching and learning.

5.1.3. Discussion on Noticed Issues related to Student Roles in Reform-Minded Teaching and Learning

As indicated before, another aim of this study was to examine the possible change and/or improvement in prospective teachers' noticing abilities with respect to the student roles in reform-minded teaching and learning when video case-based methodology was employed. Literature indicates that in addition to the teacher roles with respect to the reform-minded teaching, the use of case-based pedagogy also helps teachers notice and discuss student roles. As Masingila and Doerr (2002) indicate, cases allow both prospective and in-service teachers to analyze and reflect on student thinking and on how to facilitate student learning. Via collaborative analysis, teachers can face and develop multiple perspectives on teaching and learning, and "...may learn to more carefully observe and listen to students, and as a result, expand their conceptions of students and how they learn mathematics" (Lloyd, 1999, p. 250). In other words, through the use of cases, they can analyze student-centered teaching (Sowder, 2007).

In the present study, I observed that the prospective teachers noticed and talked about several issues related to student thinking and learning, although the

frequency of their noticing on student roles in reform-minded teaching and learning was lower than that of the teacher roles. As indicated in the results section, related to the main-themes that are *Methodological* and *Attitudinal Perspectives, and Classroom Culture*, the student roles that the prospective teachers noticed most throughout the three interviews were being able to do group work, cooperating with others, fulfilling their responsibilities, learning from each other through communication; being willing and interested in lessons, actively and equally participating in the lessons; being relaxed, and having self confidence; and not interfering with their friends, and being respectful toward their friends. Among these roles, the majority of the participants discussed about “group work” related to *Methodological Perspective*; and “active participation” and “being relaxed” related to *Attitudinal Perspective*. In other words, prospective teachers noticed and discussed more on the importance of group work and learning through cooperation; students’ playing an active role in learning and being enthusiastic about learning mathematics; and students’ being relaxed in their learning environment.

All mentioned student roles above point to the responsibilities of students in the new elementary mathematics curriculum. From here, it might be deduced that the participants did reflect on student roles in reform-minded teaching and learning. More specifically, as they started to do their internships and get involved with students in real classroom environments, they saw the implications of what they have learned so far. They observed and focused on how a group work could be effectively conducted in a lesson, how students’ active participation affected their learning, and how it was important that students were relaxed in a learning environment.

Literature also suggests that through the use of cases in teacher education, it might be possible to help teachers focus on students and their thinking. To give an example, in Star and Strickland’s (2008) study, while at the beginning of the study prospective teachers did not focus on students as they

watched classroom videos, they developed their ability to notice after one semester. In other words, significant changes were found in prospective teachers' ability to notice at the end of the study. Specifically, their ability to notice the features of classroom events, mathematical content, and communication in a classroom was increased. Similarly, van Es and Sherin's (2008) study revealed that in-service teachers' noticing skills were improved at the end of video club sessions. The teachers were more focused on student thinking and be able to interpret classroom interactions in terms of student learning at the end of the study.

In the present study, although I can claim that prospective teachers were able to notice and interpret several issues related to the student roles in reform-minded teaching and learning, it seems difficult to state that their noticing skills improved throughout the interventions as in Star and Strickland (2008) and van Es and Sherin's (2008) studies. In contrast with the study of Star and Strickland (2008), in the present study, prospective teachers were able to focus on some student roles from the beginning, while they started to notice some other roles later in the study. More specifically, some of the roles the prospective teachers noticed at the beginning were not noticed at the end, some noticed only in the middle of the study, and some of them were noticed during the study with either high or low frequencies. Some of the student roles noticed with a decreased frequency was "inquiry" and "group work" in *Methodological Perspective*, and "being respectful" and "expressing themselves" in *Classroom Culture*, although "group work" was the mostly noticed student role in all interviews. In other words, prospective teachers' noticing ability with respect to the student roles showed inconsistencies making it hard to conclude that the participants' noticing ability with respect to student roles improved at the end of the study.

Why prospective teachers in this study had difficulty with focusing on student roles might be explained by the possibility that the participants in the present study were prospective teachers as opposed to in-service teachers. As

stated in van Es and Sherin (2008) via referring to Sherin (2007), in-service teachers already have the skill to interpret classroom events, and what is expected from them is to focus on student ideas. This might explain why the participants in the present study as prospective teachers could not focus on students as much as the in-service teachers in van Es and Sherin's (2008) study.

Another explanation might be that the participants as prospective teachers preferred to focus on teacher roles in the videos since they started to think like a teacher as they were in a period where they took Teaching Methods Courses and did their internships in schools. Moreover, literature indicates that via reflective dialogue on cases, prospective teachers may go through the transition period from being student to becoming a teacher more easily and they can start thinking like a teacher (Jay, 2004). Thus, as I stated before, I infer that through the interviews and online discussions in addition to their other experiences, prospective teachers started to see themselves as teachers as opposed to students, and wanted to focus more on the teachers in the videos in order to be able to observe and analyze issues such as what the teachers in the videos were doing, how they were acting, what kind of decisions they were making to conduct their lessons, and how their instructional moves influenced student understanding.

Another possibility might be that in some of the videos watched, the main actor was generally the teacher. To give an example, in the last video watched and discussed, the teacher was quite dominant in the classroom and the students were be able to play only some certain roles such as listening and answering the teacher's questions. Consequently, during the online discussions on this video and in the interviews, the participants mostly focused on the teacher, and either criticized the teacher or provided alternative suggestions in order to improve the quality of the lesson and student understanding. That is, when the main character in a video is the teacher, participants focus more on the

teacher instead of the students. Thus, it is not surprising to come up with such a result in this study.

5.2. Concluding Comments

As indicated before, case-based pedagogy increasingly receives support in professional education of teachers as an effective way of preparing teachers for the complex teaching environments (Harrington, & Garrison, 1992; Mayo, 2004). Since there are not many stages and occasions for teachers to develop shared cognition abilities, the use of cases in teacher education becomes a useful method (Pressley, 1999) as a way of putting knowledge of teaching into the practice (Butler et al., 2006). In other words, through cases teachers may connect theory into practice (Merseth, 1992; Schrader et al., 2003; Shulman, J., 1992; Van Den Berg & Visscher-Voerman, 2000). In addition to theory-practice connection, it is also effective that through cases teachers can engage in teaching activities as learners (Borko, 2004), and they are expected to prompt discussion and reflection (Arellano et al., 2001; Shulman, L., 1992). Cases also allow both prospective and in-service teachers to analyze and reflect on student thinking and on how to facilitate student learning (Masingila & Doerr, 2002). Furthermore, they provide a context for collaborative teaching and reflection (Arellano et al., 2001).

Literature indicates that the use of cases in teacher education provides a context for prospective teachers, which prepares them for the realities of teaching (Butler et al., 2006; Lundeberg & Levin, 2003; Lundeberg et al., 1999; Powell, 2000; Shulman J., 1992). In other words, case studies are essential components of teaching practice as they reflect characteristics of a real classroom. By analyzing cases, prospective teachers are given the opportunity to understand what happens in a classroom (Lundeberg & Levin, 2003; Lundeberg et al., 1999; Shulman J., 1992). The use of cases in schools of education also frees prospective teachers from the unrealistic and utopian reform ideals, and

gives them opportunities to get to know good practice (Shulman, L., 1992). Additionally, Harrington (1999) states that via cases it might be possible to provide prospective teachers with opportunities to reason about teaching. Cases not only show prospective teachers the complex and contextualized side of teaching, but also provide a common theoretical basis for decision making (Grossman, 1992).

Being consistent with the literature, the findings of this study suggest that online video case discussions may help prospective teachers notice more details of reform-minded classrooms. Through the use of cases, they might see the aspects of reform-minded teaching and learning in the videos, analyze and discuss them, and broaden their perspectives with respect to the new elementary mathematics curriculum. Also, they might learn to connect their theoretical knowledge to practice. As they discuss the video cases, they can use what they learned during their teacher education program while analyzing a practical situation from a real classroom.

It was anticipated at the beginning of the study that it would be hard for the prospective teachers to realize and discuss all of the teacher and students roles with the classroom culture and teaching and learning environment underlined in the new curriculum. However, it was also expected to see that at the end of the study prospective teachers could notice most of the aspects of the new curriculum and internalize the vision of the curriculum. As expected, the results of this study revealed that the participants noticed more issues related to teacher and student roles in reform-minded teaching and learning throughout the process.

Additionally, in this study it was expected to see some development in the analytic skills and point of views of the prospective teachers. As Wolf, Bixby, Glenn, and Gardner (1991) claimed, during a case discussion if only students develop a point of view instead of simply summarizing the situations,

then they can learn from case discussions (cited in Lundeberg et al., 1999). The results of this study suggest that while the prospective teachers were mostly describing and summarizing the situations in the videos at the beginning of the study, their focus and noticing changed throughout the video-case based discussions, and they started to develop new points of views with respect to the new curriculum.

During the online discussions, prospective teachers were informed that the aim of the video-case based discussions was not looking for a right answer, but developing new ways of thinking as suggested by Merseth (1992). Thus, they started to focus on and notice more issues in terms of teacher and student roles in reform-minded teaching and learning, and learned to interpret classroom interactions in the videos. As van Es and Sherin (2002) suggest, taking an interpretive stance is an important skill that teachers should have in addition to the noticing skill, and as seen from the vignettes provided in the results section, I can conclude that video-case based discussions helped prospective teachers gain such skills. When it is taken into account that "...these are requisite skills that reformers have in mind..." (van Es & Sherin, 2002), it can be inferred that this study contributed to prospective teachers' learning in terms of both teacher and student roles in the new elementary mathematics curriculum.

Finally, an important issue to underline is related to the content and quality of the cases. Shulman (1992) states that cases should be images of real teaching with real consequences, and should not be boring written materials or compulsory assignments to read, but should be in a position that necessitates extra readings. In the present study, I observed that prospective teachers felt the need to do extra readings, and shared what they learned during the discussions. More specifically, they felt the need to examine the teacher guide book, the new curriculum, and other books, and also searched the internet. The messages they shared during the online discussions reveal how they made use of such sources.

Additionally, they connected the issues in the videos to their own learning, and shared their stories to explain their thinking more clearly. These observations might indicate that they were reasoning throughout the video case-based discussions.

In sum, I can conclude that online video case discussions would be an effective way to provide prospective teachers with opportunities to understand the teaching and learning environment required in the new curriculum and to get ready for the challenges of real classrooms. As Walen and Williams (2000) state, "...case methodology is a powerful tool to support teachers in a time of reform" (p. 22). Then, providing prospective teachers opportunities during their teacher education with reasoning and reflecting, building theory into practice, developing critical thinking and getting ready for the complexities of real practice through cases might increase the influence of teacher education on their reform-minded teaching practices.

5.3. Implications of the Findings

This study has several implications for teacher educators. As explained in the discussion part of this chapter, there was an increase in prospective teachers' noticing skills with respect to the teacher and student roles in the reform-minded teaching and learning after engaging in video-case based discussions. As there were not many opportunities for prospective teachers to connect their theoretical knowledge to the practice, and it was the period for them to do their internships in real classrooms; prospective teachers started to see themselves as teachers in their last year in the teacher education program. In addition to the internship experience, as they watched mathematics videos from real classrooms for a semester long, prospective teachers had a chance to improve their noticing skills. They had the environment to connect what they learned theoretically to what they see and experience both during the internship and in the videos. Thus, their awareness on teacher and student roles with respect to the new elementary

mathematics curriculum was improved. From this point, I can deduce that experiences such as video-case based discussions for prospective teachers to build a connection between theory and practice should be provided in all periods of teacher education programs. As Baran E. (2006) suggests in her study on the use of video cases in teacher education, video-case based instruction have positive effect on prospective teachers' ability to connect their theoretical and practical knowledge.

Another implication of this study is that the use of video cases in teacher education has the potential to prepare prospective teachers for reform-minded teaching. Baran E. (2006) states that in order to provide prospective teachers with opportunities to build their own knowledge as highlighted in the new curriculum, analyze teaching situations, and experience new methods of teaching; teacher education programs should include new methods such as video-case based instruction. The results of the present study also revealed that the participants noticed more issues related to teacher and student roles in reform-minded teaching throughout the process. I believe that this experience would help them when they enter the teaching profession.

I believe that in addition to enhancing their knowledge on teacher responsibilities in the new elementary curriculum, prospective teachers may also learn to focus on student responsibilities and roles in reform-minded learning. As van Es and Sherin (2002) claim, they can learn to look "...at a teaching situation for the purpose of understanding what happened, what students think about the subject matter, or how a teacher move influenced student thinking..." (p. 575) after they get engaged in video-case based discussions. In other words, use of cases let teachers learn to notice aspects of reform pedagogy that is called *professional vision for reform teaching* (van Es & Sherin, 2008, p. 244). From this point, although the results of the present study did not point a constant improvement in focusing on student roles, I can still deduce that prospective

teachers could learn to notice and focus more on student roles as they engage more in video-case based discussions.

With respect to the prospective teachers' learning related to the new elementary mathematics curriculum, as Borko et al. (2004) state, "when the situations of teacher education share conceptions of teacher learning and a vision of reformed practice, teacher education does make a difference in preparing reform-oriented educators to join the profession" (p. 204). In other words, when teacher educators use cases in teacher education, it might be possible to educate future teachers who are able to teach in line with the new elementary mathematics curriculum.

As seen in the results section, prospective teachers' noticing with respect to the pedagogical content knowledge of teachers developed with the use of cases in teacher education. As stated before, prospective teachers started to focus more on sub-issues related to PCK such as facilitation, reasoning, student-centeredness, and student understanding. The increase in the percentages in their noticing points that while prospective teachers had knowledge on PCK at the beginning, they started to notice and felt the need to talk more on such issues as the discussions took place over time. From this point, I can deduce that prospective teachers want and need to focus more on PCK during their teacher education period. Thus, teacher educators are suggested to create such environments for prospective teachers to enhance their knowledge on teachers' pedagogical content knowledge, and the use of video cases is offered as an effective way of doing that.

When it is taken into account that traditional preparation of teachers is not answering the problems of teaching profession and they are not preparing teachers for the realities of classrooms (Shulman, J., 1992), it can be anticipated why the use of cases in teacher education is crucial. As stated in the literature review section, satisfying the expectations and overcoming the challenges require an improvement on the side of teacher education programs. Then,

through teacher education programs, it should be aimed to give teachers chances to increase their professional knowledge and reasoned decision making abilities. If teacher education programs are expected to model teaching, help teachers develop their identities, develop pedagogical knowledge, and provide multiple perspectives (Borko et al., 2000), then this study shows how the employment of video-case based discussions prepare future teachers for the teaching profession. Thus, teacher educators are suggested to employ case-based pedagogy in their teacher education programs.

It should also be taken into account that it is expected from a teacher education program to give teachers opportunities to notice, interpret, and use those interpretations for pedagogical decisions. From this point, if video-case based discussions are conducted from the first to the last year of teacher education programs, then prospective teachers' awareness on teacher and student responsibilities in reform-minded teaching and learning might be maximized. If policy makers take into the account that the use of cases in teacher education offers new ways of learning for prospective teachers, and teacher educators either open new courses employing video-based cases or embed them in their existent courses, then prospective teachers' knowledge on reform-minded teaching and learning could enhance. Especially, when prospective teachers are provided with such courses in the period that they do their internships in real classrooms, I believe that they could have chances to reason from the video cases to their observations in internship schools and create a knowledge base out of those cases which eventually may lead them to learn important points on effective teaching (Jay, 2004). Through such experiences, they can understand what happens in a classroom (Lundeberg & Levin, 2003; Lundeberg et al., 1999; Shulman J., 1992), and get prepared for the realities of teaching (Butler et al., 2006). To state differently, through the discussions around cases, prospective teachers can construct and discover new knowledge, improve their awareness, and gain different perspectives (Barnett & Tyson, 1999). Thus, to enrich the

effectiveness of the courses such as Teaching Methods Courses and internship experiences, I believe that the employment of video-case based discussions would be very beneficial.

Additionally, as I mentioned above, through reasoning from one case to another, and creating a knowledge base out of the cases, prospective teachers can learn important points on effective teaching (Jay, 2004). From this point, I can deduce that building a case-library through constructing video-based cases in real mathematics classrooms might be useful in teacher education. More specifically, such a library could be used for several purposes in the faculties of education in order to raise more quality teachers.

In conclusion, prospective teachers need opportunities to connect their theoretical and practical knowledge; discuss issues related to teachers' pedagogical content knowledge; and learn about the new elementary mathematics curriculum, and the teacher and student roles in reform-minded teaching and learning. Therefore, teacher education programs should provide them such opportunities through employing new methods of teaching such as video-case based discussions.

5.4. Limitations and Recommendations

The aim of this study was to examine the possible change and/or improvement in prospective teachers' noticing abilities with respect to the teacher and student roles in reform-minded teaching and learning when video case-based methodology was employed. The findings of this study revealed that prospective teachers' noticing ability improved in several aspects throughout the video-case based discussions, indicating the possible contribution of the study to the literature.

In addition to its contributions, this study has also some limitations. First, this study was conducted at METU with prospective teachers who were in their last year of teacher education program. Although it is not the aim of this study to

reach a generalization as a qualitative study, conducting similar studies in different settings might shed light on how the use of cases in teacher education is effective in different contexts. Conducting similar studies employing the use of cases in teacher education might be helpful in understanding the possible contribution of the cases on teacher development. Therefore, replicating this study with different prospective teachers from other universities might be helpful in understanding the role of the use of video cases and online discussions in teacher education. Such studies might suggest new ways of teacher preparation for the teacher educators.

Another point to underline is that this study is limited with the discussions around the videos selected and watched during the study. In other words, the discussions could have been different with different video cases, and thus the content of the videos matters in this respect. Although the participants in this study were provided with several videos with different mathematics contents from different grade levels, it could be examined what the participants notice and focus on when they watch videos from different classrooms. For instance, they might be asked to watch videos from different grade levels such as 8th grade videos which were not available in the present study.

Another limitation is that, as indicated before, METU online forum was used for the online discussions. Although it was an effective space for the participants to make discussions around cases, prospective teachers sometimes had difficulties with using it. The problems they experienced during the discussions were losing what they wrote before submitting it, getting confused with the sequence of the messages and not being able to follow the flow of the discussions, and occasionally not being able to have access to the forum when it was under construction. To reduce the effects of these limitations, I made explanations on the use of online forum both at the beginning of and during the study, and I checked the online forum in a daily routine and informed the officers to fix the problem. In other words, while there were some problems

experienced with METU online forum, they were mostly overcome with small explanations and with little notifications. While it is not expected that the drawbacks in the METU online discussion forum negatively influenced the flow of the discussions, it is recommended that similar studies could be conducted in different and more user-friendly online forum settings.

It should also be underlined that during the last/exit interview, the participants were asked to answer more questions compared to the first and second interviews. Considering the fact that during the first interviews prospective teachers did not have much experience to share and thus it was difficult to see the changes on their noticing skills, the number of the questions raised was lower than that of the other two interviews. Incrementally, prospective teachers were asked to answer more questions from the first to the last interview. As they started to do their internships, and watched and discuss more videos, the interview questions were extended. On the other hand, it should also be taken into account that all the questions raised throughout the three interviews were similar in terms of their content. In other words, the aim of all these interviews was to understand the change/improvement on participants' noticing skills with respect to reform-minded teaching. Thus, it is assumed that there was no bias across the interviews.

Another limitation in this study to underline is that the online video case-based discussions were conducted with a whole class of senior prospective teachers (45 participants), but only the data gathered from the focus participants (15 participants) were analyzed. In order to effectively keep track of the online discussions, the focus participants were selected from different discussion groups which might make it hard to follow the entire flow of the discussions. However, what I analyzed in this study was not the interaction between the participants and how they reacted to each other, but how they discussed around the cases in an online environment. Thus, I do not expect that studying only the data from the focus participants negatively affected the findings of the study.

Additionally, since prospective teachers' noticing was mirrored in their interviews and in their reflection papers, such triangulation allowed me to follow the entire flow of the discussions. Still, similar studies might be conducted with different groups in different contexts, and with the analysis of the whole discussion group in a smaller context, it might be possible to examine what prospective teachers notice and discuss with respect to the reform-minded teaching and learning.

Another limitation is that, during the analysis period, except from the teacher and student roles, other issues related to reform-minded teaching and learning were ignored as they were out of the scope of this study. Instead, the coding categories developed by van Es and Sherin (2002) might be employed to analyze the data for changes in teachers' analyses. More specifically, for the analysis of data, the dimensions van Es and Sherin (2002) suggested that are *Actor*, *Topic*, *Stance*, *Specificity*, and *Video-Focus* might be used to get a richer information on how teachers' noticing changes over time (detailed information on these dimensions can be found in the method section). Thus, it is recommended that researchers could conduct studies to examine other issues related to the reform-minded teaching and learning.

Another point to underline is that in order to make participants in video-case based instruction notice and focus more on students and on their thinking, it should be taken into account that the contents of the videos influence and direct the flow of the discussions, and what the participants focus on and notice with respect to the reform-minded teaching and learning. Thus, a special consideration should be given to the contexts in the selected videos. Additionally, in order to make prospective teachers notice more on student roles as opposed to teacher roles, special consideration should be given to the content of the discussions and on how to moderate them.

An important recommendation to provide at the end of this study is related to the influence of the use of cases in teachers' practices. As stated in the

discussion part, prospective teachers were going to internship schools as they were engaged in video case-based discussions which might have an influence on what they got from the discussions. Beyond that, it should be further studied what they notice and focus on when they become in-service teachers. Such a follow-up study might provide more information on the effectiveness of the use of cases in teacher education. As in van Es and Sherin's (2010) and Masingila and Doerr's (2002) studies, the influence of the video case-based discussions on teachers' practices can be examined to understand how cases guide teachers' instructional practices and how they change their instruction according to the reform-minded teaching and learning. Thus, it is highly recommended that the relation between video case-based discussions and teachers' instructional practices is further studied.

It should also be studied whether prospective teachers start to focus more on student thinking when they enter the profession. To state differently, a follow-up study might be useful to understand whether and/or how their noticing shifts from teacher to the students. As stated before, in van Es and Sherin's (2008) study, the participants were in-service teachers and they were successful at focusing on student thinking where the participants in the present study as prospective teachers were more focused on teacher roles. Thus, following prospective teachers when they start teaching might be useful to understand how their noticing changes. It should also be studied whether they focus on the same teacher roles when they enter the profession as they get more experience.

In conclusion, I suggest that the use of case-based pedagogy in teacher education might be an effective way to prepare future teachers for their teaching career. Through employing effective video-case based discussions in teacher education, it might be possible to make prospective teachers notice and focus on the important and desired features of the videos (Star & Strickland, 2008); and thus helping prospective teachers with reflecting and discussing on teacher and

student roles in reform-minded teaching and learning might contribute to their success in future.

THE END

Finally comes the end. It was a long and hard journey, but enjoyable at the same time. I guess I achieved what I wanted. At the end of online video-case based discussions, I saw that prospective teachers learned what to notice and how to interpret classroom situations. They were able to discuss videos from real mathematics classrooms in terms of teacher and student roles in reform-minded teaching and learning. It was a great experience for me to hear that they left with something at the end of this study. Most of the participants shared that watching and analyzing real mathematics classrooms was very useful for their future teaching career. They felt ready to teach in line with the new elementary mathematics curriculum and lucky to be a part of this experience. Coming close to the end of their teacher education, they shared that they finally started to feel like a teacher. Taking Teaching Mathematics Method course, doing internship in real classrooms, and also taking a part in this study at the same time helped them think like a teacher. I observed that they were enthusiastic to start teaching. I hope they are teaching somewhere now and raising beautiful children.

My plans for the future are the same. I will use video cases to educate teachers in my future career as a teacher educator. I want prospective teachers to have chances to observe and analyze several real mathematics classroom videos before entering the profession. I will also focus more on the issues (such as teachers' pedagogical content knowledge) noticed more by the prospective teachers when I employ video-case based pedagogy in my courses. I am also thinking on how to make this experience more effective. I know it is not easy to make prospective teachers notice more on student thinking and understanding instead of merely focusing on teacher moves in the videos. It is quite understandable to see them reflect on teacher roles because they are not yet teachers. Their main concern is how to be able to teach. Still, I believe that

through directing them to student thinking in selected scenes in the video cases, I can guide them to the way I hope.

My suggestions for teacher educators might be to employ case-based pedagogy on their courses, especially in teaching practice courses; select videos leading discussions on student thinking; and to raise specific questions related to teacher and student roles in reform-minded teaching, and student understanding during the online discussions. That way I believe they may achieve the goals of effective teacher education. I hope my research study somehow plays a role in helping teacher educators raise more qualified teachers...

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APPENDIX A

A.1. Focus Participant Interviews

A.1.1. First Interview

1. Birlikte bir video izledik ve çevrimiçi ortamda tartışmalar yaptık. Videoyu izledikten hemen sonra yazdığın yansıtıcı görüşler de burada. Şimdi senden detaylı bilgiler almak istiyorum. Yansıtıcı görüşlerde yazdıklarını da göz önüne alarak çevrimiçi tartışma sonrası video ile ilgili görüşlerinde değişiklik oldu mu? Şimdi eklemek istediğin görüşlerin var mı? Neler?

2. Video izleme, yansıtıcı görüş yazma ve özellikle de çevrimiçi tartışma süreci sonunda videodaki öğretmenin rolleri hakkında neler düşünüyorsun, neler söyleyebilirsin? Videodan spesifik örnekler verebilir misin? (metot açısından, konu açısından, yeni programa uyum açısından, ders işleyişi açısından vs.).

3. Tartışmalar sonrası videodaki öğrenci rolleri hakkında neler düşünüyorsun, neler söyleyebilirsin? Videodan spesifik örnek verir misin?

4. Tartışmalar sonrası videodaki sınıf kültürü hakkında neler düşünüyorsun, neler söyleyebilirsin? Videodan spesifik örnek verir misin?

5. Hazır rollerden bahsetmişken, reforma dair bilgilerine, tecrübelerine ve okumalarına dayanarak söyleyebilir misin sence video reform tabanlı mıydı? Hangi açılardan? (öğretmen rolü, öğrenci rolü, sınıf kültürü anlamında).

6. Eklemek istediđin herhangi bir Őey var mı? (öđretmen ve öđrenci rolleri ile sınıf kúltürü ađısından). Çevrimiçi tartiřmalar sırasında tartiřmak isteyip de tartiřamadıđın herhangi bir konu oldu mu? Neler?

A.1.2. Second Interview

1. Birlikte üç adet video izledik ve çevrimiçi ortamda tartışmalar yaptık. Videoları izledikten hemen sonra yazdığın yazılı yansıtıcı görüşler de burada. Şimdi senden detaylı bilgiler almak istiyorum. Yazılı yansıtıcı görüşlerde yazdıklarımı da göz önüne alarak çevrimiçi tartışmalar sonrası videolarda fark ettiğin noktalarda değişiklik oldu mu? Şimdi eklemek istediğin görüşlerin var mı? Neler?

2. Video izleme, yazılı yansıtıcı görüş yazma ve özellikle de çevrimiçi tartışma süreci sonunda videolardaki öğretmen rolleri hakkında neler düşünüyorsun, neler söyleyebilirsin? Videolardan örnekler verebilir misin? (metot açısından, konu açısından, yeni programa uyum açısından, ders işleyişi açısından vs.).

3. Tartışmalar sonrası videolardaki öğrenci rolleri hakkında neler düşünüyorsun, neler söyleyebilirsin? Videolardan örnek verir misin?

4. Tartışmalar sonrası videolardaki sınıf kültürü hakkında neler düşünüyorsun, neler söyleyebilirsin? Videodan örnek verir misin?

5. Hazır rollerden bahsetmişken, reforma dair bilgilerine, tecrübelerine ve okumalarına dayanarak söyleyebilir misin sence izlediğimiz videolar hangi açılardan reform tabanlıydı, hangi açılardan değildi? (öğretmen rolü, öğrenci rolü, sınıf kültürü açısından).

6. Eklemek istediğin herhangi bir şey var mı? Çevrimiçi tartışmalar sırasında tartışmak isteyip de tartışmadığın herhangi bir konu oldu mu? Neler?

7. Sence bu video izleme, videodan hemen sonra sınıfta yazılı olarak yorumlarını yazma ve çevrimiçi tartışmalar sana bir öğretmen olarak ne kazandırdı?

8. Bir süredir staja gidiyorsun ve gözlem yapma fırsatı yakalıyorsun. Yani bir nevi sınıfta izlediğimiz videolara benzer şekilde gerçek bir sınıfta gözlemliyorsun. Peki, arkadaşlarıyla yaptığınız çevrimiçi tartışmalarda ürettiğiniz fikirleri gözlemlerinde ne derece kullanıyorsun?

A.1.3. Third Interview

1. Sizce bu videoları izlemenizin ve forumda tartışmamızın amaçları nelerdi?
2. Sınıf içinde videoları izledikten sonra yazdıklarınız;
 - a. Kişisel olarak videolarda fark ettiğiniz veya üzerinde çokça durduğunuz başlıca noktalar nelerdi?
 - b. Sizce videolarda fark ettiğiniz noktalar zaman içinde değişim gösterdi mi? Nasıl? İlk videoda farkettiğiniz noktalarla son videoları karşılaştırdığınızda neler söyleyebilirsiniz? Örneklerle açıklayınız.
3. Aslıhan Hoca'nızın ve sizlerin birbirinize yönelttiğiniz sorular tartışmaların akışını nasıl etkiledi?
4. Bu süreç sonunda videolardaki öğretmen ve öğrenci rolleri ile sınıf kültürü üzerine neler söyleyebilirsiniz? Videolardan örnekler vererek cevaplandırınız.
5. Sizce izlediğimiz videolar hangi açılardan reform tabanlıydı, hangi açılardan değildi? Videolardan örnekler vererek cevaplayınız.
6. Sizce tartışılması gerektiğini düşündüğünüz ama üzerinde durulmayan noktalar oldu mu? Neler?
7. Kazanımlar;
 - a. Video tartışmalarının staj gözlemlerinize ne gibi etkileri oldu?
 - b. Örnek olay tartışmalarının mesleki gelişiminize ve gelecekteki öğretmenlik yaşantılarınıza katkıları nelerdir? Örneklerle açıklayınız.
 - c. Bu tecrübe matematik öğretimi ve öğrenimine bakış açınızı ne yönde etkiledi?
 - d. Bu tecrübenin öğrencilere yaklaşımınızda herhangi bir farklılık yaratacağını düşünüyor musunuz? Nasıl?

8. Yeni program;

Örnek olay tartışmaları yeni programı etkili olarak uygulayabilmeniz konusunda size ne ölçüde yardımcı olur? Örneklerle açıklayınız.

A.1.4. Initial Coding Categories

Interview1	Interview2	Interview3
*****Student Roles*****	*****Student Roles*****	*****Student Roles*****
<p>Frekans: 10</p> <p>Actor students-istekli olma</p> <p>Actor students-aktif olma</p> <p>Actor students-istekli, heyecanlı, hevesli olma</p> <p>Actor std-gayretli, istekli olma</p> <p>Stds-aktif, dersle ilgili, aktiviteyle ilgili, derse yönelmiş</p> <p>Stds-motive olduktan sonra dersi gotururler, motivasyonun onemi</p> <p>std role, beklentiler-aktif, istekli olma</p> <p>std role-aktif katilim</p> <p>std role-derste, grp calismasinda aktif olma, katilma, isteyerek, eglenerek derse katilim</p> <p>std role-derse katilim</p> <p>std roles-aktiviteye katilim, soz alma, istekli ve hevesli olma</p>	<p>Frekans: 7</p> <p>Actor students-aktif ve istekli olma</p> <p>std role-ugrasma, ilgili olma</p> <p>actor stds-aktif olmama</p> <p>std roles-aktif katilim</p> <p>actor stds-derse katilma istegi</p> <p>actor stds-derse katildikca ilgilerinin artmasi, aktif olma</p> <p>actor stds-istekli olma, derse katilma</p> <p>actor stds-gonullu olma, katilma</p>	<p>Frekans: 10</p> <p>Actor students-aktif olma</p> <p>Actor students-aktif olma</p> <p>Actor stds-heyecanlı olma</p> <p>Actor stds-istekli ve ilgili olma, dersi sevme</p> <p>Actor students-aktif olma</p> <p>Actor std-heyecanlı, istekli ve ilgili olma (ogretmeni motive eder)</p> <p>std roles-derse katilma</p> <p>topic-stds derse katilimin yogunlugu, sasirtici</p> <p>actor stds-derse katilim</p> <p>actor stds-pasif olduklarinda matematikten nefret etme</p> <p>actor stds-aktif olma, parmak kaldirma, kendilerini ifade etme</p> <p>actor stds-teacher sayesinde istekli olma, teacher beklentileri heveslerini artırir</p> <p>stds roles-ilgili olma, hevesli, potansiyeli olan stds</p> <p>actor stds-sinif mevcuduna ragmen gayretli olma</p> <p>actor stds-derle ilgilenmeyen stds</p> <p>actor std-tahtaya kalkan cocugun hevesi</p>
<p>Frekans: 5</p> <p>Actor students-student learning, asking for evidence</p> <p>Actor students-student learning</p> <p>actor stds-gorek kendileri ogrenme, kendileri yaparak kalici ogrenme</p> <p>actor stds-yaparak ogrenme, kalici ogrenme</p> <p>std role-kendisinin birseyler bulmasi</p>	<p>Frekans: 1</p> <p>actor std- topic std learning</p>	<p>Frekans: 2</p> <p>actor stds-kendi cozumunu gelistirme</p> <p>actor stds-kendisi bulma, kendi yontemini gelistirme</p>

Frekans: 2 actor stds-ezberleme actor std-kendini rahat hissetmeme, ezberle yönelme	Frekans: 2 Actor students-ezberlemeyen, sorgulayan Actor stds-ezberci olmaları teacher hevesini kiriyor	Frekans: 2 Stds beklentiler-tartisabilme actor stds-ezberle çizim yapma
		Frekans:1 Actor stds-yanlis ogrenirse oyle kalir
	Frekans:1 Actor students-dusunen	
	Frekans:2 std role-soru sorma actor stds-nedenini merak etme, ogretmene sorma	Frekans:7 Actor students-soru soran Std role-anlamadiklari yerlerde soru sorma actor stds-ogretmene ragmen yine de soru sorabilme std role-anlamadiginda sorabilme std role-soru sorma actor std-sorusuna cevap alamama, topic-sorusuna cevap alamayan std daha az soru sorar, actor stds-sorularina cevap alamadiklarinda bile soru sormaktan bikmama, teacher azarlarına ragmen soz isteme, tahtaya kalkma, cabalama actor stds-sert ogretmene soru sorabilme stads role-soru sormak, sorgulamak, sacma sorular sormamak
	Frekans:1 Actor students-sorumluluklarini yerine getiren	Frekans:1 Actor students-sorumluluklarini yerine getiren
Frekans:3 Actor students-no confidence actor stds-cesur, rahat actor stds-rahata olma	Frekans:2 std role-cekingen olmama, yanlis yapmaktan korkmama, rahat olma topic-stds kendini rahat hissetmesinin gerekliligi, stads ogretmene rahat soru sorabilme, arkadasiyla konusur gibi konusabilme	Frekans:4 actor stds-sinifta rahat olamama, korku topic-stds sinifta rahat olma, ogrendiklerinin farkinda olma, soru sorabilme topic-stds rahat soru sorabilme actor std-panik olmasi
Frekans:2 Actor stds-materyal kullanma actor stds-materyalle gorerek anlayabilme	Frekans:1 actor stds-materyal kullanmaya, kesfetmeye alisik olmama	Frekans:1 actor stds-manipulative kullanma

Frekans:1 Actor stds-farkli dunyasi olma	Frekans:1 Actor stds-cok farkli dusunebilme, farkli algilayabilme, genis hayal gucu	Frekans:1 Actor stds-farkli dusunebilen
		Frekans:1 Actor stds-sonucta hepsi cocuk (no matter kimlik, cevre)
	Frekans:5 Actor stds-algilayabilme, yonergeleri anlayabilme actor stds-feedbackten yararlanamama std role-teacher yonlendirmelerinden yararlanma actor stds-ogretmenin ne istedigini anlayamadiklarindan eksik yapma, soruyu anlamama, ogretmen hatasi actor stds-aktiviteyi yapabilmek icin once anlama gerekliligi actor stds-ne yapacagini bilememe, etkinligi anlamama	Frekans:1 topic actor stds-etkinlige baslamadan anlamalilar ki duzgun yapabilsinler
	Frekans:1 Actor stds-yaparak yasayarak ogrenme	
		Frekans:2 Actor stds-saygili olma std roles-teacher a saygili olma
	Frekans:1 stds role-sorulara cevap verme	Frekans:2 Actor stds-derse katilma, sorulara cevap verme std role-dersi dinler, takip eder
Frekans:2 std role-ogretmenin dediklerini yapma actor std-istenileni yapma		
	Frekans:1 actor stds-konuya yogunlasabilme, konunun stds icin uygunlugu	
Frekans:1 std role-kesfetme	Frekans:1 actor stds-kesfederek ogrenme	Frekans:1 actor stds-materyalle kesfetmeli
Frekans:3 actor stds-grp calismasindaki rolleri stds role-grup calismasinda aktif olma, grp calismasi	Frekans:1 stds elestiri-grp worku basaramama, bireysel öne cikma cabasi	

yapabilme actor stds-grp workte esit katilmama stds role-grp work yapabilme		
Frekans:1 actor stds-rollerini gerceklestirme		
Frekans:1 std role-nedenleriyle aciklama	Frekans:1 Std role-anlama, mantigini aciklama	Frekans:1 actor stds-nasil cevap veriyor, nedenini acikliyor mu
Frekans:2 std role-grp workte birbiriyle iletisim kurma, birbirinden ogrenme actor stds-birbirinden ogrenme		
Frekans:1 actor stds-bazi kavramlar korkutuyor (formul, kural)		Frekans:1 topic-matematik zorlugu, korkusu
Frekans:1 teacher role-derse hazirlikli gelme		Frekans:2 std roles-derse hazirlikli gelme, odevleri yapma, dersi dinleme actor stds-derse hazirlikli gelme
Frekans:1 actor stds-kendi hayatlarindan ornekler verme		
		Frekans:1 actor std-surekli ogretmene sorma, cevabi isteme
		Frekans:1 actor stds-ogretmenden korkmus, konusamayan, bastirilmis
Frekans:1 actor stds-dikkatli olma		
		Frekans:1 std role-soz alma
Frekans:1 topic-stds bilgiyi insa etme	Frekans:1 std role-bilgiyi kendi insa etme, bilgiye kendisi ulasma, deneme, genelleme	Frekans:2 actor std-kendi bilgisini insa etme topic-stds kendileri ogrenmeli, temeli olusturmali

	Frekans:1 actor stds-etkinlikle kalici ogrenme	
		Frekans:1 actor stds-oyunarak, eglenerek ogrenme
Frekans:1 actor stds-writing ile kalici ogrenme, writing ile kendini rahat ifade etme, std std interaction		
Frekans:1 actor stds-dersin amaci ogrenmekten cok kendilerini gosterme		
	Frekans:2 std role-dersi anlamaya calisma stds role-bilgilerini kullanarak sorulari cozmeye calisma	Frekans:1 actor stds-anlamadiklarinda psikolojileri
	Frekans:1 std role-anlamaya istekli actor stds-seviyeleri iyi, konuyu anliyor, gunluk hayat ornekleri veriyor	
		Frekans:1 actor stds-teacher tepkilerine verdikleri yanit
Frekans:1 actor stds-ogretmenden guleryuz bekleme		
Frekans:1 actor stds-kalabaliga ragmen iyi davranis		
Frekans:1 actor stds-konuyu bilenler ve hakim olmayan sessizler actor stds-konuya hakim stds kolayca soz alir		
Frekans:1 Topic stds- bir sonraki asamayi dusunurken oncekini kacirma		
Frekans:1 actor stds-baskin ogrenciler, dogru cevaplarin aslinda hep baskin stds dan gelmesi		

Frekans:1 actor stds-tahtadaki ogrenciye firsat vermeme, mudahale etme, ogretmene sitem		
Frekans:1 actor std-ogretmenin gozunde en iyi olma cabasi, rekabet		
Frekans:1 actor stds-etkinlik yaparken heyecanlı olma, konuşma, bagirma istegi , topic-etkinlik calismalari std roles	Frekans:1 topic-ogrencilerin etkinlik kurallarini bilmeleri	
Frekans:1 actor stds-dertlerini anlatabilme (kendini ifade)		
	Frekans:1 std role-birbirine saygili, birbirini dinleyen	
		Frekans:1 actor stds-konuya dahil olma, senaryoyu kendileri yazma
	Frekans:1 actor stds-dagilmaya yatkın	
		Frekans:1 actor stds-birbirleriyle etkilesime girememe std role-etkilesimde olma
		Frekans:2 actor stds-iliski kurarak ogrenme actor stds-onceki bilgileriyle iliskilendirme, akil yurutme
	Frekans:1 std role-sorgulama, dusunme	Frekans:1 stds role-sorgulama, nedenini arama, arastırma
	Frekans:1 Actor std-stds sorumluluklari	Frekans:1 actor stds-std rolleri onemli
	Frekans:1 actor stds-sessiz ve gonullu olma actor stds-gonullu olma	

		Frekans:1 actor stds-tahmin yapamama, stds zorluklar
		Frekans:1 actor stds-firsat verildiginde yapabilme
		Frekans:1 actor stds-temel seyleri bilmeme
*****Teacher Roles*****		
Frekans:1 Actor teacher-sense of humour		
	Frekans:1 Actor teacher-yaratıcı	
Frekans:4 Actor teacher-ogrenciyi yonlendiren topic-facilitating std learning teacher roles-soru secimi, cevabi vermeme, std fikirlerini alma, yonlendirme teacher role-direkt formulu vermeme, stds a aciklatma teacher role-stds a dusundurucu sorular sorma	Frekans:6 Actor teacher-facilitation teacher role-feedbacklerle stds yonlendirme, tikandiklarinda ipucu vererek yonlendirme teacher role-stds i aktif katilim ve mantigini kavramaya yonlendirme teacher role-ipuclariyla yonlendirme teacher role-yol gosterme, ornek verme teacher role-formul vermeme, ezber ogretmeme	Frekans:10 Actor teacher-facilitation Actor teacher-zekalarini matematige yonlendirme Actor teacher-facilitator Actor teacher-facilitation elestiri Actor teacher-ogrenciyi yonlendirme, facilitator, yonlendirme, rehberlik genis anlamda teacher role-direkt cevabi vermeme, sorularla stds i dusunmeye sevkete, stds a cikarim yaptirma, mudahale etmeme, yonlendirme, yonlendiren, kolaylastiran topic-formul vermek kolay, ogretmen zor teacher role-ornekle gosterim, yonlendirici teacher role-stds yonlendirme, kesfetmelerini saglama, dusundurma, stds a buldurma topic-stds a buldurtmak direkt soylemekten etkili teacher roles-kesfettirici olma, yonlendirme, direkt cevabi vermeme, stds dan cevabi bekleme teacher role-rehber olma, bilgi kaynagi olmaktan kacinma, stds kesfetmesine yordimci olma teacher role-direkt cevabi vermeme, sorularla stds a buldurma

<p>Frekans:3 Actor teacher-clear expectations Actor teacher-acik ifade, dogru terim kullanma Actor teacher-clear yonergeler, explanations</p>	<p>Frekans:5 Actor teacher-clear expectations Actor teacher-clear expectations, yonergeler Actor teacher-dogru, acik, anlasilir ifadeler kullanma topic-teacher ifadeler, uzun dusuk cumleleri stds anlamayabilir topic-teacher yanlis ifadeler stds kafasini karistirabilir</p>	
<p>Frekans:4 Actor teacher-guven asilama Actor teacher-ogrencide self confidence olusturma Actor teacher-guven asilama Actor teacher-ogrencinin sunum yetenegini gelistirme Actor teacher-ogrencide ozguven gelistirme</p>	<p>Frekans:1 Actor teacher-ogrencide ozguven gelistirme</p>	
<p>Frekans:2 Actor teacher -gunluk hayatla iliskilendirmeler teacher role-gercek hayatla baglanti sorulari</p>	<p>Frekans:4 Actor teacher-connecting with real life and other math Actor teacher-connecting with real life Actor teacher -gunluk hayatla iliskilendirme topic-gunluk hayatla iliskilendirme, anlatilanlarin mantikli gelmesi, mantikli gelen sey kolay ogrenilir, akilda kalir</p>	<p>Frekans:5 Actor teacher-gunluk hayatla iliskilendirmeler teacher role-gunluk hayatla iliskilendirme, oyun oynatma, stds derse katma teacher role-gunluk hayat ornegiyle derse baslama topic-gercek hayatla iliskilendirerek ogretme, stds dahil etme teacher role-gunluk hayat ornekleri verme, konuyla baglanti kurdurma</p>
<p>Frekans:5 Actor teacher-ogrencilerle iliskileri Actor teacher-ogrencilerle iliskileri teacher std iliskisi-ogrenciye saygi topic-teacher std iliskisi topic-teacher stds iliski elestiri</p>	<p>Frekans:4 Ogrencilere yaklasim fark edilen nokta-ogretmen nasil davranmali teacher role-tavrin stds i etkilemesi, mesafeyi koruma ama samimi olma teacher stds iliskileri, elestiri teacher role-stds ile iletisimin önemi actor stds-teacher olumlu yaklasimi ile derse katilmak istemeleri</p>	<p>Frekans:7 Actor teacher-ogrencilerle iliskileri Actor teacher-ogrenciye davranisi, ogrencilere yaklasim Teacher student iliskileri topic-teacher std iliskisi, teacher stds a ismiyle hitap etme topic-teacher std iliksi teacher role-stds la iletisim kurma, stds i anlama topic-stds a fazla yuz vermek dogru degil</p>

<p>Frekans:2 Actor teacher-dersi sevdirme Teacher role-stds dikkatini cekme</p>	<p>Frekans:3 teacher role-stds dikkatini cekme, derse isindirma, stds ilgisini cekme topic-oyun ile stds dikkatini cekme, katilimi saglama topic-oyunla stds ilgisini cekme</p>	<p>Frekans:4 Actor teacher-ogrencileri isindirma, motive etme, dersi sevdirme Actor teacher-ogrenciyi heyecanlandirma Actor teacher-matematigi sevdirme teacher role-matematigi sevdirme, bunun icin once kendini sevdirme, stds motive etme, sorularini cevaplama, std understanding kontrol etme topic kafa karisikligi-teacher rollerini gerceklestirmemesine ragmen stds nasil istekli olur</p>
<p>Frekans:3 Actor teacher-materyal hazirlama ve kullanma Actor teacher-kesfederek ogrenmesini saglama teacher role-etkinligi, materyalleri tanitma actor teacher-materyal getirme, eski konularla baglanti yapma, std understanding icin materyal kullanimi</p>	<p>Frekans:4 Actor teacher-materyal Actor teacher-materyal kullanma, kesfettirme teacher role-stds kesfetmelerini saglama, etkinlikle kesfettirme, kalici ogrenme saglama topic-stds uzerinde dusundurecek etkinlik</p>	<p>Frekans:9 Actor teacher-materyal Actor teacher-materyal Actor teacher-materyal kullanma teacher role-materyallerle std understandingi saglama teacher-materyal kullandirma, etkinlikte materyal kullanimi actor teacher-ipuclariyla stds a kesfettirme teacher role-formul vermeden stds a kesfettirme topic-teacher materyal kullanimi, soru sordurma, stds answers, materyal secimi topic-etkinligin stds i dusunmeye sevkmesi, anlamlandirmalarını saglamasi teacher role-bastan sona kesfettirme, gunluk hayat ornekleriyle baslayip formulle devam etmeme topic-problem cozmede formul olmamali</p>
<p>Frekans:1 Actor teacher-ogretmen hersey, kilit rol</p>	<p>Frekans:1 Actor teacher-the key</p>	<p>Frekans:1 Actor teacher-the key</p>
<p>Frekans:1 Actor teacher role-planında esnek olmasi (yontem degistirebilme)</p>	<p>Frekans:1 Actor teacher role-planı olmasi + esnek olmasi</p>	

<p>Frekans:6 Actor teacher-ogrencilerin dusunmelerini saglamak Actor teacher-cevabi vermeyen, kesfetmelerini saglayan Actor teacher-ogrencilere buldurtmak Actor teacher-yeni program-ogrencilere buldurtma Actor teacher-cevabi vermeyen, stds kesfettiren actor teacher-stds a firsat tanimasi teacher role-stds i dusunmeye sevkette</p>	<p>Frekans:6 Actor teacher-stds zaman tanima, sans verme Actor teacher-cevabi vermeme, ogrencilere firsat verme actor teacher-stds a yeterince vakit tanimasi actor teacher-stds a yol gosterme, cevabi vermeme, stds kesfetmesini saglama teacher role-stds birbiriyle etkilesim kurarak kesfetmesini saglama teacher role-direkt anlatmama, stds derse katma teacher role-yanlis yapan ogrenciye sans verme, zaman tanima topic-kesfetmede stds on bilgilerin onemi</p>	<p>Frekans:9 Actor teacher-ogrencilere buldurtmak, cevabi vermeme Actor teacher-direkt bilgiyi kendisi vermeme Actor teacher-stds kesfetmelerini, kesfetme hazzini yasamasini saglayan, anlamalarini saglama Actor teacher-ogrencilerin dusunmelerini saglamak, stds matematiksel dusunmeyi gelistirme actor teacher-direkt bilgiyi mi veriyor, stds kesfetme mi sagliyor teacher role-direkt bilgi vermeme, std understanding saglama actor teacher-direkt cevabi vermeme, sorularla yonlendirme teacher role-direkt cevap vermeme, stds dusunmeye sevkette teacher roles-formul vermeme, stds fikirlerini sorma teacher role-dersi stds ile birlikte goturme, stds derse katma teacher role-stds a inceleyerek ogrenme firsati verme, formulden ziyade kesfettirme actor teacher-stds a sorulan sorular, std understandingi amaclama teacher role-yanlis yapan cocuga sans verme, ona buldurma</p>
<p>Frekans:2 teacher role-derse planli gelme, stds on bilgilerini bilme, ona gore ders planlama topic-std on bilgilerine gore soru sorma</p>	<p>Frekans:2 teacher role-derse hazirlikli, planli gelme topic-teacher derse hazirlikli gelmenin onemi, materyal getirme</p>	<p>Frekans:5 Actor teacher-being prepared Actor teacher-derse hazirlikli gelme gerekliligi Actor teacher-derse hazirlikli gelme (1.videodan) actor teacher-derse hazirlikli gelme actor teacher-ne yapacagini biliyor mu bilmiyor mu teacher role-derse hazirlanma, planli gitme</p>

<p>Frekans:2 Actor teacher-ogrencilerin anlamasini saglamak- without misconceptions, elestiri with suggestions teacher role-tum stds ogrenmelerinden emin olmaya calisma</p>	<p>Frekans:5 Actor teacher-her ogrencinin anlamasini saglamak, without misconceptions Actor teacher-hata yapmama Actor teacher-ogrencilerin anlamasini saglamak teacher role-std learning saglayacak sekilde ogretim verme topic-std learning, dersin amacina ulasmasi</p>	<p>Frekans:5 Actor teacher-std understanding i, anlamlı ogrenme saglama Actor teacher-dogru ogretim sart for std understanding, std learning saglama buyuk sorumluluk Actor teacher-ogrencilerin anlamasini saglamak (metod ne olursa olsun) teacher role-stds i ogrenmeye yogunlastirma teacher role-std understanding i dusunme teacher role-all stds learning saglama</p>
<p>Frekans:4 Actor teacher-stds fikrine deger verme Actor teacher-std dinleme teacher role-sinifta dolasma, stds fikirlerini alma teacher role-sinifta dolasma, hareket etme</p>	<p>Frekans:2 Actor teacher-stds fikrine deger verme, ogrenciye onaylatma Actor teacher-std dinleme</p>	<p>Frekans:2 Actor teacher-respectful teacher role-saygili olma, ifadelerde dikkatli</p>
<p>Frekans:1 Actor teacher-answering std questions</p>	<p>Frekans:2 Actor teacher-answering std questions teacher role-stds sorularina cevap verme</p>	<p>Frekans:1 Actor teacher-std thinking i gozonunde bulundurarak ders isleme</p>
<p>Frekans:1 teacher role-stds dusunmeye sevk etme, mantigini anlamasini saglama</p>	<p>Frekans:1 teacher role-stds dusunmeye sevk etme</p>	<p>Frekans:3 Actor teacher-answering std questions teacher role- stds sorularini aciklayarak cevaplama, stds sorularina cevap veren, soguk davranmayan teacher role-sacma sorularin gelmesini onleme, onemli sorulara deginme, sacma olanlari es gecme</p>
<p>Frekans:1 teacher role-stds dusunmeye sevk etme, mantigini anlamasini saglama</p>	<p>Frekans:1 teacher role-stds dusunmeye sevk etme</p>	<p>Frekans:4 Actor teacher-mantigini kavratma Actor teacher-mantigini kavratma Actor teacher-stds learning through connections i saglama</p>

		topic-kural da verilir ama once mantigi verilmeli teacher role-nedenlerini aciklama, mantigini kavratma
Frekans:1 Actor teacher-stds aktif kilma	Frekans:3 Actor teacher-dersi ogrencilere birakma, std-centered Actor teacher-stds aktif kilma dikkati ceken teacher role-cevap merkezi olmama	Frekans:4 Actor teacher-std-centered, discussion and stds aktif teacher role-direct teaching yapmama, stds isin icine katma, aktivite ve grp work yaptirma, dogru soru sorma teknikleriyle std merkezli ders isleme teacher role-stds i aktif kilma, kendi ogrendikleri hissini yosatma teacher role-matematigi seven sevmeyen, farkli seviyedeki tum stds i aktif kilma
Frekans:3 Actor teacher-instructional methods, Gerektiginde yontem degistirebilme Actor teacher-instructional methods Actor teacher-farkli yontemler kullanma Actor teacher- alternatif yontemler	Frekans:1 Actor teacher-instructional methods	Frekans:6 Actor teacher-instructional methods Actor teacher-alternatif yontemleri olmasi Actor teacher-instructional methods (traditional ve yeni aciklamalar) teacher role-anlasilmadiginda farkli ifade etmek teacher role-farkli gosterim yontemleri ile ogretsin ki std en uygununu secip bilgisini kendisi olustursun teacher role-her ogrenciye ulasabilmek icin farkli metodlar bilme, her stds anlayabilecegi sekilde anlatma, farkli metodlar gelistirme, farkli yollardan anlatma
Frekans:2 Actor teacher-grup calismasi yaptirma Actor teacher-grup calismasini yonetebilme		Frekans:1 actor teacher-grp calismasi yaptirma
Frekans:1 teacher role-grp workte gruplari cinsiyete gore dagitma	Frekans:1 teacher role-grp workte stds arasi iletisimi aktiflestirme	
	Frekans:1 Actor teacher-ogrenmeye acik olma	Frekans:2 Actor teacher-kendini gelistirme, genel kulturunu gelistirm, kendini update etme

Frekans:2 Actor teacher-tum ogrencilere ulasma, tum ogrencilerin katilimini saglama teacher role-etkinlik sirasinda grplar arasinda dolularak aktif ve aktif olmayan stds tespit	Frekans:5 Actor teacher-tum ogrencilere ulasma, tum ogrencileri derse katma teacher role-etkinlik yapma, ogrenciyi dahil etme, ilgisini cekme, stds aktif kilma teacher roles-stds katilimini saglama, rahat ortamini saglama teacher role-tum stds a ulasmaya calisma teacher role-stds on yargili yaklasmama, ogrenci seviye farklılıklarına acik olma	Actor teacher-ogrenmeye acik olma Frekans:5 Actor teacher-tum ogrencilere ulasma Actor teacher-farkli ogrenci seviyelerine ulasma topic-etkinlikle stds katilimi yuksek, eglenceli teacher roles-stds derse dahil etme, soru sorma, tartismayi yonlendirme, grp calismasina yordimci olma teacher role-stds a ulasma cabasi
	Frekans:2 teacher role-parmak kaldirmayanlara da soz vererek yanlisleri duzeltme teacher role-cok bilen stds yerine sessiz olanlarin ustune gitme	Frekans:1 teacher role-parmak kaldirmayan cocuga ulasma, yordimci olma
		Frekans:2 Actor teacher-teknoloji kullanimi teacher role-teknoloji kullanma
		Frekans:1 Actor teacher-std genel kulturunu gelistirme
		Frekans:3 Actor teacher-ogrenci seviyesine inebilme teacher role-stds gibi dusunebilme, stds seviyesine inebilme teacher role-stds seviyesine inebilme
Frekans:3 Actor teacher-ogrencilerini tanima Std farklılıklarına gore ogretim verme teacher role-yonergelerle stds i kontrol etme, sinif kulturunu olusturma topic-stds tanima sicak ortam ve hakimiyet saglar	Frekans:4 teacher roles-stds tanima teacher role-stds i tanima teacher role-sinif kulturunu olusturma Teacher role-stds farklılıklarının ve farklı	Frekans:4 Actor teacher-stds tanima ve ona gore sinif kulturunu olusturma Actor teacher-ogrencilerini tanima topic-ogretmenin ogrencisini tanimasi, ogrenciyi cok iyi tanımak cok onemli

	dusunebileceklerinin farkinda olma	teacher role-how stds learn bilmeli, stds tanimali
Frekans:1 Actor teacher-std understandingi degerlendirme with suggestions	Frekans:2 teacher role-stds understandingi test etme, degerlendirme teacher role-sozel olarak stds bilgilerini olcme	
Frekans:7 Actor teacher-kontrolu elinde tutma Actor teacher-sinifta gezinme topic-teacher sinif hakimiyeti sinif ortami, classroom management teacher role-grp workte esit paylasim uyarisi teacher role-sessiz ortam saglama topic-teacher sinif hakimiyeti	Frekans:4 Teacher role-classroom management teacher role-grp work hakimiyet teacher role-grp work yaptirma, gruplarla ilgilenme topic-sinif hakimiyeti	Frekans:1 Teacher role-classroom management
Frekans:2 Actor teacher-kurallari koyma, oturtma actor teacher-kural koyma, sinifta soz alma kurallari		
Frekans:3 Actor teacher-toparlama topic-ders toparlanmazsa std understanding gerceklesmez teacher role-std kesiflerini paylastirma, toparlama		Frekans:1 teacher role-en sonda toparlama
Frekans:1 Actor teacher-pratik zeka, dogru hizli karar verebilme		Frekans:1 Actor teacher-caresiz kalmama, kalifiye olma, pratik zekaya sahip olma
Frekans:1 Actor teacher-std max kapasiteye ulastirma		Frekans:2 Teacher role-stds kapasitelerini goz onunde bulundurma Teacher role-stds olabilecek en iyi seviyeye cikarma Actor teacher-std max kapasiteye ulastirma
Frekans:1 topic-stds ogretmen tavirlarindan etkilenme	Frekans:3 Actor teacher-character effect (sogukkanli ve sinirli	Frekans:4 Actor teacher-character

	<p>oluşu-olumsuz), sakin olma (olumlu) yeni fikirler-topic öğretmen durusu, sesi, tavırlar, tepkiler fark edilen-teacher character effect on stds teacher role-sakin, kendinden emin</p>	<p>topic-sert öğretmen stds i matematikten sogutur, matematik sevilmez, öğretmenle olumsuz ilişki, korkma, çekinme, teacher sertse stds söz hakkı istemekten korkar topic-stds rollerini gerçekleştirememede teacher effect (o ortamı sağlayamama) topic-stds sessiz, dinleyen ise teacher biraz baskıcıdır topic- teacher sertliği, sert öğretmenlerin başarılı görünen öğrencileri aslında anlamıyorlar</p>
<p>Frekans:2 Actor teacher-etkinlik yaptırma (olumlu eleştiri) teacher role-etkinlik öncesi beklentileri açıklama</p>	<p>Frekans:2 Actor teacher-oyun oynatma Actor teacher-etkinlik yaptırma, oyun oynatma</p>	<p>Frekans:2 actor teacher-etkinlik uygulama, topic-ders etkinlik tabanlı olmalı teacher role-stds a sorular yöneltilme, etkinlik yaptırma</p>
<p>Frekans:1 teacher role-aktivite yapma, yönlendirici sorular sorma</p>	<p>Frekans:3 Actor teacher-dogru aktivite secme, aktiviteyi dogru uygulayabilme teacher role-ogrenciye aktivite ve materyal verip yonerge sunma teacher role-etkinligi konuya baglama</p>	<p>Frekans:2 teacher roles-klasik ders islememeli, etkinlik yapmalı, günlük hayattan örnekler vermeli actor teacher-aktiviteyle kavratma, somut örnekler verme teacher role-klasik ogretim, kural verme olmamalı</p>
	<p>Frekans:3 Actor teacher-isini sevme teacher role-istekli olma teacher role-istekli olmanın önemi, teacher istek şart</p>	<p>Frekans:1 Actor teacher-istekli ve gönüllü olma, sorumluluk tasima</p>
		<p>Frekans:2 Actor teacher-neyi nasıl yapacağını bilme teacher role-ne yapacağını bilme</p>
		<p>Frekans:2 Actor teacher-herşeye hazırlıklı olma topic-derste karşılaşılabilecek beklenmedik durumlar, hazırlıklı olma gerekliliği</p>

		Frekans:3 Actor teacher-stds ne dedigini anlama teacher role-stds sorularini anlamaya calisma, dersten kopmalarini engelleme topic-stds sorularini anlayip aciklayabilmenin onemi
Frekans:1 Ogrenciyi rencide etmeme		Frekans:1 Actor teacher role- stds fazla yuklenmeme, cocuk olduklarini dikkate alma, yanlis yaptiklarinda yuklenmeme
	Frekans:1 Actor teacher-diger ogretmenlerle iletisimde olma	
		Frekans:1 Actor teacher-main role teaching
		Frekans:1 Actor teacher-ders disi takip
		Frekans:2 Actor teacher-ogrenciyi sekillendirme, ogrencinin kendisinin farkina varmasini saglama teacher role-stds rollerini stds a ogretme
		Frekans:1 Actor teacher-stds gelecege hazirlama Actor teacher-teacher role on stds future
		Frekans:2 teacher role-stds derse hazirlama, derse giris actor teachers-soru yonlendirme, derse giris
Frekans:3 teacher role-sorgulatma, cevabini aciklatma teacher roles-soru sorma, stds a buldurtma teacher role-yonlendirme, sorgulatma	Frekans:2 teacher role-stds tartismaya yonlendirme, sorgulatma teacher role-stds cevaplarini aciklatma	Frekans:5 teacher role-sebebini sorgulatma teacher role-stds cevaplarini aciklatma teacher role-sorgulatma teacher role-nedenini sorgulatma teacher role-stds a sorgulamayi ogretme

		Frekans:1 teacher role-std understanding icin en uygun yolu bulma, kullanma
		Frekans:1 tartisma focus teacher-nasil anlatirim, stds a karsi tavir ne olmalı
		Frekans:1 teacher role-soyleyeceklerinin, yapacaklarının sonuclarini onceden dusunme
Frekans:3 teacher role-yanlis cevap verdiginde stds a olumlu yaklasma teacher role-yanlis yapan ogrenciye dogruyu buldurtma teacher role-yanlis yapan ogrenciye yapici yaklasma, ogretici olma	Frekans:1 actor teacher-hep olumlu donut vermesi, aferinle odullendirmesi	
	Frekans:1 teacher role-stds a yordimci olma	
		Frekans:1 actor teacher-soru sorma ve yanitlama teknikleri
Frekans:3 teacher role-stds on bilgilerini kontrol teacher role-onceki bilgileri aktiflestirerek yeni konuyu anlatma teacher role-stds on bilgilerini yoklama		Frekans:3 actor teacher-stds on bilgilerini kontrol, gunluk hayatla iliskilendirme, stds isindirma teacher role-konulari birbirine baglamak, eski konularla bagdastirarak ders isleme teacher role-iliski kurdurabilme
	Frekans:1 teacher role-sinifta rahat olma	
		Frekans:1 topic-matematigi eglenceli hale getirme
	Frekans:1 teacher role-konuya hakim olma	
	Frekans:1 actor teacher-verdigi ornekler, getirdigi materyaller,	Frekans:1 actor teacher-ogretim yontemleri, yeni programa

	sinifta dolasma, konu anlatim, sordugu sorular	uygunluk, materyal kullanimi
	Frekans:1 teacher role-tahtanın onunde durmamali	
		Frekans:2 actor teacher-stds a tavir, sordugu sorular, derse giris, materyal getirme, konuya hakimiyet, ders islenis, diger konularla baglanti topic-derste konular arasi baglantilar yakalanmasi
		Frekans:1 topic-teachers heves eksikligi, bezginlik topic-istekli olursa teacher yeni metodlari egitim olmadan bile kullanir
Frekans:1 teacher role-guleryuzlu olma		Frekans:1 teacher role-stds a iyi davranma teacher role-iyi bir ogretmen olma, kendini sevdirmeye
Frekans:1 teacher role-sinif kulturunu olusturma, duzenleme, kurallari koyma/tartisilmayan, gorusmede akla gelen	Frekans:1 teacher role-classroom culture i olusturma	Frekans:1 teacher role: soru sormaya elverisli classroom culture olusturma
Frekans:1 teacher role-stds etkilesimini saglayacak ortam kurma		
	Frekans:1 teacher role-anlasilmayan noktaları aciklama	
		Frekans:1 teacher role-nasil stds bekliyorsan ona gore davranma
	Frekans:1 topic-teachersin basarili sinifini daha cok sevmesi	
		Frekans:1 teacher role-stds i etkilesime yonlendirme
		Frekans:1 teacher role-basit etkinlikle baslama, stds i zorlama, challenging etkinlikler, yonlendirerek

	seviyelerini yükseltme, belli bir seviyenin üstüne çıkarma
	teacher role-matematigi fazla basitlestirmeme
	topic-matematik öğretmenin gereği stds i zorlama, üst seviyeye çıkarma
	teacher role-hedeflerini stds seviyesine göre belirleme, bir üst seviyeye çıkaracak şekilde
	Frekans:2 teacher role-matematik öğretmekten önce stds a soru sormayı ve anlamadıkları noktaları fark etmeyi öğretme, stds soru sorabilmelerini sağlama teacher role-stds i soru sormaya teşvik etme, soru sorulabilecek atmosfer yaratma
	Frekans:1 teacher role-cok sert olmama, dengeyi bulma, stds soru sorabileceği ortamı kurma
	Frekans:1 teacher role-dersin amacını söyleyerek derse başlama
	Frekans:1 teacher roles-stds takıldıkları noktada yardım etme, farklı gösterimlerden yararlanma
	Frekans:1 teacher role-yeni program stds rollerini oturtma
	Frekans:1 teacher role-emin değilse cevap vermemeli, araştırıp geleyim demeli
	Frekans:1 topic-teacherin cantasında stds a sunacağı pek çok aleti olması, donanım

	Frekans:1 teacher role-stds dan beklentilerini ortaya koyma teacher role-beklentilerini acikca belirtme, kurallari koyma
Frekans:1 teacher role-kural vermeme, nedenini aciklama	
	Frekans:1 teacher role-onaylatma yerine stds a buldurma teacher role-std kendi olusturmali bilgiyi, ogretmeni onaylamaktan ziyade
	Frekans:1 teacher roles-planli olma, sorulara acik olma, sabirli olma, hosgorulu olma
	Frekans:1 topic-kilavuz kitabın etkisi on teacher

A.2. Teacher Knowledge Categories

A.2.1. Ball et al.'s (2007) Teacher Knowledge Categories

Methodological Perspective				Attitudinal Perspective	Classroom Culture				Technology	Management	
Reform-minded Teaching (knowledge needed for teaching)					Teacher-teacher communication	Teacher characteristics	Equity	Out-of-class activity			
SMCK (SKC + CCK)	PCK			Other							
	Knowledge of content and students (KCS)	Knowledge of content and teaching (KCT)	Knowledge of content and curriculum (KCC)								
Bilgili olma, neyi nasıl yapacağını bilme, konuya hakim olma	Öğrenci ön bilgilerini dikkate alma, konuları ilişkilendirme	Açık ve anlaşılır ifade ve yönergeleme kullanma	Plan yapma, planında esnek olma	Yaratıcı olma	Espri anlayışı olma	Diğer öğretmenlerle iletişimde olma	Saygılı olma	Tüm öğrencilere ulaşma, parmak kaldırmaya nlara da söz verme	Öğrencileri ders dışında da takip etme	Teknoloji kullanma	Öğrencilerle iletişim kurma, doğru ilişkiler kurma

Düşünmeye sevk etme, mantığını kavratma, kendi bilgisini inşa ettirme	Günlük hayatla ilişkilendirme		Doğru ve hızlı karar verebilme	Dersi sevdirmeye, dikkatlerini çekme, motive etme, matematik eğlenceli hale getirme	Öğrenci fikirlerine değer verme, dinleme	Her öğrencinin anlamasını sağlama	Öğrenciyi geleceğe hazırlama	Sınıfa hakim olma, kural koyma
Cevabı vermemeye, düşünmeler için yeterli zaman tanıma	Materyal hazırlama ve kullanma	Dersi toparlama	Beklenmedik durumlara hazırlıklı olma	Mesleğini sevmeye, istekli olma	Kendini geliştirme, öğrenmeye açık olma	Öğrenci farklılıklarının farkında olma, öğrencisini tanıma?		Öğrencilere doğru yaklaşabilme, fazla sert olmama
Öğrenci farklılıklarının farkında olma, öğrencisini tanıma	Öğrencileri aktif kılma, öğrenci merkezli ders işleme	Derse etkili giriş yapabileme, dersin amacını söyleme	Öğrenciyi şekillendirme, rollerini öğretme	Rahat olma	Öğrenci farklılıklarının farkında olma, öğrencisini tanıma?	Her öğrenciyi maksimum kapasiteye ulaştırma		Öğrenciyi fazla yüklenmeye, yanlış yapanlara yapıcı yaklaşma
Öğrencilerin anlamalarını	Farklı öğretim yöntemleri		Yapacaklarının sonuçlarını önceden	Güleryüzü olma, kendini	Sınıf kültürünü oluşturma			

değerlendirme	kullanabilme, anlamaları için en uygun yolu kullanma	düşünme	sevdirme, sabırlı ve hoşgörülü olma
Öğrenci sorularını, ne dediklerini anlayabilme, cevaplayabilme	Grup çalışması yaptırma ve yönetebilme, öğrenciler arası iletişimi aktifleştirmeye	Öğrencide özgüven geliştirme	Emin olmadığında cevap vermeme, araştırma
Sorgulatma, nedenini açıklatma, kural vermeme	Etkinlik yaptırma, doğru aktiviteler seçebilme	Öğrencinin genel kültürünü geliştirme	Donanımlı olma
Farklı öğrenci seviyelerine ulaşabilme, inebilme	Yeni programa uygun öğretim yöntemleri kullanma		Hata yapabilme
	Öğrenciyi soru sormaya teşvik		Önce insan olma

etme
Matemati ği basite indirgeme me, zorlayıcı etkinlikler yapma
Öğrenciyi yönlendir me, yardım etme, keşfetmes ine yardımcı olma

A.2. Teacher Knowledge Categories

A.2.2. Shulman's (1987) Teacher Knowledge Categories

Methodological Perspective					Attitudinal Perspective	Classroom Culture				Technology
Reform-minded Teaching (subject matter knowledge)						Teacher-teacher communication	Teacher characteristics	Equity	Our-of-class activity	
Content knowledge	Pedagogical content knowledge	Curriculum knowledge	General pedagogical knowledge	Other						
			Öğrencilerle iletişim kurma, doğru ilişkiler kurma	Yaratıcı olma	Esprili anlayışı olma	Diğer öğretmenlerle iletişimde olma	Saygılı olma	Tüm öğrencilere ulaşma, parmak kaldırmayanlara da söz verme	Öğrenciler dışındaki da takip etme	Teknoloji kullanma
	Öğrenciyi yönlendirme, yardım etme, keşfetmesine yardımcı olma		Sınıfa hakim olma, kural koyma		Dersi sevdirmeye, dikkatlerini çekmeye, motive etme, matematiği eğlenceli hale getirme		Öğrenci fikirlerine değer verme, dinleme	Her öğrencinin anlamasını sağlama	Öğrencilerin geleceğe hazırlanması	
	Açık ve anlaşılır ifade ve yönergeler		Öğrencilere doğru yaklaşım, fazla sert		Mesleğini sevmeye, istekli olma		Kendini geliştirme, öğrenmeye açık olma	Her öğrenciyi maksimum kapasiteye		

kullanma	olmama		ulaştırma
Günlük hayatla ilişkilendirmeye	Öğrenciye fazla yüklenmemeye, yanlış yapanlara yapıcı yaklaşma	Rahat olma	Sınıf kültürünü oluşturma
Materyal hazırlama ve kullanma	Öğrenci farklılıklarının farkında olma, öğrencisini tanıma	Gülyüzlü olma, kendini sevdirmeye, sabırlı ve hoşgörülü olma	Emin olmadığında cevap vermeme, araştırma
Düşünmeye sevk etme, mantığını kavratma, kendi bilgisini inşa ettirme			Donanımlı olma
Plan yapma, planında esnek olma			Hata yapabilme
Cevabı vermeme, düşünceleri için yeterli zaman tanıma			Önce insan olma
	Öğrenci ön bilgilerini		

dikkate alma, konuları ilişkilendir me
Öğrencileri aktif kılma, öğrenci merkezli ders işleme
Farklı öğretim yöntemleri kullanabilme , anlamaları için en uygun yolu kullanma + Yeni programa uygun öğretim yöntemleri kullanma
Grup çalışması yaptırma ve yönetebilme, öğrenciler arası iletişimi aktifleştirme

	Öğrenci farklılıklarının farkında olma, öğrencisini tanıma
Öğrencilerin anlamalarını değerlendirme	
	Dersi toplama
	Doğru ve hızlı karar verebilme
Etkinlik yaptırma, doğru aktiviteler seçebilme	
Bilgili olma, neyi nasıl yapacağını bilme, konuya hakim olma	
	Beklenmedik durumlara hazırlıklı olma

Öğrenci sorularını, ne dediklerini anlayabilme, cevaplayabilme	
	Öğrenciyi şekillendirme, rollerini öğretme
Derse etkili giriş yapabilme, dersin amacını söyleme	
Sorgulatma, nedenini açıklatma, kural vermeme	
	Yapacaklarının sonuçlarını önceden düşünme
	Öğrenciyi sormaya teşvik etme
Farklı öğrenci	

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A.3. Sub-Issues related to Methodological Perspective

A.3.1. Sub-Issues related to Pedagogical Content Knowledge

<i>Methodological Perspective</i>
Reform-minded Teaching (subject matter knowledge)
Pedagogical Content Knowledge (PCK)
FACILITATION Facilitating students, assisting students, helping students discover, providing hints when necessary <i>Öğrenciyi yönlendirme, yardım etme, keşfetmesine yardımcı olma, gerektiğinde ipucu verme</i>
INSTRUCTIONS Using clear and proper instructions and statements <i>Açık, doğru ve anlaşılır ifade ve yönergeler kullanma</i>
REAL LIFE Connecting mathematics to real life, teaching solid mathematics <i>Günlük hayatla ilişkilendirme, somutlaştırarak anlatma</i>
REASONING Motivating students to think and reason, not letting them memorize, giving the underlying meaning of concepts, letting students build their own knowledge, making students to reach generalizations, ensuring long-lasting comprehension <i>Düşünmeye sevk etme, ezberletmeme, mantığını kavratma, direkt kural vermeme, kendi bilgisini inşa ettirme, genellemeye gitmelerini sağlama, kalıcı öğrenme sağlama</i>
THINKING TIME Not providing answers right away, giving students enough time to think <i>Cevabı vermeme, düşünceleri için yeterli zaman tanıma</i>
STUDENT CENTEREDNESS Activating students, conducting student-centered lessons, giving students opportunities, not directing students too much, not being the center of the answer/approval process <i>Öğrencileri aktif kılmama, öğrenci merkezli ders işleme, öğrenciye fırsat tanıma, aşırı yönlendirmeme, öğrenciyi dahil etme, cevap-onay merkezi olmama</i>
REPRESENTATIONS Using multiple instructional methods, using multiple representations, selecting the most appropriate method for student understanding, using instructional methods in line with the new curriculum, conducting lessons in line with the new curriculum <i>Farklı öğretim yöntemleri kullanabilme, farklı-çoklu gösterimden yararlanma, öğrencilerin anlamaları için en uygun yolu kullanma, yeni programa uygun öğretim yöntemleri kullanma, programa uyumlu ders işleme</i>
GROUP WORK Making group work and managing it, dealing with students throughout the group works, managing the labor division in group work, activating the communication between students during the group work, letting students learn from each other via group work <i>Grup çalışması yaptırma ve yönetebilme, öğrencilerle grup çalışması süresince ilgilenebilme, görev dağılımı yapma, öğrenciler arası iletişimi aktifleştirme, grup çalışmasıyla birbirinden öğrenmelerini sağlama</i>
EVALUATION Evaluating student understanding, assessing through observation, arranging lesson flow according to student understanding <i>Öğrencilerin anlamalarını değerlendirme, gözlem yaparak not verme, ders akışına sınıfın durumunu değerlendirerek karar verme</i>

ACTIVITIES

Perform activities, familiarize students with the activities, selecting appropriate activities and examples, preventing students from perceiving activities as games, applying activities appropriately

Etkinlik yaptırma, etkinliğe alıştıırma, uygun aktiviteler ve örnekler seçebilme, etkinliğin oyun olarak algılanmasını önleme, etkinliği doğru uygulama

UNDERSTANDING

Being able to understand student questions and what they say, being able to answer student questions and providing feedback, giving concrete answers

Öğrenci sorularını, ne dediklerini anlayabilme, cevaplayabilme ve dönüt verebilme, net cevaplar verme

INQUIRY

Asking questions, encouraging students to inquire, asking for reasons and having students explain and justify their answers, not giving the rules

Soru sorma, sorgulatma, nedenini açıklatma, kural vermeme, cevabını savunmasını sağlama

CORRECT TERMINOLOGY

Using correct mathematical terms in class and having students do likewise

Doğru matematiksel ifade kullanma ve kullandırma

STUDENT UNDERSTANDING

Ensuring student understanding, using the new curriculum even if it takes more class time

Öğrencilerin anlamasını sağlama (daha fazla zaman gerektirse de yeni programı uygulama)

DISCUSSION

Establishing a discussion environment, having students discuss

Tartışma ortamı kurma, sağlama

MISCONCEPTIONS

Not generating misconceptions, preventing misconceptions and wrong and deficient understanding

Kavram yanlışlığı yaratmama, olası yanlışlıkları, yanlış ve eksik anlamaları engelleme

EXPLANATIONS

Appropriately explaining the subjects

Konuları yeterince açıklama

STUDENT DIFFICULTIES

Taking student difficulties into consideration

Öğrenci zorluklarını dikkate alma

ALTERNATIVE SOLUTIONS

Making students compare and share different solution methods

Öğrencileri farklı çözüm yöntemlerini karşılaştırmaya ve paylaşmaya teşvik etme

NOT BINDING

Not limiting students, not making them perceive what is right by the teachers' point of view

Öğrencileri belirli kalıplara sokmama, öğretmenin doğrularını kabul ettirmeye zorlamama

STUDENT THINKING

Understanding the ways of student thinking and their thinking structures

A.3. Sub-Issues related to Methodological Perspective

A.3.2. Sub-Issues related to General Pedagogical Knowledge

<i>Methodological Perspective</i>
Reform-minded Teaching (subject matter knowledge)
General Pedagogical Knowledge (GPK)
COMMUNICATION Communicating with students, setting up proper relationships and establishing the interaction between the students <i>Öğrencilerle iletişim kurma, doğru ilişkiler kurma, öğrenciler arası etkileşimi sağlama</i>
MANAGEMENT Managing the classroom, setting up the rules, time management and securing the order <i>Sınıfa hakim olma, kural koyma, zaman yönetimi, düzen sağlama, kontrolü elinde tutma</i>
APPROACH Positive approach towards students, not controlling too much, giving flexibility, not being too harsh, not behaving rude, not humiliating, and being decent <i>Öğrencilere doğru yaklaşabilme, aşırı kontrolden kaçınma, öğrenciye esneklik tanıma, fazla sert olmama, kaba davranmama, azarlamama + Önce insan olma</i>
PRESSURE Not putting too much pressure on students, approaching the students who make mistakes positively, and providing them opportunities <i>Öğrenciye fazla yüklenmeme, yanlış yapanlara yapıcı yaklaşma, şans tanıma</i>
STUDENT DIFFERENCES Being aware of student differences, knowing students <i>Öğrenci farklılıklarının farkında olma, öğrencisini tanıma</i>
DECISION-MAKING Having a contingency plan at hand, interfering with such situations, and having a pragmatic mind <i>Beklenmedik durumlara hazırlıklı olma, müdahale edebilme, pratik zekaya sahip olma</i>
SHAPING STUDENTS Shaping students, teaching them their roles, and distributing student roles appropriately <i>Öğrenciyi şekillendirme, rollerini öğretme, rolleri doğru dağıtma</i>
COMPETITION Preventing student competition/creating a competitive environment for motivation purposes <i>Öğrenci rekabetine engel olma/ motive amaçlı rekabet ortamı kurma</i>
EXPECTATIONS Establishing expectations from students <i>Öğrencilerden beklentilerini ortaya koyma</i>
ENGAGING Not leaving students disengaged, being able to involve them <i>Öğrencileri boş bırakmama, meşgul edebilme</i>

A.3. Sub-Issues related to Methodological Perspective

A.3.3. Sub-Issues related to Curriculum Knowledge

<i>Methodological Perspective</i>
Reform-minded Teaching (subject matter knowledge)
Curriculum Knowledge (CK)
MATERIALS Preparing and using correct materials in an accurate way without creating misconceptions. Preventing misconceptions through the use of materials <i>(Etkin) materyal hazırlama ve doğru kullanma (misconceptionu yol açmadan), materyalle misconceptionu engelleme</i>
PLANNING LESSON Making lesson plans, being flexible in lesson plans <i>Plan yapma, planında esnek olma</i>
CONNECTIONS Taking students' preknowledge into account, connecting the subjects <i>Öğrenci ön bilgilerini dikkate alma, konuları ilişkilendirme</i>
WRAPPING UP Wrapping up the lesson <i>Dersi toparlama</i>
INTRODUCTION Effective introduction to the lesson, stating the aim of the lesson, and providing students with the basics <i>Derse etkili giriş yapabilme, dersin amacını söyleme, temeli verme</i>
CHALLENGING MATHEMATICS Teaching mathematics from simple to complex, not simplifying mathematics too much, integrating challenging activities <i>Matematiğin basitten zora öğretimi, matematiği basite indirgememe, ileri düzey etkinlikler yapma</i>
NEW CURRICULUM Understanding the new curriculum and being able to adopt it <i>yeni programı anlama ve programa ayak uydurma</i>
BEING PREPARED Being prepared for the lesson <i>Derse hazırlıklı gelme</i>
STUDENT KNOWLEDGE Establishing a sound knowledge foundation <i>Öğrenci temelini doğru oturtma</i>
STUDENT LEVELS Suitability of the lessons to the levels of the students <i>Dersin öğrenci seviyesine uygunluğu</i>
GUIDE BOOK Effects of guide book, use of guide book, not sticking to the guide books <i>Kılavuz kitap etkileri, kılavuz kitaptan yararlanma, körü körüne kitabı takip etmeme</i>

A.3. Sub-Issues related to Methodological Perspective

A.3.4. The Sub-Issue related to Content Knowledge

<i>Methodological Perspective</i>
Reform-minded Teaching (subject matter knowledge)
Content Knowledge (CK)
SUBJECT MATTER KNOWLEDGE
Having subject matter knowledge, knowing what to/how to do, being qualified, not giving wrong examples
<i>Konu hakkında bilgili olma, neyi nasıl yapacağını bilme, konuya hakim olma, yanılıcı örnek vermeme</i>

A.3. Sub-Issues related to Methodological Perspective

A.3.5. The Sub-Issue related to “Other” Role with respect to the Methodological Perspective

<i>Methodological Perspective</i>
Reform-minded Teaching (subject matter knowledge)
Other (O)
MOTIVATION Motivating and encouraging students to ask and answer questions, and sharing their ideas <i>Öğrenciyi soru sormaya, cevaplamaya, fikrini paylaşmaya teşvik etme, cesaretlendirme</i>
SELF-ESTEEM Developing self-esteem in students <i>Öğrencide özgüven geliştirme</i>
EXPERIENCE Effect of teaching experience <i>Öğretmen tecrübe etkisi</i>
EFFECTIVE INSTRUCTION Giving an effective instruction and making activities even in negative conditions <i>Olumsuz şartlara rağmen iyi öğretim verebilme, etkinlik yapabilme</i>
REACHING TARGETS Being able to reach her targets <i>Amacına ulaşabilme</i>
TECHNOLOGY Benefiting from technology, technological resources <i>Teknoloji kullanma, Teknolojik olanaklar</i>
CLASSROOM CULTURE Creating classroom culture where students are not afraid of making mistakes and feel comfortable, and preventing students from interfering with each other <i>Sınıf kültürünü oluşturma (öğrencilerin yanlış yapmaktan korkmadıkları, rahat oldukları bir ortam kurma, öğrencilerin birbirine müdahalesine engel olma)</i>
STUDENT EXPRESSION Having students express themselves <i>Öğrencilerin kendilerini ifade edebilmelerini sağlama</i>

A.4. Sub-Issues related to Attitudinal Perspective

Attitudinal Perspective
(A)

MATHEMATICS AS A FUN

Having students like mathematics lessons, drawing their attention, warming them up, motivating them, making mathematics fun, and ensuring student participation
Dersi, matematięi sevdirme, dikkatlerini/ilgilerini çekme, ısındırma, motive etme, heveslendirme, matematięi eğlenceli hale getirme, katılımı sağlama

ENTHUSIASM

Enjoying her job, being enthusiastic, being willing to implement the new curriculum
Mesleęini sevmeye, istekli olma, (yeni programı uygulamaya) hevesli olma

COMFORT

Being comfortable
Rahat olma

POSITIVE ATTITUDE

Having a smiling-face, having students like her, being tolerant
Gülyüzlü olma, kendini sevdirmeye, hoşgörülü olma

VALUING IDEAS

Valuing student ideas, listening to them, trusting them
Öğrenci fikirlerine değer verme, dinleme, öğrenciyeye güvenme

VOICE TONE

Not speaking too loud, being careful with the tone of voice and mimicry
Fazla yüksek sesle konuşmama, ses ve mimiklerine dikkat etme

KNOWING STUDENTS

Knowing her students and their names
Öğrencilerini tanıma, isimlerini bilme

PATIENCE

Being understanding and patient toward students
Öğrenciyeye karşı anlayışlı ve sabırlı olma

STUDENT PSYCHOLOGY

Taking student psychology into account, and giving reinforcement to each particular student
Öğrenci psikolojisini gözönüne alma, öğrenciyeye özgü pekiştireç verme

RESPECT

Being respectful
Saygılı olma

A.5. Sub-Issues related to “Other” Theme

A.5.1. Sub-Issues related to Teacher Characteristics under the “Other” Theme

Teacher Characteristics (TC)
SELF-IMPROVEMENT Be willing to improve oneself, not resisting to innovations <i>Kendini geliştirme, öğrenmeye açık ve istekli olma, yeniliklere direnmeme</i>
SELF-ASSURANCE Being well-equipped and cultured, and having self-assurance <i>Her açıdan donanımlı olma, kendinden emin olma, kültürlü olma</i>
MISTAKES Being aware of the fact that teachers can make mistakes and must correct them <i>Hata yapabileceğinin farkında olup hatalarını düzeltmeye açık olma</i>
COLLABORATION Being in communication/collaboration with other teachers <i>Diğer öğretmenlerle iletişimde olma</i>

A.5. Sub-Issues related to “Other” Theme

A.5.2. Sub-Issues related to Equity under the “Other” Theme

Equity (E)
REACHING ALL Addressing to all students, letting students who don't raise their hands speak, and thus not losing the students who are successful in the classroom but not in the exams <i>Tüm öğrencilere ulaşma, parmak kaldırmayanlara da söz verme, sınıfta başarılı sınavda başarısız öğrencileri kaybetmeme</i>
ENSURING UNDERSTANDING OF ALL Ensuring understanding of all students' <i>Her öğrencinin anlamasını sağlama</i>
MAXIMUM CAPACITY Developing students' capacity to maximum level <i>Her öğrenciyi maksimum kapasiteye ulaştırma</i>
ADDRESSING TO STUDENTS WITH DIFFERENT LEVELS Equally reaching students with different levels <i>Farklı seviyelerdeki her öğrenciye eşit şekilde ulaşma</i>
ACTIVATING ALL Activating all students <i>Tüm öğrencileri aktif kılma</i>

A.5. Sub-Issues related to “Other” Theme

A.5.3. Sub-Issues related to Out-of-Class Activity under the “Other” Theme

Out-of-Class Activity (OC)
PREPARING STUDENTS FOR THE FUTURE Preparing students for their future careers <i>Öğrenciyi geleceğe hazırlama</i>
PARENTAL SUPPORT Receiving parental support <i>Aile desteği alma</i>
FOLLOWING STUDENTS Monitoring student behavior outside the classroom <i>Öğrencileri ders dışında da takip etme</i>

A.6. Sub-Issues related to Student Roles

A.6.1. Sub-Issues Related to Student Roles with respect to the Methodological Perspective

<i>Methodological Perspective</i>
DISCOVERY Long lasting learning by doing and experiencing, learning through discovery with activities <i>Yaparak yaşayarak kalıcı öğrenme, etkinlikle keşfederek öğrenme</i>
INQUIRY Questioning, and inquiring instead of memorizing, and thinking and asking oneself why one is learning <i>Soru sorma, sorgulama, ezberlememe, düşünme, neden öğreniyoruz sorusunu kendine sorma</i>
USING MATERIALS Using materials appropriately (improving one's motor skills through material use) <i>Materyal (amacına yönelik) kullanma (el becerilerinin gelişimi)</i>
GROUP WORK Being able to do group work, cooperating with others, fulfilling their responsibilities, learning from each other through communication <i>Grup çalışması yapabilme, ortak çalışabilme, sorumlulukların yerine getirilmesi, birbirinden öğrenme (iletişim kurarak), rekabet amaçlamama, etkileşim, iletişim kurma, paylaşım, grup çalışmasında eşit paylaşım, sadece bilen öğrencinin öne çıkmaması, grup çalışmalarında aktif olma</i>
REAL LIFE EXAMPLES Being able to give real life examples <i>Günlük hayat örnekleri verebilme</i>
CONSTRUCTING ONE'S OWN KNOWLEDGE Not waiting for the answer and the explanations to be given by the teacher, building and constructing one's own knowledge, being responsible for one's learning, being involved, giving the expected reactions, and being at the center <i>Cevabı, açıklamayı öğretmenden beklememe, kendi bilgisini kendi inşa etme, bilgiyi yapılandırma, kendi anlamalarından sorumlu olma, konuya dahil olma, istenen tepkileri verebilme, merkezde olma</i>
CONNECTION Connecting to previous knowledge, being able to use pre-knowledge, reasoning <i>Önceki bilgileriyle ilişkilendirme, önceki bilgilerini kullanabilme, akıl yürütme</i>
DISCUSSION Being able to participate in discussions, not giving the answers without discussing them first, answering their friends first instead to their teacher, and learning through discussions <i>Tartışma yapabilme, tartışmadan direkt cevabı vermeme, direkt öğretmeni değil arkadaşını yanıtlama, tartışarak öğrenme</i>
NEW CURRICULUM Being able to adapt to the new curriculum, and fulfilling its requirements <i>Yeni programa adapte olabilme, uyum sağlama, gereklerini yerine getirebilme</i>

A.6. Sub-Issues related to Student Roles

A.6.2. Sub-Issues related to Student Roles with respect to the Attitudinal Perspective

Attitudinal Perspective

ACTIVE PARTICIPATION

Being willing and enthusiastic about lessons, participating actively and equally, and being willing to learn mathematics

İstekli, ilgili, hevesli olma, aktif katılım, eşit katılım, matematiği öğrenme isteği taşıma

BEING RELAXED

Being relaxed, not hesitating or being afraid, being able to ask questions freely, having self-confidence

Rahat olma, çekinmeme, korkmama, istediğini sorabilme, kendine güven

ENJOYING MATHEMATICS

Enjoying mathematics and learning with fun

Matematikten zevk alma, eğlenerek öğrenme

EXCITEMENT

Getting excited

Heyecanlanma

A.6. Sub-Issues related to Student Roles

A.6.3. Sub-Issues related to Student Roles with respect to the Classroom Culture

<i>Classroom Culture</i>
RESPONSIBILITIES Fulfilling their responsibilities, doing what one's teacher expected, cooperating with the teacher, understanding teacher directions <i>Sorumluluklarını yerine getirme, öğretmenin dediklerini yapma, öğretmene destek olma, yönergeleri anlama</i>
FOLLOWING THE LESSON Answering teachers' questions, following the lesson, not losing interest in the lesson, concentrating on the subject, not asking irrelevant questions <i>Sorulara cevap verme, dersi takip etme, dersten kopmama, konuya yoğunlaşma, gereksiz soru sormama</i>
AIMING TO UNDERSTAND Aiming to learn during the lesson, and trying to understand <i>Derste öğrenmeyi amaçlama, anlamaya çalışma</i>
FOLLOWING RULES Following the rules, exhibiting good manners, being respectful and silent, raising hands to talk <i>Kurallara uyma, iyi davranışlar sergileme, saygılı olma, sessiz olma, parmak kaldırarak söz alma</i>
BEING RESPECTFUL Not interfering with friends' learning, giving them chances to practice and learn, being respectful toward them, listening to friends, establishing good relationships with their friends <i>Arkadaşlarına müdahale etmeme, hak tanıma, arkadaşlarına karşı saygılı olma, birbirini dinleme, birbiriyle iyi ilişkiler içinde olma</i>
EXPRESSING THEMSELVES Being able to express themselves <i>Kendini ifade edebilme</i>
MISTAKES Not being afraid of making mistakes <i>Hata yapmaktan korkmama</i>

A.7. Noticed Issues in the First, Second, and Third Interventions

TEACHER ROLES		1st Intervention	2nd Intervention	3rd Intervention
<i>Main-Themes and Main-Issues</i>	<i>Sub-issues</i>			
Methodological Perspective				
	Int: (100%; 100%; 100%) Ref (100%; 100%; 100%)			
Pedagogical Content Knowledge (PCK) (21 sub-issues)	FACILITATION Int (60%; 66.7%; 93.3%) Ref (21.4%; 13.3%; 20%)	Noticed√ (<i>Int 9 out of 15; ref 3 out of 14</i>)	Noticed√ (<i>10;2 out of 15</i>)	Noticed√ (<i>14;3 out of 15</i>)
	INSTRUCTIONS Int (13.3%; 66.7%; 60%) Ref (21.4%; 26.7%; 26.7%)	Noticed√ (<i>2;3</i>)	Noticed√ (<i>10;4</i>)	Noticed√ (<i>9;4</i>)
	REAL LIFE Int (33.3%; 60%; 60%) Ref (42.9%; 60%; 0%)	Noticed√ (<i>5;6</i>)	Noticed√ (<i>9;9</i>)	Noticed√ (<i>9;0</i>)
	REASONING Int (73.3%; 73.3%; 93.3%) Ref (42.9%; 46.7%; 86.7%)	Noticed√ (<i>11;6</i>)	Noticed√ (<i>11;7</i>)	Noticed√ (<i>14;13</i>)
	THINKING TIME Int (26.7%; 40%; 40%) Ref (14.3%; 0%; 26.7%)	Noticed√ (<i>4;2</i>)	Noticed√ (<i>6;0</i>)	Noticed√ (<i>6;4</i>)
	STUDENT CENTEREDNESS Int (60%; 86.7%; 80%) Ref (28.6%; 33.3%; 53.3%)	Noticed√ (<i>9;4</i>)	Noticed√ (<i>13;5</i>)	Noticed√ (<i>12;8</i>)
	REPRESENTATIONS Int (53.3%; 80%; 100%)	Noticed√ (<i>8;5</i>)	Noticed√ (<i>12;8</i>)	Noticed√ (<i>15;7</i>)

Ref (35.7%; 53.3%; 46.7%)			
GROUP WORK Int (53.3%; 46.7%; 53.3%) Ref (71.4%; 6.7%; 0%)	Noticed√ (8;10)	Noticed√ (7;1)	Noticed√ (8;0)
EVALUATION Int (26.7%; 26.7%; 26.7%) Ref (14.3%; 13.3%; 13.3%)	Noticed√ (4;2)	Noticed√ (4;2)	Noticed√ (4;2)
ACTIVITIES Int (46.7%; 80%; 86.7%) Ref (14.3%; 46.7%; 6.7%)	Noticed√ (7;2)	Noticed√ (12;7)	Noticed√ (13;1)
UNDERSTANDING Int (6.7%; 20%; 53.3%) Ref (14.3%; 6.7%; 53.3%)	Noticed√ (1;2)	Noticed√ (3;1)	Noticed√ (8;8)
INQUIRY Int (33.3%; 46.7%; 60%) Ref (57.1%; 40%; 40%)	Noticed√ (5;8)	Noticed√ (7;6)	Noticed√ (9;6)
CORRECT TERMINOLOGY Int (6.7%; 6.7%; 13.3%) Ref (57.1%; 13.3%; 13.3%)	Noticed√ (1;8)	Noticed√ (1;2)	Noticed√ (2;2)
STUDENT UNDERSTANDING Int (73.3%; 66.7%; 80%) Ref (57.1%; 20%; 26.7%)	Noticed√ (10;8)	Noticed√ (10;3)	Noticed√ (12;4)
DISCUSSION Int (33.3%; 26.7%; 13.3%) Ref (0%; 20%; 6.7%)	Noticed√ (5;0)	Noticed√ (4;3)	Noticed√ (2;1)
MISCONCEPTIONS Int (40%; 40%; 40%) Ref (21.4%; 40%; 40%)	Noticed√ (6;3)	Noticed√ (6;6)	Noticed√ (6;6)
EXPLANATIONS Int (20%; 6.7%; 13.3%) Ref (0%; 26.7%; 20%)	Noticed√ (3;0)	Noticed√ (1;4)	Noticed√ (2;3)

	STUDENT DIFFICULTIES Int (6.7%; 6.7%; 20%) Ref (0%; 6.7%; 0%)	Not-noticed <i>X</i>	Not-noticed <i>X</i>	Noticed√ (3;0)
	ALTERNATIVE SOLUTIONS Int (13.3%; 6.7%; 26.7%) Ref (0%; 0%; 13.3%)	Noticed√ (2;0)	Not-noticed <i>X</i>	Noticed√ (4;2)
	NOT BINDING Int (0%; 0%; 33.3%) Ref (0%; 0%; 20%)	Not-noticed <i>X</i>	Not-noticed <i>X</i>	Noticed√ (5;3)
	STUDENT THINKING Int (0%; 6.7%; 26.7%) Ref (0%; 0%; 13.3%)	Not-noticed <i>X</i>	Not-noticed <i>X</i>	Noticed√ (4;2)
General Pedagogical Knowledge (GPK) (10 sub-issues) Int (93.3%; 100%; 100%) Ref (71.4%; 60%; 80%)	COMMUNICATION Int (46.7%; 46.7%; 66.7%) Ref (0%; 0%; 13.3%;)	Noticed√ (7;0)	Noticed√ (7;0)	Noticed√ (10;2)
	MANAGEMENT Int (93.3%; 80%; 60%) Ref (71.4%; 46.7%; 40%)	Noticed√ (14;10)	Noticed√ (12;7)	Noticed√ (9;6)
	APPROACH Int (26.7%; 53.3%; 66.7%) Ref (0%; 0%; 46.7%)	Noticed√ (4;0)	Noticed√ (8;0)	Noticed√ (10;7)
	PRESSURE Int (60%; 33.3%; 6.7%) Ref (14.3%; 0%; 20%)	Noticed√ (9;2)	Noticed√ (5;0)	Noticed√ (1;3)
	STUDENT DIFFERENCES Int (0%; 13.3%; 26.7%) Ref (0%; 0%; 0%)	Not-noticed <i>X</i>	Noticed√ (2;0)	Noticed√ (4;0)
	DECISION-MAKING Int (13.3%; 6.7%; 26.7%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Not-noticed <i>X</i>	Noticed√ (4;0)

	SHAPING STUDENTS Int (13.3%; 20%; 46.7%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed√ (3;0)	Noticed√ (7;0)
	COMPETITION Int (0%; 0%; 0%) Ref (28.6%; 0%; 0%)	Noticed√ (0;4)	Not-noticed X	Not-noticed X
	EXPECTATIONS Int (20%; 6.7%; 6.7%) Ref (0%; 6.7%; 6.7%)	Noticed√ (3;0)	Not-noticed X	Not-noticed X
	ENGAGING Int (6.7%; 0%; 0%) Ref (21.4%; 0%; 0%)	Noticed√ (1;3)	Not-noticed X	Not-noticed X
	MATERIALS Int (73.3%; 46.7%; 80%) Ref (71.4%; 13.3%; 40%;)	Noticed√ (11;10)	Noticed√ (7;2)	Noticed√ (12;6)
Curriculum Knowledge (CK)	LESSON PLANNING Int (13.3%; 26.7%; 13.3%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed√ (4;0)	Noticed√ (2;0)
(11 sub-issues)	CONNECTIONS Int (33.3%; 46.7%; 46.7%) Ref (57.1%; 66.7%; 20%)	Noticed√ (5;8)	Noticed√ (7;10)	Noticed√ (7;3)
Int (100%; 93.3%; 100%) Ref (92.8%; 86.7%; 80%)	WRAPPING UP Int (40%; 6.7%; 13.3%) Ref (28.6%; 26.7%; 6.7%)	Noticed√ (6;4)	Noticed√ (1;4)	Noticed√ (2;1)
	INTRODUCTION Int (20%; 60%; 46.7%) Ref (7.1%; 86.7%; 13.3%)	Noticed√ (3;1)	Noticed√ (9;13)	Noticed√ (7;2)
	CHALLENGING MATHEMATICS Int (13.3%; 6.7%; 13.3%) Ref (0%; 6.7%; 0%)	Noticed√ (2;0)	Not-noticed X	Noticed√ (2;0)

	NEW PROGRAM Int (33.3%; 33.3%; 93.3%) Ref (14.3%; 0%; 20%)	Noticed√ (5;2)	Noticed√ (5;0)	Noticed√ (14;3)
	BEING PREPARED Int (20%; 20%; 53.3%) Ref (21.4%; 0%; 0%)	Noticed√ (3;3)	Noticed√ (3;0)	Noticed√ (8;0)
	STUDENT KNOWLEDGE Int (13.3%; %; 20%) Ref (0%; 0%; 6.7%)	Noticed√ (2;0)	Not-noticed X	Noticed√ (3;1)
	STUDENT LEVELS Int (26.7%; 46.7%; 46.7%) Ref (7.1%; 6.7%; 13.3%)	Noticed√ (4;1)	Noticed√ (7;1)	Noticed√ (7;2)
	GUIDE BOOK Int (0%; 6.7%; 33.3%) Ref (0%; 0%; 0%)	Not-noticed X	Not-noticed X	Noticed√ (5;0)
Content Knowledge (COK)	SUBJECT-MATTER KNOWLEDGE Int (26.7%; 13.3%; 33.3%) Ref (7.1%; 13.3%; 6.7%)	Noticed√ (4;1)	Noticed√ (2;2)	Noticed√ (5;1)
	Int (26.7%; 13.3%; 33.3%) Ref (7.1%; 20%; 6.7%)			
Other (O)-related to methodological perspective (8 sub-issues)	MOTIVATION Int (6.7%; 13.3%; 33.3%) Ref (7.1%; 0%; 26.7%)	Not-noticed X	Noticed√ (2;0)	Noticed√ (5;4)
	SELF-ESTEEM Int (20%; 6.7%; 6.7%) Ref (7.1%; 6.7%; 0%)	Noticed√ (3;1)	Not-noticed X	Not-noticed X
	EXPERIENCE Int (66.7%; 60%; 86.7%) Ref (28.5%; 20%; 60%)	Noticed√ (4;1)	Noticed√ (3;0)	Noticed√ (8;0)
	Int (26.7%; 20%; 53.3%) Ref (7.1%; 0%; 0%)			

	EFFECTIVE INSTRUCTION Int (13.3%; 0%; 6.7%) Ref (7.1%; 0%; 0%)	Noticed√ (2;1)	Not-noticed X	Not-noticed X
	REACHING TARGETS Int (6.7%; 13.3%; 20%) Ref (0%; 6.7%; 0%)	Not-noticed X	Noticed√ (2;1)	Noticed√ (3;0)
	TECHNOLOGY Int (0%; 6.7%; 20%) Ref (0%; 0%; 6.7%)	Not-noticed X	Not-noticed X	Noticed√ (3;1)
	CLASSROOM CULTURE Int (40%; 40%; 53.3%) Ref (7.1%; 6.7%; 33.3%)	Noticed√ (6;1)	Noticed√ (6;1)	Noticed√ (8;5)
	STUDENT EXPRESSION Int (13.3%; 0%; 0%) Ref (0%; 0%; 6.7%)	Noticed√ (2;0)	Not-noticed X	Not-noticed X
Attitudinal Perspective (10 sub-issues)	MATHEMATICS AS A FUN Int (20%; 33.3%; 80%) Ref (7.1%; 66.7%; 6.7%)	Noticed√ (3;1)	Noticed√ (5;10)	Noticed√ (12;1)
Int (66.7%; 66.7%; 93.3%) Ref (42.8%; 73.3%; 66.7%)	ENTHUSIASM Int (0%; 13.3%; 20%) Ref (0%; 0%; 6.7%)	Not-noticed X	Noticed√ (2;0)	Noticed√ (3;1)
	COMFORT Int (13.3%; 6.7%; 26.7%) Ref (0%; 6.7%; 0%)	Noticed√ (2;0)	Not-noticed X	Noticed√ (4;0)
	POSITIVE ATTITUDE Int (6.7%; 6.7%; 33.3%) Ref (7.1%; 6.7%; 6.7%)	Not-noticed X	Not-noticed X	Noticed√ (5;1)
	VALUING IDEAS Int (26.7%; 13.3%; 0%) Ref (21.4%; 26.7%; 20%)	Noticed√ (4;3)	Noticed√ (2;4)	Noticed√ (0;3)

	VOICE TONE Int (6.7%; 6.7%; 20%) Ref (0%; 0%; 46.7%)	Not-noticed <i>X</i>	Not-noticed <i>X</i>	Noticed√ (3;7)
	KNOWING STUDENTS Int (6.7%; 13.3%; 6.7%) Ref (0%; 6.7%; 0%)	Not-noticed <i>X</i>	Noticed√(2;1)	Not-noticed <i>X</i>
	PATIENCE Int (0%; 13.3%; 0%) Ref (0%; 0%; 0%)	Not-noticed <i>X</i>	Noticed√(2;0)	Not-noticed <i>X</i>
	STUDENT PSYCHOLOGY Int (0%; 13.3%; 6.7%) Ref (0%; 6.7%; 6.7%)	Not-noticed <i>X</i>	Noticed√(2;1)	Not-noticed <i>X</i>
	RESPECT Int (0%; 6.7%; 20%) Ref (0%; 0%; 0%)	Not-noticed <i>X</i>	Not-noticed <i>X</i>	Noticed√ (3;0)
<hr/>				
	Other Int (53.3%;66.7%; 80%) Ref (21.4%; 26.7%; 13.3%)			
Teacher characteristics (TC)	SELF-IMPROVEMENT Int (0%; 13.3%; 26.7%) Ref (0%; 0%; 0%;)	Not-noticed <i>X</i>	Noticed√ (2;0)	Noticed√ (4;0)
(4 sub-issues)	SELF-ASSURANCE Int (6.7%; 13.3%; 13.3%) Ref (0%; 0%; 0%)	Noticed√ (1;0)	Noticed√(2;0)	Noticed√ (2;0)
Int (13.3%; 40%; 33.3%) Ref (0%, 0%, 0%)	MISTAKES Int (6.7%; 20%; 6.7%) Ref (0%; 0%; 0%)	Noticed√ (1;0)	Noticed√ (3;0)	Not-noticed <i>X</i>
	COLLABORATION Int (0%; 13.3%; 0%) Ref (0%; 0%; 0%)	Not-noticed <i>X</i>	Noticed√(2;0)	Not-noticed <i>X</i>

Equity (E) (5 sub-issues) Int (46.7%; 60%; 73.3%) Ref (21.4%, 28.6%, 14.3%)	REACHING ALL Int (26.7%; 40%; 33.3%) Ref (14.3%; 13.3%; 6.7%)	Noticed√ (4;2)	Noticed√ (6;2)	Noticed√ (5;1)
	ENSURING UNDERSTANDING OF ALL Int (33.3%; 26.7%; 0%) Ref (7.1%; 0%; 6.7%)	Noticed√ (5;1)	Noticed√ (4;0)	Noticed√ (3;1)
	MAXIMUM CAPACITY Int (6.7%; 0%; 13.3%) Ref (0%; 0%; 0%)	Not-noticed X	Not-noticed X	Noticed√ (2;0)
	ADDRESSING TO STUDENTS WITH DIFFERENT LEVELS Int (13.3%; 13.3%; 13.3%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed√ (2;0)	Noticed√ (2;0)
	ACTIVATING ALL Int (13.3%; 26.7%; 26.7%) Ref (14.3%; 13.3%; 0%)	Noticed√ (2;2)	Noticed√ (4;2)	Noticed√ (4;0)
Out-of-class activity (OC) (3 sub-issues) Int (6.7%; 6.7%; 6.7%) Ref (0%, 0%, 0%)	STUDENT FUTURE Int (6.7%; 0%; 6.7%) Ref (0%; 0%; 0%)	Noticed√ (1;0)	Not-noticed X	Noticed√ (1;0)
	PARENTAL SUPPORT Int (0%; 6.7%; 0%) Ref (0%; 0%; 0%)	Not-noticed X	Noticed√ (1;0)	Not-noticed X
	FOLLOWING STUDENTS Int (0%; 0%; 6.7%) Ref (0%; 0%; 0%)	Not-noticed X	Not-noticed X	Noticed√ (1;0)

STUDENT ROLES				
<i>Main-Themes</i>	<i>Sub-issues</i>	1st Intervention	2nd Intervention	3rd Intervention
Methodological Perspective (9 sub-issues) Int (85.7%; 100%; 80%) Ref (71.4%, 53.3%, 13.3%)	DISCOVERY Int (13.3%; 33.3%; 0%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed√ (5;0)	Not-noticed X
	INQUIRY Int (33.3%; 26.7%; 20%) Ref (7.1%; 0%; 0%)	Noticed√ (5;1)	Noticed√ (4;0)	Noticed√ (3;0)
	USING MATERIALS Int (0%; 20%; 13.3%) Ref (1%; 0%; 0%)	Not-noticed X	Noticed√ (3;0)	Noticed√ (2;1)
	GROUP WORK Int (73.3%; 66.7%; 46.7%) Ref (28.6%; 0%; 0%)	Noticed√ (11;4)	Noticed√(10;0)	Noticed√ (7;0)
	REAL LIFE Int (0%; 13.3%; 0%) Ref (0%; 26.7%; 0%)	Not-noticed X	Noticed√ (2;4)	Not-noticed X
	CONSTRUCTING ONE'S OWN KNOWLEDGE Int (0%; 33.3%; 26.7%) Ref (1%; 0%; 0%)	Not-noticed X	Noticed √ (5;0)	Noticed√ (4;1)
	CONNECTIONS BETWEEN SUBJECTS Int (0%; 13.3%; 0%) Ref (0%; 13.3%; 0%)	Not-noticed X	Noticed√ (2;2)	Not-noticed X
	DISCUSSION Int (0%; 13.3%; 13.3%) Ref (0%; 0%; 0%)	Not-noticed X	Noticed√ (2;0)	Noticed√ (2;0)

	NEW PROGRAM Int (0%; 20%; 0%) Ref (0%; 6.7%; 0%)	Not-noticed <i>X</i>	Noticed√ (3;1)	Not-noticed <i>X</i>
Attitudinal Perspective (4 sub-issues)	ACTIVE PARTICIPATION Int (73.3%; 60%; 66.7%) Ref (28.6%; 26.7%; 6.7%)	Noticed√ (11;4)	Noticed√ (9;4)	Noticed√ (10;1)
Int (86.7%; 80%; 100%) Ref (35.7%, 26.7%, 26.7%)	BEING RELAXED Int (53.3%; 20%; 53.3%) Ref (0%; 0%; 20%)	Noticed√ (8;0)	Noticed√ (3;0)	Noticed√ (8;3)
	ENJOYING MATHEMATICS Int (0%; 0%; 13.3%) Ref (0%; 0%; 0%)	Not-noticed <i>X</i>	Not-noticed <i>X</i>	Noticed√ (2;0)
	EXCITEMENT Int (13.3%; 0%; 0%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Not-noticed <i>X</i>	Not-noticed <i>X</i>
Classroom Culture (7 sub-issues)	RESPONSIBILITIES Int (13.3%; 33.3%; 13.3%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed√ (5;0)	Noticed√ (2;0)
Int (66.7%; 80%; 66.7%) Ref (0%, 40%, 13.3%)	FOLLOWING THE LESSON Int (0%; 33.3%; 40%) Ref (0%; 0%; 6.7%)	Not-noticed <i>X</i>	Noticed√ (5;0)	Noticed√ (6;1)
	AIMING TO UNDERSTAND Int (13.3%; 13.3%; 0%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed√ (2;0)	Not-noticed <i>X</i>
	FOLLOWING RULES Int (26.7%; 33.3%; 26.7%) Ref (0%; 26.7%; 0%)	Noticed√ (4;0)	Noticed√ (5;4)	Noticed√ (4;0)
	BEING RESPECTFUL Int (46.7%; 40%; 13.3%) Ref (0%; 13.3%; 0%)	Noticed√ (7;0)	Noticed√ (6;2)	Noticed√ (2;0)

	EXPRESSING THEMSELVES Int (20%; 13.3%; 0%) Ref (0%; 0%; 0%)	Noticed√ (3;0)	Noticed√ (2;0)	Not-noticed X
	MISTAKES Int (13.3%; 0%; 0%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Not-noticed X	Not-noticed X
Other Int (13.3%; 6.7%; 6.7%) Ref (0%, 0%, 0%)	IMAGINATION Int (13.3%; 6.7%; 6.7%) Ref (0%; 0%; 0%)	Noticed√ (2;0)	Noticed (1;0)	Noticed (1;0)

APPENDIX B

B.1. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Osmanođlu, Aslıhan
Nationality: Turkish (TC)
Date and Place of Birth: 10 September 1976, Ordu
Marital Status: Single
Phone: +90 312 210 40 59
Fax: +90 312 210 79 84
email: oaslihan@metu.edu.tr

EDUCATION

Degree	Institution	Year of Graduation
MS	Ohio University Mathematics Education	2003
BS	Yildiz Technical University Mathematics Engineering	1997
High School	Ordu Fatih Lisesi, Ordu	1993

WORK EXPERIENCE

Year	Place	Enrollment
2006- Present	METU Department of Education	Research Assistant
2005-2006	Trakya University Department of Education	Research Assistant

FOREIGN LANGUAGES

English

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1. Koc, Y., Peker, D., & Osmanoglu, A. (2009). *Supporting teacher professional development through online video case discussions: An assemblage of preservice and inservice teachers and the case teacher*. *Teaching and Teacher Education*, 25(8), 1158-1168, [doi:10.1016/j.tate.2009.02.020](https://doi.org/10.1016/j.tate.2009.02.020).

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APPENDIX C

C.1. TURKISH SUMMARY

1.1. Amaç ve Gerekeçe

Öğretmenlik tüm sorumluluk ve gerekleriyle zor bir meslektir. Özellikle reform çabalarının getirdiği yükler ile öğretmenlerin sorumlulukları biraz daha artmıştır. Reforma dayalı bir programı başarılı kılan ise ancak öğretmenlerin onu sınıflarında uygulayabilmeleridir (Feiman-Nemser, 2001; Spillane, 1999). Bu da öğretmen cephesinde ciddi bir öğrenme süreci gerektirmektedir ve destek ile yönlendirme olmadan gerçekleşmesi zordur (Borko, 2004). Öğretmen adayları bu öğrenme sürecinde üniversite eğitimleriyle sınırlıdır. Bu nedenle, öğretmen eğitimi sürecinde öğretmen adaylarına yeni ilköğretim programında vurgulanan öğretme ve öğrenme ortamlarını tanıtmak ve onları gerçek sınıf ortamlarının zorluklarına hazırlamak gereklidir. Diğer bir deyişle, öğretmen eğitimi programları, gerçek sınıf ortamının zorluklarına hazır ve kaliteli öğretmen yetiştirmede önemli rol oynamaktadır. Kaliteli öğretmen yetiştirebilmede ise bu programların öğretimi modelleyen bir rol üstlenmesi gerekmektedir. Örnek olay kullanımı bu hedeflere ulaşmada kullanılacak yöntemlerden biridir.

Örnek olay incelemeleri uzun süredir hukuk, tıp, işletme gibi alanlarda öğretim amaçlı kullanılmaktadır (Masingila & Doerr, 2002; Shulman L., 1992; Sowder, 2007). Paralel şekilde, öğretmen eğitiminde kullanımı yeni olmayıp 1920'lere dayanmaktadır (Merseth, 1999) ve son 20 yıl içerisinde kullanımı daha da yaygınlaşmıştır (Darling-Hammond & Hammerness, 2002; Merseth, 1996; Shulman L., 1992).

Literatürde, amaç ve kullanımına göre çeşitli örnek olay tanımları mevcuttur (Merseth, 1996). J. Shulman (1992) sınıf ortamında kullanılan örnek

olayları, kontrol edilebilir gerçeklikler olarak tanımlamaktadır. Bunlar, öğretmen eğitiminde kullanılmak üzere oluşturulmuş ve öğretimi tanımlayan olaylardır (Sykes & Bird, 1992). Örnek olaylar, problem çözme yeteneğini geliştiren, öğretimi anlamaya yarayan ve öğretmen ve öğretmen adaylarına analiz fırsatı veren araçlardır.

Literatürde, çoğunluğu nitel olmak üzere, öğretmen adayları ve/veya öğretmenlerle gerçekleştirilmiş çeşitli çalışmalar mevcuttur (Arellano et al., 2001; Bencze et al., 2001; Boling, 2007; Daehler & Shinohara, 2001; Louden et al., 2001; Loughran et al., 2001; Maor, 2000; Mayo, 2004; Mccurry, 2002; Powell, 2000; Schrader et al., 2003; Van den Berg, 2001). Bu çalışmalardan bazıları ise matematik öğretmenleriyle gerçekleştirilmiştir (Borko et al., 2007; Doerr & Thompson, 2004; Hill & Collopy, 2003; Masingila and Doerr, 2002; McGraw et al., 2007; van Es & Sherin, 2008). Kimi çalışmalar yazılı örnek olay incelemesini ele alırken bazıları video ya da çoklu ortam örnek olaylarını kullanmışlardır.

Fen, edebiyat, sosyal bilimler gibi alanların yanı sıra, matematik öğretmen eğitiminde de örnek olay incelemesi üzerine yapılmış çalışmalar olumlu sonuçlara işaret etmektedir. Örneğin, Masingila ve Doerr (2002) öğretmen adaylarının örnek olay kullanımıyla karmaşık öğretim deneyimlerini anlamlandırabildiklerini ve örnek olayların uygulamalarını yönlendirdiklerini göstermiştir. Adaylar, öğrencilerin nasıl düşündükleri üzerine yorum yapabilmüş ve yaşadıkları zorluklara odaklanabilmiştir. Doerr ve Thompson'ın (2004) çalışması ise, öğretmen adayları ve öğretmen eğitimcileri ile gerçekleştirilmiş ve örnek olay kullanımı ile öğretmen eğitimcilerinin adayların öğretime dair düşüncelerini anlayabildiklerini ve öğretmen eğitimcileri ve adaylarının matematik alan bilgisinin öğretimdeki önemini kavrayabildiklerini göstermiştir. Hill ve Collopy (2003) ise video-tabanlı örnek olay kullanımının öğretmenlerin matematiksel anlamalarını artırdığını ve öğrenci kavram yanılgılarını fark etmelerine yardımcı olduğunu göstermiştir.

Örnek olay incelemelerinin öğretmen eğitiminde önem kazanmasının altında yatan nedenlerden biri öğretmen adaylarını gerçek ve karmaşık öğretim ortamlarına hazırlamasıdır (Harrington, & Garrison, 1992; Lundeberg & Levin, 2003; Mayo, 2004; Powell, 2000). Öğretmenlerin teorik bilgilerini pratiğe dökebilecekleri çok fazla ortama sahip olmamaları, örnek olayları faydalı bir metot kılmaktadır (Pressley, 1999). Ayrıca, öğretmen ve öğretmen adaylarının öğrencilerini bilişsel anlamda daha iyi tanımaları ve öğrenci öğrenmelerini artırmaları anlamında da faydaları vardır (Masingila & Doerr, 2002). Tartışma ortamı oluşturarak öğretmen ve adaylarının farklı bakış açılarını görmelerini sağlaması ve işbirlikçi öğrenme ve öğretmen ortamı oluşturması anlamında da yararlar sağlamaktadır (Arellano et al., 2001). Tüm bu özellikler öğretmen eğitiminde örnek olay kullanımını etkili bir araç kılmaktadır.

Literatürde var olan çalışmaların da gösterdiği gibi öğretmen eğitiminde örnek olay incelemesi kullanımı öğretmen adaylarının öğrenmelerine katkı sağlamaktadır. Öğretmen yetiştirmede karşılaşılan güçlükler dikkate alındığında öğretmen adaylarının eğitimlerinden maksimum faydayı sağlamaları ve öğretime daha hazır hale gelmeleri için öğretmen eğitiminde birtakım yeniliklere gidilmesinin gerekliliği fark edilmektedir. Bu anlamda, olumlu bulgular gösteren çalışmaların ışığında öğretmen yetiştirmede örnek olay kullanımının öğretmen adaylarının öğrenmelerine katkı sağlayacağı, teorik bilgilerini pratik bilgileriyle ilişkilendirmeleri için fırsat yaratacağı ve farklı düşünce ve yaklaşımların paylaşıldığı bir ortamda öğretime daha hazır hale gelmelerini sağlayacağı düşünülmektedir.

1.2. Yeni İlköğretim Matematik Programı ve Örnek Olay Kullanımı

Pilot çalışmaları 2004 yılında başlatılmış olan yeni ilköğretim matematik programı, matematiği kurallar ve ezberlenmesi gereken formüllerden ziyade anlamlı ilişkiler ağı kabul etmekte ve etkili, anlamlı ve kalıcı öğrenme gerçekleştirilebilecek öğrenme ortamları oluşturmayı amaçlamaktadır (Talim

Terbiye Kurulu [TTKB], 2006). Öğrencilerin daha aktif bir rol alması beklenen bu programda sorgulama, keşfetme, grup çalışması ve bilgiyi yapılandırma esastır. Bu hedeflere ulaşmada öğretmen ve öğrencilere düşen görev ve sorumluluklar da artmıştır. TTKB'nin (2006) raporunda belirtilen öğretmen sorumluluklarından bazıları sorgulama; düşündürme ve tartışırma; etkinlik geliştirme ve uygulama; yönlendirme, rehberlik yapma ve motive etme; öğrencileri tanıma; anlamlı ve kalıcı öğrenme sağlama; bilgiyi yapılandırma ve bilgiyi günlük hayatla ilişkilendirmedir. Benzer şekilde yeni program kapsamında öğrencilerden beklenenler de değişim göstermiştir. Buna göre öğrencilerden beklenenler öğrenme sürecine zihinsel ve fiziksel olarak aktif katılma; kendini ifade edebilme; soru sorma ve sorgulama; düşünme ve tartışma; kendi öğrenmelerinden sorumlu olma; birlikte çalışabilme ve iyi iletişim kurabilmedir.

Öğretmen ve öğrencilerin bu özelliklere sahip olması, yeni programın başarılı olması için gereklidir. Yeni programın hedeflerine ulaşabilmesi, en azından karşılaşılabilecek problemlerin en aza indirgenmesi adına, öğretmen adaylarının programın beklentilerini öğrenmeleri ve programı tanımaları gereklidir. Bu noktada öğretmen eğitiminde örnek olay kullanımı ile öğretmen adaylarının reforma dayalı öğretime hazırlanması etkili bir yoldur (Lloyd, 1999). Öğrenmeyi aktif bir süreç kabul eden eğitimde örnek olay kullanımı (Mayo, 2004) ile öğretmen adaylarının yeni programın öğretim ve öğrenime yaklaşımını anlayabilmeleri mümkün olabilmektedir. Sowder (2007)'e göre örnek olay kullanımı ile öğretmenler öğrenci merkezli öğretme ve öğrenmeyi analiz etme şansı yakalayabilmektedirler. Özellikle birlikte yapacakları analiz ve tartışmalar ile öğretmenler, öğrenciler ve matematiği nasıl öğrendiklerine dair bilgi edinebilmektedirler (Lloyd, 1999). Masingila ve Doerr (2002), öğretmen adaylarına örnek olay kullanımı ile öğrenci düşünceleri üzerine yansıtıcı görüş paylaşabilecekleri ortamlar sunulmasının, onların gelişimleri adına gerekli olduğunu belirtmişlerdir. Bu çalışmayla, öğretmen adaylarına yeni programa

uygun ders ortamlarını inceleme ve analiz etme fırsatı verilerek görüş paylaşabilecekleri ortamlar sunulması ve onların eğitim ve öğretime hazırlanmasına katkı sağlaması amaçlanmıştır.

Sonuç olarak, öğretmen eğitiminde örnek olay incelemesi kullanımı öğretim ve öğrenmenin doğasını daha iyi anlamamızı sağlaması açısından önemlidir. Matematik öğretmen eğitiminde örnek olay kullanımı ile kalitenin artırılması ve öğretmenlere daha fazla ve yararlı bilgi kazandırılması mümkün gözükmektedir. Bu çalışmanın amacı, öğretmen eğitiminde örnek olay kullanımı üzerine yapılmış çalışmalar ışığında, ilköğretim matematik eğitimi öğretmen adaylarının video örnek olaylarından ne derece yararlandıklarını araştırmaktır. Diğer bir deyişle, bu çalışmada ilköğretim matematik öğretmenliği bölümü öğretmen adaylarının video örnek olayları izleme ve çevrimiçi tartışmalar ile fark etme becerilerinde meydana gelebilecek değişiklikler incelenmiştir. Bu bağlamda, Ortadoğu Teknik Üniversitesi İlköğretim Matematik Öğretmenliği Bölümü son sınıf öğrencilerinden bir ders kapsamında gerçek matematik sınıflarında çekilmiş videolar izlemeleri ve bunları çevrimiçi ortamda tartışmaları istenmiştir. Bu amaçla, 45 ODTÜ Matematik Öğretmenliği bölümü son sınıf öğrencisi 4 gruba bölünmüş ve reforma dayalı bir video sınıfta izlendikten sonra her bir gruptan çevrimiçi ortamda bu video üzerine tartışmaları istenmiştir. Çalışma kapsamında farklı gruplardan toplam 15 öğretmen adayı seçilmiş ve analizler bu odak katılımcılar üzerinden gerçekleştirilmiştir. Çalışma bir dönem sürmüştür.

1.3. Alana Sağladığı Katkı

Bu çalışma sonucunda alana çeşitli katkılar sağlamaktadır. Çalışma sonuçları öğretmen eğitimine yeni bakış açıları sunmakta ve öğretmen adaylarını yeni programa yönelik öğretime hazırlamada fayda sağlamaktadır.

Daha önce de belirtildiği gibi reforma dayalı öğretmen eğitimi verebilmede öğretmen adaylarının programı tanımaları önemlidir. Aksi takdirde

reformun gerekleri öğretmenlerin üzerinde ağır bir yük olmakta ve öğretim kalitelerinin düşmesi hatta mesleği bırakma gibi kötü sonuçlar doğurabilmektedir. Bu çalışma öğretmen adaylarına reforma uygun bir örnek olay üzerine tartışabilecekleri bir ortam sunmakta ve birbirlerinin farklı görüş ve bilgilerinden faydalanma fırsatı yaratmaktadır. Çalışmada ayrıca mesleki gelişim aracı olarak video örnek olayı kullanılmış ve iletişim teknolojilerinden yararlanılmıştır. Öğretmen adaylarının video örnek olaylarından ne öğrendikleri üzerine yapılan çalışmaların azlığı (Boling, 2007) göz önüne alındığında çalışmanın alana sağladığı katkı açıkça görülmektedir.

1.4. Metot

Bu çalışma kapsamında Ankara merkez Çankaya ilçesindeki gönüllü ilköğretim okullarında matematik dersleri videoya alınmış ve bu videolar başka bir araştırmacının daha önce çekmiş olduğu videolarla birlikte öğretmen adaylarına tartışma ortamında örnek olaylardan ne öğrendiklerini anlamak amacıyla izletilmiştir. Pilot çalışması 2007-2008 bahar döneminde tamamlanan bu çalışma ODTÜ İlköğretim Bölümü Matematik Öğretmenliği son sınıf öğrencileriyle 2007-2008 güz döneminde gerçekleştirilmiştir. Bu çalışma ile matematik öğretmen adaylarının örnek olay incelemesinden ne öğrendiklerinin ve bu süreçte ne tür beceriler kazandıklarının tespit edilmesi amaçlanmıştır.

Daha detaylı belirtmek gerekirse, 2008-2009 güz döneminde son sınıf öğretmen adayı grubundan altı adet 5-7. sınıf matematik dersi videosu izlemeleri ve bunları METU çevrimiçi forum ortamında tartışmaları istenmiştir. 6-7. sınıf videoları araştırmacı tarafından bir önceki dönemde gerçek sınıflarda çekilmiş videolardır. Katılımcılardan her hafta sınıfta video izledikten hemen sonra video yorumlarını yazmaları istenmiştir. Çevrimiçi tartışmalar Metu Online-Net ClassR tartışma forumunda gerçekleştirilmiş ve tartışmalar her bir video üzerine yaklaşık bir hafta sürmüştür.

Katılımcıların dikkatini videodaki yeni ilköğretim matematik programına uygun ve uygun olmayan noktalara çekebilmek adına tartışma yürütücüsü derste kullanılan öğretim teknikleri ve öğrenci öğrenmelerine etkileri, öğrencilerin anladıkları ve anlamadıkları noktalar üzerine sorular yönelmiş ve videolardan örnekler istemiştir. Çalışma öncesinde, 2 eğitimci ve 1 öğretmenden videoları izlemeleri istenmiş ve reforma dair videolarda gördükleri noktalar listelenerek tartışma soruları hazırlanmıştır.

Bu çalışma, doğası gereği nitel bir çalışmadır. Veri toplama araçları temel olarak yazılı yansıtıcı video raporları, seçilen öğrencilerle gerçekleştirilen görüşmeler ve çevrimiçi tartışma ortamıdır. Seçilen 15 öğrenciyle dönem başı, ortası ve sonunda gerçekleştirilen görüşmeler ana veri toplama araçlarıdır. Veriler nitel veri analizi teknikleriyle analiz edilmiş olup içerik analizinden faydalanılmış ve veriler seçilen teorik çerçeveye (Fark etme Teorisi) ait analiz prosedürüyle analiz edilmiştir.

Veri kodlama sürecinin ilk aşamasında alan yazınından yararlanarak ve açık kodlama suretiyle kodlar geliştirilmiştir. Birbirini kapsadığı düşünülen kodlar birleştirilmiştir. Kodlar belirlendikten sonra öğretmen adaylarının yansıtıcı görüşleri, belirlenen bu kodlar göz önünde bulundurularak okunmuş ve üzerinde durdukları konular bu kodlar ile kodlanmıştır. Benzer şekilde, çözümlenen görüşmeler de kodlanmıştır. Bu kodlama sırasında bazen tek bir cümle birden fazla kod ile kodlanabildiği gibi bazen bir mesaja tek bir kod verilmiştir. Kodlama işlemi iki matematik eğitimcisi tarafından gerçekleştirilmiş ve güvenilirlik için kodlar tartışmalar sonucunda ortak karar ile verilmiştir.

Aşağıda kodlama süreci sonucunda elde edilen ve temalar altında toplanan öğretmen ve öğrenci rolleri sırasıyla sunulmuştur.

Tablo 1. Öğretmen Rollerini

Ana-temalar		Metotsal Bakış				Tutumusal Bakış	Diğer		
Ana-konular	Pedagojik Alan Bilgisi (PCK)	Genel Pedagojik Bilgi (GPK)	Müfredat Bilgisi (CK)	Alan Bilgisi (COK)	Diğer (O)		Öğretmen Karakteristiği (TC)	Eşitlik (E)	Sınıf-dışı Aktiviteler (OC)
Alt-konular	Yönlendirme	İletişim	Materyaller	Alan bilgisi	Motivasyon	Eğlenceli matematik	Kendini geliştirme	Herkese ulaşma	Öğrenciyi geleceğe hazırlama
	Öğretim	Yönetim	Dersi planlama		Özgüven	İstek	Kendine güven	Herkesin anlamasını sağlama	Aile desteği
	Gerçek yaşam	Yaklaşım	İlişkilendirmeler		Tecrübe	Rahat olma	Hata	Maksimum kapasite	Öğrenciyi takip
	Akıl yürütme	Baskı	Dersi toparlama		Etkili öğretim	Olumlu yaklaşım	İşbirliği	Farklı seviyelere ulaşma	
	Düşünme süresi	Öğrenci farklılıkları	Derse giriş		Hedefe ulaşma	Fikirleri önemseme		Eşit katılım	
	Öğrenci merkezliliği	Karar verme	Üst seviye matematik		Teknoloji	Ses tonu			
	Farklı gösterimler	Öğrenciyi şekillendirme	New program		Sınıf kültürü	Öğrenciyi tanıma			
	Grup çalışması	Rekabet	Hazırlıklı olma		Öğrenci ifadeleri	Sabır			
	Değerlendirme	Beklentiler	Öğrenci bilgisi			Öğrenci psikolojisi			
	Aktivite	İlgi çekme	Öğrenci seviyeleri			Saygı			
	Anlama		Rehber kitap						
	Sorgulama								

Dođru terim

Öđrenci
anlamaları

Tartıřma

Kavram

yanılgıları

Açıklamalar

Öđrenci
zorlukları

Alternatif

çözümle

Sınırlamama

Öđrenci
düşünmeleri

Tablo 2. Öğrenci Roller

Ana temalar	Metotsal Bakış	Tutumusal Bakış	Sınıf Kültürü	Diğer
Alt-konular	Keşfetme	Aktif katılım	Sorumluluklar	Hayal gücü
	Sorgulama	Rahat olma	Dersi takip etme	
	Materyal kullanma	Zevk alma	Anlamayı hedefleme	
	Grup çalışması	Heyecan	Yönlendirme	
	Gerçek yaşam		Kurallara uyma	
	Bilgiyi inşa etme		Saygılı olma	
	İlişkilendirme		Kendini ifade etme	
	Tartışma		Hatalar	
	Yeni program			

1.5. Bulgular

Bulgular, video örnek olayı ve çevrimiçi tartışmalar ile öğretmen adaylarının gerçek bir matematik sınıf ortamını gözleme şansı elde ettiklerini ve videodaki öğretim ve öğrenim üzerine konuşabildiklerini göstermektedir. Öğretmen adayları yönlendirildiklerinde yeni programın gerekleri üzerine daha kapsamlı ve detaylı konuşabilmekte ve öğrenci anlamaları üzerine daha fazla yoğunlaşabilmektedir. Diğer bir deyişle, öğretmen adayları video tartışmaları sırasında sınıf ortamı, öğretmen ve öğrenci rolleri gibi farklı konular üzerine konuşabilmekte ve tartışma yürütücüsünün yönlendirmeleriyle tartışma içeriklerini zenginleştirebilmektedir. Sonuç olarak, öğretmen eğitiminde video örnek olayı kullanımının etkili olabildiği ve öğretmen adaylarını yeni programa dayalı öğretime hazırlayabildiği düşünülmektedir. Aşağıda öğretmen adaylarının birinci, ikinci ve üçüncü görüşmelerde fark ettikleri roller sırasıyla öğretmen ve öğrenci rolleri başlıkları altında sunulmaktadır. Görüşme bulguları, öğretmen adayı yazılı yansıtıcı görüşleri ve çevrimiçi tartışmalarda fark edilen noktalarla desteklenmektedir.

1.5.1. Birinci Görüşmeler, Yansıtıcı Görüşler ve Çevrimiçi Tartışmalarda Fark edilen Öğretmen Roller

Metot bölümünde de verildiği gibi kodlamalar sonucu elde edilen 3 temel tema *Metotsal Bakış*, *Tutumusal Bakış* ve *Diğer*'dir. Onbeş katılımcının birinci görüşmeleri kodlandığında tüm katılımcıların *Metotsal Bakış* teması üzerine konuşabildikleri görülmüştür. Diğer yandan, 10 katılımcı *Tutumusal Bakış*, 8 katılımcı ise *Diğer* temasına ilişkin rollerden bahsedebilmişlerdir. Birinci yansıtıcı görüşlerde ise yine tüm katılımcılar *Metotsal Bakış* teması üzerine konuşabilmişlerdir. *Tutumusal Bakış* temasına 6 katılımcı, *Diğer* temasına ilişkin rollere ise 3 katılımcı değinebilmiştir. Aşağıda bu ana temalara ilişkin ana-konular ele alınacaktır.

1.5.1.1. Öğretmen Rollerine İlişkin Fark edilen Ana-Konular

Metotsal Bakış temasına ilişkin 5 ana-konu yer almaktadır. Bunlar Pedagojik Alan Bilgisi, Genel Pedagojik Bilgi, Müfredat Bilgisi, Alan Bilgisi ve “Diğer” konularıdır. *Tutumsal Bakış* temasına ait ana-konu bulunmazken *Diğer* temasına ait 3 ana-konu yer almaktadır. Bunlar Öğretmen Karakteristiği, Eşitlik ve Sınıf-Dışı Aktivitelere dir.

1.5.1.1.1. Metotsal Bakış Temasına İlişkin Fark edilen Ana-Konular

Yukarıda da belirtildiği gibi tüm katılımcılar *Metotsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu katılımcıların tamamı Pedagojik Alan Bilgisi üzerine konuşabilirken 14’ü Genel Pedagojik Bilgi, 15’i Müfredat Bilgisi, 4’ü Alan Bilgisi ve 10’u “Diğer” rollerinden bahsedebilmişlerdir. Benzer şekilde, birinci yansıtıcı görüşlerde de tüm katılımcılar Pedagojik Alan Bilgisi üzerine konuşabilmiştir. Katılımcıların 10’u Genel Pedagojik Bilgi, 13’ü Müfredat Bilgisi, 1’i Alan Bilgisi ve 4’ü “Diğer” rollerinden bahsedebilmişlerdir.

1.5.1.1.1.1. Pedagojik Alan Bilgisi’ne İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde tüm katılımcılar Pedagojik Alan Bilgisi üzerine konuşabilmiştir. Bu ana-konu altında 21 adet alt-konu yer almaktadır. Bu alt-konular Metot bölümünde verilmiştir. Bu alt-konulardan 18’i birinci görüşmelerde katılımcılar tarafından fark edilebilmiştir.

Örnek vermek gerekirse, birinci görüşmelerde 15 katılımcıdan 9’u “Yönlendirme” rolü üzerine konuşabilmişlerdir. Bu öğretmen rolü en fazla fark edilen rollerden biridir. Örneğin, Katılımcı-4 yeni programda öğretmenin yönlendirme rolünün önemini aşağıdaki gibi vurgulamıştır:

Yeni müfredatın en önemli özelliği. Öğretmen rehberdir. Rehber. Yani benim mesela en büyük... İnşallah yapmak

istediğim, olmak istediğim şey bu. Yani ben orda çocuklara rehberlik yapmaya çalışacağım. Yönlendirmeye. Aramızdaki tek fark bu olacak yani inşallah.

Benzer şekilde, çevrimiçi tartışmalarda da katılımcılar bu rol üzerine yorum yapabilmişlerdir. Katılımcı-5 yeni programda altı çizilen önemli öğretmen rollerinden birinin öğrencileri yönlendirmek olduğunu aşağıdaki gibi vurgulamıştır:

Yeni müfredat ile ilgili olarak da bu bahsettiğimiz şeylerden - en güzellerinden birisi hatta- başta da dediğim gibi öğrencilerin cevapları bulmalarına yol göstermek. Örneğin, grup olarak önünüzdeki kâğıtlara bu şeklin özelliklerini listeleyin derken bile onlara rehberlik etmek nerelere gelebildiklerini nerelerde ne gibi takıntılar yaşadıklarını anlamak amacıyla yanlarına gidilebilir, düşünceleri incelenebilirdi.

Birinci yansıtıcı görüşler de bunu desteklemektedir. Birinci görüşmelerdeki kadar üzerinde durulmasa da bu rol yansıtıcı görüşlerde de fark edilmiştir. Örneğin bu rolü fark eden 3 katılımcıdan Katılımcı-6 aşağıdaki gibi öğrenciyi yönlendirme üzerine fikir paylaşabilmiştir.

[...] Öğretmen sorularıyla öğrencileri yönlendirdi ve onları doğru cevaba yöneltti.

Pedagojik Alan Bilgisi'ne ait diğer bir alt-konu olan "Akıl Yürütme" ise en çok fark edilen rollerden bir diğeridir. Daha açık belirtmek gerekirse 11 katılımcı öğretmenlerin öğrencilerini akıl yürütmeye sevk etmeleri, ezbere izin vermemeleri ve öğrencilerin kendi bilgilerini inşa etmelerine üzerinde durmuşlardır.

Pedagojik Alan Bilgisi üzerine katılımcıların en çok fark ettikleri alt-konular "akıl yürütme", "öğrenci anlamaları", "yönlendirme" ve "öğrenci

merkezliliği”dir. Birinci görüşmelerde fark edilmeyen roller ise “öğrenci zorlukları”, “sınırlamama” ve “öğrenci düşünceleri”dir.

Aşağıda *Metotsal Bakış* teması altında yer alan bir diğer ana-konu olan Genel Pedagojik Bilgi üzerine fark edilen alt-konular üzerinde durulacaktır.

1.5.1.1.1.2. Genel Pedagojik Bilgi’ye İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde 14 katılımcı bu ana-konuya ilişkin konuşabilmiştir. On adet alt-konuya sahip olan bu ana-konuda 9 alt-konu katılımcılar tarafından fark edilmiştir. Katılımcıların en çok fark ettikleri konular “yönetim” ve “baskı”dır. Öte yandan birinci görüşmelerde fark edilmeyip yazılı yansıtıcı görüşlerde geçen alt-konu ise “öğrenci farklılıkları”dır.

1.5.1.1.1.3. Müfredat Bilgisi’ne İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde tüm katılımcılar bu ana-konu üzerinde durabilmişlerdir. Onbir alt-konuya sahip bu ana-konuya ilişkin olarak 10 alt-konu birinci görüşmelerde fark edilmiştir. En çok fark edilen rol “materyaller” olurken, ilk görüşmede fark edilmeyen tek rol “rehber kitap”tır.

1.5.1.1.1.4. Alan Bilgisi’ne İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde 15 katılımcıdan 4’ü alan bilgisi üzerine konuşabilmiştir. Örnek vermek gerekirse, tek bir alt-konuya sahip bu ana-konuya ilişkin olarak Katılımcı-7 videodaki öğretmeni eleştirmiş ve yeterli alan bilgisine sahip olmadığından öğrencilerde kavram yanılgılarına yol açtığını belirtmiştir:

Tam orda küp derken, küpün 3 boyutu falan kelime geçtiği zaman, öğretmen dedi ki, bir dakika dedi. Arkadaşımızın bir sorusu vardı dedi. Ona döndü. Ve orda ona somut örnek vermeye çalıştı. Kâğıdı örnek verdi, işte kâğıt 2 boyutludur dedi. Normalde işte 3 boyutu olduğu zaman bir de yüksekliği

olması lazım dedi. 3 yandan bakabiliriz dedi. Bu konuda birazcık işte öğretmen, bu kâğıtta da yazmamıştım, 3 boyutu tanımlarken birazcık herhalde orda bir anlam kargaşası oldu. Yani biraz geçiştirir gibi oldu 3 boyutlunun ne demek olduğunu. Yandan, sağdan, soldan baktığımız zamandaki gibi.

1.5.1.1.1.5. Metotsal Bakış Teması'na dair Diğer Rollere İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde 10 katılımcı bu ana-konuya ilişkin rollerden bahsedebilmiştir. Bu ana-konu 8 adet alt-konuya sahip olup bunlardan 5'i birinci görüşmelerde fark edilmiştir. En fazla fark edilen rol "sınıf kültürü" olurken, birinci görüşmelerde fark edilmeyen roller "motivasyon", "hedefe ulaşma" ve "teknoloji"dir.

1.5.1.1.2. Tutumsal Bakış Temasına İlişkin Fark edilen Ana-Konular

Daha önce de belirtildiği gibi Tutumsal Bakış ikinci ana temadır. Birinci görüşmelerde 10 katılımcı bu tema üzerine konuşabilmiştir. Bu temaya ilişkin 10 alt-konu yer almaktadır. Birinci görüşmelerde bu alt-konulardan 3 tanesi fark edilmiştir. En fazla fark edine rol "fikirleri önemseme" iken fark edilmeyen roller "istek", "olumlu yaklaşım", "ses tonu", "sabır", "öğrenci psikolojisi" ve "saygı"dir.

1.5.1.1.3. Diğer Temasına İlişkin Fark edilen Ana-Konular

Daha önce de belirtildiği gibi üçüncü ana tema *Diğer* temasıdır. Birinci görüşmelerde 8 katılımcı bu tema üzerine konuşabilmiştir. Bu temaya ilişkin 3 ana-konu yer almaktadır; Öğretmen Karakteristiği, Eşitlik ve Sınıf-Dışı Aktiviteler. Birinci görüşmelerde ilk ana-konu olan Öğretmen Karakteristiği'nden 2 katılımcı, Eşitlik'ten 7 katılımcı ve son ana-konudan sadece 1 katılımcı bahsedebilmişlerdir.

1.5.2. İkinci Görüşmeler, Yansıtıcı Görüşler ve Çevrimiçi Tartışmalarda Fark edilen Öğretmen Roller

Onbeş katılımcının ikinci görüşmeleri kodlandığında tüm katılımcıların *Metotsal Bakış* teması üzerine konuşabildikleri görülmüştür. Diğer yandan, 10 katılımcı *Tutumsal Bakış*, 10 katılımcı ise *Diğer* temasına ilişkin rollerden bahsedebilmişlerdir. İkinci yansıtıcı görüşlerde ise yine tüm katılımcılar *Metotsal Bakış* teması üzerine konuşabilmişlerdir. *Tutumsal Bakış* temasına 11 katılımcı, *Diğer* temasına ilişkin rollere ise 4 katılımcı değinebilmiştir. Aşağıda bu ana temalara ilişkin ana-konular ele alınacaktır.

1.5.2.1. Metotsal Bakış Temasına İlişkin Fark edilen Ana-Konular

Yukarıda da belirtildiği gibi tüm katılımcılar *Metotsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu katılımcıların tamamı Pedagojik Alan Bilgisi ve Genel Pedagojik Bilgi üzerine konuşabilirken, 14'ü Müfredat Bilgisi, 2'si Alan Bilgisi ve 9'u "Diğer" rollerinden bahsedebilmişlerdir. Benzer şekilde, ikinci yansıtıcı görüşlerde de tüm katılımcılar Pedagojik Alan Bilgisi üzerine konuşabilmiştir. Katılımcıların 9'u Genel Pedagojik Bilgi, 13'ü Müfredat Bilgisi, 3'i Alan Bilgisi ve 3'ü "Diğer" rollerinden bahsedebilmişlerdir.

1.5.2.1.1. Pedagojik Alan Bilgisi'ne İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde tüm katılımcılar Pedagojik Alan Bilgisi üzerine konuşabilmiştir. Bu ana-konu altında 21 adet alt-konu yer almaktadır. Bu alt-konulardan 17'si ikinci görüşmelerde katılımcılar tarafından fark edilebilmiştir. İlk görüşmelerde ise bu sayı 18'dir. İkinci görüşmelerde en fazla fark edilen roller "öğrenci merkezliliği", "farklı gösterimler", "aktivite", "akıl yürütme", "yönlendirme", "öğretim", "öğrenci anlamaları" ve "gerçek yaşam"dır. İkinci görüşmelerde fark edilmeyen roller ise "öğrenci zorlukları", "alternatif çözümler", "sınırlamama" ve "öğrenci düşünceleri"dir.

1.5.2.1.2. Genel Pedagojik Bilgi'ye İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde tüm katılımcılar bu ana-konuya ilişkin konuşabilmiştir. On adet alt-konuya sahip olan bu ana-konuda 6 alt-konu katılımcılar tarafından fark edilmiştir. Katılımcıların en çok fark ettikleri konular “yönetim” ve “yaklaşım”dır. Öte yandan birinci görüşmelerde fark edilmeyip yazılı yansıtıcı görüşlerde geçen alt-konu ise “öğrenci farklılıkları”dır. Fark edilmeyen roller ise “karar verme”, “rekabet”, “beklentiler” ve “ilgi çekme”dir.

1.5.2.1.3. Müfredat Bilgisi'ne İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde 14 katılımcı bu ana-konu üzerinde durabilmişlerdir. Onbir alt-konuya sahip bu ana-konuya ilişkin olarak 8 alt-konu ikinci görüşmelerde fark edilmiştir. Bu sayı birinci görüşmelerde 10'dur. En çok fark edilen roller “derse giriş”, “materyaller”, “ilişkilendirme” ve “öğrenci seviyeleri” olurken, fark edilmeyen roller “üst seviye matematik”, “öğrenci bilgisi” ve “rehber kitap”tır.

1.5.2.1.4. Alan Bilgisi'ne İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde 15 katılımcıdan sadece 2'si alan bilgisi üzerine konuşabilmiştir. Bu sayı birinci görüşmelerde 4'tür. İkinci yansıtıcı görüşlerde ise 2 katılımcı bu rolden bahsedebilmiştir.

1.5.2.1.5. Metotsal Bakış Teması'na dair Diğer Rollere İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde 9 katılımcı bu ana-konuya ilişkin rollerden bahsedebilmiştir. Bu ana-konu 8 adet alt-konuya sahip olup bunlardan 4'ü ikinci görüşmelerde fark edilmiştir. En fazla fark edilen rol “sınıf kültürü” olurken, fark edilmeyen roller “özgüven”, “etkili öğretim”, “teknoloji” ve “öğrenci ifadeleri”dir.

1.5.2.2. Tutumsal Bakış Temasına İlişkin Fark edilen Ana-Konular

Daha önce de belirtildiği gibi Tutumsal Bakış ikinci ana temadır. İkinci görüşmelerde 10 katılımcı bu tema üzerine konuşabilmiştir. Bu temaya ilişkin 10 alt-konu yer almaktadır. İkinci görüşmelerde bu alt-konulardan 6 tanesi fark edilmiştir. Bu sayı birinci görüşmelerde 3'tür. En fazla fark edilen rol "eğlenceli matematik" iken fark edilmeyen roller "rahat olma", "olumlu yaklaşım", "ses tonu" ve "saygı"dır.

1.5.2.3. Diğer Temasına İlişkin Fark edilen Ana-Konular

Daha önce de belirtildiği gibi üçüncü ana tema *Diğer* temasıdır. İkinci görüşmelerde 10 katılımcı bu tema üzerine konuşabilmiştir. Bu temaya ilişkin 3 ana-konu yer almaktadır; Öğretmen Karakteristiği, Eşitlik ve Sınıf-Dışı Aktiviteler. İkinci görüşmelerde ilk ana-konu olan Öğretmen Karakteristiği'nden 6 katılımcı, Eşitlik'ten 9 katılımcı ve son ana-konudan sadece 1 katılımcı bahsedebilmişlerdir.

1.5.3. Üçüncü Görüşmeler, Yansıtıcı Görüşler ve Çevrimiçi Tartışmalarda Fark edilen Öğretmen Roller

Metot bölümünde de verildiği gibi kodlamalar sonucu elde edilen 3 temel tema *Metotsal Bakış*, *Tutumsal Bakış* ve *Diğer*'dir. Onbeş katılımcının üçüncü görüşmeleri kodlandığında tüm katılımcıların *Metotsal Bakış* teması üzerine konuşabildikleri görülmüştür. Diğer yandan, 14 katılımcı *Tutumsal Bakış*, 12 katılımcı ise *Diğer* temasına ilişkin rollerden bahsedebilmişlerdir. Üçüncü yansıtıcı görüşlerde ise yine tüm katılımcılar *Metotsal Bakış* teması üzerine konuşabilmişlerdir. *Tutumsal Bakış* temasına 10 katılımcı, *Diğer* temasına ilişkin rollere ise 2 katılımcı değinebilmiştir. Aşağıda bu ana temalara ilişkin ana-konular ele alınacaktır.

1.5.3.1. Metotsal Bakış Temasına İlişkin Fark edilen Ana-Konular

Yukarıda da belirtildiği gibi tüm katılımcılar *Metotsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu katılımcıların tamamı Pedagojik Alan Bilgisi, Genel Pedagojik Bilgi ve Müfredat Bilgisi üzerine konuşabilirken 5'i Alan Bilgisi ve 13'ü "Diğer" rollerinden bahsedebilmişlerdir. Benzer şekilde, üçüncü yansıtıcı görüşlerde de tüm katılımcılar Pedagojik Alan Bilgisi üzerine konuşabilmiştir. Katılımcıların 12'si Genel Pedagojik Bilgi ve Müfredat Bilgisi, 1'i Alan Bilgisi ve 9'u "Diğer" rollerinden bahsedebilmişlerdir.

1.5.3.1.1. Pedagojik Alan Bilgisi'ne İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde –birinci ve ikinci görüşmelerde olduğu gibi- tüm katılımcılar Pedagojik Alan Bilgisi üzerine konuşabilmiştir. Bu ana-konu altında 21 adet alt-konu yer almaktadır. Bu alt-konuların tamamı üçüncü görüşmelerde fark edilebilmiştir. Bu sayı birinci görüşmelerde 18, ikinci görüşmelerde ise 17'dir.

Bu ana-konuya ilişkin en çok fark edilen alt-konular "farklı gösterimler", "yönlendirme", "akıl yürütme", "aktiviteler", "öğrenci merkezliliği" ve "öğrenci anlamaları"dır.

1.5.3.1.2. Genel Pedagojik Bilgi'ye İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde tüm katılımcılar bu ana-konuya ilişkin konuşabilmiştir. On adet alt-konuya sahip olan bu ana-konuda 7 alt-konu katılımcılar tarafından fark edilmiştir. İlk görüşmelerde bu sayı 9, ikinci görüşmelerde ise 6'dır. Katılımcıların en çok fark ettikleri konular "iletişim", "yaklaşım" ve "yönetim"dir. Fark edilmeyen roller ise "rekabet", "beklentiler" ve "ilgi çekme"dir.

1.5.3.1.3. Müfredat Bilgisi'ne İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde tüm katılımcılar bu ana-konu üzerinde durabilmişlerdir. Onbir alt-konuya sahip bu ana-konuya ilişkin olarak tüm alt-konu üçüncü görüşmelerde fark edilmiştir. Birinci görüşmelerde bu sayı 10 iken ikinci görüşmelerde 8'dir. En çok fark edilen roller ise “yeni program”, “materyaller” ve “hazırlıklı olma”dır.

1.5.3.1.4. Alan Bilgisi'ne İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde 15 katılımcıdan 5'i alan bilgisi üzerine konuşabilmiştir. Bu sayı birinci görüşmelerde 4 iken ikinci görüşmelerde 2'dir.

1.5.3.1.5. Metotsal Bakış Teması'na dair Diğer Rollere İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde 13 katılımcı bu ana-konuya ilişkin rollerden bahsedebilmiştir. Bu ana-konu 8 adet alt-konuya sahip olup bunlardan 5'i üçüncü görüşmelerde fark edilmiştir. Bu sayı birinci görüşmelerde 5 iken ikinci görüşmelerde 4'tür. Üçüncü görüşmelerde en fazla fark edilen roller “tecrübe” ve “sınıf kültürü”dür. Fark edilmeyen roller ise “özgüven”, “etkili öğretim” ve “öğrenci ifadeleri”dir.

1.5.3.2. Tutumsal Bakış Temasına İlişkin Fark edilen Ana-Konular

Daha önce de belirtildiği gibi Tutumsal Bakış ikinci ana temadır. Üçüncü görüşmelerde 14 katılımcı bu tema üzerine konuşabilmiştir. Bu temaya ilişkin 10 alt-konu yer almaktadır. Üçüncü görüşmelerde bu alt-konulardan 7 tanesi fark edilmiştir. Bu sayı birinci görüşmelerde 3, ikinci görüşmelerde ise 6'dır. En fazla fark edilen rol ise “eğlenceli matematik” olmuştur.

1.5.3.3. Diğer Temasına İlişkin Fark edilen Ana-Konular

Daha önce de belirtildiği gibi üçüncü ana tema *Diğer* temasıdır. Üçüncü görüşmelerde 12 katılımcı bu tema üzerine konuşabilmiştir. Bu temaya ilişkin 3 ana-konu yer almaktadır; Öğretmen Karakteristiği, Eşitlik ve Sınıf-Dışı Aktiviteler. Üçüncü görüşmelerde Öğretmen Karakteristiği'nden 5 katılımcı, Eşitlik'ten 11 katılımcı ve son ana-konudan sadece 1 katılımcı bahsedebilmişlerdir.

1.5.4. Öğrenci Rollerine dair Fark edilen Noktalar

Metot bölümünde de verildiği gibi kodlamalar sonucu elde edilen öğrenci rollerine dair 4 temel tema *Metotsal Bakış*, *Tutumsal Bakış*, *Sınıf Kültürü* ve *Diğer*'dir. Onbeş katılımcının birinci görüşmeleri kodlandığında 12 katılımcının *Metotsal Bakış* teması üzerine konuşabildikleri görülmüştür. Diğer yandan, 13 katılımcı *Tutumsal Bakış*, 10 katılımcı *Sınıf Kültürü* ve sadece 2 katılımcı ise *Diğer* temasına ilişkin rollerden bahsedebilmişlerdir. Birinci yansıtıcı görüşlerde ise 10 katılımcı *Metotsal Bakış*, 5'i *Tutumsal Bakış* üzerine konuşmuştur. Sınıf Kültürü ve *Diğer* temalarına ilişkin rollere ise katılımcılar değinememişlerdir. Aşağıda bu ana temalara ilişkin alt-konular ele alınacaktır.

1.5.4.1. Birinci Görüşmeler, Yansıtıcı Görüşler ve Çevrimiçi Tartışmalarda Fark edilen Öğrenci Roller

1.5.4.1.1. Metotsal Bakış Temasına İlişkin Fark edilen Alt-Konular

Yukarıda da belirtildiği gibi 12 katılımcı *Metotsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 9 alt-konuyu kapsamaktadır. Birinci görüşmelerde bunlardan 3'ü katılımcılar tarafından fark edilebilmiştir. Bu roller "keşfetme", "sorgulama" ve "grup çalışması"dır. Bu roller arasında en fazla fark edilen öğrenci rolü "grup çalışması" iken birinci görüşmelerde fark edilmeyen

roller “materyal kullanma”, “gerçek yaşam”, “bilgiyi inşa etme”, “ilişkilendirme”, “tartışma” ve “yeni program”dır.

1.5.4.1.2. Tutumsal Bakış Temasına İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde 13 katılımcı *Tutumsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 4 alt-konuyu kapsamaktadır. Birinci görüşmelerde bunlardan 3’ü katılımcılar tarafından fark edilebilmiştir. Bu roller “aktif katılım”, “rahat olma” ve “heyecan”dır. Bu roller arasında en fazla fark edilen öğrenci rolleri “aktif katılım” ve “rahat olma” iken “zevk alma” fark edilmeyen tek rol olmuştur.

1.5.4.1.3. Sınıf Kültürü Temasına İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde 10 katılımcı *Sınıf Kültürü* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 7 alt-konuyu kapsamaktadır. Birinci görüşmelerde bunlardan 6’sı katılımcılar tarafından fark edilebilmiştir. Bu roller arasında en fazla fark edilen öğrenci rolü “saygılı olma” iken “dersi takip etme” fark edilmeyen tek rol olmuştur.

1.5.4.1.4. Diğer Temasına İlişkin Fark edilen Alt-Konular

Birinci görüşmelerde sadece 2 katılımcı *Diğer* temasına ilişkin alt konudan bahsedebilmişlerdir. Bu tema yalnız 1 alt-konuyu kapsamaktadır; “hayal gücü”. Birinci yazılı yansıtıcı görüşlerde ise bu rolden bahsedilmemiştir.

1.5.4.2. İkinci Görüşmeler, Yansıtıcı Görüşler ve Çevrimiçi Tartışmalarda Fark edilen Öğrenci Roller

Metot bölümünde de verildiği gibi kodlamalar sonucu elde edilen öğrenci rollerine dair 4 temel tema *Metotsal Bakış*, *Tutumsal Bakış*, *Sınıf Kültürü* ve *Diğer*’dir. Onbeş katılımcının birinci görüşmeleri kodlandığında tüm katılımcıların *Metotsal Bakış* teması üzerine konuşabildikleri görülmüştür. Diğer

yandan, 12 katılımcı *Tutumsal Bakış* ve *Sınıf Kültürü* ve sadece bir katılımcı *Diğer* temasına ilişkin rollerden bahsedebilmişlerdir. İkinci yansıtıcı görüşlerde ise 8 katılımcı *Metotsal Bakış*, 4'ü *Tutumsal Bakış*, 6'sı da *Sınıf Kültürü* üzerine konuşmuştur. *Diğer* temasına ilişkin rollere ise katılımcılar değinememişlerdir. Aşağıda bu ana temalara ilişkin alt-konular ele alınacaktır.

1.5.4.2.1. *Metotsal Bakış* Temasına İlişkin Fark edilen Alt-Konular

Yukarıda da belirtildiği gibi tüm katılımcılar ikinci görüşmelerde *Metotsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 9 alt-konuyu kapsamaktadır. İkinci görüşmelerde bu rollerin tamamı fark edilmiştir. Bu sayı birinci görüşmelerde ise sadece 3'tür. En fazla fark edilen öğrenci rolü ise “grup çalışması” olmuştur.

1.5.4.2.2. *Tutumsal Bakış* Temasına İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde 12 katılımcı *Tutumsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 4 alt-konuyu kapsamaktadır. Birinci görüşmelerde bunlardan 3'ü katılımcılar tarafından fark edilebilmiş iken bu sayı ikinci görüşmelerde 2'ye düşmüştür. Fark edilen bu iki rol ise “aktif katılım” ve “rahat olma”dır.

1.5.4.2.3. *Sınıf Kültürü* Temasına İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde 12 katılımcı *Sınıf Kültürü* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 7 alt-konuyu kapsamaktadır. Birinci görüşmelere paralel şekilde bu rollerden 6'sı ikinci görüşmelerde katılımcılar tarafından fark edilebilmiştir. Bu roller arasında en fazla fark edilen öğrenci rolü “saygılı olma” iken “hatalar” fark edilmeyen tek rol olmuştur.

1.5.4.2.4. Diğer Temasına İlişkin Fark edilen Alt-Konular

İkinci görüşmelerde sadece bir katılımcı *Diğer* temasına ilişkin alt konudan bahsedebilmişlerdir; “hayal gücü”. Birinci yazılı yansıtıcı görüşlerde olduğu gibi ikinci yansıtıcı görüşlerde de bu rolden bahsedilmemiştir. Birinci görüşmelerde ise bu rolden 2 katılımcı bahsetmiştir.

1.5.4.3. Üçüncü Görüşmeler, Yansıtıcı Görüşler ve Çevrimiçi Tartışmalarda Fark edilen Öğrenci Roller

Analiz sonuçları üçüncü görüşmelerde 12 katılımcının *Metotsal Bakış* ve *Tutumsal Bakış* temaları üzerine konuşabildiklerini göstermiştir. Diğer yandan, 10 katılımcı *Sınıf Kültürü* ve sadece 1 katılımcı *Diğer* temasına ilişkin rollerden bahsedebilmişlerdir. Üçüncü yansıtıcı görüşlerde ise 3 katılımcı *Metotsal Bakış*, 4’ü *Tutumsal Bakış* ve 2’si *Sınıf Kültürü* üzerine konuşmuştur. *Diğer* temasına ilişkin rollere ise katılımcılar değinememişlerdir. Aşağıda bu ana temalara ilişkin alt-konular ele alınacaktır.

1.5.4.3.1. Metotsal Bakış Temasına İlişkin Fark edilen Alt-Konular

Yukarıda da belirtildiği gibi üçüncü görüşmelerde 12 katılımcı *Metotsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 9 alt-konuyu kapsamaktadır. Üçüncü görüşmelerde bunlardan 5’i katılımcılar tarafından fark edilebilmiştir. Bu sayı birinci görüşmelerde 3 iken ikinci görüşmelerde ise 9’dur. Fark edilen roller “sorgulama”, “materyal”, “grup çalışması”, bilgiyi inşa etme” ve “tartışma”dır. Bu roller arasında en fazla fark edilen öğrenci rolü “grup çalışması” iken birinci görüşmelerde fark edilmeyen roller “keşfetme”, “gerçek yaşam”, “ilişkilendirme” ve “yeni program”dır.

1.5.4.3.2. *Tutumsal Bakış* Temasına İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde tüm katılımcılar *Tutumsal Bakış* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 4 alt-konuyu kapsamaktadır. Birinci görüşmelere paralel şekilde bu rollerden 3'ü katılımcılar tarafından fark edilebilmiştir. İkinci görüşmelerde ise bu sayı 2'dir. Üçüncü görüşmelerde fark edilen roller “aktif katılım”, “rahat olma” ve “zevk alma”dır. Bu roller arasında en fazla fark edilen öğrenci rolleri “aktif katılım” ve “rahat olma” iken “heyecan” fark edilmeyen tek rol olmuştur.

1.5.4.3.3. *Sınıf Kültürü* Temasına İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde 10 katılımcı *Sınıf Kültürü* temasına ilişkin konulardan bahsedebilmişlerdir. Bu tema 7 alt-konuyu kapsamaktadır. Birinci ve ikinci görüşmelerde bunlardan 6'sı katılımcılar tarafından fark edilirken üçüncü görüşmelerde bu sayı 4'e düşmüştür. En fazla fark edilen öğrenci rolü “dersi takip etme” iken “anlamayı hedefleme”, “kendini ifade etme” ve “hatalar” fark edilmeyen roller olmuştur.

1.5.4.3.4. *Diğer* Temasına İlişkin Fark edilen Alt-Konular

Üçüncü görüşmelerde sadece bir katılımcı *Diğer* temasına ilişkin alt konudan bahsedebilmişlerdir; “hayal gücü”. Birinci yazılı yansıtıcı görüşlerde bu rolden bahsedilmemiştir. Birinci ve ikinci görüşmelerde ise bu rol sırasıyla 2 ve 1 katılımcı tarafından fark edilmiştir.

Sonuç olarak, çalışma bulguları göstermektedir ki, öğretmen adayları yeni programa yönelik öğretmen ve öğrenci sorumluluklarından bahsedebilmişler ve bu bağlamda matematik videolarını analiz edebilmişlerdir. Görülmektedir ki, çalışma başından sonuna kadar öğretmen ve öğrenci rollerine ilişkin noktaları fark eden katılımcı sayısında artış söz konusu olurken aynı zamanda fark edilen noktalar da çeşitlilik açısından artış göstermiştir. Çalışma boyunca öğretmen adayları fark etmeleri gereken önemli noktaların neler

olabileceği konusunda becerilerini geliştirebilmişlerdir. Ayrıca öğretmen adaylarının mesajlarının içerikleri incelendiğinde bu anlamda da kalite olarak artış olduğu gözlemlenmekte ve adayların öğretim ve öğrenim durumlarını yorumlayabilme anlamında kendilerini geliştirdikleri anlaşılmaktadır.

1.6. Tartışma, Sonuç ve Öneriler

Giriş kısmında da belirtildiği gibi, öğretmen ve öğretmen adaylarının yeni programın gerekleri hakkında yeterli bilgiye sahip olmaları, görevlerini yerine getirmeleri adına gereklidir, çünkü reform çalışmalarının başarılı olabilmesi, öğretmenlerin programları sınıflarında uygulayabilmelerine bağlıdır (Feiman-Nemser, 2001; Spillane, 1999). Bu ise, öğretmen cephesinde önemli bir öğrenme gerektirmektedir ve destek olmadan başarılması güçtür (Borko, 2004; Davis, Petish ve Smithey, 2006). Bu noktada özellikle öğretmen adaylarının desteklenmesi çok önemlidir (Davis ve diğerleri, 2006; San, 1999), çünkü adayların öğretmenlik mesleğinin zorluklarına hazırlanırken bir yandan da yeni programın gereklerini anlamaları gerekmektedir. Öğretmen adaylarının eğitim sürecinde, hedeflenen öğretimin modellenmesi onların gerekli mesleki bilgiyi edinebilmeleri ve matematik üzerine konuşabilmeleri açısından gereklidir (NCTM, 1991). Öğretmen eğitiminde örnek olay tartışmaları ile adaylara yeni programa uygun ders ortamlarını inceleme ve analiz etme fırsatı verilmesi ve görüş paylaşabilecekleri ortamlar sunulmasının, onların eğitim ve öğretime hazırlanmasına katkı sağladığı düşünülmektedir. Bu çalışmada öğretmen adaylarının izledikleri video ve yapılan tartışmalar ile yeni programın öğretmen ve öğrencilere yüklediği rolleri analiz etme fırsatı yakaladıkları ve programda vurgulanan öğrenci odaklı öğretime hazırlanabildikleri görülmektedir. Bulgulara dayanarak öğretmen eğitiminde örnek olay tartışmalarının kullanılmasının adayları reforma dayalı öğretime hazırlamada etkili olabileceği önerilmektedir.

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