FOSTERING PRESERVICE MATHEMATICS TEACHERS' PROFESSIONAL IDENTITY ORIENTATIONS THROUGH NOTICING PRACTICES IN A VIDEO CASE-BASED COMMUNITY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

KÜBRA ÇELİKDEMİR

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
DOCTOR OF PHILOSOPHY
IN
THE DEPARTMENT OF ELEMENTARY EDUCATION

JULY 2018

Approval of the Graduate School of Social Sciences

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ABSTRACT

FOSTERING PRESERVICE MATHEMATICS TEACHERS' PROFESSIONAL IDENTITY ORIENTATIONS THROUGH NOTICING PRACTICES IN A VIDEO CASE-BASED COMMUNITY

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July 2018, 326 pages

The aim of this study was to investigate preservice middle school mathematics teachers' professional identities in a video case-based community. Data were collected from 12 preservice teachers (the community) during the Fall semester of 2015-2016 education year in the school experience course. Six video cases in the area of Geometry and Measurement were discussed for six weeks in the community coordinated by the researcher. Data were collected via individual initial-post interviews, reflection papers, group discussions, evaluation form and researcher's reflective memos.

Teacher identity and noticing frameworks were integrated to analyze what and how preservice teachers noticed of teacher roles and student outcomes as components of teacher identity. The analysis revealed that what preservice teachers noticed related with teacher roles and student outcomes became varied, emphasis to cognitive outcomes was increased and interpretation skills were developed over time. By highlighting multidimensionality of classroom and complexity of teaching mathematics, the community developed a professional vision for teacher roles and student outcomes, and increased their self-awareness. The collective influences of

these experiences transformed participants' noticing practices and identity orientations. Various personal and contextual factors such as expertise in teaching mathematics, willingness to participate group discussions, content of the videos and researcher's interventions were taken into consideration while interpreting these transformations. Teacher educators and researchers in teacher education might benefit from the findings of the present study to develop preservice teachers' noticing practices and professional identities. The combined framework used in this study might provide a perspective for the mathematics teacher identity studies.

Keywords: Professional Identity, Identity Orientations, Noticing, Video Cases, Preservice Mathematics Teachers

ÖZ

MATEMATİK ÖĞRETMEN ADAYLARININ MESLEKİ KİMLİKLERİNİN FARK ETME PRATİKLERİ ARACILIĞI İLE ÖZEL DURUM VİDEOLARI TEMELLİ TOPLULUK KAPSAMINDA GELİŞTİRİLMESİ

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Temmuz 2018, 326 sayfa

Bu çalışmanın amacı video durum temelli bir toplulukta ortaokul matematik öğretmen adaylarının mesleki kimliklerini incelemektir. Veriler 2015-2016 eğitim öğretim yılı güz dönemi okul deneyimi dersi kapsamında 12 öğretmen adayından toplanmıştır. Çalışma için Geometri ve Ölçme öğrenme alanından seçilen altı video araştırmacının grup yöneticisi olarak bulunduğu toplulukta altı hafta süresince tartışılmıştır. Araştırmanın verileri bireysel ön ve son görüşmeler, yansıtıcı düşünce raporları, grup toplantıları, değerlendirme formu ve araştırmacının yansıtıcı notlarının oluşturduğu çoklu veri kaynaklarından toplanmıştır.

Mesleki kimliğin bileşenleri olarak öğretmen rolleri ve öğrenci çıktılarına yönelik öğretmen adaylarının ne fark ettiği ve nasıl fark ettiğini incelemek için öğretmen kimliği ve fark etme teorik çerçeveleri birlikte ele alınmıştır. Elde edilen bulgular öğretmen adaylarının fark ettiği öğretmen rolleri ve öğrenci çıktılarının zamanla çeşitlendiğini, özellikle bilişsel çıktılara yapılan vurgunun arttığını, aynı zamanda yorumlama becerilerinin geliştiğini göstermektedir. Video durum temelli topluluk matematik öğretiminin kapsamı, sınıf ortamının çok boyutlu yapısını ön plana çıkararak öğretmen rolleri ve öğrenci çıktılarına yönelik bir vizyon oluşturmuş ve öğretmen adaylarının öz-farkındalıklarını arttırmıştır. Bu kazanımların birlikte

ortaya çıkan etkileri sonucu öğretmen adaylarının fark etme becerileri ve mesleki kimlik yönelimleri dönüşüme uğramıştır. Bu dönüşümler yorumlanırken, öğretmen adaylarının matematik öğretimine yönelik uzmanlığı, video durum temelli topluluğa katılım istekleri ile videonun içeriği, araştırmacının müdahaleleri gibi pek çok bireysel ve bağlamsal faktörler dikkate alınmıştır. Öğretmen eğitimcileri ve araştırmacıların öğretmen adaylarının fark etme becerilerini ve mesleki kimliklerini geliştirmek için mevcut çalışmanın bulgularını esas alabileceği düşünülmektedir. Çalışmada kullanılan birleştirilmiş çerçeve matematik öğretmen kimliklerinin incelendiği çalışmalar için farklı bir bakış açısı sunabilir.

Anahtar Kelimeler: Mesleki Kimlik, Kimlik Yönelimleri, Fark Etme, Video Durumları, Matematik Öğretmen Adayı

To my lovely daughter, Nehir

ACKNOWLEDGEMENTS

Firstly, I would like to express my sincere gratitude to my supervisor Assoc. Prof. Dr. Çiğdem HASER for her endless support, encouragement, smiling face and patience. Her guidance helped me in all the time of research and writing of this thesis. She is more than a supervisor for me, she is a shoulder that I cry on. Thanks for standing by me all the time.

I also would like to thank my dissertation committee members, Prof. Dr. Erdinç ÇAKIROĞLU, Assist. Prof. Dr. Zeynep Sonay AY, Assist. Prof. Dr. Şerife SEVİNÇ, and Assist. Prof. Dr. Oğuzhan DOĞAN for their time, constant support, valuable comments, and feedbacks to make this study better.

Special thanks to TÜBİTAK for supporting me with their scholarship program (2211-National Scholarship Programme for PhD Students).

I would like to thank to all my colleagues at TEDMEM and at METU. They have always supported and encouraged me to accomplish my aims.

Grateful thanks to my family, Şemri MİHYAP, Ahmet Metin MİHYAP, Seval ÇELİKDEMİR, İsmail ÇELİKDEMİR, Osman ÇELİKDEMİR, Seda UĞUZ, Resul UĞUZ and my lovely nephews Yiğit and Çınar UĞUZ. Thank you for your endless love and patience. This study would not be completed without your encouragement, support, and love.

Last words are for my daughter Nehir and my husband Mert. It is hard to put into words my feelings and how much I appreciate your love and cheer. Owing to your love, I was able to complete this dissertation. Thank you, and I love you!

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

The notion of teacher identity has consistently attracted scholars' attention in educational research (Taylor, 2017). Studies in teacher identity are generally focusing on the questions "Who am I as a teacher?", "Who do I want to become?" (Akkerman & Meijer, 2011, p. 308) and "Who am I at this moment?" (Beijaard, Meijer, & Verloop, 2004, p. 108). Specifically, teachers' perspectives about what kind of teacher they want to be and how they see their role as teachers (Beijaard, Verloop, & Vermunt, 2000; Korthagen, 2004) were used as indicators of teacher identity.

In addition to teacher education, identity is widely used in various disciplines including sociology, anthropology, philosophy and psychology (Beijaard et al., 2004; Sfard & Prusak, 2005; Zembylas & Chubbuck, 2015). Therefore, definition of identity varies such as recognition of self as a certain kind of person (Gee, 2001), sense of self (Helms, 1998), and the various meanings that people attach to themselves (Beijaard et al., 2004). Considering the related literature, Sfard and Prusak (2005) questioned the reason of the sudden reveal of identity and how it is different from more traditional terms such as personality, character and nature. They attributed this tendency to the general sociocultural turn in human sciences because unlike the traditional terms, which were irrevocably associated with biological determinants, identity is formed through social interactions within social situations. In other words, identity is a man-made construct created and recreated through interactions among people (Beijaard et al., 2004; Sfard & Prusak, 2005).

Professional identity is accepted as a part of personal identity (Slay & Smith, 2011). Perceptions about the profession (Lutovac & Kaasila, 2011) or identity related with person's professional status (Gee, 2001) are frequently used as professional identity definitions in many research studies (see Hodges & Cady, 2012; Thomas & Beauchamp, 2011; Trent, 2011). Based on the studies focusing on

professional identity, educational researchers concentrated their efforts to understand teacher identity, its characteristics and development during teacher education and beyond (Beijaard et al., 2004). When the history of teacher identity in educational research is examined, it is seen that while the earlier studies explain identity as a unique and stable entity, it is considered as a complex dynamic system in postmodern studies (Akkerman & Meijer, 2011). Although there are multiple interpretations of teacher identity in postmodern studies (Darragh, 2016; Lasky, 2005; Lutovac & Kaasila, 2011), there are some common characteristics related with the nature of identity on which most of the educational researchers agree (Beijaard et al., 2004). These characteristics are multiplicity, discontinuity and social nature of identity (Akkerman & Meijer, 2011). Accordingly, identity is not a fixed and absolute construct (Settlage, Southerland, Smith, & Ceglie, 2009), rather it is an ongoing and dynamic process (discontinuous) involving the interpretation and reinterpretation of experiences (Meijer, Oolbekkink, Pillen, & Aardema, 2014). Hence, it is socially constructed (social nature) and it shifts with the context (multiplicity) (Beijaard et al., 2004).

Akkerman and Meijer (2011) criticized this postmodern approach of teacher identity by asking "if one claims that people are fragmented and in a continuous flux, how can it be that we are recognized as one and the same person as we were yesterday?" (p. 310). Based on this, they proposed a dialogical approach assuming multiplicity, discontinuity and social nature of identity in relation to previous assumptions of identity as unity, continuity and individual. According to the dialogical approach (Akkerman & Meijer, 2011), individuals do not have multiple professional identities. Instead, they manifest their identity in different communities which vary depending on the task and the other individuals that they interact with (van Zoest & Bohl, 2005). Different identity enactments in different contexts may address the characteristics of multiplicity and discontinuity but focusing on individuals' narratives and discourses enables to understand how they form a somewhat harmonious whole (Akkerman & Meijer, 2011; Beijaard et al., 2004). Therefore, identity can demonstrate a continuous pattern and be in unity.

On the other hand, identity is related with individuals' way of explaining and justifying their experiences to themselves (Beijaard et al., 2004). Based on this,

Wenger (1998) stated that how we interpret what we do shapes who we are, which means that although individuals share common experiences in a context, they can develop different identities because they can negotiate their experiences differently. That is why individual perspectives are needed to be considered with social perspectives to study teacher identity (Akkerman & Meijer, 2011). Considering all of the dichotomous understanding of teacher identity (multiplicity-unity, discontinuity-continuity, and social-individual), the present study conceptualized teacher identity based on Akkerman and Meijer's (2011) dialogical approach which was explained in detail in the next chapter.

Although Akkerman and Meijer's (2011) dialogical approach explains the complexity of teacher identity formation, it does not help researchers in capturing teacher identity during data analysis process. Therefore, researchers found own ways to analyse teacher identity. Beijaard et al. (2000) provides a methodological approach in analysing teacher identity in this regard. Accordingly, teacher identity is described in terms of the ways the teachers perceived themselves based on the knowledge areas namely, *subject matter experts, didactical experts* and *pedagogical experts*. They may consider their profession as having deep knowledge of their discipline and transmitting information to their students (subject matter experts), knowledge of planning, execution and evaluation of teaching and learning process to facilitate understanding for students (didactical experts), and knowledge of supporting students' social, emotional, and moral development (pedagogical expert) or combination of these expertise aspects. These three aspects of the teacher knowledge base reflecting teacher professional identity are connected to teacher's content knowledge, pedagogical content knowledge and pedagogical knowledge which Shulman (1986) described, respectively. However, teacher professional identity addressed in this framework is beyond what teachers should know, rather it focuses on what teachers find important in their professional work (Beijaard et al., 2004). In the present study, Beijaard et al.'s (2000) identity framework was used for understanding what kinds of teachers the preservice teachers want to be and how they see their role as future mathematics teachers. Detailed explanation of the framework will be given in the next chapter.

Researchers also focused on how teacher identity is developing during teacher education since it has been attributed as the key context for preservice teachers to construct their professional identity (Flores, 2014; Timostsuk & Ugaste, 2010). It is important to understand preservice teachers' emerging identities during teacher education in order to support them in creating and providing a clear vision for what it means to be a professional teacher (Volkmann & Anderson, 1998). However, developing pedagogies for supporting preservice teachers' professional identity formation is considered as a challenging step for teacher educators (Beauchamp & Thomas, 2009; Flores, 2014; Leijen, Kullasepp, Katrin & Anspal, 2014; Meijer et al., 2014).

It has been argued that development of teacher identity can be enhanced more effectively through teaching practice in which student teachers are given the opportunity to observe and teach a lesson, by getting feedback from the mentor teachers and teacher educators, and more importantly recognizing who they are in the classroom (Anspal, Eisenschmidt, & Löfström, 2012; Beijaard et al., 2004). Teaching practice provides preservice teachers opportunities for social interaction and engagement in the school context and confronting with the difficulties and complexities of teaching, increasing their perceptions of preparedness and thus, to test the robustness of their identity against reality (van Putten, Stols, & Howie, 2014).

However, it is not possible to place teaching practice at the center of teacher education (Beauchamp & Thomas, 2009). There is need to develop intentional and structural pedagogies to support preservice teachers' professional identities throughout teacher education programs (Zembylas & Chubbuck, 2015). Concerning this need, Flores (2014), Leijen et al., (2014) and Meijer et al., (2014) have focused on the key features of explicit pedagogies for identity development in teacher education. Although their voices are different, they address similar points. First of all, they all underline the importance of self-awareness of preservice teachers. Focusing on student teachers' written and oral narratives in terms of their past, local and future stories provides self-awareness because student teachers can realize and reflect their own motives and beliefs about their role as future teachers (Flores, 2014; Leijen et al., 2014; Meijer et al., 2014). Such pedagogy helps student teachers

to recognize their present and future state of identities or as in Sfard and Prusak's (2005) words; actual and designated identities. Then, it facilitates the construction of learning trajectory through defining themselves by where they have been and where they are going (Wenger, 1998) and maintains continuity of identity (Akkerman & Meijer, 2011). Taking preservice teachers' narratives about who they are and who they want to be as future mathematics teachers helps us in understanding their process of becoming mathematics teachers within the context of teacher education.

In addition, implementing a guided reflection procedure (Leijen et al., 2014) or designing collaborative reflection meetings (Meijer et al., 2014) is also a recommended pedagogy for teacher education programs. Although taking preservice teachers' autobiographies and future plans, as in the first pedagogy, can also provide self-reflection, second pedagogy focuses on the importance of social-relationship in a context. Based on this pedagogy, joint reflection on the roles of teachers by analyzing sample lessons is important experience for preservice teachers (Leijen et al., 2014). Specifically, what is recommended is to use video-cases in teacher education programs and to form communities providing joint reflection on the video cases to support preservice teachers' identity formation (Leijen et al., 2014; Maclean & White, 2007). Based on the previous studies, a video case-based community of preservice middle school mathematics teachers was formed in the present study to support and explore their identity transformations.

Constructing a video case-based community provides many opportunities for preservice teachers and they all contribute the development of teacher identity. First of all, video cases provide preservice teachers opportunity to observe and notice what takes place in real classrooms (van Es & Sherin, 2002). Therefore, they have chance to imagine themselves as the teacher of the classroom within different contexts and to negotiate their pedagogies for those contexts. In addition, in video case-based communities, preservice teachers find opportunity to share what they have noticed and discuss alternative approaches for the concepts of the lessons. Thus, reflections in video case-based communities transform preservice teachers' perspectives about "the roles they are going to shoulder and the objectives they want to fulfil" (Izadinia, 2013, p. 708).

Although noticing skills were attributed as significant for developing teacher identity, it is found that preservice teachers generally tend to focus on superficial moments of the classroom instruction (Star & Strickland, 2008) and teachers' behaviours and students' actions rather than students thinking (Levin, Hammer & Coffey, 2009). In addition, preservice teachers are not able to interpret what they have noticed and make sense of their noticing for instructional decisions (Sherin & van Es, 2009; van Es & Sherin, 2002). Accordingly, interactions among the preservice teachers in video case-based communities develop their reasoning, reflecting and decision making processes, and therefore enhance what and how preservice teachers noticed about the instructions in the videos (Amador & Weiland, 2015; Fernández, Llinares, & Valls, 2012).

van Es (2011) generated a framework by synthesizing the noticing studies and highlighted two central dimensions: *What teachers notice* and *how teachers notice*. While the first dimension represents what teachers observe in classroom episodes based on the *actors* and the *topic*, the second one focuses on how they reason about these features. In other words, the second dimension is related with the *stance* and the *specificity* of the noticing. These dimensions present a developmental trajectory in noticing that includes four levels: baseline (level 1), mixed (level 2), focused (level 3) and extended (level 4). However, it was stated that further revisions are needed to specify the topics in the first dimension – what teacher notice (van Es, 2011). Accordingly, Beijaard et al.'s (2000) identity framework was integrated in analysing what preservice teachers notice about the video-cases in the present study. Detailed explanation about the noticing framework and how it was employed within the present study was given in the method chapter.

To sum up, preservice teachers' professional identity could develop in video-based communities by giving opportunities to reflect video cases of other teachers, sharing what they notice and learn from each other through joint reflection. Therefore, the present study created an intentional video case-based community for preservice teachers and used video cases for identity transformations. Akkerman and Meijer's (2011) dialogical approach, Beijaard et al.'s (2009) identity framework and van Es's (2011) noticing frameworks

constituted the combined framework of the study. Detailed explanation for the guiding frameworks was given in the next chapter.

1.1 Purpose of the Research & Research Questions

The purpose of the present study is to investigate preservice middle school mathematics teachers' professional identities in a video case-based community. Within the frame of this research aim, this study sought answers for the following research questions:

1. How do preservice middle school mathematics teachers profess themselves as future mathematics teachers before working with video cases?
2. What do preservice middle school mathematics teachers notice in a video case-based community?
3. How do preservice middle school mathematics teachers notice in a video case-based community?
4. How is preservice middle school mathematics teachers' professional identity transformed through noticing practices in a video case-based community?

1.2 Significance of the Study

Varghese, Morgan, Johnston and Johnson (2005) argued that in order to understand the teaching and learning processes "we need to understand teachers, and in order to understand teachers, we need to have a clearer sense of who they are" (p. 22). If this idea is adapted to teacher education, in order to understand how preservice teachers are developing, we need to understand who they are as prospective teachers and how they are developing the sense of being a teacher. However, when the related literature was searched especially in mathematics education, it is seen that there are significant deficiencies (Akkerman & Meijer, 2011; Beauchamp & Thomas, 2009; Darragh, 2016; Sfard & Prusak, 2005). First of all, teacher identity in many studies is ill-defined (Sfard & Prusak, 2005). Therefore, there is a need to clarify the construct both theoretically and methodologically. Second, professional identities of preservice middle school

mathematics teachers, how they develop their professional identity during teacher education and how teacher education programs can support this process have not been adequately addressed yet (Beauchamp & Thomas, 2009; Darragh, 2016). Little is known regarding the importance of context for teacher identity in teacher education. Considering these needs, the potential of the present study in terms of research and practice was addressed in the following paragraphs. In detail, how the study contributes to identity research and the implications for teacher education programs were discussed.

Researchers generally tend to collect data after teachers experienced something related with teaching and they interpret teacher identity as if it is a product (Akkerman & Meijer, 2011; Wood, 2013). However, this tendency causes to neglect positioning of teacher identity in a specific context which is also called as *micro-context* and how it is transformed within the norms of the community (Wood, 2013). One of the main reasons could be related with the possibility of observing different positioning for different contexts (Beauchamp & Thomas, 2009). As in Akkerman and Meijer's (2011) words, it is possible to observe multiple I-positions. However, understanding how teachers, especially preservice teachers, negotiate their professional identity within a community is important to interpret the balance between the characteristics of teacher identity, namely the balance between multiplicity-unity, discontinuity-continuity and social-individual characteristic of identity (Akkerman & Meijer, 2011; Zembylas & Chubbuck, 2015). Based on this, by constructing a video case-based community, the present study presented an example of micro-context for teacher education and provided an opportunity to investigate the situatedness of identity. Therefore, this study has the potential to present evidences for the moment of identification (Akkerman & Meijer, 2011; Sfard & Prusak, 2005; Wood, 2013).

However, considering micro-context is not enough to reach an improved understanding of the complex nature of teacher identity. Accordingly, Beauchamp and Thomas (2009) noted that personal stories and experiences are inseparable from the notion of discourses by indicating the way in which identity is positioned within a specific context. Similarly, Akkerman and Meijer (2011) noted that without macro-frames which take into consideration of teachers' narratives reflecting past,

present and future stories, micro-context cannot be understood. Then, what is methodologically needed is to connect the micro and macro analyses. Researchers should consider how the patterned behaviours, which are informed by the participants' narratives, and momentary positions in a specific context are interrelated (Akkerman & Meijer, 2011). Therefore, how micro-context possibly affects the macro-context can be studied (Akkerman & Meijer, 2011). By conducting interviews before and after the video-based community, this study aims to interpret not only how preservice teachers position their identity in the community but also how their identity is transformed to a patterned discourse.

Moreover, macro analysis provides holistic understanding of the factors influencing the construction of teacher identities (Bukor, 2015). Personal identities, family and sociocultural background, experiences as students, previous teachers and the experiences in teacher education, especially the teaching practicum, are the most attributed factors in the literature (Beijaard et al., 2004; Duru, 2006; Hobbs, 2013). The present study considered these factors within the scope of the interviews while investigating preservice middle school mathematics teachers' professional identities. Therefore, it aims to understand preservice teachers' negotiations of the structures of the video case-based community and provide more insight into the interrelationship between the individual-social characteristics of identity.

Constructing a video case-based community also informs transformations of preservice teachers' identities and therefore, teacher education. It is agreed that preservice teachers enter teacher education with already established conceptions of what it means to be a mathematics teacher (Izadinia, 2013). During the teacher education, they develop "possible selves" (Markus & Nurius, 1986) or "ideal selves" (Sfard & Prusak, 2005). However, it is found that ideal selves are not congruent with those actualized in the classroom when preservice teachers become teachers (van Putten et al., 2014). This was attributed to the beginning teachers' lack of preparations to deal with the complexity of teaching (Flores & Day, 2006). In this study, preservice middle school mathematics teachers had the opportunity to observe, criticize and reflect video cases. Therefore, they had an opportunity to notice different situations which made them interpret multidimensionality of classroom and complexity of teaching mathematics (Koc, Peker, & Osmanoglu,

2009). In addition, sharing what they have noticed and discussing their contradictory ideas in the video case-based community may provide a vision for teacher roles and the objectives that they want to fulfil (Izadinia, 2013). This vision can prompt preservice teachers to negotiate in terms of who they will be as a mathematics teacher because they were guided to imagine themselves as the teacher in the video-cases and reflect their pre-existing conceptions related with teaching and learning mathematics.

From a different point of view, Izadinia (2013), related with the preservice teacher education, questioned why working on identity, which are originated in USA, UK and Australia, is concentrated in western cultural context. Considering the importance of contextual factors, she noted the need for investigating what meaning and implications on teacher identity carry in underdeveloped and developing countries' teacher education programs. As a response to this gap in the literature, this study produces information from a Turkish context, as one of the developing countries in the World.

As a conclusion, the significance of the present study with regard to identity research in teacher education lies in the application of a holistic perspective because the combined framework and methodology of this study have a potential for providing a broader interpretative framework. In addition, this study provided an example of alternative experiences for preservice teachers in teacher education programs that may enhance the understanding of how teacher education programs can provide a more comprehensive foundation for future development of preservice teacher education.

1.3 Definitions of the Important Terms

Teacher Identity: In the present study, Akkerman and Meijer's (2011) dialogical approach was used as a theoretical framework for conceptualizing teacher identity. Therefore, their definition of teacher identity was adopted. Accordingly, "teacher identity" or "being someone who teaches" was defined as

> *ongoing process of negotiating and interrelating multiple I-positions in such a way that a more or less coherent and consistent sense of self is maintained throughout various participations and self-investments in one's (working) life*. (p. 315)

Preservice teachers' professional identity (orientations): On the basis of the Akkerman and Meijer's (2011) dialogical approach, preservice teachers' identity in this study was defined as their sense of who they are as prospective teachers as an ongoing process of individual negotiations of their professional experiences during teacher education and it is more or less coherent and consistent sense of self. Specifically, what preservice teachers considered as essential and significant in teaching mathematics in terms of attributed teacher roles was used as indicator for their professional identity. Thus, Beijaard et al.'s (2000) identity framework was used for understanding what kinds of teacher the preservice teachers want to be and how they see their role as future mathematics teachers

It is important to note that professional identity, teacher professional identity and teacher identity were used interchangeably within the dissertation. They define the same construct explained above. The reason of preferring "preservice teachers' professional identity" especially in research questions is to stress on the identity related with the teaching profession, rather than personal attributes.

It is also significant to note that preservice teachers did not state who they were as future mathematics teachers at the time of the data collection. Rather, they expressed that what they will prioritize in their future teaching. In other words, what was focused in this dissertation was not the present states of preservice teachers, instead their future states as teacher candidates. Therefore, what we mean by the teacher identity in this study was actually their orientations as future mathematics teachers. For this reason, in most part of this study, preservice teachers' identity orientations were used to refer to their mathematics identity orientations.

Transformation of teacher identity: Based on the idea that "learning transforms who we are" (Wenger, 1998, p. 215), learning through noticing was used as the indicator of transformation of teacher identity. Specifically, transformations in how and what preservice middle school mathematics teachers noticed in the video cases and how these transformations influenced their identity orientations after video case-based community were used as indicators of transformation in identity. "Transformation of identity" was preferred to be used instead of "development of identity" since the

purpose was to understand emerging identities in video case-based community, not to supplement their orientations in a certain pathway.

Noticing: Sherin and van Es (2005) defined noticing as ability of interpretation of classroom interactions. They proposed three components of noticing:

- noticing involves identifying what is important in a teaching situation,
- noticing involves making connections between specific classroom interactions and the broader concepts and principles of teaching and learning, and
- noticing involves teachers using what they know about their specific context to reason about a given situation.

Based on these components, preservice teachers are expected to identify the situations that seems important to them and make connections between what they have noticed and the concepts and principles that they have learned in teacher education. Moreover, they are expected to use their knowledge related with teaching and learning while interpreting their noticing. Specifically, it was expected for preservice teachers to notice the role of the teachers in the videos, relate these components and also provide alternative pedagogies to what they noticed.

Video Cases: Video cases are defined as "multimedia presentations of classroom actions and analyses that include moving pictures (usually on videocassette) of classroom action" (Richardson & Kile, 1999, p. 122). In this study, video cases refer to the video clips of the mathematics teachers who voluntarily took the videos of their teaching for a national competition in Turkey.

Video case-based community: Steyn (2015) defined a teacher community as "a group
of collaborating teachers with a certain group identity, shared domain and goals, and an interactional repertoire that allows them to effectively share and build knowledge" (p. 695). Based on this definition, video case-based community in the present study is defined as a group of preservice teachers having a purpose of

reflecting and discussing video cases, integrating on an on-going basis and increasing their expertise in being a mathematics teacher.

Although Wenger (1998) focused on the importance of communities for identity development through the term – community of practice, video case-based community in the present study could not be defined as a community of practice. The reason of this was explained in the next chapter.

CHAPTER 2

LITERATURE REVIEW

The present study aimed to understand preservice middle school mathematics teachers' professional identities in a video case-based community. Based on this purpose, relevant literature was divided into three main parts. It started with how teacher identity was defined in the related literature and how the present study constructed teacher identity. Then, preservice teachers' identity development during teacher education was discussed. In the last part of this chapter, case-based pedagogy in teacher education and preservice teachers' noticing practices were presented.

2.1 Understanding Teacher Identity

Although studies on teacher identity are growing, there is still no clear and common definition (Darragh, 2016; Vermunt, Vrikki, Warwick & Mercer, 2017). Researchers attributed this deficiency to the complexity of the construct. Nevertheless, many researchers have made their own definitions. A sample of the (teacher) identity definitions is represented in Table 2.1 in a chronological order.

Table 2.1

Identity Definitions

Studies	Identity Definitions
Holland, Lachicotte, Skinner and Cain (1998)	"the way in which person understands and views himself and is often viewed by others – a perception of self that can be fairly constantly achieved" (p.68).
Wenger (1998)	"a way of talking about how learning changes who we are and creates personal histories of becoming in the context of our communities" (p.5)..
Lasky (2005)	"how teachers define themselves to themselves and to others" (p. 901).
Sfard and Prusak (2005)	"identities may be defined as collections of stories about persons, or, more specifically, as those narratives about individuals that are reifying, endorsable and significant" (p.16).
Bishop (2012)	"an identity is a set of beliefs that one has about who one is with respect to mathematics and its corresponding activities" (p.41).
Izadinia (2013)	"perceptions of their cognitive knowledge, sense of agency, self-awareness, voice, confidence and relationship with colleagues, pupils and parents, as shaped by their educational contexts, prior experiences and learning communities" (p.708)
Johnson (2013)	"identities are the positions assumed by people in their interactions with others both in moment-to-moment interaction and as accumulated over time" (p.22).
Zembylas and Chubbuck (2015)	"teacher identity is an ongoing process of negotiating one's belief, values, emotions and teaching practices all in the context of political realities" (p.187).
Darragh (2016)	"identity is a result of the process of identifying whether this is self-identification or identification by others" (p.6).

Similar to the sample identity definitions as seen in Table 2.1, Darragh (2016) investigated definitions of teacher identities in almost two hundred published studies conducted in mathematics education. Based on the approaches in defining teacher identity, she split the studies into four categories: *participative, narrative, discursive and performative*. These categories were explained in detail below.

In *participative approach*, studies focused on participation and engagement in a social group. Most of the studies that adopted participative approach in defining teacher identity were built on Wenger's (1998) community of practice theory (Darragh, 2016). Therefore, to understand participative approach, it is needed to clarify how Wenger (1998), who is one of the pioneers in the identity research, defines identity: "a way of talking about how learning changes who we are and creates person histories of becoming in the context of our communities" (p. 5). He addressed such a community as *community of practice* which are social learning systems for individuals. Participants combine their competencies with the experiences gained through the community and transform them into a way of knowing. This knowledge directs individuals to decide what matters and what does not in their profession (Wenger, 2000).

Wenger, McDermott and Snyder (2002) defined community of practice as "*the groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by integrating on an ongoing basis"* (p. 4). Regularity on the meetings and participants' attributed values on interactions are important characteristics of community of practices. Through sharing information, insight and advice, participants can create tools, designs or any other documents in their community of practices. Developing a hand-held product is not mandatory; they may even develop a common perspective, approach or knowledge (Wenger et al., 2002). The important point is that over time "*they may even develop a common sense of identity*" (Wenger et al., 2002, p. 5).

According to Wenger et al. (2002) communities of practices creating common sense of identity are everywhere and every person in the world experiences community of practices. For example, in the early ages, people living in the caves gathered around a

fire and discussed the better ways for hunting and surviving are attributed as a community of practice (Wenger et al., 2002). The important point is creation of knowledge and the common perspective in a specific issue from the participants who get together regularly. However, it is somehow misleading because not every group of people who get together in regularly bases constructs a community of practice. In all communities of practices, there is an initial hierarchy which is called as apprenticeship model in which the newcomers learn from more experienced participants (Lave & Wenger, 1991). For example, novice teachers' identities can be developed in a school community including other teachers with different backgrounds. They can adjust themselves to that community and become a more central participant throughout time. That is the reason that video case-based community in the present study could not be defined as a community of practice since there is no hierarchy in the community. All of the preservice middle school mathematics teachers participated in the community at the same time and there are not newcomers or old timers in the community.

Nevertheless, studies which adopted a *participative approach* benefit from the way Wenger (1998) explain identity formation without consideration of whether the group in the study could be represented as a community of practice or not. To be more explicit, participative approach underlines the importance of teachers' knowledge gained through interactions with other individuals in their professional community (Darragh, 2016). Therefore, teachers can decide what matters and what does not in teaching and learning mathematics. Since the present study investigates what preservice teachers consider as essential and significant in their profession through participating in a video case-based community, it aligns with the participative approach in this respect.

The second approach in defining teacher identity in mathematics education literature is based on the narratives (Darragh, 2016). *Narrative approach* focuses on teachers' stories about teaching and learning mathematics and searches for the significant experiences in those stories. Researchers who adopted narrative approach in defining teacher identity attributed to Sfard and Prusak's (2000) study. Sfard and Prusak (2000) states that telling stories is an identification process since the stories are the

identities themselves rather than reflection of the identities. They defined identifying through a metaphor: "collapsing a videoclip into a snapshot" (p.16). In other words, storytelling provides freezing the picture of the actions and turning from properties of actions to the properties of actors (Sfard & Prusak, 2000). To be more explicit, storytelling based on the previous experiences demonstrates individuals' state of affairs. Through identification, Sfard and Prusak (2000) put emphasis on the words used by the identifier which requires discourse analysis. For example, Kaasila, Hannula and Laine (2012) focused on the five preservice teachers' identity talk based on the mathematical autobiographies and conducted discourse analysis to explain their identification process. However, not all of the studies which considered the effects of teachers' or preservice teachers' prior experiences about mathematics conduct discourse analysis. Narrative approach in defining identity is not clear in this sense and Darragh (2016) did not point out in this issue. Therefore, focusing on the preservice teachers' stories about their previous experiences in learning mathematics without conducting discourse analysis as in the present study can be counted as a narrative approach.

Another approach in defining teacher identity is *discursive approach*. It is important to discriminate discursive approach from narrative approach which necessitates discourse analysis for understanding teacher identities from their stories. In discursive approach, the focus is not on teachers' previous experiences. Instead, it examines how people position themselves in a conversation (Darragh, 2016). Most of the studies in this category addressed Gee's (2000, 2001) discursive perspective in defining identity.

According to Gee (2001), the way the individuals position themselves in a conversation must be recognizable by others. More precisely, he attributed recognition as a key for discursive approach in identity and stated that:

> *If you put language, action, interaction, values, beliefs, symbols, objects, tools, and places together in such a way that others recognize you as a particular type of who (identity) engaged in a particular type of what (activity) here and now, then you have pulled off a Discourse*. (p. 18)

This idea is parallel with that identity is not only stories told by ourselves, but also stories about us told by the others (Sfard & Prusak, 2005; van Zoest & Bohl, 2005). Gee (2000) gave an example to explain it in a clear way. Accordingly, being a charismatic individual is not an inborn characteristic, rather it is constructed and sustained through dialogue with others. Therefore, others can recognize him as a charismatic person. Since others' recognition in understanding preservice teachers' identity is not considered in the present study as it does not fit the discursive perspective.

Positioning oneself and being positioned by others have been taken up by several researchers in mathematics education (Darragh, 2016). These researchers did not only focus on the conversations among the group of individuals but also emphasized the performance of the self in a community which represent the *performative approach* in Darragh's (2016) review paper. More explicitly, both performative and discursive approaches benefit from the ideas of positioning theory. What differentiated them is their unit of analysis. While discursive approach analyses the dialogue among individuals, performative approach focuses on the moment of actions.

Butler (1997) is stated as the pioneer of the performative approach. She pointed out the interactive relationships between performance and identity. Accordingly, identity is constituted through performance and similar performances over time ensure continuity of identity. Therefore, teacher identity studies (Darragh, 2016; Wood, 2013) which adopted performative approach recommend analysing the moment of time in teaching mathematics. As an example, Wood (2013) focused on the moments in which the identity is enacted which are called as micro identities by considering the situational dynamics. This is significant in understanding the interrelationships between micro and macro identities which are collected through narrative approach. Therefore, practitioners can have knowledge about different micro-identities enacted during teaching mathematics and how shifting across identities facilitates learning for students, and can organize opportunities to develop teacher identities in productive way (Darragh, 2016). The present study focuses on the preservice teachers' noticing practices in understanding transformation of identity through a video case-based community. Therefore, what

preservice teachers performed was not teaching mathematics as in other studies that adopted performative approach. Instead, it was reflecting other teachers' video-taped performances. For this reason, this study does not fit the performative approach.

Although researchers adopted different approaches, identity is generally regarded as dynamic, relational, multiple and changing over time under the influence of a range of individual and contextual factors (Vermunt et al., 2017; Zembylas & Chubbuck, 2015). There is a need to account for modern nations as well and explore how identity could be continuous, unique and individual (Gee, 2001). As a response to these ideas, dialogical approach characterizes teacher identity as both unitary and multiple, both continuous and discontinuous, and both individual and social (Akkerman & Meijer, 2011). Since dialogical approach integrates both modern and postmodern notions in explaining how teacher identity is developing and constructing in wider social context, it is a comprehensive approach in understanding teacher identity. Based on this, the present study utilized dialogical approach in understanding preservice teachers' identity orientations and possible identity transformations.

2.1.1 Akkerman and Meijer's (2011) dialogical approach in teacher identity

Dialogical approach in teacher identity is based on the ground of Dialogical Self Theory (DST) which was introduced by Hermans and colleagues (Hermans, 2001, 2013; Hermans & Dimaggio, 2007; Meijers & Hermans, 2018). DST is a comprehensive theory which elaborates on the characterizations that dialogical approach assumed and their interrelations (Akkerman & Eijck, 2013). It was inspired by the American pragmatism and Russian dialogism represented as self and dialogue "to create a bridge between individual and society" (Meijer & Hermans, 2018, p. 7).

DST underlines the dialogue not only between and among individuals but also within the oneself (Meijers & Hermans, 2018). It holds a view of self as a process of continuously changing internal and external relations (van Loon, 2017). Therefore, through the composite concept 'dialogical self', the theory combines internal space of

the individual mind and external relations with others. Specifically, dialogical self is defined as "a dynamic multiplicity of I-positions in the society of mind" (Meijers & Hermans, 2018, p. 7). To understand this definition, the terms *society of mind* and *I-positions* were needed to be clarified.

According to DST, people live in a space surrounded by both internal and external boundaries. Our mind as human beings is not independent of the society we live in. It was populated by many people whom we are constantly interacting with (van Loon, 2017). That is what Meijers and Hermans (2018) mean by 'society of mind' in explaining the composite concept dialogical self. Therefore, society of mind is a dialogical concept "infusing the external to the internal and in reverse introducing the internal to the external" (van Loon, 2017, p. 10). In other words, not only society affects our mind in constructing self, but also our enactments or positions in the society shapes the norms of that society.

Society of mind manifests itself in multiple I-positions in a dialogue which is defined as "*a spatial-relational act exists in the context of the positions of other people*" (Meijers & Hermans, 2018, p. 8). It was a special-relational process because it represents a stance toward somebody and addresses the other people or oneself within the communications. In other words, the people in the communications determines the stance of the individual positioning such as positioning oneself as strong towards a competitive other and as warm towards a loving other. Therefore, dynamics in the context and who are participating in are important for I-positions in DST (Meijer & Herman, 2018).

In short, DST supports the idea that self is not only a psychological process but also relational phenomenon (Akkerman & Meijer, 2011). It provides a method for explaining formations of identity based on the emergence of different I-positions in the context of professional practices (Leijen, Kullasepp & Toompalu, 2018). In other words, dualism between individual and social and self and dialogue was emphasized in formation of teacher identity (Akkerman & Meijer, 2011). Therefore, by taking the dialogical views, identity is explained as multiple, discontinuous and social and

simultaneously as unitary, continuous and individual (Akkerman & Meijer, 2011). In the following sub parts, each bilateral relation in Akkerman and Meijer's (2011) dialogical approach of identity was clarified.

Multiplicity and unity: Multiplicity of identity proposes that identity is fragmented into multiple I-positions which are driven by its own intentions such as “the artist in me who wants to express, the mother in me who wants to care, or the pragmatist in me who strives for solutions” (p. 311). Moves from particular I-positions to another are represented like a potpourri in many research studies and complicated the effort to understand identity as a whole. However, dialogical approach discusses that I-positions are “always in a dialogical relationship of inner-subjective exchange and temporary dominance” (p. 312). By means of self-dialogue, people can negotiate their I-positions and attempt to synthesize them for maintaining coherent and consistent sense of self.

Multiple I-positions and self-dialogues are important in understanding multiplicity and unity of teacher identity, because teachers throughout their career face dilemmas or tensions which cause them to practice multiple I-positions. It is significant to make teachers to be aware of their multiple I-positions and provide opportunity for them interconnect those positions. In this study, by reflecting the multiplicity and unity perspectives, preservice middle school mathematics teachers might demonstrate different I-positions while criticizing the video cases. We expect that discussions during the group meetings might enable them to be aware of different perspectives through self-dialogue and also dialogue with others, and might transform their identity from multiplicative to unitary nature.

Discontinuity and continuity: Akkerman and Meijer (2011) address that multiplicity of I-positions also reflects the voices of the context in which identity is manifested. In other words, manifested identity can change according to the type of situations and the people in that situation. “Who I am at this moment” does not only reflect the individual at that moment but also the other people and the things in that moment. For example, positions

in a meeting could change according to the context of the meeting and the other participants. Therefore, actions in a specific moment cannot be attributed to the person entirely. From a teacher identity perspective, a teacher who performs authoritarian identity in a class may perform a different identity in other class, which may cause to be seen as having a discontinuous identity. Therefore, being authoritarian may be attributed to the contextual factor which causes the teacher taking classroom management as the priorities for that context.

According to the dialogical approach, continuity of identity could be maintained through narratives. Sfard and Prusak (2005) stated that narrative approach is important to understand individuals' identifying processes and "overcome the fluidity of change by collapsing a video clip into a snapshot" (p. 16). Therefore, their I-positions become recognizable through time and provide individuals to plan for a similar context tomorrow (Sfard & Prusak, 2005). From the researchers' perspective, narrative approach provides understanding the patterned behaviors of their participants. In this study, preservice middle school mathematics teachers' narratives about their past experiences as students and as prospective teachers are sought to make sense of their vision of becoming a mathematics teacher. It is believed that these narratives will enable us to interpret possible multiplicity of I-positions in video-critics. Moreover, we expect that different I-positions will be transformed into a patterned discourse and will become observable and predictable.

Social and individual: As it is addressed in discontinuity and continuity nature of dialogical approach, I-positions reflect the voices of others in that community (Akkerman & Meijer, 2011). Individuals' narrations to a child, to a teacher, to a boss or to a stranger are different even if the massage is similar. When the other participants' voices in the community become a part of individuals' vision, their shared vision in that community affects who they are and also who they are not.

Dialogical approach does not address social characteristics of identity as an external source of individuals. Instead, it assumes social as a part of the individual and

calls “group voices” when the participants in a community share enough time together. In other words, transforming identity is considered neither a psychological, nor a sociological process entirely. Instead, it is a relational process in which the communities play a significant role in individuals’ I-positions. However, it is important to note that although they share a vision in a community and develop a group voice together, individuals implicitly construct and negotiate their identity. Personal autonomy or (called as) agency in many studies provides introducing new voices to the dialogue in that community. Therefore, not only communities can affect the individuals’ relative I-positions, but also individuals’ I-positions have power to develop communities. In the case of the teaching profession, it can be said that teachers enter the school community, negotiate the vision of that community and position their identity based on both psychological and sociological factors. Therefore, their identity is affected by and also affects the school community.

Based on these ideas, in this study, by creating a video case-based community, we expect that the group voices will become observable through time. Specifically, what and how they noticed the utterances in the video cases will become similar in the group. However, we are aware that preservice middle school teachers may negotiate the structures of the community in a different way which causes differences in transformations of their identity orientations.

According to the Annese and Traetta (2018), studying teacher identity considering the dialogical approach produces more theoretical expansions than methodological innovations. In other words, it helps in understanding the complexity of identity transformation, but what the researcher looks for in the data is another issue. Therefore, researchers find their own ways to analyse who the teacher is and what priorities the teacher has in teaching. Based on this need, while explaining the preservice teachers’ professional identity orientations, Beijaard and his friends (2000) approach in teacher identity will be utilized.

2.1.2 Beijaard, Verloop and Vermunt’s (2000) approach in teacher identity

Beijaard et al.'s (2000) identity framework describes teacher identity in terms of the knowledge areas influencing a teacher. They asked teachers to define themselves as teachers by allocating their expertise across three areas: subject matter, didactics and pedagogy. They defined *subject matter expert* as teachers who are knowledgeable relevant to students, keep pace with new developments in their discipline and do not permit themselves to make mistakes in teaching (mathematics). Beijaard et al. (2000) argued that subject matter has been neglected in identity research but it is needed to be integrated since it plays a significant role in teacher effectiveness. *Didactical experts* are the teachers who base their profession on knowledge and skills on planning, organizing, executing and evaluating the teaching and learning processes. More precisely, didactical experts take into account the students' levels and strategies in learning and adopt their teaching to support students' understanding. *Pedagogical experts* are defined as the teachers who base their profession on student-teacher relationship and classroom climate to support students' social, emotional, and moral development. Pedagogical experts recognize students' needs and personal problems and show awareness of broader societal issues and challenges affecting classroom climate. It is important to note that these three areas should not be confused with the Shulmans' knowledge areas (content knowledge, pedagogical content knowledge and pedagogical knowledge) because Biejaard's et al. (2000) identity framework addresses what teachers see important in their profession (Beijaard et al. 2004).

To test the framework, Beijaard and his colleagues (2000) collected data from secondary teachers (n=80) and found that teachers' professional identity consisted of the distinct aspects of expertise as it was expected. In addition, most teachers saw themselves more like subject matter and didactical experts and less as pedagogical experts. They concluded that these aspects are not mutually exclusive; rather all influence teachers' professional identity. Beijaard et al. (2004) discussed that the knowledge base that the teachers rely on in teaching can be the indicator of what is seen as the primary role of the teacher.

Beijaard et al.'s (2000) theoretical framework have been applied in several studies. For example, Löfström, Anspal, Hannula and Poom-Valickis (2010) used this model of teacher identity to investigate preservice teachers' metaphors for teachers. They further added *self-referential* and *contextual* categories to address teachers' personality and the characteristics of the teaching environment respectively. The reformed categorizations were investigated in preservice teachers' and inservice teachers' metaphors in different contexts based on the developed manual for the analysis (Löfström, Poom-Valickis, & Hannula, 2011). Studies which conducted in Finland found that teacher as didactics expert was the most common metaphor used by both pre-service and in-service teachers (Oksanen & Hannula, 2013; Oksanen, Portaankorva-Koivisto, & Hannula, 2014). They concluded that it is important to create learning environments that support the students' learning process and to use different teaching and learning methods for Finnish teachers. Similarly, Haser, Arslan and Celikdemir (2015) explored Turkish preservice middle school mathematics teachers' identity through their written metaphors and found that preservice teachers prioritized didactical expertise. These findings indicated that the model was effective in analyzing metaphor data requiring short answer.

Van Putten et al. (2011) conducted a case study and investigated six fourth grade preservice mathematics teachers' perceived professional identity based on Beijaard et al.'s (2000) framework and the actualization of these aspects in the context of teaching practice. She found that perceptions of preservice teachers are not congruent with those aspects as actualised in the classroom. In other words, what these preservice teachers professed about their professional identity were not who they were actually in the classroom. Expecting congruence of professional identity in different contexts conflicts with the idea of Akkerman and Meijer's (2011) dialogical approach in three perspectives. First of all, it supports unity and ignore the multiplicative nature of identity. Second, it assumes continuity, whereas teachers enact different positions depending on the context. Third, characterizing teachers with a single term are used like a personal attribute and therefore, cause to neglect the influences of social environment.

Then, what is needed is to make an effort in combining methodological and theoretical frameworks. This could be possible if the data collected based on Beijaard et al.'s (2000) identity framework was interpreted with Akkerman and Meijer's (2011) dialogical approach. Therefore, the present study acknowledges that preservice teachers' identity orientations before the video case-based community and what they noticed based on their orientations could be different in a certain degree. It is believed that making explicit the dynamics in the video case-based community will help us understand transformations of preservice teachers' identity orientations.

2.2 Preservice Teachers' Identity Development

Teacher education programs are considered as the most important stage in the development of teacher identity (Izadinia, 2013). As Bullough (1997) stated "teacher identity is a vital concern to teacher education; it is the basis of meaning making and decision making" (p. 21). Understanding of the process of identity formation or identity development of preservice teachers could positively inform teacher education (Beauchamp & Thomas, 2009). More precisely, it provides what factors positively and negatively affect the process of identity formation during teacher education and enlightens researchers and teacher educators about the way they can support identity formation (Beauchamp & Thomas, 2009; Izadinia, 2013).

Researchers (Flores & Day, 2006; Izadinia, 2013; van Putten, et al., 2014) focusing on the formation and the development of professional identity agreed that it begins in the early years of schooling. Therefore, each preservice teacher comes to the teacher education programs with conceptions about what it means to be a teacher and these conceptions come from their observations and experiences as a student (Izadinia, 2013). That is why K-12 experiences (Binks, Smith, Smith, & Joshi, 2009; Kang, 2012), early teacher role models (Knowles, 1992) or biography of teachers (Beijaard, Meijer, & Verloop, 2004) is attributed as an important factor in understanding teacher identity. Kang and Battey (2017) conducted a case study with two preservice teachers and explored their identity development during the method courses and teaching practice

considering their K-12 experiences. They found that since preservice teachers' K-12 experiences were different, their incoming identities and the way they formed their identities during the method course and teaching practice were different. This finding supports the idea that preservice teachers develop identity on the basis of their experiences with the schooling and their beliefs and concepts about teaching and being a good teacher (Flores & Day, 2006).

Making these views and the process of identity formation explicit during teacher education is one of the important steps that teacher educators should take to support preservice teachers' identity development (Flores & Day, 2006; Zembylas & Chubbuck, 2015). Specifically, it is noted that teacher education programs need to provide intentional and structural opportunities for preservice teachers to explore, negotiate and develop their identities (Zembylas & Chubbuck, 2015). Although finding ways to provide these opportunities is attributed as a challenging step for teacher educators (Beauchamp & Thomas, 2009), there are various attempts documented in the related literature. While some researchers focused on the coursework by addressing preservice teachers' development of knowledge in the profession (Ebby, 2000; Kang & Battey, 2017; Kanno & Stuart, 2011; Lee, 2013; Yuan & Lee, 2015), some of them adopted a performative approach and canalized their efforts to practice teaching (Kanno & Stuart, 2011; Smagorinsky, Cook, Moore, Jackson & Fry, 2004). There are also studies investigated preservice teachers' identification in alternative settings which is beyond the content of the regular teacher education program (Maclean & White, 2007). Present study belongs to the third category since preservice teachers' identities were investigated in a video case-based community. Nevertheless, studies which can provide an insight for the present study in each category were reviewed.

2.2.1 Identity development through knowledge building

Teacher identity formation is inseparable from their cognition which refers to what teachers know about teaching (Kanno & Stuart, 2011; Lee, 2013; Yuan & Lee, 2015). As teachers and preservice teachers construct their knowledge about teaching, their

professional identities undergo constant transformations (Izadinia, 2013; Yuan & Lee, 2015). More precisely, building knowledge through coursework in teacher education significantly enhances their professional identities. For example, Lee (2013) investigated four language writing teachers' identities and concluded that a common body of knowledge of writing including knowledge of composing process, genre and text functions is central to their identity constructions. In a similar study, Yuan and Lee (2015) found that preservice language teachers developed and modified their identities through engaging cognitive learning within the scope of a coursework. Sutherland, Howard and Markauskaite (2010) also explored the relationship between teacher cognition and identity, but they focused on the text-based online forum as the context of the study. They concluded that preservice teachers built knowledge through individual and collective reflection and it shaped their professional identity as teacher candidates.

According to Akkerman and Meijer (2011), building knowledge related with teaching is not related with learning how to teach; instead, it is related with learning to be someone who teaches. Therefore, identity development is parallel with the development in learning to teach (Alsup, 2006). For preservice middle school mathematics teachers, researchers specifically investigated the effects of the method courses although they took many courses during teacher education (Kang & Battey, 2017). In method courses, preservice teachers were provided a conceptual understanding of mathematics content and ways to think about mathematics instruction (Selden & Selden, 2001). In particular, preservice teachers reconstructed their knowledge and beliefs about what it means to teach mathematics and set their goals to become the mathematics teachers they wanted to be (Kang & Battey, 2017; Selden & Selden, 2001). This is why the the context or the effects of the method courses were investigated in identity research.

According to Kagan (1992), preservice teachers who proceed teacher education without a clear sense of self tend to face difficulties in internalizing knowledge gained during the method courses. In other words, being aware of themselves as teacher candidates influences the way they benefit from the method courses. This idea was

verified by the empirical studies (Ebby, 2000; Kang & Battey, 2017). Ebby (2000) conducted a case study with three preservice elementary mathematics teachers and investigated whether the method courses helped them to develop new teaching perspectives. Specifically, she wanted to explain how preservice teachers incorporated constructivist teaching perspectives into their self-perspectives. She found that preservice teachers who defined themselves as learners were more successful in making sense of constructivist perspectives. However, one of them did not adopt a constructivist perspective because she did not make an effort in understanding. Ebby (2000) attributed this to the preservice teacher's previous experiences. More precisely, she had strong negative experiences and feelings about learning mathematics which prevented her making sense of the constructivist related knowledge. Therefore, it was concluded that preservice teachers' prior beliefs, dispositions and experiences were needed to make explicit to be successful in providing opportunities within the method courses. Kang and Battey (2017) found similar findings in their case study conducted with two preservice middle school mathematics teachers. They concluded that negative experiences in learning mathematics hinder development of teacher identity in line with the method courses. In contrast, being confident in the content knowledge advances the development of teacher identity. Therefore, what is needed through the method courses is to consider preservice teachers' K-12 experiences and to raise their self-awareness to match between incoming and intended identities (Kang & Battey, 2017)

In Turkish literature, method courses are addressed as the fundamental courses that preservice teachers learn how to teach and develop their expertise (Higher Education Council [HEC], 2007). It is noted that with the development of new elementary mathematics teacher education curriculum in 2006, the number of mathematics teaching method courses is increased. Therefore, more opportunities to have in-depth understanding of mathematical procedures and pedagogical content knowledge were given to preservice teachers (Isiksal, Koc, Bulut, & Atay-Turhan, 2007). The influence of these courses is supported by Tanıslı's (2013) study in which preservice teachers who had not taken teaching method courses did not have adequate

level of skills for preparing questions and capturing knowledge of students compared to the preservice teachers who have taken the method courses.

Although supporting preservice teachers' identity orientations through the coursework, especially through method courses, is not in the scope of the present study, preservice teachers' cognition is important in understanding their identity orientations and noticing practices. In particular, based on the studies summarized above, we believe that preservice teachers' knowledge in teaching mathematics and their self-awareness affects their identity orientations and noticing practices in the video case-based community. Importance of knowledge in noticing practices was explained in the related part (see part 2.3.2).

2.2.2 Identity development through teaching practice

Compared to the course work, practice teaching has been given more importance since teaching practice was found to be the most powerful predictor of teacher identity (Beauchamp & Thomas, 2009; Lutovac & Kaasila, 2011). For example, Anspal, Eisenschmidt and Löfström (2012) explored professional identity development among thirty eight student-teachers in the first through fifth year of a specific teacher education program. They collected narrative stories from student teachers on the topic of "Myself as a Teacher Today" and searched for the factors within these stories. Practice period was found to be highly influential for identity development. Similarly, Chong, Low and Goh (2011) focused on preservice teachers' formation of their professional identity and whether teaching experience can make a difference. In this longitudinal study, they collected necessary information from 105 preservice teachers at the beginning and at the end of the education by a survey in which they were asked how they were feeling about teaching and who would be when they start carrying out their profession. They found that practice teaching changed preservice teachers' perceptions about themselves as teacher candidates and concluded that even this short period of practice teaching has such a power in playing a role their emerging identities.

It is agreed that through practice teaching, preservice teachers have the chance to apply what they perceive as important in their teaching and to observe their strengths and weaknesses in actual classrooms (Izadinia, 2015). In particular, Smagorinsky et al. (2004) noted that practice teaching provokes tensions to challenge their identities and thus allows for questioning of themselves. For example, self-conceptions of four preservice teachers were challenged in their teaching practicum in Johnson's (1994) study. Preservice teachers noticed that their images of teaching were in sharp contrast to the realities of the classroom which provide evolving perceptions of themselves as teacher candidates. Similarly, in Kanno and Stuart's (2011) study, teaching practice provided understanding what was important in teaching and identifying themselves as prospective teachers.

Noticing these tensions as prospective teachers provides a transition from being a student to being a teacher (Kagan, 1992; Smagorinsky et al., 2004; Wenger, 1998). This transition can be supported through collaboration with mentor teachers (Izadinia, 2013; Korthagen, 2004). Therefore, preservice teachers get chance to explore and negotiate their identities (Bjuland, Cestari, & Borgersen, 2012). Researchers who adopted this point of view focused on the importance of mentors for enhancing preservice teachers' identities in teaching practice contexts. For example, Liu and Fisher (2006) conducted a case study with three preservice teachers. They observed that preservice teachers' conceptions of their identity were positively changed. They attributed these changes to the supports acquired from the collaboration with mentor teachers. Similarly, in two other case studies (Izadinia, 2015; Kang & Battey, 2017), sharing common goals with the mentors, receiving feedback and mentors' encouragement for teaching were highlighted as the supportive community of practice for preservice teachers' identity development. More precisely, mentoring relationship provided positive emotions toward teaching and strengthen preservice teachers' self-image as in the case that preservice teachers and mentor teachers share common goals about teaching mathematics (Izadinia, 2015). Otherwise, they could not enhance their identities and they might lose their interest in teaching practice.

In spite of the lack of special focus on the identity development, there were studies investigated the preservice teachers' perceptions or experiences about teaching practice period in Turkish teacher education system. They found that preservice teachers complained about lack of required support during their practice teaching (Boz & Boz, 2006; Eraslan, 2009). To overcome this problem, it is recommended to establish partnerships with schools and generate communities including preservice teachers, teacher educators and mentor teachers to share their experiences and learn from each other (Eraslan, 2009). As a response, Yiğit, Alev and Ekiz (2010) conducted an action research study considering preservice mathematics teachers' needs during their practice teaching. They formed small groups including the mentor teachers, teacher educators and the preservice teachers. Within these groups, preservice teachers' written reflections about their experiences and their weaknesses and strengths were discussed. Therefore, they received appropriate feedback about what they really did in the classroom and had opportunity to realize what they needed to actualize their ideal teaching. They concluded that thanks to these groups, the preservice teachers were able to learn from their experiences and seek solutions to the difficulties that they had during their practice teaching. Through participating in these kinds of communities, preservice teachers may realize their inadequate skills and knowledge to actualize their ideal selves and make an effort for professional development (van Zoest & Bohl, 2005; Wenger, 1998).

It seems that experiencing real classroom settings and collaboration with mentor teachers play significant role in preservice teachers' identity development and their confidence in their identity orientations (Izadinia, 2013; Leijen et al., 2014; Meijer et al., 2014). In other words, collaboration with teacher educators, mentor teachers and receiving feedbacks from them were found as significant factors in identity formations.

2.2.3 Identity development through reflections

Reflective process in the negotiation of identity is frequently tacit, unexamined and even unconscious but there is a need to be make it explicit for identity formation (Beauchamp & Thomas, 2009; Korthagen, 2004; Sutherland et al., 2010; Zembylas &

Chubbuck, 2015). As Kennedy (1999) discussed, preservice teacher education is "*ideally situated... located squarely between teachers' past experiences as students in classrooms and their future experiences as teachers in classrooms*" (p. 57). Then, it is a space for preservice teacher to negotiate their previous and current experiences and to construct an image for what they wanted to be as a teacher and what kinds of priorities they will have in teaching.

Unless preservice teachers are encouraged and supported to relate their experiences to their knowledge and perceptions, they cannot develop a sophisticated understanding of ideal self (Korthagen, 2004). Therefore, it is crucial to make preservice teachers self-reflective individuals to develop professional identities in accordance with teacher education programs and to actualize their identities into their teaching. Reflection processes could be supported in each part of the teacher education.

Then, how preservice teachers' reflections skills can be enhanced during teacher education is important to discuss. Studies emphasized various ways. First one was storytelling because through storytelling preservice teachers can attach meaning to their experiences (Binks et al., 2009). To be more explicit, preservice teachers relive their histories through storytelling and relate them to the knowledge or experiences gained in teacher education. Therefore, they can make connection between what they have already known and be able to do and their needs for personal growth (Binks et al., 2009). Reflecting upon the values, beliefs, feeling and experiences for preservice teachers helps to shape their professional identity. In other words, it raises self-awareness and helps them to negotiate the new experiences based on their already existing knowledge, beliefs and values (Izadinia, 2013). Therefore, identity development takes place through reflection on past, present and future self-images (Zembylas & Chubbuck, 2015).

Another one was reflective writing about what and how they are learning. Although the focus was not to facilitate identity formation, Tok (2008) investigated the effect of reflective thinking activities on student teachers' attitude toward teaching during the Introduction to Teaching Profession course. For this purpose, she demanded preservice teachers in experimental group to criticize what they had learned at the end of

each unit considering their future teaching and then she gave feedback to each student. At the end of the 12-week period, she found positive effects of reflective thinking on student teachers' attitudes toward teaching profession. This is what Löfström et al., (2010) suggested to teacher educators about developing self-reflection at the initial years of teacher education programs. Therefore, preservice teachers could become more cognizant of their learning which is important to construct their professional identities (Beauchamp & Thomas, 2009)

On the other hand, one of the most recommended activities during teacher education to raise preservice teachers' reflection skills is criticizing and discussing video cases within a group (Maclean & White, 2007; Stenberg, 2010). Therefore, it is possible to observe identification processes of preservice teachers within a group (Maclean & White, 2007). To be more explicit, reflecting on a video club showing a part of an actual classroom provides a context for capturing I-positions in preservice teachers identity developments (Akkerman & Meijer, 2011). Considering this idea, Maclean and White (2007) investigated four preservice teachers' identity developments through video recordings of their teaching practices. It was defined as an action reflection cycle since preservice teachers first taught individually and then reflected on their teaching within the group. Reflecting on their own practice provided preservice teachers to realize their strengths and weaknesses in teaching and to give a rationale for their actions. Therefore, preservice teachers benefited from the reflection on videos by increasing their confidence, enthusiasm and professional learning. Similarly, it is found that video based reflection on classroom practice promoted preservice teachers' professional development in Stenberg's (2010) study. She concluded that two of the preservice teachers developed self-awareness during the process which associated as the starting point for identity development.

In short, preservice teachers' reflection skills to develop their professional identity could be supported through storytelling, reflective writing and video based discussions. The present study considered these to support preservice teachers' identity orientations. To be more explicit, preservice teachers were directed to share their

previous experiences as students, their evaluations of those experiences and their identity orientations. Therefore, they had the chance to be aware of their preconceptions about being a mathematics teacher. In addition, a video case-based community was constructed to give preservice teachers opportunities to notice complexity of teaching mathematics and to reflect on it based on their conceptions about teaching. It is believed that preservice teachers will benefit from the dynamics in the community to transform their identity orientations. In the following section, how video cases used in teacher education were reviewed.

2.3 Case-based Pedagogy and Teacher Noticing

According to Loughran (2014), noticing through video cases can support the development of identity since it provides understanding the importance of teachers' roles in mediating the relationship between teaching and learning process. Similarly, case-based pedagogy was suggested in terms of developing a professional vision for multidimensionality of classroom and complexity of teaching mathematics (Goodwin, 1994; Koc et al., 2009) and for teacher roles and the objectives that they want to fulfill (Izadinia, 2013). Based on these suggestions, in this study, it is believed that noticing practices in a video case-based community prompt preservice teachers to negotiate their identity orientations. However, there is a lack of empirical research integrating teacher identity and teacher noticing in the literature. Therefore, in the following subsections, case-based pedagogy and noticing in teacher education was explained without referring to teacher identity literature.

2.3.1 Video case-based pedagogy in teacher education

Case is defined as "*a descriptive research document based on a real-life situation or event*" (Merseth, 1996, p. 726). Use of cases, or named as case-based pedagogy in teacher education, attracted several researchers' attention and turned out to be a popular topic after the Lee Shulman's speech in American Educational Research Association (AERA) meeting in 1985 (Darling-Hammond & Hammerness, 2002;

Merseth, 1996). It was a wakeup call for teacher educators and educational researchers to use cases in teacher education. Shulman (1992) argued that use of cases in teacher education would transform preservice teachers' pedagogies, knowledge and skills in teaching.

Case-based pedagogy in teacher education was developed mainly for preparing teacher candidates for the complexity and authenticity of real classrooms (Shulman, 1992; Sykes & Bird, 1992). It is argued that in contrast to the lecture-based pedagogies in traditional teacher education programs, case-based pedagogies can bridge the gap between theory and practice (Abell & Cennamo, 2004; Shulman, 1992; Sykes & Bird, 1992; Van Den Berg & Visscher-Voerman, 2000) because it creates an instructional environment for preservice teachers to reflect on teaching and learning processes, restructure their understanding and build new perspectives (Butler, Lee & Tippins, 2006; Merseth, 1996). In addition, case-based pedagogies are characterized as more manageable for teacher educators and less daunting for teacher candidates or novice teachers than fieldwork where they may feel helpless due to lack of experience for complex classroom situations (Morettini & Reddy, 2014). Yadav (2008) attributed success of cases in teacher education compared to lecture based pedagogies and field experiences to the benefits of cases in providing rich and contextual representations of problems and dilemmas that preservice teachers may encounter in their classrooms.

Researchers defined several types of cases: Text-based cases, video cases and multimedia cases. Text-based cases are narratives of real classrooms such as diaries, photocopies of student work and observer's notes which were given as a part of the textbooks (Merseth & Lacey, 1993; Shulman, 1992). Although text-based cases are easy to access and use in teacher education, they have several deficiencies. First, they can be biased because they describe what the observer noticed in the classroom (Smith & Diaz, 2002). Therefore, they may have subjective points. In addition, text-based cases fail to capture the reality of the acts, tone of voice, facial expressions, body language and gestures of the teacher and the students which are significant in understanding the

classroom climate (Bayram, 2012). Considering these critics and the developments in the digital age, researchers shifted their focus to video cases and multimedia cases.

Video cases, which are the video-taped real lesson excerpts, are the most preferred cases in teacher education (Frederiksen, Sipusic, Sherin, & Wolfe, 1998; Star & Strickland, 2008; van Es & Sherin, 2002, 2005). They offer several opportunities to the researchers and also to the video users as the leaners in teacher education. First, video cases provide time and place-independent learning (Bayram, 2012). Preservice teachers can watch video cases any time they want. In addition, unlike the fieldwork observations, they can pause, re-play, analyze and re-analyze the same instance of practice (Seago, 2003; Sherin, 2004). Therefore, they can attend to the specifics of the cases more carefully. Similarly, teacher educators can attract attention to the specific instance in the video by pausing and re-playing after discussion (Seago, 2003). Moreover, video cases capture more of the social basis of the classroom interactions and provide more details of the classroom (Bayram, 2012, Koç et al., 2009). It can be important in understanding the dynamics in the classroom and the teachers' pedagogical approach.

Considering the opportunities of video cases in teacher education, several researchers conducted video case-based studies and investigated preservice teachers' progress on different points such as classroom management issues (Koç, 2011), students' mathematical thinking (Didiş, Erbaş, Çetinkaya & Çakıroğlu 2014; Ding & Dominguez, 2016; Olkun, Altun, & Deryakulu, 2009; Ulusoy, 2016; Walkoe, 2014), teacher and student roles (Kim & Hannafin, 2009; Osmanoğlu, 2010), and teaching pedagogies (Friel & Carboni, 2000). Although these studies were not directly related to preservice teachers' identity orientations, few of them may shed light on the present study since they also focus on transformation of preservice teachers' beliefs or perceptions about teaching mathematics. For example, Friel and Carboni (2000) investigated the impact of video cases on preservice teachers' comprehension of teaching mathematics by constituting video-cases as a part of the course work. They concluded that video case-based pedagogy directed preservice teachers' beliefs from a

teacher centered approach to a more student-centered pedagogy by stimulating reflection. Osmanoğlu (2010) explored the effects of video cases representing reform-minded teaching in mathematics on preservice teachers' perceptions about the role of the teachers and students in new curriculum in Turkey in an online platform. It was found that video cases developed preservice teachers' construction of teacher and students' roles in reform-minded teaching and learning. Similarly, Kim and Hannafin (2009) concluded that video cases supported prospective teachers in understanding and gaining more concrete ideas about the teaching contexts, teachers' role, student characteristics, and educational strategies.

Schrader et al. (2003) conducted a similar study and stated that the important aspect of video cases in teacher education like any technological innovation is not the design of the videos; rather, the creation of social harmony among preservice teachers. They underlined that preservice teachers' individual reflections on video cases are not enough to gain new perspectives about teaching and learning. It is important to receive feedback related with their reflections from other preservice teachers and/or teacher educators (Shrader et al., 2003). Therefore, researchers questioned how the video cases can effectively be woven into teacher education to create a social environment. As a response to this question, video-clubs or video case-based communities were offered to construct collaborative discussion and reflection environment in teacher education or it is suggested to integrate video case-based discussion on teacher education courses' content.

Video clubs or video case-based communities were defined as group meetings in which participants are involved in discussions about videos (Sherin & van Es, 2005). They do not only raise preservice teachers' awareness of what took place in classrooms, but also increase their communication skills based on teaching and learning processes (Sherin, 2003). It is important for preservice teachers to share and argue about their noticing and to learn from each other through discussion. For example, in Sherin and Han's study (2004), the teachers involved in a video club began to see different issues occurring in classroom interactions and discussed approaches to investigating both

teacher's pedagogy and students' conceptions or misconceptions. Manouchehri's (2002) study is another example showing the significance of interactions and discourse among preservice teachers. He concluded that through group discussion on video cases, preservice teachers listened to each other's perspectives, justified their interpretations and so developed a more sophisticated understanding in the mathematics content, students' learning and curriculum related issues in that content.

Manouchehri (2002) also pointed out that collaborative discussion in video case-based communities not only supported preservice teachers' understanding of teaching mathematics, but also made them realize the gaps in their professional knowledge, and therefore, developed preservice teachers' self-awareness. It is a significant finding for the present study because being aware of their needs as human beings produces more realistic identity orientations for preservice teachers (Hall, 2004). More precisely, if preservice teachers know who they are as teacher candidates and who they want to be as expert teachers, they can be conscious in the process of becoming teachers and can develop pathways to reach their ideal teacher (Bullough, 2015). Therefore, it is believed that constructing a video case-based community will help preservice teachers in raising awareness in their present state of self and give them opportunity to develop their understanding related with becoming a mathematics teacher.

In summary, based on the literature review, it seems that there are limited studies on the use of video cases which could indirectly effect preservice teachers' identity orientations. Thus, what preservice teachers gained from video case-based community and whether or how they transformed their identity orientations were focused in the present study.

2.3.2 Teacher Noticing

Based on the idea that video cases develop preservice teachers' understanding of classroom interactions and complexity of teaching (mathematics) as reviewed above, several researchers investigated noticing practices in the context of teacher education. Before reviewing those studies, it is significant to clarify what teacher noticing is.

Mason (2002) noted that teacher noticing is different from the ordinary noticing in everyday life. Noticing is related with teachers' vision and expertise that enables them to see and interpret complex situations in lesson (Goodwin, 1994; Jacobs, Lamb, & Philipp, 2010; Koellner-Clark & Lesh, 2003; Sherin & van Es, 2009). Therefore, preservice teachers' noticing skills should be developed to help them in their journey of becoming experts (Sherin & van Es, 2009).

Teacher noticing inspired many researchers to focus on how preservice teachers can develop noticing expertise and how teacher educators can help them in equipping preservice teachers with the necessary noticing skills (Sherin, Jacobs, & Philipp, 2011). To achieve these purposes, they investigated preservice teachers' noticing with similar methodological approaches (Borko, Jacobs, Eiteljorg & Pittman, 2008; Frederiksen et al., 1998; Koc et al., 2009; Sherin et al., 2016; van Es, 2011; van Es & Sherin, 2002). They arranged a video-club or video case-based community as an intervention program and mainly investigated the trajectories and shifts in teachers' noticing by exploring their comments before, during and after the intervention.

Although their methodologies seemed to be similar, the way that researchers conceptualized teacher noticing was different. While some of them conceptualized noticing only as an identification process (Star, Lynch, & Perova, 2011; Star & Strickland, 2008), others also focused on how teachers interpreted the events that they identified (Sherin & Han, 2004; van Es & Sherin, 2002; van Es, 2011). For the present study, how preservice teachers interpret what they notice in the video cases is as significant as what they notice. Therefore, among the teacher noticing conceptualizations, *Learning to Notice Framework* developed by van Es (2011) was used as a framework in the present study. In the following part, Learning to Notice Framework and related empirical studies were reviewed.

2.3.2.1 van Es's (2011) learning to noticing framework

As the basis of the Learning to Noticing Framework, van Es and Sherin (2002) proposed three main aspects in noticing skills: *"(a) identifying what is important in a*

teaching situation; (b) making connections between specific events and broader principles of teaching and learning; and (c) using what one knows about the context to reason about a situation" (p. 573). The first aspect focuses on how (preservice) teachers identify noteworthy events in a complex classroom environment. Teachers cannot attend all aspects of the lesson. Thus, they should select the events to focus on and respond during the lesson which was also called as selective attention or call outs (Frederiksen et al., 1998). All of them represent the incidents in the video that teachers considered critical. The second aspect of noticing emphasizes the importance of interpretations of noticed events based on instructional principles (van Es & Sherin, 2002). Teachers should not only describe events literally, but also interpret specific events by connecting to broader and general issues in education. The third and last aspect is about teachers' knowledge of the subject matter, knowledge of how students think and the knowledge of the context to identify and interpret the specific events (van Es & Sherin, 2002). Compared to novice teachers, expert mathematics teachers know their students and their subject matter better. Thus, their ability to identify and interpret noteworthy events in lesson is much more professional.

Based on these aspects, van Es and Sherin (2002) conducted a case study aiming to understand how teachers learn noticing classroom interactions. In particular, they constructed a video-club with preservice mathematics and science teachers and investigated how they discuss their own video-taped lessons. They found that preservice teachers learned to notice and interpret significant events for students' learning with respect to instructional principles. In addition, their comments about what they noticed showed the developmental characteristics: Descriptive, evaluative, interpretive and elaborative. These findings indicate the improvement of preservice teachers' noticing skills and underline the trajectory of noticing levels.

Other studies conducted by Sherin and van Es (2005, 2008, 2009) verified that teachers' noticing and discussion shifted from evaluation to interpretation of the significant events. In addition, at the beginning of the group discussions, teachers tend to focus on the teachers' actions in the video and state their strengths and weaknesses. After

a while, they began to interpret those actions for students' learning. In one of these studies, they created four categories to deepen what and how teachers notice (Sherin & van Es, 2008). These categories were *actor, topic, stance* and *specificity*. Specifically, the *actor* refers to whom the teachers notice. Teacher can focus on the teacher in the video, a group of students as a whole class or particular students. The *topic* represents the issues the teacher noticed in the video, such as classroom climate, the context of the lesson, students thinking or teachers' pedagogies. *Stance* is related with the approach in teachers' noticing: describing, evaluating and interpreting. While describing the video refers to expressing the issues that they notice, evaluating indicates teachers' judgments about what was good or bad in the video. Interpreting, on the other hand, represent the teachers' reasoning about the topic they notice and their efforts to understand the reasons behind the topic. As the last category, *specificity* refers to the depth of analysis based on the details or the evidences related to what they notice. Sherin and van Es (2008) found that teachers' noticed points were shifted from whole class to particular students, from classroom climate to students' learning, from describing to evaluating and from evaluating to interpreting, and from general expressions to detailed explanations. It was concluded that video case-based discussions help teachers in focusing on students and their mathematical thinking, referring to specific events in the video and gaining interpretive stance.

Considering the previous studies' findings, van Es (2011) developed a trajectory for teachers' noticing called as Learning to Noticing Framework. In this framework, teachers' noticing was examined in two dimensions, what teachers notice and how teacher notice. While the first dimension is related with the *topic* and the *actors* in the noticing, the way that teachers analysed what they notice represents the *stance* and *specificity* of the noticing and forms the second dimension.

In this trajectory, she proposed four levels of noticing: *Level 1 (Baseline), Level 2 (Mixed*), *Level 3 (Focused)* and *Level 4 (Extended)*. In each level, the observed characteristic of teachers' noticing in terms of the topic and the actors and the way they analysed are defined. On the *baseline level (Level 1),* in terms of what they notice,

teachers tend to focus on the whole class or teacher. Teachers only notice the superficial events in the videos representing how they notice in this level. They do not elaborate their noticing and do not provide specific evidences from the video. For example, "*They all wanted to volunteer*" represents baseline level of noticing (van Es, 2011, p. 142).

Level 2 is defined as the *mixed level* since teachers both notice on teacher pedagogies and student related issues. The important point in this level is related with the main focus. Teachers mainly focused on the teachers' actions in the lessons and possible effects on the students. However, they continue to offer general impressions with judgmental evaluations, but start to call out the important events in terms of students and to make interpretations with little or no evidences. At this level, teachers can make comments such as "*I like how he borrowed*" and "*They do not get it*" (van Es, 2011, p. 144)

The shift from Level 2 to Level 3 is attributed as an important step in learning to notice because at *Level 3* teachers notice primarily particular students' mathematical thinking. It other words, teachers no longer focus on the issues related with the whole class. This is why it was named as *focused level*. In addition, they can elaborate their noticing with the evidences from the video. For instance, "*She was using two different approaches, estimation and the traditional algorithm, to solve the problem*" represents the expressions that teachers can state in Level 3 (van Es, 2011, p. 146).

Finally, at *Level 4*, teachers relate what they noticed at the Level 3 to the teacher pedagogy in the video. In other words, teachers focus on students' thinking and extend their analysis through teacher related issues. On the other hand, as an additional feature for this level, teachers discuss for the alternative pedagogies to advance students' thinking. For example, "*So maybe we need to really rethink our assessment of students*" represents the characteristics of extended level (van Es, 2011, p. 145).

Since Learning to Noticing Framework is relatively new in teacher education, there is not an extensive body of work in the related literature. Researchers investigated teachers' and prospective teachers' noticing practices by using this framework and the roles of cognitive and psychological factors on what and how they noticed. For example,

Güner and Akyüz (2017) investigated two preservice middle school mathematics teachers' noticing practices in a lesson study context. They found that preservice teachers focused on the behaviours of teachers, the use of material, attention of students and classroom setting rather than particular students' mathematical thinking. In addition, preservice teachers' noticing was either descriptive or evaluative without an interpretive stance. Therefore, the dominating level of noticing during the whole lesson study process was found as Level 2. Nevertheless, they indicated that lesson study process was helpful in guiding preservice teachers to focus more on the student outcomes and the related teaching practices. In a similar context, Amador and Weiland (2015) found that preservice teachers primarily noticed elements about the classroom environment and teacher pedagogy, but also included instances of noticing centred on students' mathematical thinking, which was coded either in Level 2 or Level 3. Nevertheless, the absence of Level 4 noticing was attributed to the preservice teachers' lack of classroom experiences to draw connections between theories on teaching and learning, and what they noticed related with students. In addition, they added that preservice teachers probably did not have necessary knowledge required in making those connections.

Similarly, Francis, Eker, Lloyd, Liu and Alhayyan (2017) investigated eight elementary teachers' noticing practices and the relationship between teachers' mathematical knowledge for teaching (MKT) and their level of noticing. They observed that there was an alignment between high MKT and strong noticing abilities. In particular, they found that teachers with high or low level of MKT were able to identify significant mathematical events, but low MKT teachers struggled in interpreting what they noticed meaningfully and connecting them with pedagogical solutions (Level 1 or Level 2).

These findings align with the existing research that did not use van Es's (2011) noticing trajectory, but suggested that expert teachers identify and interpret more comprehensively than novice teachers or preservice teachers. For example, Erdik (2014) focused on the differences in noticing practices of mathematics teachers between inexperienced and experienced teachers. He concluded that there were differences

between teachers' noticing in terms of the actor, topic and stance categories and also how they interpreted what they noticed. However, to what extend the experienced teachers were differentiated than inexperienced teachers was not clear because findings were not coded based on the noticing trajectory. Similarly, Colestock and Sherin (2009) found that compared to expert teachers, preservice teachers were more likely to describe the teacher's actions in the video instead of interpreting and discussing how these actions helped students to accomplish something. In another related study, Sherin and van Es (2005) concluded that inservice teachers were more likely to focus on what the teacher was doing in the video and how these actions reflected to students, whereas preservice teachers commonly focused on the chronological events taking place with an evaluative approach.

All of these findings suggested that expertise in teaching mathematics is important in teachers' noticing practices. Thus, in the case of teacher education, it is suggested to construct video case-based communities and video clubs or integrating video-cases into the courses to enhance preservice teachers' expertise in teaching mathematics (Sherin & van Es, 2005; van Es, 2011). Through discussing different cases, they can direct their attention from the teacher that they observed to the students in the lesson, and develop expertise in attending to and interpreting students' outcomes (Jacobs et al., 2010). Therefore, it is believed that video case-based community in the present study has the power to enhance preservice teachers' ability to associate on teacher roles and student outcomes, and develop their noticing practices.

2.4 Summary

The purpose of the present study was to investigate preservice middle school mathematics teachers' professional identities in a video case-based community. The first part of this chapter is related with understanding teacher identity based on the relevant studies and the theoretical perspectives. Darragh's (2016) review encapsulated the messy literature in teacher identity and grouped the studies into four categories based on their approaches in defining teacher identity: participative, narrative, discursive and

performative. Studies can belong either one or more of the approaches. Participative and narrative approaches were considered in the scope of the present study. In particular, by investigating preservice middle school mathematics teachers' identity orientations in a video case-based community, it prioritized the group interactions as a way to construct common sense and to decide what matters and what does not in their profession (Wenger, 1998). That is why it adopted a participative approach. In addition, the present study considered narrative approach since it collected preservice teachers' past experiences related with teaching and learning mathematics to understand their orientations before participating in the video case-based community. First part of this chapter also clarified two theoretical perspectives adopted in the present study. While the Akkerman and Meijer's (2011) dialogical approach were used to understand preservice teachers' identification process, Beijaard et al.'s (2000) identity framework helped us to look for the data as the indicator of their identity orientations. Therefore, theoretical expansions and methodological innovations of teacher identity were combined for the present study.

In the second part of this chapter, what factors positively and negatively affected the process of identity formation during teacher education and enlightens researchers and teacher educators about the way they can support identity formation were summarized. This part was divided into three subparts: Identity development through - knowledge building, teaching practice and reflections. Although the present study focused on identity transformations of preservice teachers through reflections of the video-cases, understanding how teacher education courses, especially method courses and teaching practices, influence their way of becoming mathematics teachers is also significant for the present study. We believe that preservice teachers' knowledge in teaching mathematics and their self-awareness (Ebby, 2000; Kang & Battey, 2017; Selden & Selden, 2001) affects their identity orientations and noticing practices in the video case-based community. In addition, experiencing real classroom settings and collaboration with mentor teachers play significant role in preservice teachers' identity development (Izadinia, 2013; Leijen, et al., 2014; Meijer et al., 2014). In other words, as

the studies focusing on teaching practice, the present study gave opportunities to observe different classroom settings and discussion among preservice teachers. However, it was stated that unless preservice teachers are encouraged and supported to relate their experiences to their knowledge and perceptions, they cannot develop a sophisticated understanding of ideal self (Korthagen, 2004). Therefore, it is crucial to make preservice teachers self-reflective individuals to develop professional identities in accordance with teacher education programs and to actualize their identities into their teaching. Reflection processes in the present study was supported through storytelling, reflective writing and video based discussions. To be more explicit, preservice teachers are directed to share their previous experiences as students, their evaluations of those experiences and their identity orientations. Therefore, they had the chance to be aware of their preconceptions about being a mathematics teacher and also considered the pedagogies emphasized in teacher education. In addition, a video case-based community was constructed to give preservice teachers opportunities to notice complexity of teaching mathematics and to make them reflect based on their conceptions about teaching. It is believed that preservice teachers will benefit from the dynamics in the community to transform their identity orientations.

In the third part of this chapter, case-based pedagogies in teacher education were summarized first. Then, implications of video-cases were clarified. Video cases were chosen for the present study since they develop a professional vision for multidimensionality of classroom and complexity of teaching mathematics (Goodwin, 1994; Koç et al., 2009) and for teacher roles and the objectives that they want to fulfill (Izadinia, 2013). We believed that such a vision could influence preservice teachers' identity orientations. In addition, as in most of the studies in the literature in which integrating video case-based pedagogy in teacher education were investigated, we focused on preservice teachers' noticing practices. Among different teacher noticing conceptualizations, Learning to Notice Framework developed by van Es (2011) was used as a framework in the present study. It was chosen because it features a trajectory in terms of what and how (preservice) teachers notice. Therefore, we could see

transformations of noticing practices of preservice teachers throughout the video case-based community.

All of these findings suggested that expertise in teaching mathematics is important in teachers' noticing practices. Thus, in case of teacher education, it is suggested to construct video case-based communities and video clubs or integrated video-cases into the courses to enhance preservice teachers' expertise in teaching mathematics (Sherin & van Es, 2005; van Es, 2011). Through discussing different cases, they can change their attention from the teacher that they observed to the students in the lesson and develop expertise in attending to and interpreting students' outcomes (Jacobs et al., 2010). Therefore, it is believed that video case-based community in the present study has power to enhance preservice teachers' ability to associate on teacher roles and student outcomes and develop their noticing practices.

In short, transformations of noticing practices and identity orientations of preservice teachers were interpreted under the guidance of Learning to Notice framework (van Es, 2011) and identity frameworks (Akkerman & Meijer, 2011; Beijaard, 2000). Literature review on these issues reveals the need of such an integration for teacher education in Turkey and abroad.

CHAPTER 3

METHODOLOGY

The purpose of this study was to investigate preservice middle school mathematics teachers' professional identities in a video case-based community. In accordance with this purpose and the restated research questions below, the research design, participants of the study, data sources and data collection and analysis processes were described in the following sections. Moreover, trustworthiness of the study, researcher role and limitations and delimitations of the study were explained.

3.1 Research Questions

The research questions which guided the present study were as follows:

1. How do preservice middle school mathematics teachers profess themselves as future mathematics teachers before working with video cases?
2. What do preservice middle school mathematics teachers notice in a video case-based community?
3. How do preservice middle school mathematics teachers notice in a video case-based community?
4. How is preservice middle school mathematics teachers' professional identity transformed through noticing practices in a video case-based community?

3.2 Research Design

This study aimed to understand preservice middle school mathematics teachers' professional identity in a video case-based community in which they noticed and discussed teacher roles and associated student outcomes in the videos. For this purpose,

it was essential to get an in-depth picture of the preservice teachers' noticing practices and how their identities were transformed through gaining noticing experiences. Therefore, the employment of a qualitative research design was needed because it allows researchers to understand people's interactions and their construction of the meaning that they attached to their experiences (Merriam, 2009). In addition, qualitative research provides opportunities to get in-depth and holistic understanding of the context where the participant gained experiences (Punch, 2005). For the present study, it provides understanding of the context of video case-based community in which preservice teachers notice and discuss teacher roles and associated student outcomes.

To achieve these purposes, data should be collected and analyzed in the natural setting of the people (Creswell, 2013). The present study used different types of data (interviews, reflection papers, researchers' reflective memos during the discussions) in the context of the school experience course at a mathematics teacher education program. By this way, rich data about preservice teachers' noticing practices and their effects on their professional identity orientations in a setting that they were familiar with were gathered.

There are different types of qualitative research methodologies (Creswell, 2013). In line with the purpose of this research and the research questions, case study design was considered as appropriate for this research study. Educational researchers explained case studies differently in a certain extent. For example, Creswell (2013) defined case study as a qualitative approach in which the researcher, which he addressed as an investigator, "*explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information… and reports a case description and case themes*" (p. 97). On the other hand, Yin (2003) defined case study as "*an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*" (p. 13). Similarly, it was defined as an intensive description and analysis of an instance, phenomenon or

social unit by Merriam (1998). All of these definitions concentrate on the case or multiple of cases and how it is or they are bounded within the context.

The case may be a program, an institution, an event, an activity, an individual or group of individuals (Merriam, 2009; Yin, 2003), where special attention to a unit of analysis is attached (Yin, 2003). The case in the present study is the activity in which preservice teachers discussed what they had noticed related with the video-cases. In another perspective, the case is the video case-based community itself.

According to Yin (2003), there are four types of case study designs: single-case design with single unit of analysis (holistic), single-case design with multiple units of analysis (embedded), multiple-case design with single unit of analysis (holistic), and multiple-case design with multiple units of analysis (embedded). In multiple case studies, researchers focus on multiple cases to understand the similarities and differences between the cases and interpret the data for each situation and also across situations. (Stake, 1995; Yin, 2003). However, in single cases, the purpose is to understand the single case itself without making comparisons. Yin (2003) explains five different rationales to choose single cases in the studies. One of them is to understand how certain conditions change through the stages of the study. For the present study, how the preservice teachers' noticing practices were transformed throughout the six-week period of the study was the rationale for the single case study. In addition, the present study considered multiple units of analysis through preservice teachers' noticing practices and their discussions for different video cases. Therefore, single-case design with multiple units of analysis (embedded) was determined for the present study to examine how noticing practices of preservice teachers in a video case-based community influence their professional identity orientations.

3.3 Context and Participants

As it was stated above, the purpose of the present study was to investigate preservice middle school mathematics teachers' identity in a video case-based community. It is important to clarify the broader and the specific context of the study

and who participated in the study. Therefore, in the following parts, teacher education program in Turkey, the context of the video case-based community with the research processes and the participants of the study were explained.

3.3.1 Teacher education program

The study was conducted in a middle school mathematics teacher education program in Turkey. It is a four-year undergraduate program aiming to educate professionally competent middle school mathematics teachers (Isiksal et al., 2007). Graduates of the program are qualified to teach mathematics in middle schools, grades from 5 to 8 in Turkey.

The curricula of teacher education programs are determined by the HEC in Turkey, universities may have certain flexibilities in terms of the content of the courses. However, preservice teachers who participated in the community stated that they did not watch video-cases in any of their courses before. The curriculum and the information package of the courses were given in the HEC's website.

The program offers mathematics courses (e.g., calculus I-II, differential equations, linear algebra I-II), pedagogy courses (e.g., introduction to education, measurement and assessment), mathematics education courses (e.g. teaching method courses) and some other obligatory courses (e.g., Turkish, physics, history). In the third year of the program, preservice teachers take two teaching methods courses, one for each semester. In these courses, preservice teachers have opportunities to learn how they could effectively design and implement mathematical learning processes for their students for specific mathematics topics. Moreover, preservice teachers take two practice teaching courses in their last year. In the first school experience course, preservice teachers only observe their mentor teacher's classroom in a public school without teaching practicum. They make 4 hours of observations for each of 14 weeks. On the other hand, they have opportunities both to observe and conduct teaching practices in the second school experience and teaching practice course. They were expected to be in the practice schools for at least 6 hours for a week throughout the semester. Although preservice teachers have opportunities to observe and interpret classroom interactions and the complexity of

mathematics teaching through teaching practice courses, opportunities were limited to a specific school context. Therefore, video case-based community provides preservice teachers to observe and notice several classroom interactions and to imagine themselves as mathematics teachers in several classroom settings different from the one they could observe though teaching practice courses. Context of the video case-based community was explained in section 3.3.3.

3.3.2 Participants

This study was carried out in the Fall semester of 2015-2016 education year and twelve (10 female, 2 male) preservice middle school mathematics teachers who participated in the video case-based community. The participants were senior students studying in a middle school mathematics education program at a public university in Ankara. Their GPA was ranging from 2.50 to 3.60. Most of the preservice teachers (10/12) have graduated from Teacher Training High Schools (Öğretmen Lisesi) which include educational courses in addition to the courses in other high schools. In addition, students in these high schools had extra points in University Entrance Examination if they chose a teaching career at the time of the participants' entrance to the program.

All of the participants came from middle or low income families. Two of the participants' families (including fathers and mothers) were engaged in farming. The rest of mothers (10/12) were housewives and fathers were working as civil servants (eg. imam, policeman) or labor. Only one of the participants' father was a teacher who retired a short time ago. All of them grew up in small towns with two or more siblings. They mentioned positive memories about their childhood and the context that they grew up. They told that their family always believed in them and stood by their children. Therefore, by feeling their family support, they stated that they chose teaching career willingly. There was only one participant who entered the program because her University Entrance Examination score was not sufficient for the other programs that she wanted to study. Nevertheless, all of them stated that they were happy to be in the program.

Some of the participants had teaching experiences through private tutoring or working as a teacher in private class tutoring centers (dershane) which were after school institutions preparing students to the national examinations. However, none of them thought that they were ready for the profession although they proceeded to the fourth year in the program successfully. They all stated that they were not confident in teaching mathematics since they did not know how to organize their lesson according to the level of the students and how to use the curriculum. Although they had two mathematics teaching methods courses in the third year, preservice teachers complained about their program's insufficiency in terms of supporting preservice teachers' pedagogical content knowledge and curricular knowledge. However, it can be said that method courses fell short of the goals for these preservice teachers.

Participants were taking school experience course at the time of the study. In this course, the preservice teachers were only observing their mentor teacher's classroom in a public school without teaching practicum. While the six of them were observing the teacher having 30 years of experience, other preservice teachers' mentor teacher had three years of experience. They were also preparing for the national examination (Kamu Personeli Seçme Sınavı, [KPSS]) to be a mathematics teacher in the public schools. Therefore, most of them were refreshing their knowledge gained in the teacher education program through the books prepared for this examination or through the dersanes. Consideration of concurrent experiences with the present study is important to distinguish experiences gained through video case-based community.

3.3.3 Research context and the procedures

Preservice teachers taking the teaching practice courses also have to attend the theoretical part of these courses in the university. In these class hours, preservice teachers generally share their teaching practice experiences with rest of the classroom and the teacher educator and take feedbacks. However, as it was stated above, teacher educators have certain flexibilities in designing the content of the courses. Based on this, video case-based pedagogy was integrated into the school experience course in the Fall semester of

2015-2016 education year. Therefore, a group of preservice teachers and me, as the instructor of the teaching practice course and also the coordinator of the community, came together once a week for one hour throughout the 14-week period.

Before the group discussion based on video cases were started and after the individual initial interviews were conducted, it was realized that the participants did not have the knowledge about the philosophy, emphasized skills and coverage of the Turkish Middle School Mathematics Curriculum which was revised in the 2013. However, it was important to benefit from the curriculum for preservice teachers to interpret what they have noticed. For this reason, the first week of the group meeting was arranged as a curriculum week before the group discussions on the video cases started. For this purpose, preservice teachers were asked to download the previous (MONE, 2005) and new (MONE, 2013) versions of the middle school mathematics curricula and to analyze the similarities and differences between them. However, during the group meeting, they could only talk about the page limits for the specific parts of the curricula. Therefore, as the coordinator of the community, I mentioned the similarities and differences between the philosophy and the coverage of the curricula.

Besides from the curriculum week and the individual interviews, group discussions based on the videos lasted six weeks. Before each group discussions, participants were assigned the video case in the Friday night of each week. They were expected to watch the videos, write a reflection paper and send it to me via e-mail until the next Tuesday night. I read all of the papers in two days and determined the key points based on preservice teachers' contradictory noticing and the points that I have found important for the group discussion. Based on these points, I prepared a power-point slide to arrange the flow of the discussion and to make preservice teachers remember their noticing. The group meetings were conducted as a way to provide awareness of other preservice teachers' ideas and allow preservice teachers to clarify and discuss what they had noticed. Right after the group discussion, I took notes about the dynamics in the community. Each participant was interviewed before and after

participating in the video cased-based community to understand possible transformations of identity orientations.

The research process is briefly explained in the Figure 3.1. The colors in the box feature the actors participating in the process: Blue for preservice teachers, orange for the researcher, and mixed for the group.

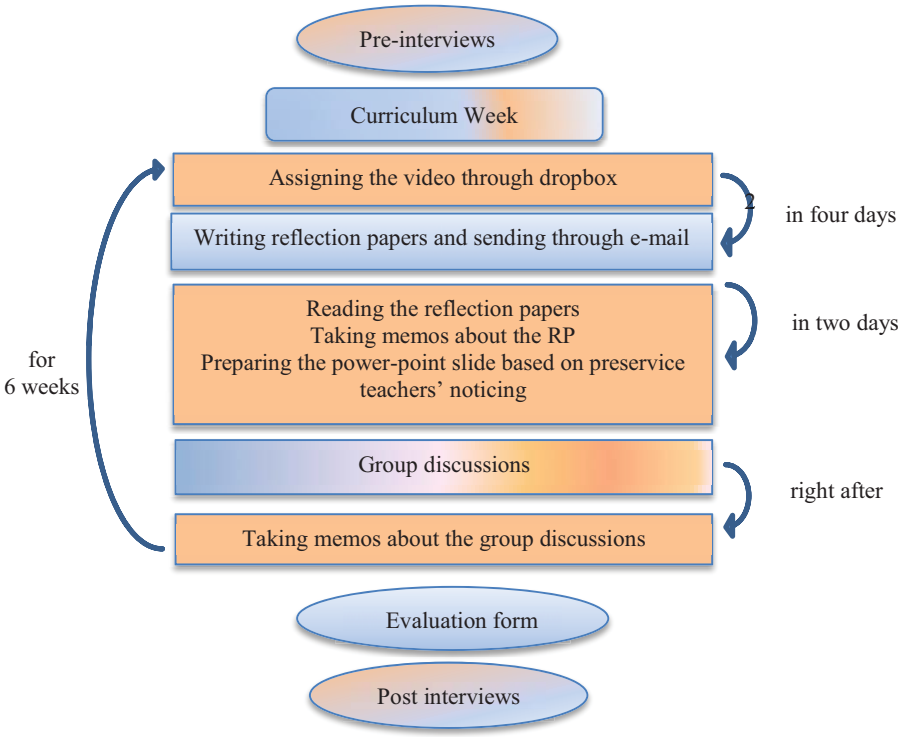

Figure 3.1 Research process in the main study

3.4 Data Collection Tools

In order to develop an in-depth understanding of how the activities of video case-based community are reflected on preservice teachers' professional identity, data were collected from multiple sources. These sources were interviews, reflection papers and

group discussions and the evaluation form. In addition, as a researcher, I took reflective memos for each part of the study. Detailed information about the data collection tools is given in the following parts.

3.4.1 Interviews

Preservice teachers' identity orientations were explored before and after their participation in the video case-based community through semi structured interviews. In the following parts, the interview protocols and the procedures were explained in detail.

3.4.1.1 Initial interviews

Before the group meetings, initial interviews were conducted with each participant to collect data related to their professional identity orientations. Specifically, initial interviews were done to answer the following research question: How do preservice middle school mathematics teachers profess themselves as future mathematics teachers before working with video-cases?

1. How do preservice middle school mathematics teachers profess themselves as future mathematics teachers before working with video cases?
2. What do preservice middle school mathematics teachers notice in a video case-based community?
3. How do preservice middle school mathematics teachers notice in a video case-based community?
4. How is preservice middle school mathematics teachers' professional identity transformed through noticing practices in a video case-based community?

Initial interview protocol had 26 questions. Participants were mainly asked questions about what kind of teachers they wanted to become and what they would prioritize in their teaching when they were to enter their profession. Through this focus, as part of the interview protocol, the following questions were asked to the participants:

- What kind of a teacher and mathematics teacher do you want to become when you enter the profession?
- Are there any differences between being a teacher and a mathematics teacher? Why?
- What will be your fundamental purpose in teaching/teaching mathematics?
- To reach this purpose, what are your responsibilities?

Besides these kinds of identity orientations questions, participants' personal and professional experiences and how they felt about these experiences were sought. The examples of these questions are presented below:

- Can you tell me about who is (name of the participant) in your daily life? (personal identity)
- Can you tell me about who was (name of the participant) as a student? (experiences as a student)
- Can you tell me about your previous teachers who affected your perceptions in a positive or negative way related with being a teacher, their teaching, relationship with students, demographics and etc. (previous teachers)?
- Why did you choose teaching as a profession? (choice of profession)
- What was your most liked and disliked lesson that you have taken during teacher education program, why? (experiences in teacher education)
- Do you have teaching experience such as private tutoring, working as a volunteer teacher etc.? (teaching experiences)

Participants were asked additional questions based on their responses. The complete initial interview protocol is given in Appendix A. Each interview was audio-recorded based on participant's consent and transcribed verbatim. The duration of the initial interviews ranged from 43 to 74 minutes.

3.4.1.2 Post interviews

Individual post interviews were conducted with each participant after participating in the video case-based community. Specifically, post interviews were

done to answer the research question: How is preservice middle school mathematics teachers' professional identity transformed through noticing practices in a video case-based community?

This interview protocol was composed of 17 questions in three main sections. In the first section, preservice teachers' simultaneous experiences gained through the courses, KPSS dershane and school experiences were sought. These data were collected to differentiate the experiences of video case-based community from the other communities that preservice teachers participated. In the second section, preservice teachers' evaluations related with the processes of video case-based community were collected to specifically address their experiences in the video case-based community. The reason to ask these questions was to give opportunity to the preservice teachers to express what they did not write in the reflections and also to clarify what they had written. In the final part of the interview protocol, preservice teachers' professional identity orientations after participating the video case-based community were examined through comparing themselves to the teachers in the videos. In addition, their self-awareness and the solution strategies to improve their weaknesses were investigated in this part. The examples of questions are presented below with the related section in parenthesis:

- Could you interpret your experiences gained in this semester, about your mentor teacher, other courses you took and KPSS preparation etc.? (experiences in other communities)
- Could you interpret your experiences gained in video case-based community: watching videos/ writing reflection papers/ participating group discussions separately? (evaluations video case-based community)
- Compare yourself as a future mathematics teacher and the teachers in the videos in terms of the teacher roles and the associated outcomes? (identity orientations)

Participants were asked additional questions based on their responses. The complete post interview protocol is given in Appendix B. Each interview was audio-recorded and transcribed verbatim. The duration of the post interviews ranged from 19 to 32 minutes.

3.4.2 Video-cases, reflection papers and group discussions

3.4.2.1 Video cases

The video cases selected for the study were taken from the website of a company, which developed and organized the national competition for middle school teachers in 2009 (http://www.vitaminogretmen.com/videolar/12/1?konu=6&tip=29). The teachers in various disciplines including mathematics, science, Turkish language and social sciences took part in the competition and videotaped their classrooms while teaching a specific topic or a concept in the curriculum. Teachers were expected to demonstrate original and creative teaching strategies and contexts in their teaching videos. From this aspect, we thought that the videos may provide many opportunities for preservice teachers who cannot observe such teaching in their school experience courses. First, they may see different classroom contexts from the different regions of Turkey. Indeed, the videos selected for this study vary in contexts from a village school to a private school. In addition, they may notice variety of points in the videos regarded as exemplary based on the philosophy of the curricula. Since the most of the videos (four out of six) were awarded videos in the present study, they were rich in content. Therefore, it was believed that multidimensionality of classroom and complexity of teaching mathematics were highlighted in the present study which may develop preservice teachers' professional visions for teacher roles and student outcomes.

A total of 1099 videos from 713 middle school teachers took place in the competition. Duration of the videos changed from 8 minutes to 15 minutes. A committee consisted of teachers and teacher educators watched and evaluated the videos in the first phase and then, determined 200 videos for the second phase. All of the videos in the second phase were evaluated again and posted in the website of the competition. After the second evaluations, five videos were awarded in each discipline. However, apart

from the first video, other four videos were not ranked. Therefore, we only know which videos were awarded. It is important to note that the quality of the videos was determined by the jury of the competition in terms of the appropriateness of the videos to the objectives of the lesson, lack of misconceptions and providing alternative activities.

There were 52 videos of mathematics content. The topics in these videos varied across the strands of the curriculum: Number and Operations, Algebra, Geometry and Measurement, Data Analysis and Probability. The videos chosen for the present study was in the area of Geometry and Measurement. There were three main reasons to focus on this strand. First of all, half of the videos (21 of 52) were in this area. Therefore, it provided a rich variety in terms of the content and quality of the videos. In addition, five videos were granted an award in the competition and four of them were in Geometry and Measurement area. Through these video cases, preservice teachers had the opportunity to observe and notice different classroom mathematics practices within different contexts. Final reason was related to the coverage of the curriculum. Geometry and Measurement takes part within the all class levels so that the participants could observe different levels of students. Although the purpose of the study did not focus on the content of the videos, such a restriction to Geometry and Measurement stand reduced the diversity among the curriculum strand and provided preservice teachers to focus and compare the content of the lessons.

To select the videos to be analyzed, I watched all 21 geometry and measurement videos and took notes related with them. I decided to choose the videos in Table 3.1 including the videos which won award in the competition since all bring forward to different features of teaching (mathematics) briefly explained below.

Table 3.1

Distribution of the videos to the groups meetings in the main study

Weeks	Contents
1	Geometric shapes & solids *
2	Polygons
3	Liquid measurement **
4	Circle
5	Transformation geometry: Reflection **
6	Angles in circle **

* video was the first in the competition
** videos were in the first five in the competition

In the first week video, the focus was on the out-of-school activity including the comparison of geometric shapes and solids. Therefore, it gave opportunities to notice and discuss different issues mainly on students' mathematical connection skills and how the teacher managed the activity. I purposefully chose this video for the first week of the community because interviews revealed that none of the preservice teachers planned their sample future teaching in out-of-school context and classroom management was one of their main concerns. Therefore, I believed that it would gain preservice teachers' attention and create a fruitful discussion environment. It was also important in order to establish the group dynamics in the first week.

The second week video was about teaching polygons. The teacher used several materials to teach polygons and even a robot that he generated. Therefore, preservice teachers could discuss the use of materials while teaching mathematics and its associated student outcomes. In the third week video, a few students were making drama about problem in liquid measurement and others were sitting on the back and watching their friends. Therefore, it would generate a discussion environment related with students' active participation both psychically and cognitively. In the fourth week, not only the dynamics of the teacher but also the conceptualization of the concept and their effect on students' cognitive outcomes were at the forefront. Similarly, fifth week video featured the conceptualization of reflection topic in addition to an alternative assessment technique, keeping journals. In the last week video, the activities that teacher did while conceptualizing the angles in a circle was considered and students' possible conceptions

and misconceptions were concentrated. In addition, appropriateness of the video to the curriculum was one of the main concerns.

As it is briefly explained, each video featured a different issue related with the teacher roles and student outcomes. However, it is important to note that preservice teachers noticed many points in each video as presented in the Findings chapter. The features of the videos stated above were only the salient points in preservice teachers' noticing. Detailed descriptions of each video were given before stating preservice teachers' noticing in the Findings chapter.

3.4.2.2 Reflection papers and group discussions

During the pilot study which was explained in detail below, preservice teachers were expected to write what they had noticed in the video. However, they tended to write only descriptive and evaluative comments. Therefore, in the main study, preservice teachers were guided to write longer and be more specific. Accordingly, in the reflection papers of the main study, participants were asked to answer two questions each week. The first one was about the strengths and the weaknesses of the teaching in the video and the second one is about how they would teach the content if they were the teacher of the classroom. While the first question attempted to explore what preservice teachers noticed and how they interpreted their noticing, the second question aimed to collect data related with preservice teachers' professional identity through their fictionalized teaching. However, participants wrote very short responses for the second question for different reasons which were explained in the result chapter. Therefore, the data collected by the second question were not analyzed in the scope of this research. Same questions were asked each week. The length of the reflection papers was between 1 to 3 pages.

After preservice teachers submitted their reflection papers on Tuesday night and before the group discussions, I read and utilized participants' reflection papers to effectively direct the flow of the discussions. Mainly, I determined the similar and conflicting points in participants' reflections and prepared a power point slide based on

what preservice teachers noticed about the video and what the contradictory points in their noticing were. In the Friday morning, I shared each participant's ideas with the group and asked them what they thought about it. While doing these, I showed the related moments of the video from the computer in order to help them remember. In this part of the group discussion, I aimed to provide opportunities to the preservice teachers to explain their ideas in their own perspectives and also to make other preservice teachers in the group notice what and how others noticed. Therefore, preservice teachers were expected to notice more points in the subsequent videos. In addition, I brought the contradictory points in their noticing into the forefront to create a discussion platform which contributed the dynamics of the group meetings. On the other hand, if preservice teachers did not notice something that I thought as important, I posed questions about it to make preservice teachers notice and discuss. In particular, first, I showed a related part of the video to make them remember. Then, I asked why and how questions about the issue to provoke a discussion among preservice teachers. If the discussion did not sufficiently direct them to the point, then I explained the issue. Each group discussion was audio-recorded and transcribed verbatim. These group discussions took about one hour.

3.4.3 Evaluation form

At the end of the last group discussion, students filled out the evaluation form. In this form, participants were asked to share their evaluations and ideas about the different phases of the present study. Particularly, they wrote whether the phases of the video case-based community contributed themselves as future mathematics teachers or not and how they thought so. These questions were also asked during the post interviews. Nevertheless, to get more valid data and to get preservice teachers' ideas about the video case-based community without the concern for the course grade, participants' ideas were taken anonymously through the evaluation from.

3.4.4 Researcher reflective memos

As the researcher and the coordinator of the community, I wrote memos before the group discussions and also immediately after the group discussions. Before the group discussion, I read all of the reflection papers and I wrote my interpretations about preservice teachers' reflections and their noticing about the videos of the week. I also noted my individual interpretations for each preservice teacher. For example, as a general interpretation about the Week 3 reflection papers, I noted that: "Most of the preservice teachers could not write interpretative comments even in the third week reflections" (Week3). This note showed that the most of the preservice teachers in the third week could not interpret the classroom situation in detail and could not provide pedagogical solutions for what they noticed in the video. Moreover, right after the group discussion each week, I noted my observations about the group dynamics. For example, how preservice teachers participated in the group discussion, whose ideas directed the flow of the discussion and if there were any noticing ideas which were not stated in any of the reflection papers were noted. These reflective memos guided the present study in terms of evaluating the dynamics in the community.

3.5 Role of the Researcher

In the present study, as stated while explaining the context of the study (see section 3.3.3), video case-based pedagogy was integrated into the school experience course. A group of senior preservice teachers and me as the instructor of the teaching practice course and also the coordinator of the community came together once a week for one hour throughout the 14-week period. In other words, as a researcher, I was a part of the study as a participant observer and facilitator. Although my roles were also explained in the above sections - research context and procedures (section 3.3.3) and reflection papers and group discussions (section 3.4.2.2), they were summarized in the following paragraphs.

Although I was a teaching assistant at the university, preservice teachers did not know me from their courses. Therefore, it was significant to build rapport and a balanced relationship between me and the preservice teachers. For this purpose, during

the initial interview, I asked questions about their personal identities and tried to understand who they are as human beings, what they like or dislike. Also, I introduced myself and encouraged them to ask me about what they wanted to know about me.

Besides, as the instructor of the teaching experience course, I always asked them specific questions about the context of the teaching practice schools, students' behaviors inside or outside of the classroom, mentor teachers' teaching approaches or relationship with the students or their colleagues. In addition, I asked them what they found significant in particular week's observation and what made it different from the other observations. I opened them up for discussion and gave some information and suggestions to manage the situations that we discussed. My purpose for asking these kinds of questions and intervening their observations was to make them notice and interpret complexity of teaching mathematics and imagine themselves as the teacher in that context. Therefore, I was able to combine my responsibilities as the instructor of the course and the coordinator of the community.

For the video case-based community, I led the discussions of the group meetings and conducted individual interviews with the participants. Discussions were conducted based on the preservice teachers' contradictory noticing because disagreements within the groups encourage participants to take the floor and clarify their thinking (Kitzinger, 1994). In addition, I always paid attention to quote each preservice teacher's noticed points in their reflection papers to the power point slide prepared for the discussion. Therefore, each of the preservice teachers had a chance to participate in group discussions and the interactions among the participants were maximized. To minimize the power differentials between the participants and me and to make them share their ideas freely without having a fear of being judged, I avoided evaluating their identity orientations in each part of the data collection.

Besides, I helped them every time they needed my thoughts and ideas to strengthen the rapport between me and the participants. For example, I directed them to the relevant books in the library for their projects in another course or gave information related with the master and doctoral programs. I believe that all of these enabled the

participants to feel comfortable while sharing their ideas with me in each part of the study.

3.6 Pilot Study and Revisions for the Main Study

Before conducting the main study, all of the data collection instruments and procedures which were explained in the above sections 3.3.3 and 3.4 were piloted. Only minor revisions were needed for the main study in terms of the procedures and instruments. However, data analysis of the pilot study elicited the need for proposing further revisions in the frameworks and conduct analysis based on the revisions. All minor and major revisions for the main study were explained in the following subsections.

3.6.1 Pilot study procedures and data collection instruments and revisions for the main study

The procedures explained in the section 3.3.3 for the main study were piloted first with three preservice teachers one year before the main study. Since the number of the participants was smaller than the main study, two videos were discussed in each week. Therefore, the pilot study was concluded in three weeks. The main study was concluded in six weeks because twelve preservice teachers created a more productive discussion environment for each video and more time were needed for such a discussion. Therefore, the increase in the number of the participants increased what they have noticed in the video cases and also increased the time that was needed to discuss their noticing. This was the only revision for the main study in terms of the procedures of data collection.

In terms of the data collection instruments, the content of the reflection paper was revised. As it was stated in the section 3.4.2, during the pilot study preservice teachers only asked to write about what they had noticed and interpret their noticing. However, they wrote short reflections including mostly descriptive and evaluative comments. Therefore, for the main study, I decided to ask specific questions to direct

preservice teachers write interpretive comments. Detailed explanations were given in section 3.4.2.2.

Moreover, evaluation form explained in section 3.4.3 was not conducted in the pilot study. It was developed after the data analysis of the post interviews in the pilot study to hinder evaluations stated for pleasing me as the coordinator of the community. It was believed that anonymous evaluations collected through evaluation forms produced more honest evaluations collected through interviews.

3.6.2 Pilot study data analysis and revisions for the main study

Pilot study analysis produced the need for revisions in the identity framework developed by Beijaard and his colleagues (2000) and revised by Löfström and her colleagues (2010). These revisions affected the analysis of the how preservice teachers professed themselves as future mathematics teachers before and after working with video-case based community and what preservice teachers noticed in video-cases. Similarly, we proposed some revisions for analysis of how preservice teachers noticed in video-cases through Noticing Framework (van Es, 2011). Considering this, revisions in Identity and Noticing frameworks were explained in different subsections in this section.

3.5.2.1 Revisions for identity framework

To analyze preservice teachers' identity orientations in the pilot study, transcribed data were coded based on the manual developed for the metaphor studies by Löfström et al. (2011) based on Beijaard et al.'s (2000) identity framework. Considering the manual, identity orientations were coded to the one of the categories in the framework (subject-matter expertise, didactical expertise, pedagogical expertise, self-referential and contextual). Then, the coded statements in each category were interpreted in terms of whether they represented similar ideas as it was proposed in the manual and also whether they provided adequate and meaningful explanation for preservice teachers' identity orientations. The complete manual is given in Appendix C.

During the coding of the pilot study data based on the manual, I realized that although preservice teachers' expressions were coded in the same category, their intensions for these expressions were different. For example, all three preservice teachers mentioned the importance of using concrete materials while teaching mathematics which was coded as didactical expertise category of the framework and they said that they needed to use concrete materials to gain students' attention to the lesson or to make them enjoy learning mathematics. Although teacher role was didactical, intention was not to facilitate students' understanding as it was indicated in the framework; rather it was about addressing students' affective outcomes. Therefore, I concluded that coding the data only provided information about which category dominated preservice teachers' identity orientations and did not express clearly the intentions of preservice teachers' attributed roles. Therefore, the questions "What is the role of the teacher in each category of the identity framework?" and "What are the intentions of their attributed roles?" were asked in order to make a better analysis of the data. As a result, identity orientations were divided into the two themes: *Teacher Role* and (associated) *Student Outcome*.

Accordingly, *Teacher Role* explained what the preservice teachers thought about the role of the teacher in subject matter, didactical or pedagogical experts; what the attributed personality traits were (self-referential) and in what circumstances preservice teachers put their professional identity orientations into practice (context). More precisely, the name of the categories and their meanings in terms of associated teacher roles were unchanged. On the other hand, preservice teachers' intentions to prioritize certain teacher roles in their future career were entitled as *Student Outcome*.

Considering this dichotomous understanding, as a final step of data analysis, preservice teachers' identity orientations were inductively re-coded and related codes were grouped in *Teacher Role* and *Student Outcome* categories as components of teacher professional identity. Based on the inductive coding, preservice teachers' intentions were categorized as *affective, behavioral and cognitive outcomes*. In affective outcome, teacher intention was to develop students' affective skills toward mathematics such as

positive attitude toward mathematics or confidence in mathematics. In behavioral outcome, students' actions such as participation to class discussions and solving mathematics questions were considered. Students' understanding based on reasoning, problem solving and making connection skills was the main concern in cognitive outcome. The themes and the categories were represented in the Table 3.2 with sample identity quotations from the pilot study.

Table 3.2

Categorization of Teacher Identity with Revisions for the Present Study

	Themes	Categories	Sample identity orientations
Teacher Identity	Teacher Role	Subject-matter expertise	*After I transmit all the necessary knowledge to the students, I can make some activities.*
		Didactical expertise	*I will use hands-on materials to attract students' attention and to make the topic concrete for the students.*
		Pedagogical expertise	*I want to establish a balanced relationship with the student to be respected.*
		Self-referential	*I want to be an idealist teacher.*
		Contextual	*I want to be a teacher in a small town.*
		Affective	*I want my students to appreciate the value of mathematics.*
	Student Outcome	Behavioral	*My students should raise their hand before they begin to speak.*
		Cognitive	*I want my students to make connection between topics.*

3.5.2.2 Revisions for noticing framework

As it was explained in the previous chapter (see section 2.3.2.1), van Es (2011) created a trajectory demonstrating teachers' development in learning to notice. In this trajectory, she proposed four levels of noticing: Level 1 (Baseline), Level 2 (Mixed), Level 3 (Focused) and Level 4 (Extended). In each level the observed characteristic of teachers noticing in terms of the content and the actors and the way they analyzed are defined and summarized in Table 3.3.

Table 3.3

Framework for Learning to Notice Student Mathematical Thinking (van Es, 2011, p. 139)

	What Teachers Notice	How Teachers Notice
Level 1 (Baseline)	Attend to whole class environment, behavior, and learning and to teacher pedagogy.	Form general impressions of what occurred. Provide descriptive and evaluative comments. Provide little or no evidence to support analysis.
Level 2 (Mixed)	Primarily attend to teacher pedagogy. Begin to attend to particular students' mathematical thinking and behaviors.	Form general impressions and highlight noteworthy events. Provide primarily evaluative with some interpretive comments. Begin to refer to specific events and interactions as evidence.
Level 3 (Focused)	Attend to particular students' mathematical thinking.	Highlight noteworthy events. Provide interpretive comments. Refer to specific events and interactions as evidence. Elaborate on events and interactions.
Level 4 (Extended)	Attend to the relationship between particular students' outcomes and between teaching strategies and student mathematical thinking.	Highlight noteworthy events. Provide interpretive comments. Refer to specific events and interactions as evidence. Elaborate on events and interactions. Make connections between events and principles of teaching and learning. On the basis of interpretations, propose alternative pedagogical solutions.

During the analysis of the pilot study, van Es's noticing framework was employed but the study offered some revisions. The topic of the present study is not about noticing students' thinking as in the framework. Instead, it is about noticing teacher roles and student outcomes as components of teacher identity. Therefore, the first dimension of the study, *what they notice*, was revised based on the identity framework which was explained in detail below. The second dimension, *how they notice*, was used as in the framework without any revisions. In other words, second dimension still refers to the depth of the preservice teachers' noticing. Revised noticing framework with sample quotations from the pilot study was given in Table 3.4.

Table 3.4

Revised Noticing Framework for teacher identity

	What Teachers Notice	How Teachers Notice	Sample Noticing
Level 1 (Baseline)	Attend teacher roles for whole class outcomes	Form general impressions of what occurred. Provide descriptive and evaluative comments. Provide little or no evidence to support analysis.	*The activity was good for attracting students' attention.*
Level 2 (Mixed)	Primarily attend to teacher roles. Begin to attend to particular students' outcomes.	Form general impressions and highlight noteworthy events. Provide primarily evaluative with some interpretive comments. Begin to refer to specific events and interactions as evidence.	*Since the length of the arms of the students in the activity was different, student might have misconception about symmetry.*
Level 3 (Focused)	Attend to particular students' outcomes	Highlight noteworthy events. Provide interpretive comments. Refer to specific events and interactions as evidence. Elaborate on events and interactions.	*Difference in the physical appearance of the students in the activity might inhibit those students to think that the object and its reflected image on the mirror should be congruent.*
Level 4 (Extended)	Attend to the relationship between particular students' outcomes and teacher pedagogy	Highlight noteworthy events. Provide interpretive comments. Refer to specific events and interactions as evidence. Elaborate on events and interactions. Make connections between events and principles of teaching and learning. On the basis of interpretations, propose alternative pedagogical solutions.	*"...So maybe we need to really rethink our assessment of students" (van Es 2011, p.146)**

* None of the noticed issues were coded under Level 4 within the present study. That is why the sample noticing for Level 4 was taken from the van Es's (2011) framework.

For the first dimension – what preservice teachers notice – first of all, the actors in the noticed points about the teacher roles and student outcomes were coded. If the only actor or the dominating actor in the noticing was the teacher, then the noticing was coded under Level 1 or Level 2. On the Level 1 noticing, preservice teachers noticed the teacher roles without associated student outcomes or associated to a student outcome but spoke for the whole class not for the particular students in the video. Level 2 is called as mixed level since preservice teachers both noticed teacher roles and student outcomes. The important point in this level is related with the dominating actor in the noticing. Preservice teachers mainly focused on the teacher roles and started to associate student outcomes to the noticed teacher roles. At Level 3, preservice teachers notice primarily students' outcomes. What is significant in this level is that preservice teachers no longer focus on the outcomes for the whole class; rather, they attend to particular students' outcomes in the video. Therefore, it deserves the name of the level as focused level. It is significant to note that difference of Level 3 in the present study from the original framework is the focus on a holistic view of student outcomes not particularly on students' mathematical thinking. Finally, at Level 4, preservice teachers related what they noticed at the Level 3 to the teacher's pedagogy in the video. More precisely, preservice teachers focused on student outcomes and extended their analysis through teacher pedagogy.

3.7 Data Analysis

Table 3.5 summarizes the data analysis of the main study considering related data sets and frameworks for each research question. As it was explained above, the same process was employed in the pilot study. However, data analysis of the pilot study based on the identity framework created the need to add further revisions to the framework. Therefore, while explaining the analysis of the data, revisions added during the pilot study analysis were also explored. More precisely, the analysis of preservice teachers' identity orientations before and after participating in the video case-based community and their noticing practices throughout the video case-based

community was clarified below. All of the data analysis was conducted using MAXQDA software.

It is important to note that a sample of data was also coded by another researcher who was a doctoral student studying teacher identity in his dissertation. Even so, identity framework (Beijaard et al., 2000) was introduced with the further revisions added during the pilot study. In addition, analysis of noticing trajectories based on van Es's (2011) noticing theory was also clarified. Then, one preservice teachers' initial and post interviews and reflection papers were randomly selected for the second coder. Researchers compared their codes and discussed about the differences in coding. It was completed with 87% agreement. Disagreements were resolved through discussion until the consensus was reached.

Table 3.5
Data Analysis of the Study

		Data Set	Analysis Framework*
Research Questions	1. How do preservice middle school mathematics teachers profess themselves as future mathematics teachers before working with video cases?	• InıtiaiI	• Identity Framework
	2. What do preservice middle school mathematics teachers notice in a video case-based community?	• GD • RP	• Identity Framework
	3. How do preservice middle school mathematics teachers notice in a video case-based community?	• RRM	• Noticing Framework
	4. How is preservice middle school mathematics teachers' professional identity transformed through noticing practices in a video case-based community?	• Post-I	• Identity Framework

Note Initial-I (initial interviews), Post-I (post interviews), GD (group discussions), RP (reflection paper), RRM (researcher reflective memos), EF (evaluation form)

* Identity and noticing frameworks were utilized with the revisions added after the pilot study

3.7.1 Analysis of the preservice teachers' identity orientations

In this part, analyses of how preservice teachers professed themselves as future mathematics teachers before and after working with video-case based community (Research question 1a and 1d) were explained. As it was stated in data

collection instruments part, these data were collected through individual pre and post interviews. Therefore, as the first step of the data analysis, all of the audio recorded data were transcribed verbatim. Then, transcribed data were read many times to engage with the data.

As a second step of the data analysis, the written document was segmented into idea units that represented a meaningful expression about the issue that was identified (Grant & Kline, 2004). In this study, preservice teachers' "I…" sentences represented the idea units in the data. In these sentences, they either pictured themselves as future mathematics teachers or they described their role as a teacher based on the experiences as a student or as a preservice mathematics teacher. According to Sfard and Prusak (2005), these sentences froze the picture through "turning properties of actions into properties of actors" (p. 16). In other words, "I…" sentences within the interview data demonstrated preservice teachers' identification process as prospective teachers. It was defined as I-positions in Akkerman and Meijer (2011)'s dialogical approach which was already explained in section 2.1.1 of the review of literature chapter.

After segmenting the transcribed data into the idea units, the next step was coding each idea unit based on the identity framework considering the revisions that we added after the pilot study. More precisely, idea units were coded based on the *Teacher Role* and *Student Outcome* categories which were considered as the components of teacher identity within the frame of this study. Based on this categorization, subcodes in each category were determined through open-coding as it was described above. It was important to note that, code names or labels which were seen in the tables in the findings chapter of the present study were in-vivo codes constructed through the exact words used by the preservice teachers (Creswell, 2013). Therefore, these codes did not always address the common meaning in the literature. For example, preservice teachers defined students' participation as taking role within the activities. They did not focus on the cognitive processes while participating in the lesson, rather they only focused on being

physically active. Therefore, "participation" as a code name was considered under behavioral outcome, not under cognitive outcome.

It is also crucial to note that the frequencies of preservice teachers' professional identity orientations were not equal in *Teacher Role* and *Student Outcome* as components of teacher identity because idea units did not always include both of them simultaneously. In other words, preservice teachers did not always mention the intentions of the defined roles or did not state the role of the teacher while describing something related with *Student Outcome*. For example, one of the preservice teachers stated that "There are connected topics in the curriculum. While teaching a specific topic, I want to mention the connected topics that we saw before." This sentence was coded only in didactical category of *Teacher Role* since the focus was on the role of the teacher and there was no mention of the intention of making connections as a *Student Outcome* component. Similarly, identity orientations were sometimes coded only in *Student Outcome* category such as "My students should understand the value of mathematics in daily life" coded in affective outcome category in *Student Outcome* component of professional identity.

In short, considering our revisions of the Beijaard's et al. (2000) identity framework, the data coming from the interviews were analyzed through the processes explained above. Therefore, preservice teachers' identity orientations before and after participating in video case-based community were clarified.

3.7.2 Analysis of preservice teachers' noticing practices

Preservice teachers' noticing practices were investigated through reflection papers and group discussions. Analysis of reflection papers were conducted to understand what and how preservice teachers noticed from the video (research questions 1b and 1c). For this purpose, first of all, preservice teachers' written comments were segmented into idea units following Sherin and van Es's (2009) method of analysis of teachers' noticing practices. In their methodology, they first segmented the transcripts of the interviews into idea units representing distinct topics of conversation. Then, they coded each idea unit in terms of actor, topic and

stance. For example, "*Students were [talking]. You didn't have just one child just sitting and watching and not contributing. They were all contributing*" (Sherin & van Es, 2009, p. 29) represented one of the teachers' noticing which was coded as student for actor, classroom climate for topic and descriptive for stance. Accordingly, shift in the idea units were distinguished with the shift in the topic (Sherin & van Es, 2009). For example, when the teacher started to talk about management issues of classroom organization such as use of time and handling of disruptions, then it was coded as another idea unit.

For the present study, the topic represents what preservice teachers noticed in their reflection papers based on the Identity Framework considering the revisions we added after the pilot study. Shift in the topic in reflection papers, therefore, was determined by the shift in the noticing in the *Teacher Roles* or the *Student Outcomes* as components of identity. In other words, if what preservice teachers noticed based on the teacher roles and student outcomes was changed, then it was considered as an another idea unit.

It is important to note that determining the idea units and coding what preservice teachers noticed based on the Identity Framework were almost operated simultaneously. Nevertheless, each idea unit was reanalyzed based on the Noticing Framework by considering what and how preservice teachers noticed as explained in section 3.5.2.2.

In short, preservice teachers' noticing was analyzed in terms of what and how they noticed based on the Identity and Noticing frameworks considering the revisions for the present study. Therefore, each idea unit was coded for each framework separately. For example, one of the preservice teachers noticed and wrote in the second week reflection paper that "*The teacher in the video was not dynamic enough to attract students' attention.*" In terms of the Identity framework, the focused teacher role in this idea unit was being a dynamic teacher coded under self-referential category. In addition, intention was to attract students' attention coded under affective outcome category. In other words, what she noticed based on teacher roles and student outcomes were coded first. Then, it was also coded based

on the trajectory of noticing as Level 1 since she could not interpret what she had noticed; instead, she only described and evaluated.

For the group discussions, first, six-week audio-recording of discussions were transcribed verbatim and segmented into idea units. Similarly, the content of the conversations in the community represented the unit of analysis in the present study. For example, discussion about the appropriateness of the video to the curriculum was an example for unit of analysis. As a researcher, I examined the content of each idea units by comparing what the preservice teachers noticed about it. I took notes about how the idea units were negotiated in the community, which idea they adopted at the end of the conversation or whether they maintained their ideas without considerations of others.

3.8 Trustworthiness of the Study

For reliability and validity issues in qualitative studies, trustworthiness is used as a comprehensive term (Lincoln & Guba, 1985). To ensure the trustworthiness of the present study, Lincoln and Guba's (1985) four main strategies namely *credibility* (for internal validity), *transferability* (for external validity/generalizability), dependability (reliability) and *conformability* (for objectivity) were considered.

For *credibility*, Lincoln and Guba (1985) discussed that ensuring credibility, which was stated as internal validity in quantitative research, is one of most important factors in establishing trustworthiness. Merriam (2009) stated that internal validity or credibility deals with the question "How congruent are the findings with reality?" (p. 213). Triangulation was stated as a main strategy to promote credibility (Merriam, 2009). According to Creswell (2005), examination of a similar construct across different data sources, such as triangulation, minimizes researcher-based biases in the analysis. In the present study, multiple data sources such as initial and post interviews, reflection papers, group discussions, researchers' reflective memos and evaluation forms were used to ensure triangulation. In addition, prolonged engagement

in the particular context and with the participants and opportunities stated above were provided for establishing rapport between the researcher and the participants.

Nevertheless, asking different questions to understand preservice teachers' professional identity orientations before and after working with the video cases could be regarded as a threat for credibility for the present study. We used the terms initial and post interviews instead of pre-post interviews to prevent such a misunderstanding. We purposefully changed the questions in the post interviews to see the reflections of the video case-based community into preservice teachers' identity orientations.

Researchers should use thick descriptions in order to demonstrate that qualitative studies' findings are applicable to the other contexts, such as similar situations, similar populations and similar phenomena (Merriam, 2009). Therefore, *transferability* of the study can be provided. In the present study, detailed description of the research context, characteristics of participants, data collection and analysis procedures of the study were provided.

Dependability, referring to reliability, is defined as the "the extent to which research findings can be replicated" (Merriam, 2009, p. 221). It is important to note that dependability is not whether the findings will be found again if the study is replicated, but whether the results are consistent with the data collected (Merriam, 2009). Promoting this can be possible through explanations about how research design was implemented, how the data were gathered, and what was done to describe the context in the data (Shenton, 2004). In this study, the issue of dependability was addressed to a certain extent by describing data gathering process, the dynamics in each week's group discussions and the theoretical backgrounds of the data analysis in detail. Dependability was also ensured through inter-rater reliability in which another researcher coded the randomly selected data.

Finally, *confirmability,* which refers to the objectivity of the study, was stated as a criterion to establish trustworthiness. For confirmability, detailed explanation of the methodology of the study and triangulation was stated as strategies which were explained above while expressing how other criteria of trustworthiness were ensured.

CHAPTER 4

FINDINGS

In this chapter, the findings of the study were summarized into three main sections and related subsections. In the first section, how preservice teachers professed themselves as future mathematics teachers before working with video-cases was analyzed by using their verbal responses to the questions in the initial interviews considering the presented revisions in Beijaard et al's (2000) identity framework. In the second section, what and how preservice teachers noticed in their written reflections about the video-cases were examined based on the identity and noticing frameworks. In addition, how these noticed instances were discussed within the community was described. In the final section, how preservice teachers' professional identity was transformed through noticing practices in a video-case-based community was summarized by using the data taken from the reflection papers, individual post interviews, researchers' notes and evaluation forms.

4.1 Preservice Teachers' Professional Identity Orientations before Video Case-Based Community

In this part of the chapter, preservice teachers' professed identities before working with video-cases were investigated. Specifically, what preservice teachers saw essential and valuable in terms of teaching mathematics was sought based on the initial interview data. Preservice teachers' identity orientations were investigated through Beijaard et al.'s (2000) identity framework with further revisions added in the present study. At the end of the identity orientations, attributed factors and self-evaluations in becoming such mathematics teachers were explored.

Table 4.1 demonstrates the weights of the preservice teachers' orientations related to the teacher role and student outcome components of teacher identity.

These categories are not mutually exclusive. Instead, they are related. For example, they attributed a self-referential characteristic as a prerequisite for a pedagogical role. Therefore, in some of the cases teacher roles in different categories were presented in the related subtitle. It is also important to note that each teacher role was not associated to a student outcome. Preservice teachers did not state the purpose of having a role in each statement in spite of the prompting questions. Therefore, in the following part, some of the orientations were stated without any connection to a student outcome.

Table 4.1
Preservice Teachers' Identity Orientations

Components	Categories	Percentages
Teacher Role	Didactical	30.1
	Pedagogical	12.5
	Subject Matter	8.8
	Self-Referential	6.0
	Contextual	7.8
Student Outcome	Affective	18.9
	Cognitive	8.4
	Behavioral	7.5
	Total	100

4.1.1 Preservice teachers' didactical orientations

As it was seen in the Table 4.1, preservice teachers emphasized being a didactical expert the most. They stated several points of view that as future mathematics teachers they will make activities, use materials, visuals and technology, solve questions, assess teaching and learning, apply questioning strategy and considered students' differences while teaching mathematics as it was seen in Table 4.2. These were the main didactical roles emphasized by the most of the preservice teachers. There were other didactical roles, such as questioning and giving homework which were stated by elaborating the main roles stated above. Only few of the preservice teachers focused on these additional roles. In the following parts, preservice teachers' orientations related with these didactical roles were explained in detail.

Table 4.2
Preservice Teachers' Didactical Orientations before Video Case-Based Community

Category	Codes
Didactical Orientations	Making activity Use materials Solving questions Connect real life Level of students Assessment Student differences Technology integration Using visuals Questioning Homework Connection between topics

Making activities and using materials were the most emphasized didactical roles in preservice teachers' orientations. Except three preservice teachers, all of them stated that they needed to make activities and use materials in teaching mathematics. However, most of them stated that they could apply them either before or after the main part of the lesson: "*If I have material, I do not know when to use it. It can be at the beginning or end of the lesson. It may change according to the situation. In addition, I can do activities after the concepts are covered*" (PT-8). Preservice teachers who planned to use materials at the beginning of the lesson mainly attributed this use to the affective outcomes – being attentive and enthusiastic about the topic, and enjoying learning activities: *At the beginning of the lesson, something interesting can be shown to the students. So that lesson could be fun and attract students' attention. This interest can also be maintained when the lesson starts* (PT-7). Most of the preservice stated that activities could be conducted for reinforcement of the concept and to provide permanent learning which were stated as a product of the teaching: *"We are teaching, then we are doing an activity so that they can go through what we have taught and (learning can) become permanent"* (PT-7).

In some other cases, preservice teachers did not mention the context, rather they expressed general ideas. For example, PT-11 stated that "*I want to break the*

prejudices of students through attracting attentions by making activities. I want them to be enthusiastic" (PT-11). Similarly, PT-4 wanted to "*I want to create an environment where my students are always enthusiastic through conducting activities*" (PT-4). These examples showed that participants focused rather on the activities and associated them to affective outcomes regardless of their usage.

On the other hand, some preservice teachers deepened their ideas and explained how they could use materials while teaching. However, the salient point in these explanations was the dominance of the teacher. They expressed that as a teacher they could demonstrate materials to transmit knowledge to the students. They did not focus on students' reasoning processes in constructing their knowledge. For example, one of the preservice teachers answered how she wanted to teach mathematics as in the following:

> *I want to make materials that students can see. It is not enough to write and solve problems on the board. For example, make an activity if you are teaching angles. You can even show it through two rulers. Students understand better. But they do not understand if you only write that the degree of the explementary angle. Mathematics should not be taught like a verbal course. For example, do not ask student to write the definition of rational numbers. I think you should explain it on the sample, then explain it on the material to make students understand the topic.* (PT-10)

PT-9 stated a similar idea: "*Then we give the subject headings. Then we show in on the material. If we are teaching cubes, we can demonstrate the corners, faces etc."* As seen in the excerpts, the main focus of these ideas was transmitting knowledge through materials. Therefore, a didactical role was explained with a role in subject matter expertise.

Similarly, using materials and making activities were expressed with other didactical roles. For example, PT-6 stated that students in the middle school could have difficulties in understanding abstract concepts, so they needed to consider students' level of cognition and use materials or make activities. This was the only orientation locating students' understanding to the center of the purpose of using materials. From another angle, level of students was stated as a reason for using materials:

> *More concrete because, some subjects of mathematics can be very abstract. For example, the triangle has three sides of the student, we are talking on the board, but they cannot imagine it. We can bring concrete materials, visuals about the topic or they can play a game.* (PT-2)

Similar to this idea which integrated consideration of level of students with using materials and conducting activities, PT-1 focused on the importance of questioning while making activities through an example:

> *The teacher needs to ask questions continuously. For example, let's consider the whole numbers. We know an absolute zero, but we never know before the zero. For example, let's move on with the current examples. Yours is the starting point, there are numbers in the back, what are you going to do when you go back, what do you think the points behind youare? He could show turning back. Or the distance to the center is absolute value but we can show it differently in order. We're far away, but you're more prone to zero. Here you are, I am here, 2 is here, I can imagine how close I am so big.*

Although students' interpretations were the main purpose of making activities in PT-1's statement, associated outcomes were generally permanent learning, reinforcement, enjoying mathematics, being enthusiastic and paying attention. This showed that preservice teachers were not able to deepen their ideas about using materials and making activities for students' cognition.

On the other hand, related orientations about using materials and making activities were originated from students' demands in the modern world and from the vision acquired from teacher education. For example, "*Children are thinking faster now. Technologically, there are many systems such as smart boards. I have to teach using those technologies, using materials, and applying teaching methods like drama"* (PT-11). Similarly, PT-2 stated that teacher education program directed them to "*They are waiting for me to teach appropriately to the necessities of time such as using technology, preparing material and using visuals to make topics concrete*". In addition, most of the preservice teachers expressed that they learned mathematics by repetition and memorization so that their knowledge was nonpermanent. It seemed that negative experiences as students directed some of them to use materials and making activities as future mathematics teachers in order to provide better learning opportunities. For example, PT-6 stated that

> *I think teaching mathematics through solving routine problems is bad. It won't be permanent in such a way. Perhaps this is the most important reason why we cannot even define the rational number. Our teachers gave definition and solve question in one or two minutes and passed on another content. But to be permanent, it should include practices or drama activities. I think children will pay more attention if you bring at least a colorful cardboard to the class.*

As it was seen in the above examples, preservice teachers expressed using materials and making activities sometimes together with using visuals and integrating technology while they were talking about teachers' didactical roles. Future intentions of integrating technology and using visuals in teaching mathematics were originated from students' demands and teacher education. Society's views about mathematics also affected preservice teachers' orientations in visualization of mathematical concepts:

> *Teacher should do something which attracts whole class' attention because most of the students don't like mathematics. Something must be visual. For example, before starting the lesson, teacher can demonstrate a short movie about that subject. Then, they can pay attention and realize the usage of mathematics in real life.* (PT-10)

PT-10 associated this teacher role to students' valuing the usage of mathematics in daily life. In similar orientations, gaining attention and providing permanent learning were stated as intentions. For example, PT-6 associated using technology with gaining students' attention and so providing permanent learning: "*Because we are in the age of technology, our students are very attentive. It will be more permanent when we demonstrate the examples like that"* (PT-6).

Preservice teachers' expressions demonstrated similarities in terms of their depth and the way teachers addressed using technology and visuals. Specifically, preservice teachers did not consider students' thinking processes and approached these didactical roles rather to establish the authority of the teacher by planning to demonstrate technology as their subject matter expertise. For example, PT-7 stated that "*I want to show my students Geogebra which I learned during teacher education. I want to make students wonder and not want them to be bored"* (PT-7). Therefore, technology and visuals were tools to transmit knowledge.

Another emphasized didactical role was solving questions. Except for PT-4, who only focused on students' affective outcomes and associated teacher roles, all of the preservice teachers stated that they wanted to solve questions after they taught the concepts as PT-8 expressed: *"I do not know what kind of technique I'm going to explain at this point, but after the explanation, I will solve some examples to practice"* (PT-8). As in this example, implicitly associated outcome for solving questions was the reinforcement of the concepts.

Although the frequency in solving questions as a didactical role was higher in many other teacher roles, they did not associate solving questions to higher level student outcomes. For example, none of them attributed solving questions to problem-solving skill as a student outcome. The reasons for participants' ideas about solving questions were clearly seen in the following two examples. While one of the preservice teachers expressed her learning experiences as a reason for her idea "*I personally do not always understand anything from the subject. I understand best through solving question. Therefore, I will teach through solving questions as much as possible"* (PT-7), another preservice teacher referred to the national examination that the students had to take in eighth grade "*We need to think about TEOG as well. I have to solve a lot of questions"* (PT-12).

Few of the preservice teachers also mentioned that students' practices in solving questions provided feedbacks for teachers to assess what students had learned. Asking questions was identified as a way for assessment as a didactical role: "*I ask questions and observe how they are solving questions to measure if they are aware of what we are doing in the lesson.*" (PT-6). In addition, giving homework was stated as a way to assess students' learning and organize their teaching accordingly: "*When I check the homework, I can see what the student does not understand. Then, I can repeat the subject"* (PT-7). However, this was the only positive comment about homework. In contrast, preservice teachers worried about the consequences of homework for students and the teachers: "*I do not want to give too much homework to prevent students alienated from the lesson*" (PT-9) and "*I do*

not want to follow whether students do their homework. I think it is wrong to spend time checking (the homework) one by one" (PT-1).

Most of the preservice teachers preferred to use questioning strategy for assessment and giving feedbacks: "*I ask students questions to follow the mistakes of the students and to give feedback to them*" (PT-6). PT-4 also noted that questioning provides teachers making connection between the topics: "*By asking the questions, I can understand whether they remember the topic that we had covered during the previous lesson and can make connection to the new topic"* (PT-4). In fact, assessment and making connection as didactical roles were stated as an outcome of questioning.

Preservice teachers approached questioning also from a different stand point. They stated that questioning provides students' interpretation and reasoning about the concepts if they ask why and how questions in teaching mathematics:

> *Let's say for any subject, do you have any information about it? What is it? I'd like to make students think about the topic while I'm teaching. I ask questions such as why and how it was happened. Therefore, students are trying to make sense of it.* (PT-8)

This was rarely seen in preservice teachers' responses because only few of the participants emphasized students' cognition in the processes of learning mathematics. They even associated questioning to students' affective outcomes:

> *PT-3: I'll ask questions. They will answer. Such as, have you ever seen things like this before?*
> *R: What will this provide?*
> *PT-3: It will attract students' attention. They will be able to listen carefully to the lesson and become enthusiastic.*

The specific emphasis on questioning seemed to be due to preservice teachers' negative learning experiences as students:

> *There should be no question marks in students' heads. They should not memorize. We've always memorized. Our teachers said that this is the formula and we memorized without thinking on it. But we should ask why and how questions in teaching.* (PT-4)

Connecting real life, as another didactical role, was similar to the other didactical roles stated above in terms of the associated affective outcomes. More precisely, preservice teachers stated that teachers should connect daily life at the

beginning of the lesson to direct students' attention to the topic and to highlight the value of mathematics. For example, PT-1 stated that *"I certainly think about giving a current example or story about the topic, because this is not a fiction. I want to say that ancient people made it by using this information. Then, I think that students will listen very carefully."* However, students' cognitive outcomes and connection skills were not emphasized in any of the related orientations.

Real life connection orientations were originated from two different factors. First one was the current education system:

> *Mathematics was used in a lot of place. For example, Mimar Sinan (a famous architect of the Ottoman Empire) used the integral. Even the derivative has been used in a lot of architectural structures. They all work for certain jobs in real life. Current education system aims to give more sense of the topics. It is not based on rote-learning as in the history. Therefore, as teachers we need to know foundations of the topic to teach them.* (PT-4)

In addition, PT-8 cited her previous teacher and students' demands as factors of the need for making real life connections:

> *My teacher in high school explained where trigonometry is used in daily life like building bridges in architecture. Like him, I tell where we use it and the value of it in daily life after transmitting knowledge. Because students at that age already ask them. They will be enthusiastic if they know the value of the topic. Otherwise, they see it as unnecessary.*

Students' cognition appeared in some of the orientations about consideration of student differences. In these orientations, almost all of the preservice teachers stated that they wanted to consider students' differences in learning mathematics. Specifically, differences in students' previous knowledge and existing capabilities were the main points that preservice teachers underlined. They noted that as future mathematics teachers, they needed to consider what students had already known about the concept to organize their lesson: "*I need to pay attention what they knew and how they learned. If they have misinformation related with a subject in the 5th grade, then this would be my priorities. First, I teach and pass to other topic"* (PT-11). As in this example, teacher was the main actor; yet, participant's expressions implicitly included students' cognition of connection between topics.

Preservice teachers stated that they should consider student differences in

their existing capabilities in teaching mathematics "*When they do not understand, I need to be able to explain in two or three different ways considering different intelligences*" (PT-4). Student understanding, as an outcome, was implicitly stated: *"Students are not same, they have different intelligences. Some have visual intellect, some touch it, some have to think of something audible. Techer should consider all of them"* (PT-10). Participants could not elaborate more on their orientations in terms of students.

On the other hand, one of the preservice teachers considered differences in students' readiness based on the differences in students' grades. Specifically, she stated that her teaching approaches could be changed accordingly: "*There is a need to understand the readiness of the students. If they are too childish, we should use models or games to make it funny. Systematic and scientific approach can be used in sixth and seventh grades"* (PT-11). In other words, she considered students' grade levels as factors of her orientation.

4.1.2 Preservice teachers' pedagogical orientations

After didactical expertise, preservice teachers put emphasis on being a pedagogical expert. As it was seen in Table 4.3, they mainly focused on establishing relationships with students, classroom and time management and providing equal opportunities for every student in the class. Other pedagogical roles such as giving feedback and activating all of the students were stated by elaborating the main roles.

Table 4.3
Preservice Teachers' Pedagogical Orientations before Video Case-Based Community

Category	Codes
Pedagogical Orientations	Relationship with students Equity Classroom management Giving feedbacks Activating all of the students

Establishing relationships with students was the most emphasized pedagogical role because all of the preservice teachers stated something related with this role. The common point on these orientations was the thin line between being authoritarian and friendly: "*I'll be friendly to all of the students. There is a thin line between being a friend and a teacher. I need to balanced them*" (PT-8). In a similar conversation during the interview, PT-4 referred to her previous Turkish teacher in the middle school and said that she was a role model for her:

> *PT-4: He was a friend and a teacher for us. We could be comfortable with him like a friend but we could not cross the line*
> *R: Is this person a role model for your views on teaching?*
> *PT-4: Of course, I want to be like her. I want to be a loved teacher like her.*

As in this example, liking teacher as an affective outcome was one the purposes for establishing a balanced student-teacher relationship. In addition, respecting teacher was emphasized by four preservice teachers as a behavioral outcome: "*Teacher should communicate well with the students. He should understand them*" (PT-7). Some of them emphasized different student outcomes in their orientations. Specifically, they expressed that students should be confident and be able to express themselves without fearing: "*You have to be disciplined and not too soft. Otherwise students do not have much respect. But they should not be afraid of you. They should be able to comfortably express themselves when they are on the board"* (PT-10). To establish such a relationship, one of the preservice teachers attributed to self-referential characteristics of the teacher and said that teachers should be consistent in their relationship with the students: "*I need to settle my behaviors and attitudes toward students in a balanced way. I must be consistent. I should not cross the line"* (PT-4). PT-10 also expressed similar idea but she attributed it to her private tutoring experience:

> *There should be respect between students and teachers. Teachers should not act too sincerely like a friend. Students should not be afraid of the teachers, should not think that she would be angry if they make a mistake. They should be self-confident. While I was giving private lessons, I would never get angry. I have gave feedbacks and showed the truth. They loved me very much.*

In this statement, PT-10 also focused on giving verbal feedback while focusing on student-teacher relationships.

PT-2, on the other hand, emphasized giving feedbacks as a pedagogical expert for encouraging students toward participating in the lesson: *"I write questions to the board. Some students are very abstentious. I can say that "this is the question with award. You can do it. There is nothing to be afraid of…. Let's applaud your friend."* As a factor of this pedagogical orientation, PT-2 referred to the views about mathematics in the society and intended to avoid students' possible anxieties: *"Already, there is a perception that mathematics is difficult. A small mistake while solving a question can turn into a future prejudice. They can say they could not do it, like it. That's why the teacher has to be very careful*."

Some of the orientations about the relationships between the teacher and students were associated to the management orientations. As participants indicated above, if they could establish a balanced relationship, students would respect the teacher. In such kind of the classroom context, they believed that classroom management was not the issue to be considered. In addition, two preservice teachers mentioned the existence of classroom management strategies but they did not elaborate much: "*Our teacher educators are showing classroom management techniques. I want to apply them*" (PT-7). In this example, teacher education was indicated as a factor for management orientations. They also emphasized time management. More precisely, they stated that they wanted to plan the lesson carefully: "*I should not begin the lesson with instant decisions. I must plan all of them in advance to use the process smoothly and adequately*" (PT-4). However, management related orientations were expressed as either a requirement or a result of establishing good relationships with the students. Therefore, such orientations were not directly related to student outcomes.

Equity was also an important point in preservice teachers' pedagogical orientations. It was addressed by either providing equal learning opportunities or treating equally in student teacher relationships. Equal learning opportunities as a pedagogical role were associated to consideration of student differences as a

didactical role. More precisely, they emphasized that since every student is different, teachers should consider this in their teaching to establish equity in learning. The differences in students' levels directed preservice teachers to emphasize equity in understanding: *"I try to teach for everyone in the class. For students who have difficulties in learning, I can ask easy questions to encourage them. For successful students, I can ask challenging questions to make them think about the subject"* (PT-6). Another preservice teacher referred to her experiences as a student and internship at high school when stating her ideas about providing equal learning opportunities for students:

> *Our primary teacher was making groups of two. I was more successful than my deskmate. Off course, he was not explaining why we were grouped with our friends. In such groups, students were interacting each other. I went to an internship school when I was a student in Anatolian Teacher Training School. I was shocked when I saw the classes were separated by students' success: Hardworking, middle and lazy classes. This is wrong. We need to behave every student like our children, not as lazy or hardworking.* (PT-6)

Equity related orientations were generally arouse from the negative experiences as a student. More precisely, preservice teachers stated that they had teachers in middle or high school who were only paying attention to the hardworking students or the students in the front seats:

> *They were not considering each student in the class. They were just teaching on the board without specific attention to the students. They were not doing anything else. Half of the students were not understanding but they were only interested in the students sitting in the front. I do not want to be like them, I want to address all my students.* (PT-10)

In two of the equity related orientations, preservice teachers focused on students' participation to the lesson as a behavioral outcome. Therefore, they expressed their orientations in terms of activating all of the students without discriminating: "*We will do something to participate all of the students in the lesson. The important thing is that they all try. Teacher should not ignore that and should encourage students by asking questions and giving feedback"* (PT-8). More precisely, activating of all of the students, as a pedagogical teacher role, was associated to establishing equity. However, their main focus was students' participation to the lesson and how teachers designed their lesson accordingly.

In addition to the focus on equity, preservice teachers emphasized treating students equally which was evaluated under pedagogical expertise of teacher identity. More precisely, preservice teachers mentioned students' personality differences: "*Some of the students are very entrepreneurs, some are very backward and remain silent. They might think that the teacher did not see them. Some teachers make eye contact with each student. Therefore, they can encourage the students"* (PT-7). As in this example, valuing student differences and providing equal opportunity were associated with students' enthusiasm as an affective outcome.

4.1.3 Preservice teachers' self-referential orientations

In addition to the didactical and pedagogical roles, preservice teachers expressed the personal characteristics that they had to possess as a teacher, which was evaluated under self-referential category of teacher identity. In other words, they associated the personal characteristics of a teacher and being a mathematics teacher. Accordingly, as it was seen in Table 4.4., they mainly focused on being responsible, role model, dynamic and productive teachers. Being communicative and consistent teachers, which were self-referential characteristics of a teacher, were expressed above while explaining pedagogical roles of the teacher as they were intertwined in pedagogical roles. Therefore, findings related to these two characteristics were not rewritten in this part. Frequency of the rest of the orientations was very low compared to the other teacher roles. Nevertheless, they were explained briefly below.

Table 4.4
Preservice Teachers' Self-Referential Orientations before Video Case-Based Community

Category	Codes
Self-Referential Orientations	Dynamic Communicative Idealist Consistent Productive Self-confident Responsible Role Model

Being a responsible teacher was the most emphasized self-referential characteristic. Accordingly, preservice teachers stated that teachers should fulfill their duty and give students their due: "*The teacher should fulfill the requirements of the job and be conscientious. Otherwise, he can have his own way, he can teach just half an hour and pass it. The teacher should notice that he is earning his money from this job and the students' development is his own responsibility"* (PT-6). They associated their orientations to the opportunities provided for the students. In other words, they attributed being responsible as a reason for the other teacher roles.

Similarly, being a dynamic teacher was referred as a personal characteristic. More precisely, preservice teachers thought that mathematics teachers were needed to be energetic and funny to gain students' attention to the topic and make them listen the lesson:

> *I need to be dynamic so that I can draw students' attention to the lesson. Students should notice this dynamism to listen the lesson. I need to be fluent in speaking and writing on the board. I have never taken an example of a teachers who teach slowly.* (PT-5)

In the above orientation, PT-5 stated that she did not take monotone teachers as a role model for her. In other words, previous teachers' dynamics was indicated as a reason of her orientation.

Since previous teachers represented as a role model for preservice teachers in terms of their teaching, their relationship with students or their personality, few of the preservice teachers stated that they also wanted to be a role model for their students. More precisely, they expressed that mathematics teachers should be a role

model in behaviors, attitudes and apparel. PT-1 even considered being a role model in daily life more important than being a subject matter expert: "*I want to be remembered as a teacher having a strong personality, being an example, a friend and a guide instead of being good at mathematics."* The main concern of these kinds of the orientations was to support students' personality rather than their learning in mathematics.

Preservice teachers also stated that a mathematics teacher should be productive, idealist and open to improvement. It was more than being responsible for preservice teachers. In this characteristic, preservice teachers were not satisfied with fulfilling the responsibilities; instead, they expected teachers to go further. They stated that a mathematics teacher should possess the required knowledge for teaching effectively and improve their knowledge and skills by following the improvements in the discipline: "*I think a mathematics teacher should be a much more accomplished teacher who develops himself continuously. You need to show that you are an idealist teacher. Otherwise students do not have much respect"* (PT-11). Similarly, PT-2 stated that teachers should have self confidence in their learning and skills: "*I am expected to be a teacher who is self-confident, has comprehensive knowledge in mathematics, keeps the balance in relationship with students and makes students like the lesson"* (PT-2). However, their main concern in having such personalities was not to teach effectively, rather to develop students' affective and behavioral outcomes.

4.1.4 Preservice teachers' subject matter orientations

Subject matter expertise related orientations also played an important role in preservice teachers' orientations. All of them emphasized being knowledgeable and transferring knowledge to the students as future mathematics teachers as represented in Table 4.5. Transferring knowledge was the most referred teacher role when they expressed didactical roles of the teachers that they wanted to be. For example, as it was explained above, few of the preservice teachers wanted to demonstrate materials/visuals and technology while transferring the knowledge to the students. In

other words, they referred to these didactical roles as a tool for being subject matter experts.

Table 4.5
Preservice Teachers' Subject Matter Orientations before Video Case-Based Community

Category	Codes
Subject Matter Orientations	Being knowledgeable Transferring knowledge

On the other hand, when they asked their sample teaching, all of them stated expressions related with transferring knowledge in the following way: "Before/After I gave/transmit/introduced the knowledge/information/concepts…". For example, PT-12 stated that "*First, I would say what we are going to see and give daily life examples. Then, I would give information about the concepts. As I proceed, I think that I also support with various problems."* Similarly, PT-7 stated *"After giving the concepts-details in detail, I would pass to the application of the concepts through solving exercise."* In a similar conversation, PT-5 portrayed her previous teacher as a role model in a transferring knowledge role: "*I also want to be a teacher who produces practical information and synthesizes the information from different sources."* She addressed that national examinations that students have to take were the reasons for giving the shortcuts of the concepts/questions: "*Mathematics should be taught with such practical things considering the national examinations that students take"* (PT-5). More precisely, national education context and teaching methods that they observed directed preservice teachers' identity orientations in this manner.

Since preservice teachers preferred to transfer knowledge in their teaching orientations, they put emphasis on being knowledgeable as future mathematics teachers. There were also other purposes of being such a knowledgeable teacher. Participants stated that they needed to have comprehensive knowledge in their discipline. When it was asked what they meant by the comprehensive knowledge, most of them stated that a mathematics teacher should solve every question coming

from the students: "*Some students ask questions, teachers must be able to solve them in different ways"* (PT-7). They thought it as necessary in order to be good at classroom management because they believed that students respected the knowledge of the teachers and listen to the teacher in silence. For example, PT-9 stated that:

> PT-9: *Students should respect the teacher to give their attention and listen to the lesson.*
> R: *How do you think this teacher will provide this respect?*
> PT-9: *Students ask a lot of questions. The teacher must solve every question.*

On the other hand, some of them stated that they needed to have in-depth mathematical knowledge to teach better emphasizing the pedagogical content knowledge. However, they generally stated general ideas instead of elaborating on this idea: "*He needs to have comprehensive knowledge in teaching mathematics. I mean, he needs to know the subject he is going to teach"* (PT-12). Some of them gave examples of having pedagogical content knowledge: "*He must have comprehensive knowledge in his field. For example, he needs to know where the exponentials are used in daily life, integrate this knowledge to the lesson and explain students why they need to learn this topic"* (PT-2). In this example, PT-2 expressed teachers' knowledge in being a didactical expert, but she associated this expertise to valuing mathematics, which was considered as an affective outcome. Nevertheless, some other preservice teachers focused on students' cognition while talking about pedagogical content knowledge: "*For example, you should know the difference between 6x1/2 and 1/2x6 and you should have the knowledge that you can reduce it to student level when you teach it so that students can understand"* (PT-6).

In summary, although being knowledgeable was taken as a teacher role in the theory, preservice teachers considered being knowledgeable as requirement for the activation of their identity orientations. Accordingly, preservice teachers' statements related with their strengths and weaknesses were presented at the end of the identity related orientations below.

4.1.5 Preservice teachers' contextual orientations

Preservice teachers stated that they can change the physical arrangement of the context according to their purposes. One of these purposes was to give students opportunity to follow the instruction easily. They referred to U-shaped seating arrangement as optimal for this purpose when the class size was not high: *"I think it might be U-shaped rather than traditional seating arrangement so that they can see the board and me comfortably but it is not possible in crowded classrooms"* (PT-8). Interaction between students was also emphasized as a purpose. To ensure this, PT-6 proposed grouping students: *"Our classes need to be in clusters because we can only increase the interaction and communication among the students."* PT-1, on the other hand, stated his purpose of considering traditional seating arrangement: "*I like interactions among students. I do not want somebody to stay in the back and the others to be very close to me. For this reason, I am planning to rearrange the class frequently."* His purpose was to increase interaction between students and the teacher. In addition, he implicitly focused on the ensuring equity for the students.

On the other hand, they wanted to use the walls of the classrooms for displaying visuals. They stated that they would hang the famous mathematicians' posters of their biographies and also the examples from the usage of mathematics in daily life. For example: "*There may be different things on the walls like posters including daily life examples such as Fibonacci number. I want my classroom to be very colourful"* (PT-8). As the purpose of this contextual arrangement, preservice teachers stated that students can appreciate the value of mathematics in daily life and be motivated for the lesson.

However, most of the contextual related orientations included preservice teachers' expectations related with the context of the school. They built their orientations based on the existence of those circumstances. For example, one of the preservice teachers wanted to be a teacher in the school with a low socioeconomic background especially in a village school:

> *The students in the villages are better than the students in the big cities downtowns in terms of their behaviours and attitudes. My cousin is working as a mathematics teacher in a small village in Bingöl. He said that they do*

> *not let their teachers release the board or carry anything. They love their teachers. They listen their teachers quietly not to upset them. This conscience does not exist everywhere. That's why I want to be a teacher at village school.* (PT-1)

Based on these experiences, he wanted to be a teacher in a village to be loved and respected. In a similar conversation, PT-2 stated the importance of similarities among the students in terms of socio-economic status:

> *There should not be too much differences among the students in terms of their financial situations. Students may be anxious if there are very rich and very poor students in the class. This could affect their interactions and willingness to participate in class discussions.* (PT-2)

In other words, she related socio-economic status to students' behavioral and affective outcomes similar to the most of the contextual related orientations.

4.1.6 Preservice teachers' student outcome orientations

It is important to note that preservice teachers mentioned several outcomes during the interviews, as seen in Table 4.6. Although cognitive outcomes caught preservice attention even less than half of the affective outcomes, they demonstrated diversity (interpretation, learning, permanent learning, reasoning, connection to real life, connection between topics, mathematical independence, solving questions, reinforcement and misconception). In addition, they spoke about the students' behavioral outcomes (participation, expressing themselves, peer interactions, respect and studying for the lesson). Almost all of these outcomes were stated while explaining preservice teachers' identity orientations through the roles of teachers that they attributed themselves. Therefore, these excerpts were not repeated here.

Most of the associated student outcomes were stated while explaining their orientations in terms of the attributed teacher roles. Nevertheless, preservice teachers were also asked their purposes of teaching mathematics with a separate question in the interview protocol. More precisely, what they wanted to improve in their students and what they expected as an outcome of their teaching were asked. Accordingly, five of the preservice teachers expressed similar purposes: liking teacher/mathematics, enjoying learning mathematics, being confident in mathematics or being prejudice free, and appreciating the value of mathematics. In

other words, most of the preservice teachers attributed their main purposes of teaching mathematics to the affective outcomes. For example: "*At first I want to eliminate students' prejudices about mathematics. I want my students to say that mathematics is really fun and it is used in such areas*" (PT-2).

Table 4.6

Preservice Teachers' Student Outcome Orientations before Video Case-Based Community

Component	Categories	Codes
Student Outcomes	Affective	Attention
		Like math
		Like teacher
		Prejudice
		Enthusiasm
		Confidence
		Value math
	Cognitive	Interpretation
		Permanent learning
		Reinforcement
		Mathematical independence
		Reasoning
		Connection to real life
		Connection between topics
		Learning
		Misconception
		Solving questions
	Behavioral	Express themselves
		Participate
		Peer interaction
		Respect teachers
		Study for the lesson
		Follow instruction

Students' independence in learning mathematics was also stated as a main purpose of teaching mathematics by four preservice teachers. More precisely, they wanted their students to be self-regulated learners. For example: "*I want to make the students self-confident in mathematics. They should try different ways if they could not solve the question and take actions accordingly"* (PT-5). As it was seen in this example, their main concern was to improve students' mathematical thinking processes, which was evaluated under cognitive outcome category.

Three of the participants expressed supporting students' personality as a main purpose of being a teacher: *"Before teaching mathematics, I want my students to love the nation, love its homeland, respect their parents and teachers, and acquire basic values. The teacher should be conscientious and do his duties as it was expected"* (PT-6). These preservice teachers prioritized being a teacher much more than being a mathematics teacher. They emphasized that all of the teachers from different disciplines should consider these outcomes as their priority.

4.1.7 Factors affecting preservice teachers' orientations

While preservice teachers were stating their identity orientations, they implicitly indicated the factors for these orientations. These factors were mostly stated above after the related teacher roles and associated students' outcomes. Accordingly, preservice teachers attributed their identity orientations to their learning experiences as students, previous teachers, teacher education program, students' demand in the new world, views about mathematics in Turkish society, TEOG and private tutoring experiences. In addition, after they described their identity orientations, a specific question was asked: "*As a future mathematics teacher, what factors affected your orientations?"* Therefore, they were given opportunity to explicitly state the factors. Personality was indicated as factor in addition to the stated factors above. In the following paragraphs, each of these factors was summarized.

Learning experiences as a student were the most emphasized factors in their orientations. Especially, they attributed to their negative experiences in learning mathematics and stated that they learned mathematics mostly by memorizing. That's why they prioritized being a didactical expert. In addition, providing equal learning opportunities was arouse from their negative observations as a student. As future mathematics teachers, they put themselves in the place of their future students and said that they will consider equity in their relationships as pedagogical experts and in their teaching as didactical experts.

Impact of their previous teachers was stated while mentioning the role of the mathematics teachers that they wanted to have. In addition, preservice teachers were asked to share their memorable (mathematics) teachers in their school life. They stated their negative and positive experiences and expressed that they will consider them in their teaching. Accordingly, most of the preservice teachers remembered the teachers' relationship with the students and their dynamics as positive, but not equalizing the opportunities given for the students as negative points. Most of them did not remember the didactical expertise of their previous teachers. They only stated that their teachers were solving many questions in one class hour which influenced their solving-questions-related roles. However, they said that they were not aware of the importance of many didactical roles while they were students. Therefore, liking or disliking the previous teachers were not associated to the teachers' expertise in teaching mathematics; rather to these teachers' relationship with the participants as perceived by them.

Preservice teachers stated that they realized most of the didactical roles during their enrollment in the teacher education program. Specifically, almost all of the preservice teachers stated that they began to consider what kind of teacher they wanted to be in the teacher education program. The courses taken in the third and fourth years were considered as significant in constructing such a vision. However, they stated that teacher education did not help to improve their subject matter knowledge and pedagogical content knowledge as they expected. Rather, it provided awareness in these points.

In contrast, one of the preservice teachers stated that her identity orientation was constructed during the high school years and it was not changed in teacher education. Therefore, as the factors of her identity, she indicated the high school teacher who was solving many questions in one class hour and gave the shortcuts in solving questions. She prioritized this role because of the national examinations in the Turkish education system. Specifically, TEOG directed her to prioritize being a subject matter expert as a prospective teacher. Similarly, four other preservice

teachers stated that TEOG was an important factor in their teaching and they had to organize their lessons considering this exam.

Preservice teachers also stated that particular group of people considered mathematics as the most difficult subject ever. They underlined the views about mathematics in the society and thought that this view affected students' attitudes toward mathematics. Therefore, they wanted to change students' attitudes and make them like mathematics, be free of any sort of prejudice and feel confident in learning mathematics. This was another factor that most of the preservice teachers attributed while stating these affective outcomes.

However, some of the factors were associated to the students' cognitive outcomes. Specifically, preservice teachers stated that as the world was developing, people were more questioning and inquiring, and that is why the new generation's demands were different from the demands of the past. According to this idea, teachers were needed to integrate questioning strategy in their teaching to develop students' reasoning skills. In addition, they expressed that development in technology affected the content of the curricula and expectations from the teachers. Therefore, teachers needed to integrate technology in their lesson to visualize the topic and develop students' interpretation.

Similarly, the grade level of the students or students' cognitive developments was stated as a factor in their orientations. They stated that based on the level of students, teachers should teach through concrete materials. One of the preservice teachers stated that this could be necessary especially for the fifth and sixth graders to make them enjoy learning mathematics. This factor was stated while mentioning the didactical role of the teachers, but it was again associated to the students' affective outcomes.

Although preservice teachers stated their identity orientations based on their own visions by indicating "personally, I think…", only one of the preservice teachers stated her personality explicitly as a factor in her identity orientations. Specially, she associated being a dynamic and responsible teacher as self-referential characteristics to her personal identity. In other words, personal identity was

inseparable from the self-referential characteristics as a teacher. However, except one, preservice teachers did not associate explicitly their self-referential orientations to their personal identity.

Similarly, private tutoring experience was cited as a factor only by one of the preservice teachers. She indicated her relationship to the student taking private tutoring as a reason of her pedagogical orientations. In contrast with this idea, another preservice teacher stated that private tutoring was different from teaching in a class which included more than one student. Therefore, as he stated, teachers in the classroom would have different priorities and therefore, different teacher identities.

In conclusion, as preservice teachers' responses to the questions in the interview protocol, experiences as student, their previous teachers and TEOG were the most associated factors. Perceptions about mathematics in the society, developments in the world and in education, students' cognitive level, personal identity and private tutoring experiences were associated only by few of the preservice teachers. Although teacher education program was stated as an important factor in developing preservice teachers' identity orientations, they expressed many criticisms about the program in terms of their qualifications in being a teacher. Based on these criticisms, their strengths and weaknesses were described in the following part.

4.1.8 Preservice teachers' self-evaluations

At the end of the individual interviews, preservice teachers were asked to evaluate their strengths and weaknesses as future mathematics teachers. The reason for asking their strengths and weaknesses was that if the preservice teachers felt incompetent in an issue related with their orientations, they would probably have difficulties in the activation of their identities into the practice. Therefore, it was important to search for their self-evaluations to understand the robustness of their orientations. Therefore, preservice teachers' self-evaluations were examined below.
Participants stated various strengths and weaknesses. They agreed in some of the weaknesses. First weakness was the lack of knowledge about curriculum. Only few

of the preservice teachers stated that they had a chance to look at the curriculum without a deep analysis: "*I just looked at the topics. For example, I look at what is taught in the 5th grade. I did not look at the objectives and philosophy of the curricula"* (PT-9). Rest of the preservice teachers stated that they did not know almost anything about the curriculum. This was clearly seen in the curriculum week of the group discussion. They expressed that they did not know most of the information that were covered in the curriculum week. Although they were directed and motivated to use curriculum in some of the courses, they stated that they were still feeling insufficient: "*I only know the topics that I made presentations in the teacher education courses. I know the objectives of those topics*" (PT-7). In those courses, as preservice teachers described, preservice teachers were grouped and each week one of the groups were making presentations about the topic that they were given to them. They criticized these courses and asserted that did not learn much about teaching mathematics: "*They did not teach us how to teach mathematics or what activities can be done. We have not listened to other preservice teachers' presentations. These courses did not develop us.*" While they blamed teacher education in terms of not providing opportunities in developing pedagogical content knowledge, they accepted that they did not make use of the course experiences much either.

In spite of the weaknesses in pedagogical content knowledge, most of the preservice teachers felt competent in the content knowledge. They associated content knowledge as their strengths, however, they did not elaborate on this strength much:

> R: *How much information do you have about the topics you will teach?*
> PT-10: *I do not have to work (on the topics) before teaching.*

This strength could be seen also in high number of subject matter expertise orientations. In other words, preservice teachers oriented towards teaching mathematics through transmitting knowledge because they perceived that they were knowledgeable in mathematics. However, they stated that they gained their content knowledge in the middle and high school, not in the teacher education program. This seemed to explain teaching through transmitting knowledge without much

consideration of students' thinking. In other words, the lack of pedagogical content knowledge in spite of having subject matter knowledge could be the possible reason for the low frequency in students' cognitive outcomes.

Another weakness that most of the preservice teachers stated was the lack of teaching practices in a classroom. Therefore, they stated that they were not sure whether they would be able to activate their orientations into practice. Their main concern in the teaching practice was their success in managing the classroom and establishing a balanced relationship with the students. In other words, they had doubts about being a pedagogical expert:

> *I need to be able manage the classroom. I do not have teaching experience but I believe that I can develop myself through time. I can be serious or friendly depending on the situation. I can give the students that comfort. I think they will take me seriously* (PT-8).

In spite of these weaknesses and needs, all of the preservice teachers stated that they believed in themselves to put their ideas into the practice. They offered pathways to overcome these weaknesses. One of them is gaining experiences in teaching. They indicated that they would not be fully able to represent their identity in their first years of their teaching. However, they could be the teacher that they wanted to be by gaining experiences: "*I do not think it will be easy for me in the first years since I do not have teaching experience and I am an excited and anxious person. I believe that it will last a year or two years"* (PT-5).

As another pathway, preservice teachers mentioned many tools that they can use for improving the weaknesses in their knowledge and skills. They generally indicated internet sources to find the necessary information. In addition, most of them thought that Ministry of National Education's (Milli Eğitim Bakanlığı, [MEB]) textbooks were beneficial for directing teachers: "*I can search on the internet and the MoNE textbooks which work through the topics and give daily life examples"* (PT-7). Another preservice teacher stated that she could also read articles about the teaching and learning about a specific topic as she had read in teacher education:

> *This year we are reading articles. They are explaining the sample practices, misconceptions and the way to overcome those misconceptions. Practices made in various schools explain the mistakes of the learners and how they*

should be corrected. I can follow such articles and learn from them. (PT-6)

In addition, experienced colloquies were stated as a resource for their improvement.

In summary, preservice teachers evaluated themselves as strong or needed improvement in some of the points in their identity orientations. Nevertheless, they did not see these weaknesses as an obstacle for the enactment of their identity into practice. They believed in themselves and stated that they could strengthen their weaknesses through getting experiences or using the tools that they referred.

4.1.9 Summary of preservice teachers' professional identity orientations before video case-based community

Preservice teachers stated many different roles and associates outcomes representing their identity orientations. As all explained above, although the frequency of didactical expertise was higher, they mainly expressed their identity through transmitting knowledge as subject matter experts. In addition, they put importance in being a teacher as well as being a mathematics teacher which resulted in high frequency of pedagogical expertise roles. Based on these stated roles, preservice teachers also stated several student outcomes. They especially prioritized the affective outcomes while even speaking of a didactical role, on the contrary to what Beijaard et al. (2000) addressed. Preservice teachers did not focus on students' cognition and did not state them as one of their priorities.

Based on the preservice teachers' identity orientations, related factors for these orientations and their self-evaluations, video case-based community could provide opportunities to focus more on the students thinking process and transfer their identities. In addition, participation in a video case-based community could be one of the factors in developing professional identity during teacher education. In the next section of this chapter, preservice teachers noticing practices and the related discussions in video-case enhanced discussions were investigated.

4.2 What and How Preservice Teachers Notice in Video Case-Based Community

In this part of this chapter, preservice teachers' noticing in reflection papers and related discussions during the group meetings of the video case-based community were analyzed based on the combined theoretical framework of this study. More precisely, what they noticed in videos was analyzed considering Beijaard et al's (2000) identity framework with further revisions added in the present study. Accordingly, what they found essential in the videos to reflect in terms of the teacher roles and student outcomes were explored. Then, how they noticed was investigated based on the developmental trajectory of the Noticing framework (van Es & Sherin, 2011).

It is important to note that idea units generally included more than one code from the different categories of the teacher role and student outcome components of teacher identity. During the discussion of those idea units, preservice teachers even connected the noticed issues to a different category. For example, for a noticed issue related with the conceptualization of the topic, preservice teachers discussed how the teachers connected the concepts, how they used their communication skills or how they used the material and their associated student outcomes. Although it was mainly related with the didactical expertise of the teacher and the associated cognitive outcomes, some of the preservice teachers connected these points to the other categories of the teacher roles and students' outcomes. These kinds of contributions generally shifted the flow of the discussions. Therefore, stating a discussion unit without connecting to the flow of that week's discussion did not fully illustrate the noticing trajectory. Considering these, to understand how the noticed issues were changed throughout the six-week period, it was important to explain noticing and discussion of each week.

Based on this need, for each week, what and how preservice teachers noticed and how these noticed issues were discussed with rest of the groups were written in different subsections. Each of these subsections included a description about the video. In addition, frequencies of what and how preservice teachers noticed about

the video in their reflection papers were given in related tables with necessary explanation. It is important to note that the frequencies represent both positive, negative and neutral noticed issues. More precisely, they do not inform about preservice teachers' evaluations. Instead, they only demonstrate the noticed issues in that week.

Not all of the noticed issues in the reflection papers were discussed in the group meetings. Therefore, which of the noticed issues were reflected to the group discussion and how they were discussed within the group meetings were explained in a different subsection. At the end of each week's noticing, a summary for each week based on the unique issues of the week was given.

In addition, a general summary of the six-week noticing and discussion was given to describe the trajectories of what the preservice teachers found essential to notice and discuss based on the dynamics of the video case-based community. Therefore, effects of the video case-based community on the preservice teachers' professed identities were clarified.

4.2.1 First week's noticing and discussions

In the first week video, there was an out of class activity called "Geometry Camp". Two students were involved in the activity; one got inside of the tent and took one of the materials in hand and the other asked questions and tried to find the material. Materials were made from colorful cardboard by the teacher and demonstrated geometric shapes or figures. There were a square, a rectangle, a parallelogram, a rhombus, a pentagon and a hexagon as geometric shapes and a cube, a tetragonal prism/pyramid, a rectangular prism/pyramid and a triangular prism/pyramid as geometric figures. The student outside of the tent could ask a maximum of four questions before making prediction. If he/she guessed right, he/she won, otherwise lost. This process was repeated four times with eight different students.

When the first week's noticed issues were interpreted as a whole, it was seen that preservice teachers noticed several points in the video as stated in the reflection

papers in terms of various roles of the teacher and associated student outcomes. As it was seen in Table 4.7, noticed issues were coded in different codes under teacher role and student outcome component of teacher identity. It was important to note that the total number does not represent 193 different noticing or different codes. Most of the time, same noticing segments were coded with more than one code. Nevertheless, the table represents the emphasized categories within teacher role and student outcomes for the first week.

Table 4.7
Frequencies of Noticed Issues in the First Week's Reflection Papers

Components	Categories	Week 1
Teacher Role	Subject Matter	1
	Didactics	71
	Pedagogical	16
	Self-referential	3
	Context	12
Student Outcome	Affective	40
	Cognitive	40
	Behavioral	10
Sum		193

Focusing mostly on the didactical roles of the teacher in the video was expected when the content of the video was considered. The important point, on the other hand, was what and how preservice teachers noticed related with the didactical categories. As it was described below in detail, preservice teachers focused on the didactical expertise of the teacher with many different perspectives represented in Table 4.8. Although there were contradictory ideas in many of these noticing, preservice teachers criticized the teacher in terms of her clarification, connection to real life, consideration of the students' levels, appropriateness of the lesson to the objectives stated in the beginning of the videos and conceptualization of the topic. On the other hand, most of the preservice teachers appreciated the teacher since she arranged such an alternative activity for the students, used concrete materials, served as model in terms of using mathematical language and represented student-centered approach.

Table 4.8
Frequencies of Didactics Noticing in the First Week's Reflection Papers

Components	Categories	Codes	Week 1
Teacher Role	Didactics	activity	28
		appropriateness the objective	2
		assessment	1
		clarifying	6
		conceptualization	3
		connection to real life	3
		group working	1
		inductive	2
		level of the students	10
		materials	11
		mathematical communication	1
		student centeredness	3

Preservice teachers noticed teacher roles in other categories to a lesser extend compared to didactical expertise as presented in Table 4.9. Although there were positive comments, preservice teachers generally criticized the teacher based on activating all of the students, relationship with the students, verbal feedbacks and being dynamic in the classroom. In addition, preservice teachers who criticized the context of the activity interpreted the arrangement of the context as a management problem for the teacher. Arrangement of the context was one of the mostly highlighted points in the first week reflections.

Table 4.9
Frequencies of other Teacher Role Noticing in the First Week's Reflection Papers

Components	Categories	Codes	Week 1
Teacher Role	Subject Matter	transmitting knowledge	1
	Pedagogical	management	3
		relationships with students	2
		verbal feedback_encouragement	2
	Self-referential	dynamic	3
	Context	out of class/school activities	12

When the noticed ideas were examined based on student outcome component of teacher identity, equal emphasis on the cognitive and affective outcomes and

relatively less emphasis on behavioral outcomes were observed for the first week, as seen in Table 4.10. Preservice teachers generally wrote positive comments about the affective outcomes. More precisely, they interpreted that by conducting such an activity, the teacher drew students' attentions, made them enthusiastic, provided opportunity to enjoy learning mathematics and appreciate the value of mathematics, increased their confidence in mathematics and reduced their anxiety. It was important to note that gaining attention was the most noticed outcome for the first week compared to the other outcomes in all of the student outcome categories. Preservice teachers associated gaining attention to many different student outcomes especially in cognitive outcome category.

Table 4.10
Frequencies of Student Outcome Noticing in the First Week's Reflection Papers

Components	Categories	Codes	Week 1
Student Outcome	Affective	attention	19
		confidence	3
		enthusiastic	9
		like/enjoy math	6
		prejudice/anxiety	1
		value math	2
	Cognitive	connect daily life	1
		connect between topic	6
		interpretation	2
		learning	4
		learning by doing	3
		mathematical communication	3
		misconceptions	3
		permanent learning	8
		problem solving	1
		reasoning	7
		reinforcement	2
	Behavioral	follow instruction	1
		participate	9

More precisely, preservice teachers connected students' attention to the capacity of the activity to be remembered which seemed to address permanent learning. Although they stated that the activity provided permanent learning in their

reflections, they simply considered that the activity gained students' attention and therefore it provided permanent learning. Therefore, they did not focus on the process of learning. Similarly, learning, learning by doing and reinforcement were the other cognitive outcomes stated as a product of the activity. Reasoning and connection between topics as mathematical process skills were the most highlighted points in the reflections. Similarly, communication, connection to daily life, misconceptions, interpretation and problem solving were also the highlighted points underlying the process of students' cognitions. Almost the entire noticed behavioral outcomes (9 out of 10), on the other hand, were related with whether the students had participated in the activity or not. In one of these noticing, it was noted that since the activity was for two students, the rest of the students were not following the instruction.

Up to this point, what preservice teachers noticed in terms of teacher role and associated student outcome components of teacher identity in the first reflection papers was summarized. Then, it was necessary to analyze how they noticed these issues. Table 4.11 demonstrated the frequencies of the Noticing Levels of the first week noticing. Accordingly, most of the noticed issues were in Level 1. Preservice teachers mostly focused on the teacher related issues in the video in the first week and not on the students' outcomes. In addition, they expressed their noticing through describing and evaluating, instead of interpreting and elaborating their noticing.

Table 4.11
Frequencies of Noticing Levels in the First Week's Reflection Papers

Noticing Levels	Week-1
1	57
2	19
3	2
4	-

How were these noticed issues discussed within the group? As it was explained in the methodology chapter, I have read all of the reflection papers and determined the contradictory issues in preservice teachers' noticing to promote a discussion platform. By this way, I aimed to make them express and defend their

ideas and get a chance to observe other's perspectives in that issue. Then, I also shared with them issues that I found important although they were not contradictory to any other noticing. In the following part, preservice teachers' noticed issues undertaken in the group discussion were explained.

4.2.1.1 First week's noticed issues undertaken in the group discussion

Since the salient characteristic of the video was related with the arrangement of the context as an out of class activity, there were many contradictory noticing. Therefore, discussion started with the arrangement of the context as one of the teacher roles. Most of the preservice teachers interpreted the out of class activity as positive in terms of gaining attention and developing positive attitudes toward learning mathematics: "*It was a good activity because it was unusual and made students to attend the lesson. It attracted students' attention because it was an out of class activity called as geometry tents"* (PT-2). Similarly, PT-8 stated *"Making an out of class activity in the garden through a mathematics camp will attract students' attention, make them remember the activity throughout their lives and increase their sympathy for the lesson."* On the other hand, three of the preservice teachers criticized the context and recommended to conduct the activity in the class. When these noticed issues were evaluated in terms of their depth or the level of the noticing framework, it was seen that most of the preservice teachers wrote their reflections through describing the context and stating the associated student outcomes such as, "*Making a tent and conducting the activity attracted students' attentions" (PT-9).* Such positive comments were evaluated as Baseline Noticing (Level 1), since the main actor of their noticing was the teacher who arranged the context of the activity, students' outcomes were not the main concern. On the other hand, two of the preservice teachers demonstrated the characteristics of mixed level of noticing since they criticized the role of the teacher outside of the classroom in increasing students' understanding of the concepts: *"I think the teacher could not make good use of the environment. After the activity, she could ask students to pay attention to their surroundings and explain the shapes and solids they saw. So they*

could easily associate what they learned and saw" (PT-3). I brought this contradictory noticing in preservice teachers' reflections to the group discussion:

R:	You have contradictory views about the context of the activity.
PT-1:	I think it was bad.
PT-8:	I thought positively because I thought that it would attract attention of the student, but I would make it in the class if I were the teacher.
PT-6:	They would forget if it was in the class.
PT-9:	If I was a student in that activity, I would look at the birds flying in the air and anything else. It was very distracting so classroom management was a problem.
PT-8:	But it was more memorable because they were making the activity together.
PT-1:	Our goal is to integrate daily life to the topic. We have to bring it to class without going out.
PT-3:	I would like to take the children to the park and see the geometric shapes in daily life, but it would be very difficult to control them.
PT-1:	I thought that it would increase their motivation because it was a different environment than the classroom. I think camping is very engaging.
PT-9:	Why do you think it as negative, PT- 6?
PT-10:	The geometric shapes have formed by the teacher. It would have made sense to do it outside, if she showed something concrete outside.
R	Right.
PT-6	She did not use anything from outside.
PT-8	Yes, it's just interesting.
PT-6:	It becomes more memorable.
PT-8:	I agree.
PT-9:	You have contradictory views about the context of the activity.
PT-11:	I think it was bad.

In this discussion unit, preservice teachers discussed how the context of the activity could be arranged as an alternative approach. Preservice teachers (PT-3, PT-8, PT-9, PT-10, PT-12) who liked the context of the activity thought that the activity gained students' attention, increased their motivation and therefore, had the potential to make students remember the concept easily. PT-1, on the other hand, considered out of class activity as a management problem for the teacher and an attention problem for the students. PT-1's ideas did not leave an impression on other

preservice teachers since others' main concern in the activity was not related with classroom management. However, PT-6's idea as an alternative approach for the activity gained broad acceptance since she focused on the need to relate mathematics to daily life, if the activity would be conducted outside of the classroom to help students attach meaning to the concept. This idea was approved and extended by PT-8 and PT-9. Therefore, most of the preservice teachers changed their noticing during the discussion.

It was important to note that, while three of the preservice teachers interpreted the activity and the used materials in terms of the lack of real life connection in their reflection papers, this idea was generated by another preservice teacher (PT-6) during the group meeting. In other words, while some preservice teachers did not participate in the group discussion about what they had already noticed, PT-6 elaborated her noticing during the group discussion. Therefore, group discussion gave opportunity to increase rest of the preservice teachers' awareness in terms of alternative approaches as future mathematics teachers.

The alternative approach was stated for the activity as it could be conducted outside of the classroom. However, PT-6 insisted that the activity should be conducted in the classroom to achieve the purpose of the activity which was explained by the teacher at the beginning of the activity. Related with this, in the reflection paper, PT-6 stated that:

> *The teacher said that the purpose of this activity was to enable students to learn similarities and differences between geometric shapes and solids. However, it was not implemented through the activity. Similar and different aspects are needed to be emphasized. There is a possibility that students may forget and not link the answers of the questions. If students in the class see all the features together, they can make a better association and interpretation. It was difficult to associate because they did not see the features together.*

This noticing demonstrated the characteristics of Level 2 since the main concern of the preservice teacher was to develop students' connection and reasoning skills categorized under cognitive domain of student outcome component of teacher identity. Although it was not a contradictory noticing, I opened up PT-6's idea for

discussion as the coordinator of the group meetings to the rest of the group and asked their opinions:

R:	Was it appropriate to the objectives of the lesson?
PT-6 and PT-9:	Not exactly.
PT-8:	There was nothing related to similarities and differences. It focused on only one geometric object, not a similarity or difference with the other.
R:	PT-6 has written that the purpose was to emphasize similar and different aspects, but she could not apply it during the event. There was a need to emphasize similar and different aspects. Can you explain your idea?
PT-6:	She did not emphasize similar and different features. It just did not seem right to me.
R:	How can you achieve that, you have an idea about it, you have written it.
PT-6:	Umm .. (other teacher candidates are talking about before we explain it)
PT-8:	If they take two geometric objects or shapes and compare them, then similarities and differences between them can be clearer.
PT-6:	You need to compare them with each other.
R:	How else could it be? or Did not she emphasize the similarities and differences?
PT-8:	Students seemed to reason.
PT-6:	There is reasoning, but they do not relate with each other.

In this discussion unit, although preservice teachers came to agree in the development of reasoning skills as a result of the activity, they argued that connection between the concepts as a main objective of the activity was not achieved appropriately. This consensus changed PT-11's idea. In the reflection paper, PT-11 evaluated the activity considering Van Hiele's levels of geometric understanding and interpreted it as level two for the students. She wrote that the students could recognize the relationship between the properties of shapes through this activity: "*Van Hiele's geometric thinking model includes 5 levels. This activity shows the properties of Level 2.*" Although she thought that the teacher reached the purpose of the lesson, she changed her mind as in the following:

R:	PT-11 has opinions about the level of the activity. She thinks that it was level 2 for Van Hiele geometric model. Could you explain it PT-11?

PT-11: ... (briefly introduced levels). Now I am thinking that it did not succeed although it intended.

Preservice teachers stated many reasons for activity's inadequacy in reaching its aims in the reflection papers. One of them was the appropriateness of the lesson to the level of the students. Some of the preservice teachers focused on the difficulties of the activity for the fifth grade students. For example, PT-1 stated that *"This study requires that all of the students have detailed knowledge about the topic in advance. It is difficult to achieve. I think that the direction was limited."* Similarly, PT-12 considered the difficulty of the activity as a weakness: *"The weakness of activity is that every student cannot participate in the activity if they do not know so much. In order to be able make the activity, students must know deep knowledge in geometric shapes and solids, which may not be possible for every student."* Although these noticing focused on the level of students, they could not examine the cognitive processes that students possessed. On the other hand, their noticing in the reflection paper spoke for the whole class, not for a specific event in the video. Therefore, they demonstrated the characteristics of Level 1.

In contrast, some other preservice teachers appreciated the teacher in terms of designing the activity appropriate to the level of the students such as *"In general, considering the level of the student, it was a useful and proper activity to reinforce the topic"* (PT-7). In addition, they interpreted the activity based on Piaget's cognitive development theory and decided that it was applicable to the fifth grade students who were in the transition from the concrete operational to formal operational stage:

> *According to Piaget's theory of cognitive development, the students are in the process of concrete operational stage in the age range of 7-11 years, and in the process of formal operational stage over the age of 11 years. The students were in the 5th grade, on average 11 years old. This means that they were somewhere in the process of transition from concrete operations to formal operations. In this sense, we can say that the more abstract concepts we will give to the students, the better they will understand the concepts. As it was stated in the video, students learned shapes and solids through hands on materials. (PT-3)*

Therefore, there were contradictory ideas in terms of (teacher's preparation of) the appropriateness of the activity to the level of the students as a didactical teacher role.

However, it was not explicitly discussed within the group because the difficulty was associated with teacher's lack of clarifications. In other words, teacher's lack of clarification (noticed) as another didactical role changed the flow of the discussion as it was stated in the following dialogue.

In the reflection papers, preservice teachers who interpreted the activity as difficult for the students criticized the teacher in terms of not interfering in the activity with necessary explanations. They interpreted that the teacher did not clearly explain the activity and direct students to asking questions such as *"The teacher said that you have the right to ask 4 questions but she did not say how the students should determine the questions"* (PT-2). In addition, they thought that the teacher did not give clues or hep students through explaining the concepts in the activity. However, these noticing exhibited features of Level 1 since they were not specific and they evaluated the teacher only in terms of effective or ineffective actions.

While discussing the level of students and teacher's lack of clarification within the activity, PT-6 explained what she had written in the reflection paper. She had proposed an alternative approach for clarification and helping students in predicting process:

PT-1: The teacher wanted them to ask four questions. Every student has different strategies to learn and remember the features. Therefore, what they needed was not a restriction, instead they needed to be directed.

R: PT-6 has an idea to develop the activity based on this point. Do you want to explain it PT-6?

PT-6: If I were a student who asked the question to the one in the tent, I would forget the first answer while I was asking the fourth one. I think it was difficult to relate because they were only fifth graders. It still be an out of class activity but it would be better if there were a board. I would want one of my students to write down all of the features said on the boras so that the student who were predicting could see all of them. I would like to ask more questions if it's wrong. If they still could not find it, then I would emphasize the features of shapes and solids. Therefore, it would be more effective.

As PT-6 also stated in this dialogue, in the reflection paper, she noticed the problem in clarification but mainly focused on students' difficulties in making connection

between the properties and proposed a possible solution. She thought that using a board would help the students in visualizing the properties of the object. She also added that in case of not finding the correct answer, she could ask further questions or review the properties. Although she elaborated what she had noticed about the clarification problem, she had difficulties in explaining the students' thinking process in detail. Hence, her noticing exhibited the characteristics of Level 2.

PT-6's idea directed one of the preservice teachers to generate another alternative solution:

PT-1	I have another idea. We can draw lines between the features of the shape and solids and can show the relationships based on those lines like a map. Students can use the roads by using the lines while reasoning about the answers.
PT-8	This is what is called the concept map.
PT-6:	In this way, students can imagine the features better.
R:	By looking at the concept map, student can argue about the questions she will ask. For example, is it a shape or solid or two- or three-dimensional?
All PTs	Yes.
R:	The student can also start directly from such a question: Do you have 12 pieces? We did not see it in the video, but it could be in real life. Students probably will not know where to start. We need to direct them.

As the coordinator of the group meetings, the idea that I gave in the above dialog prompted the preservice teachers to realize the students' mathematical thinking in the activity. If they could notice it in the reflection paper, it would be evaluated as Level 3. However, they came to realize it in the discussion:

PT-9:	Students asked questions from holistic to pieces.
PT-1:	It is already a right strategy. Students should ask questions from general to specific features.

Clarification as a didactical teacher role was also questioned by PT-9 based on the specific events in the video. In the reflection paper, she noticed two different events:

> *In the second turn of the activity, teacher should have said that not only shapes but also solids' areas could be measured.* (PT-9)

> *When the student outside of the tent asked whether it is a regular polygon or not, the students in the tent answered that it was not a regular polygon.*

> *However, all the pentagons and hexagons in the activity were regular polygons. We saw that the teacher did not make an intervention for such misunderstanding.* (PT-9)

The underlying outcome in these noticed issues were students' misconceptions. She criticized the teacher in terms of not providing clarifications to overcome these kinds of misconceptions. Although PT-9 described the event in detail and interpreted it with a deep concern in students' mathematical learning, she could not focus on students' thinking process. In other words, she could not generate the idea of what was the reason of the misconception in students' minds. Therefore, her noticing demonstrated the characteristics of Level 2. Since this noticing concerned student mathematical learning, it was shared with rest of the group to raise their awareness. Other preservice teachers did not participate in the conversation between me and PT-9. They only appreciated PT-9 in addressing such an in-depth noticing.

Another noticing was related with students' misconception as written by PT-8:

> *One of the things that attracted attention was the fact that the girl guessing the object in the final turn in the activity was asking that whether it was a rectangular prism or not, the student in the tent said that it was not. But it was a rectangular prism because all square prisms are also rectangular prism. Students did not know or the teacher did not highlight this knowledge.*

It was different from the previous noticing about students' misconception because she elaborated her noticing by explaining the reason of this student outcome. More precisely, she attributed the outcome to the students' lack of knowledge in connection between the concepts of a square and a rectangle and also to the deficiency in explaining the concept as a teacher role. Therefore, her noticing was considered as Level 3. It was rare for the first week in terms of its depth and was considered as noteworthy to share with other preservice teachers. Other preservice teachers appreciated PT-8 for her detailed noticing and recognized how videos should be analyzed:

> R: Student outside of the tent were asking: Are the bases perpendicular?
> Student in the tent: No.
> Outside the tent: Then, it is not a perpendicular prism.
> PT-8 has an idea about this conversation. Let's read on the slide.

PT-9: I have never thought so.
PT-1: I did not pay much attention to this.
PT-12: You have examined like examining city surveillance cameras.
R: You need to look at it like this. If you do not, you may not notice what the students say in your classroom.
PT-1: Honestly, I do not know that you have such an expectation.
PT-12: Exactly.
PT-1: But they are important, we should have noticed them.

Although PT-12 evaluated his noticing superficial compared to PT-8 in this discussion, he focused on a specific event from a video in the reflection paper and elaborated his noticing based on students' understanding. More precisely, he interpreted one of the students' reasoning process and made inference about the student's knowledge:

> *Since the teacher used inductive method in the activity, students were using a bottom up strategy by knowing all the concepts in the topic. For example, a student was asking whether it was a geometric shape or solid. This demonstrates that she knew the differences between them. Then, she was asking about the surfaces and edges of the objects. These also features her knowledge about the concepts while reasoning about cube.*

He associated student's thinking process to the teacher's pedagogy. Therefore, the main actor in his noticing was students and it was considered as Level 3. Similar to the other Level 3 noticing, it was shared with the group to raise other preservice teachers' awareness.

Up to this point, preservice teachers' didactical noticing and associated student outcomes were described. They also noticed other categories of teacher role component of teacher identity. Related with the pedagogical teacher roles, preservice teachers mostly focused on whether the teacher was successful in activating all of the students in the video. Preservice teachers interpreted the activity in terms of whether the students had actively participated in the activity as a behavioral student outcome or had opportunity in learning by doing. Preservice teachers had contradictory ideas in this point. While some of the preservice teachers criticized the activity because they thought that only two of the students were conducting the activity and the rest of them were observing them. Others thought that the activity was applicable for such a class size so that each student was able to

take a role in the activity. However, they indicated that it could not be possible if the class size was higher. Some of them proposed alternative approaches for such a case such as making groups instead of individual students. When the noticed issues were compared in terms of the depth, it was observed that negative comments were tended to be in Level 2. Positive comments, on the other hand, mostly demonstrated the characteristics of Level 1 since they generally included comments such as "*Every student was participating in the activity, they watched carefully and participated in*" (PT-4). Although these noticed issues were contradictory, there was not a rich discussion environment in this issue, as illustrated in below discussion about participation in the activity:

R: You have different ideas about students' participation.
PT-9: Those two students were active but not all of them.
PT-8: If it was conducted with groups in two or more, everyone could participate. It is difficult to understand whether the rest of students were listening or reasoning. Still everyone can participate in this activity since the class size is small.
PT-10: I agree. The activity was not appropriate for whole class participation. It was just between two students.
PT-8: I think everybody can join in turn.

Relationship with students and giving verbal feedbacks as pedagogical teacher roles were noticed together with the teacher's dynamic behaviors in the self-referential category. These roles were associated to the affective outcomes such as being enthusiastic, liking mathematics and paying attention. Although the focused issues were not contradictory in nature, they were represented in the group discussion to increase preservice teachers' awareness in pedagogical and self-referential categories of teacher roles component of teacher identity. Other preservice teachers who did not focus on these issues agreed on their friends' ideas as follows:

R: PT-11 thinks that the teacher was not excited.
PT-11: If she was more active like saying "guys we are going to do this now", she could energize the activity.
PT-9: She did not encourage students.
PT-11: I agree or she did not give reinforcements in right answers. She was so dull to me.
PT-9: So dull and rough looking.

PT-11: Exactly.

R: PT-3 criticizes the teachers' speech language. As you said PT-10, she used commands like come, do etc. She thought that the teacher should have used a more friendly language like "lets' do it together."

It is important to note that none of the preservice teachers used curriculum as a tool in their reflections even though the content of the curriculum was mentioned one week before this video case discussion. Therefore, at the end of the meeting, I reminded preservice teachers the importance of curricula while writing reflection papers:

> *None of you has looked at the curricula. Whether it is appropriate to the new curriculum or not. You should have thought that how could you apply similar activity in your lesson. Then, you can design lessons that are more realistic. While the objective of this activity was in the 5th grade in 2005 curriculum, it fits on the 8th grade in the new curriculum. Therefore, as future mathematics teachers, you should design the activity based on the 8th graders.*

After warning preservice teachers about the usage of curriculum, the objectives related with the content of the video for each of the curriculum was distributed to preservice teachers and explained in detail:

> *In the time of this video, 2005 curriculum was in use. In that curriculum, there was a suggestion statement: "Two different prism models are distributed to student groups to find their similarities and differences." For example, you get a triangular prism, the other one gets a square prism and you are comparing the objects in your hands. Based on this suggestion, the teacher has incorporated both geometrical shapes into his activity and developed it in this way.*
> *2013 curriculum, on the other hand, says that students should recognize the right prisms and know the fundamental properties. Students are learning only rectangular prisms in the 5th and 6th grades but they do not know solids like square prism and cube. In this case, the 8th grade seems to the best appropriate grade level.*

And then, preservice teachers were encouraged to use the curriculum before writing video reflections:

> *In the following weeks, please try to investigate how the topic of the activity was considered in the curriculum. Therefore, you can look at what objectives are included and whether the activity is appropriate to the curricula. If you write your reflections in such a way, you can support your comments.*

Summary of first week's noticing and discussion

As it was stated above, not all of the noticed issues were undertaken in the group discussions. Although I listed all of them into a PowerPoint slide, discussions were mainly based on the issues which contradicted each other. Preservice teachers' main contradictions were on the context of the activity and its' advantages and disadvantages for the teacher and for students. These arguments directed them to consider whether the activity was appropriate for the purpose of the lesson as another contradictory issue in the reflection paper. They focused on the appropriateness of the activity to the level of the students which requires reasoning skills and skills in making connections between topics. Then, they concluded that teachers' lack of clarification could cause misconceptions. They reasoned about the alternative approaches which could be used in the activity. Therefore, they were able to elaborate what they had noticed in the reflection papers about the didactical roles and associated cognitive outcomes during the group discussion. Similarly, they argued about student' participation of the activity and criticized the teacher in terms of not providing equal chances. On the other hand, noticed issues in pedagogical roles such as relationship with students and giving verbal feedbacks, and self-referential characteristics such as the dynamism of the teacher were also shared with the group although these issues were not contradictory in their reflection papers and preservice teachers considered curriculum in interpreting their noticing.

All of the preservice teachers followed the rules of the community, wrote their reflections and sent it to me via e-mail on time. However, two of them (PT-4 and PT-7) did not attend the group meeting. The rest of them showed great interest in the discussion but they assumed different roles during the discussion. While some of them were more dynamic and asserted their becoming core members in the community (PT-1, PT-3, PT-9, PT-10 and PT-12), some of them took back seats in the discussion and only listened to the discussion most of the time (PT-2, PT-5, PT-6, PT-8 and PT-11). Few of the preservice teachers took advantage of the knowledge gained from their studies for the national examination for placement in public schools such as van Hiele Levels of Geometric Understanding. This shows that other

communities, in this case it was the group in which they participated for preparation of the national examination, influenced their noticing even in the first week. These reflective memos guided the flow of next week's discussions.

4.2.2 Second week's noticing and discussions

The content of the second week video was polygons. At the beginning of the lesson, the teacher asked whether the students knew the shape of the honeycomb. One of the students answered that it had six sides and six corners. Then, the teacher showed three visuals from the slide and gained students' attention to the polygons in those visuals. Then, they continued the lesson by using a robot that the teacher designed. The robot made the definition of a polygon and stated how the polygons were named and the teacher repeated what it said. Then, an activity was conducted. In this activity, students and the teacher represented the corners of the polygons and hold the sticks to represent the sides of the polygons. They constructed a triangle, a quadrilateral, a pentagon, a hexagon and a heptagon. Therefore, a maximum of 6 students took role in the activity. At the end of the lesson, students constructed polygons by using their crayons and explained the rest of the classroom what they had did. Seating arrangement was U-shaped with almost 15 students in the class.

What preservice teachers noticed about the second video was interpreted compared to the first week's noticing. Accordingly, it was seen in Table 4.12 that preservice teachers noticed more issues in the second reflection papers although one of the preservice teachers did not write a reflection paper.

Table 4.12
Frequencies of Noticed Issues in the Second Week's Reflection Papers

		Weeks	
Components	Categories	1	2
Teacher Role	Subject Matter	1	3
	Didactics	71	101
	Pedagogical	16	7
	Self-referential	3	4
	Context	12	9
Student Outcome	Affective	40	27
	Cognitive	40	52
	Behavioral	10	25
Sum		193	228

Similar to the first week, preservice teachers focused on the didactical expertise of the teacher in different perspectives as presented in Table 4.13. Although there were contradictory ideas in many of these noticing, preservice teachers mainly criticized the teacher in terms of designing the activities appropriate to the objectives and also to the curriculum, making connection to real life and using many materials within the time of the video. These were the central discussion issues in the group meeting. On the other hand, appropriateness of curriculum together with making connections between the topics, giving homework, using questioning strategy, considering student differences in terms of their gender and interests, using visuals and making summary were noticed for the first time in the second week. For the noticed issues about homework, students' differences, and visuals were mainly related with the content of the video rather than the previous discussions. However, in other didactical roles, it could be said that preservice teachers were affected by the first week's discussion.

Table 4.13
Frequencies of Didactics Noticing in the Second Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2
Teacher Role	Didactics	activity	28	17
		appropriateness to the curriculum		4
		appropriateness the objective	2	10
		assessment	1	1
		clarifying	6	3
		conceptualization	3	6
		connection to real life	3	11
		connection between topics		2
		group working	1	
		homework		3
		inductive	2	
		level of the students	10	6
		materials	11	21
		mathematical communication	1	
		questioning		4
		solving questions/problems		
		student centeredness	3	4
		student differences		4
		summarizing		1
		visuals		4

In the other teacher role categories, there were similar issues with the first week noticing as shown in Table 4.14. More precisely, for the second video, preservice teachers liked the teacher's activation all of the students without discrimination and his classroom management as pedagogical teacher roles with considering class size and physical context of the classroom. One of the students admired his usage of language as a self-referential role. On the other hand, they criticized the teacher since he transmitted knowledge as a subject matter expert, did not encourage students as a pedagogical expert and was not dynamic as in the self-referential category. It is important to note that preservice teachers noticed lesser compared to the first week about teacher's pedagogical expertise in the second week. This was probably related with the shift in their concern to the more didactical issues.

Table 4.14
Frequencies of Other Teacher Role Noticing in the Second Week's Reflection Papers

			Weeks	
Components	Categories	Codes	1	2
Teacher Role	Subject Matter	transmitting knowledge	1	3
	Pedagogical	activating all	9	2
		equity		
		management	3	2
		relationships with students	2	
		verbal feedback_encouragement	2	3
	Self-referential	communicative		1
		dynamic	3	3
		role model		
	Context	out of class/school activities	12	1
		class size		2
		class physical context		6

Similar to the shift to didactical expertise, preservice teachers focused more on the cognitive outcomes compared to the first week's noticing. More precisely, preservice teachers focused more on the process skills and how the students interpreted the concept. They started to focus on the process of learning

mathematics, rather than considering learning as a product. Therefore, they also started to consider students' behavioral outcomes in these learning processes such as following the instruction, participating in the activities and interacting with friends. The salient point in Table 4.15 was the decrease in affective outcomes compared to the first week. Preservice teachers noticed mostly about gaining attention and they continued to see attention as prerequisite for most of the other outcomes similar to the first week.

Table 4.15
Frequencies of Student Outcome Noticing in the Second Week's Reflection Papers

Components	Categories	Codes	Week 1	Week 2
Student Outcome	Affective	attention	19	21
		confidence	3	
		enthusiastic	9	4
		like/enjoy math	6	
		prejudice/anxiety	1	1
		value math	2	1
	Cognitive	connect daily life	1	1
		connect between topic	6	4
		interpretation	2	10
		learning	4	3
		learning by doing	3	6
		mathematical communication	3	1
		misconceptions	3	4
		permanent learning	8	11
		problem solving	1	
		reasoning	7	6
		reinforcement	2	6
	Behavioral	express themselves		
		follow instruction	1	5
		participate	9	16
		peer interaction		4
		respect		

What preservice teachers noticed about the role of the teachers and the associated student outcomes were summarized compared to the first week. Then, how they noticed about these issues was analyzed as seen in Table 4.16. Accordingly, most of the noticed issues were in Level 1 as in the first week. Preservice teachers mostly focused on the teacher related issues in the video and not

much on the students' outcomes. In addition, they expressed their noticing through describing and evaluating. They could not interpret and elaborate their noticing as in the first week. However, the increase in Level 2 noticing was observed. It seemed that preservice teachers tended to focus on the teacher roles and associated these roles to the student outcomes, but they did not interpret and elaborate students' mathematical thinking, which would be evaluated as Level 3.

Table 4.16
Frequencies of Noticing Levels in the Second Week's Reflection Papers

	Weeks	
Noticing Levels	1	2
1	57	55
2	19	26
3	2	4
4	-	-

In conclusion, not all of the noticed issues in the video were discussed with the groups. Noticing based on the contradictions and noticing found as important were discussed. In the following part, preservice teachers' noticed issues undertaken in the group discussion were explained.

4.2.2.1 Second week's noticed issues undertaken in the group discussion

Second week discussion started with the noticing related with appropriateness of the video to the 2005 and 2013 curricula. More precisely, in contrast to the first week in which preservice teachers discussed whether the objectives of the lesson were fulfilled without any consideration of curricula, four of the preservice teachers (PT-3, PT-6, PT-8, PT-11) analyzed curricula while interpreting the content of the video. They searched the curricula, found related objectives and wrote their reflections illustrated in PT-3's reflection below:

> *All of the activities in the video was somehow appropriate to the objective of the activity that the teacher said in the beginning of the video. For example, related with classifications of polygons, students classified only the polygons' numbers of edge but they did not consider the angles, diagonals or corners and the relationships among them.*

In the 2005 curriculum, while some of the objectives such as classifies polygons, distinguishes regular polygons were accomplished, he did not focus on the classification of triangles by their edges and angles and examination of the properties of square, rectangle, parallelogram and rhombus. Therefore, the video was not appropriate to the curriculum.

Name, construct, and recognize polygons, edges, interior angles, corners, and diagonals of the polygons as the objective of the new curriculum were not reached appropriately since polygons were only named and crated without referring to the inside angles and rectangles. Similarly, the sum of the interior angles of the triangles and quadrilaterals were not considered either.

Noticing based on the appropriateness of the curriculum had the features of Level 2 since preservice teachers focused on the role of the teacher and aimed to reach necessary conceptualization for the students. However, they were concerned about the whole class, not a specific group of students' mathematical learning. Therefore, their noticing demonstrated the characteristics of mixed level.

Although consideration of curricula was significant in writing reflections, preservice teachers did not consider the total number of class hours devoted to the objectives in the curricula and the video duration. Therefore, as the coordinator of the group meeting, I demonstrated the possible time table for the related objectives in the curricula to emphasize that the teacher could not consider all of them in a ten-minute video. I also wanted them to be aware of teachers' flexibility in designing their lessons as in the following discussion:

R: You cannot teach all of these in a lesson. The curriculum does not tell you that how many hours you must allocate for each objective.
PT-9: Really!
R: Yes, it does not. Teachers are free to arrange their time. You can dedicate 1 or 5 hours. It is up to you. However, you cannot change the order of the units. You have no such flexibility.
PT-9: But there is a time table in the curriculum.
R: You are right but it is just a possible time table. Look, there's a note under that table.
PT-9: It says that the times were given approximately.
R: Since it is thought that it can be given in such a long time, it is given approximately. But you are flexible.

After warning preservice teachers for time management, they started to discuss whether the teacher fulfilled the objectives of the lesson. Accordingly, in the reflection papers, eight preservice teachers expressed their ideas related with the appropriateness of the objectives four of which did not consider curricula in their evaluations. Their noticed issues were contradictory with equal weights. Four of the preservice teachers thought that the teacher was able to accomplish the objectives through designing such a lesson. Three of these participants demonstrated the characteristics of Level 1 since they only included an evaluative statement such as *"The teacher has achieved the purposes of the lesson that he stated at the beginning of the lesson"* (PT-9). One of them, on the other hand, was interpreted as Level 2 since she also focused on how it was accomplished and what the student outcomes were, adopting a mixed approach:

> *In my opinion, the teacher achieved the purpose of the lesson in a great extent since he gave daily life examples, he used robot to attract attention, he made an activity in which students created polygons using pencils. In this video, he used different teaching methods (audio visual, learning by doing). It was suitable for the level of the students because the class is in the concrete operational period, and the activities are through concrete materials.* (PT-11)

On the other hand, the rest of the preservice teachers wrote that the lesson was superficial from many perspectives. Mainly, they argued that the teacher should have included other properties of polygons to provide in depth learning for the students:

> *At the beginning of the lesson, the teacher stated that the purposes of the lesson were to make students recognize and classify polygons. However, in this activity polygons were only classified according to the number of edges and the number of corners, diagonals and interior angles of the polygons were not considered. This hindered complete understanding.* (PT-10)

PT-2, with a similar approach, focused on teachers' conceptualization and students' possible misconceptions through noticing two specific events in the video. The first one was "*Polygons were defined as triangle, quadrangle, pentagon or hexagon based on their number of sides and it is finished there. Therefore, students may think that polygons could be six-sided at most. Students could not completely understand that the naming of polygons is based on the number of edges.*" In addition, she noted

that "*All of the polygons chosen for the activity were regular polygons. Students might think that edges of the polygons must be equal.*" These kinds of noticing based on teachers' conceptualization, missing points in the content and possible overgeneralization or misconception were evaluated as Level 3 since they were concerned about students' mathematical learning through focusing on a specific event in the video. In addition, they interpreted what they noticed considering students' cognitive outcomes. PT-2's noticed issues were shared with the group as follows:

R: According to PT-2, there was a deficiency in the second activity. What can it be?
PT-9: He was not saying that polygons should be closed shapes.
R: No you missed it, he was saying.
PT-8: Were all regular polygons?
R: Yes all of the length of the bars and angles were equal.
PT-1: Like the examples at the beginning of the lesson such as, hospital sign.
PT-9: Exactly, he should have different examples so that students did not overgeneralize.
R: But you have to be careful about the terms. You should not name them as regular or irregular polygons because it was included in the later part of the curriculum. You can say that it is a polygon but it has equal or unequal sides and angles.
PT-9: …. (they were nodding)
R: What else?
… …(they were thinking)
R: Polygons were not limited to hexagons.
PT:6 He did not let students to make generalization about the polygons.
PT-12: How PT-2 noticed them? Congratulations.

In this part of the discussion, I directed preservice teachers' attention to the book that was published by MEB to demonstrate how polygons were conceptualized in the book. I distributed the corresponding pages of the book and asked them to analyze how polygons were conceptualized:

PT-9: Polygons and non-polygonal shapes have been grouped and asked to students to focus in their differences.
PT-1: For example, there are curves here and line segments in here.
PT-9: Even though the student cannot say line segment, they can say that they are closed.
PT-8: Based on the polygons and non-polygons, it was asked students to

make their own definitions. In addition, it shows naming polygons and the properties like edges, corners and angles.

R: They already know the angles form the previous unit. Therefore, while making classifications of the polygons, we need to talk about their angles as PT-10 stated. You may not include diagonals; it may be the next lesson.

PT-9: But there is a note in here and saying that we should not teach concave and convex polygons.

R: You are quite right, but it only warns us not using the terms. We can talk about the angles of the polygons. They can have obtuse or acute angles this might prevent students from possible overgeneralizations.

In this part of the discussion, they realized how the book conceptualized the topic. While they were focusing on the book, they discussed appropriateness of the conceptualization to the curriculum and also students' thinking in constructing their own knowledge. They came to agree in that the teacher in the video might cause overgeneralization about polygons and inductive teaching strategy could be one of the ways in conceptualizing polygons. Then, I distributed geo-boards to direct preservice teachers' attention to an alternative tool.

R: How can you use geometry board in teaching?

PT-1: We can teach first what is polygon through direct teaching. Then I can say that lets make polygons on the geometry boards.

R: What can be done to be more systematic? What will happen after we say let's do polygons?

PT-9: Ayşe, what have you done? I made a polygon that was not regular.

PT-1: We can ask their process of construction of polygons: how did you form it?

PT-3: We should ask why questions: why did you do this?

PT-8: To be more systematic, we can say that let's make triangles. Then we can ask students to show their triangles to their friends.

PT-1: Let's make triangles, rectangles. We can ask how many edges the polygons can have

R: Therefore, they can see variety of polygons different form their minds. We can prevent over generalizations through this way.

This discussion initiated another discussion about the material (robot) in the video because the robot was defining what a polygon is. In other words, instead of providing opportunities to the students to construct their own knowledge as in preservice teachers' ideas stated above, the teacher used robot to transmit the knowledge. In the reflection paper, some of the preservice teachers argued that the

material was not effective because it was more like a parrot. There were also positive comments in terms of gaining attention and therefore, providing permanent learning for the students. Most of these noticing, either positively or negatively stated, was categorized under Level 1 since they included descriptive and judgmental statements and did not consider students' mathematical learning. For example: *"The self-inventing geo-named robot is nice to attract attention, but I cannot figure out exactly what it does, which is unnecessary for me. I cannot see the difference between asking the robot the definition or the teacher stating it" (PT-1).* On the other hand, few of the noticing demonstrated the characteristic of Level 2 in terms of including interpretive statements about students' mathematical learning*: "The robot was used to attract attention, but I do not think it's useful because the students did not construct their own knowledge. The robot was giving the definitions"* (PT-8). Following script is part of the related discussion:

R: We have seen examples of how polygons can be conceptualized from the books and through the material. How does the teacher use the robot for conceptualization? PT-4 and PT-10, you said that the robot works very well in learning the concepts, but many of your friends did not think so.
PT-3: I thought students listen because it attracts attention.
R: What was your opinion PT-6?
PT-3: He could direct students to construct their own definitions through the reflector. Then, he could use robot for reinforcement. It would be more beneficial.
R: I agree. The robot was nice, but it was used just the beginning of the lesson. The knowledge was transformed.
PT-3: It could be used as a reinforcement.
PT-1: I think it was distracting. If I was in the class, I would have always looked the robot.
PT-9: I could not listen the definition, its' appearance and voice distracted me.
PT-8: I agree.

They concluded that robot was not effective in conceptualizing the concept and in gaining students' attention. While most of the preservice teachers in the reflection paper commented positively in terms of gaining attention, they started to think about the function of the material in terms of learning mathematics.

In addition to the robot, as it was stated above, there were different materials in the video and this caused contradictory noticing in the reflection papers. Some of the preservice teachers evaluated it as richness of the learning environment in terms of considering student differences. On the other hand, others thought that they were confusing since they thought that materials fell short of the goals.

R: PT-3 says that the materials used in the video were too many and distracting.
PT-4: You can make one activity or play one game in a single lesson.
R: In your opinion, which one was enough?
PT-4: Actually, I had noticed the robot positively in the reflection paper but the discussion changed my mind. The second activity or the last one was enough I think. It was too heavy for me.
PT-1: It could be PowerPoint presentation or robot or the material. Multidimensionality of the classroom cannot be emphasized like that. Classroom are complex environments, there are different students. He told that he would use different teaching strategies but what did he do for expository teaching for example?
R: How do you answer this question PT-6?
PT-6: I just said that it was effective for student differences.
PT-10: I think it was funny. It shows that it was addressed to all kinds of students.
PT-6: It depends on your perspectives.
R: Perspectives about the lesson, students. It's about how you think your students understand better. If you think they will understand with only one of them, you may not need so many different things.
PT-4: He can do just few of them. I am still thinking that they were too much.
PT-6: Maybe, it is because of the time limit of the video. It would not be evaluated like this if it was 40 minutes lesson.
PT-4: I think it's still too much.

In contrast to the other discussions stated so far, in this discussion, preservice teachers maintained their disagreement. When the noticed issues were beyond the content of the video and how the teacher conceptualized the topic in the video, they did not tend to change their perspectives.

Preservice teachers had contradictory ideas related with the conceptualization of polygons through daily life examples which were agreed in the end. Since the lack of daily life examples were criticized in the first week's discussion, preservice teachers appreciated the teacher's usage of daily life examples in this video. Most of

the preservice teachers evaluated that through demonstrating daily life examples, the teacher gained students' attention to the topic, made them understand the value of mathematics and increased their connection skills. They also noted that the activity promoted permanent learning for the students. These noticed issues were generally categorized as Level 1 if they only associated students' affective outcomes or included evaluative statements such as: *"Starting from a daily life example – honeycomb, he attracted students' attention and emphasized the usage of polygons in daily life" (PT-3)* or "*I liked his way of starting to the lesson through daily life examples" (PT-12).*

Some of these noticing also included critics about the usage of daily life examples as a didactical teacher role. There were three different perspectives in the critics. The first one was about the visualization of the examples. Two of the preservice teachers expressed that the teacher should have used more concrete examples from the daily life to direct students' interpretation of the concept: "*Giving daily life examples like traffic made the topic concrete for the students, but it would be more concrete and students would understand better if they had hands-on materials"* (PT-6). The second one was related with the appropriateness of the examples to students' differences. They evaluated that the examples used in the video favored male students. The third perspective in the critics was about the possible misconceptions for the students since polygons were illustrated by using three-dimensional objects. The last two perspectives were discussed as in follows:

R: You have comment about the examples that the teacher gave. There's a hospital sign, a school sign, and a ball.
PT-9: The ball was interesting because it is three dimensional.
PT-1: It was nonsense.
PT-6: The ball is three dimensional you are right but the teacher emphasizes the shapes - a pentagon and a hexagon, on the surface of the ball.
PT-12: It was not a suitable example for girls. The teacher was favoring boys.
PT-1: I think boys also cannot know the shapes on the ball.
R: The teacher actually was warning the students for looking at the shape on the ball. He was not asking the edges of the ball. He was saying the white and black areas on the ball. Therefore, it cannot be evaluated as wrong.

PT-8: Students do not either drive a car. The teacher can give examples from their life.
PT-1: The examples should be inclusive.
PT-12: He was asking the reflector to a female student. She said it was a triangle. Many of them cannot know this.
PT-3: I thought it was interesting but I could not examine it in detail. I agree that the teacher did not really consider girls

Although they came to agree that the examples were not appropriate to all of the students in the classroom, they did not propose alternative examples from the daily life. In other words, they could not elaborate their noticing considering students' mathematical thinking during the discussion as in the reflection papers. Therefore, all of the noticed points about criticizing the teacher's usage of daily life examples in the reflection papers were evaluated as Level 2.

In addition to these main discussion points stated above, activity management and effective use of mathematical communication as didactical roles; and whether the teacher was effective in activating all of the students and in establishing positive relationship with the students as pedagogical teacher roles were discussed briefly with the group. On the other hand, although most of the teacher roles were associated to the student cognitive outcomes, process skills emphasized in the video and students thinking came up separately during the discussion.

Mathematical communication, connection between topics, connections to daily life, and reasoning were the process skills which were mentioned while focusing on the role of the teacher. Two of the preservice teachers specifically pointed out the skills that the video aimed. While PT-8 stated that "*At the beginning of the video, he emphasized reasoning, making connection and communication skills but there were no questions that would trigger those skills".* PT-9 wrote the exact opposite: "*The use of making connection and reasoning skills has been provided."* PT-8 attributed her idea to lack of questioning strategy as a didactical teacher role which was evaluated as Level 2 since she focused on student cognitive outcome and made interpretation about it. On the other hand, PT-9 only indicated what she noticed about process skill without evaluation or interpretation and therefore,

categorized as Level 1. This contradiction was opened up for discussion to let preservice teachers make their ideas explicit:

R: PT-9, you said that the use of making connections and reasoning skills were provided but you did not make an explanation. In which part of the video and how were these skills provided? Or Why do you think these skills were nor triggered, PT-8?

PT-9: I think they made relations with real life, for example, hospital sign but I do not remember what I thought about reasoning skills.

PT-8: Knowledge was transmitted. Students were not discovering that is why they were not reasoning about the topic.

PT-3: In the second activity including bars, students can make generalization about the edges and the name of the polygons. For example, if it has three edges then it is a triangle, quadrilateral for four edges etc.

R: Reasoning has some subordinate skills such as making predictions of generalization.

PT-6: At the end of the lesson, asking students what and how they have formed may have provided reasoning but this activity should have been in the beginning, not the end

R: Exactly. If you make them find the definition of polygon through the geometry board or as in the book, then you can increase your students' reasoning skills.

PT-4: Like showing the polygon examples and asking the definition of the polygon.

R: Yes, you can ask that why these are polygons and why these are not?

PT-4: How exactly do you think the student would reason?

R: They might say these are white and these are black. You can get these kinds of answers. However, you will surely come close to the answers you want. They can say these are open and curved. These groups on the other hand, are closed. They can make generalization about polygons and non-polygons.

At the end of the discussion, preservice teachers discussed the students' mathematical thinking considering Van Hiele's levels similar to the first week. However, the only written noticing was in PT-11's reflection paper: *"By using the strips in the second activity, students discovered triangles, quadrilaterals if the shapes had three sides and four sides, and made generalizations about polygons. In other words, it fits the van Hiele's second level since they build the relationship between the edges and name of the polygons."* This was categorized as a mixed level of noticing since she could not elaborate students' mathematical thinking in detail in spite of focusing on a specific event in the video based on a cognitive

outcome. However, the rest of the preservice teachers did not consider Van Hiele levels in their reflections. Yet, it directed others' attention and they agreed that the activity was more appropriated to Level 1:

R: Do you remember the honeycomb example? The teacher asked, do you know honeycomb?
PT-3: One of the students answered as it has 6 edges and 6 corners. He explained it through the properties of the shape instead of how it is looks like.
R: Then, what is the level of this kind of geometric thinking according to van Hiele's levels?
PT-11: I think it was Level 2 because students were comparing the properties.
PT-3: I don't agree, Level 1 is more appropriate. They were not comparing different shapes just saying the properties. They need to have more complicated thinking.
PT-11: You are right, I thought as in the previous week.
PT-4: It was Level 1 then.

Considering the first week discussion, they agreed that the activity was more appropriate to the first level since the connection was not the main scope of the lesson.

Summary of the second week's noticing and discussions

As it was in the first week discussions, not all of the noticed issues were undertaken in the group discussions. Discussion was again started through the contradictory issues. Similar to the first week discussion, whether the activity was appropriate for the purpose of the lesson was the main contradiction in the second week discussion. However, this time, many of them considered curriculum as a base for their arguments. During discussion, they noticed new things about the application of curricula such as notes about what they should not mention related with the topic or the flexibility in time management. Making connection to real life and using many materials within the time of the video were the central discussion issues in the group meeting. In addition, in their reflection papers, some of them focused on definition of polygon which robot did at the beginning of the activity. However, their argument was the necessity of such a material in the class. I directed their attention to the definition itself and asked them to focus on conceptualization

of the topic. Then, I distributed the corresponding pages of the book and asked them to analyze how polygons were conceptualized. Discussion based on the book made them to think about the alternative activities. Geoboards that I brought to the meeting were evaluated as one of the alternatives. In addition to these main discussion points, effective use of mathematical communication as didactical roles; and whether the teacher was effective in activating all of the students and in establishing positive relationship with the students as pedagogical teacher roles were discussed briefly with the group. Process skills emphasized in the video and students' thinking came up separately during the discussion.

As the coordinator of the group meeting, I had certain roles as in the first week. At the beginning of the group meeting, I listed all of the noticed issues into a PowerPoint slide to show the diversity of their focus. I again mainly featured the issues contradictory to each other. Therefore, preservice teachers got chance to participate in the discussion, defend their opinions and understood others' perspectives. During such a discussion, I posed questions to direct preservice teachers to think about what they had not elaborated especially on students' mathematical thinking. I highlighted the noticed issues focusing and interpreting students' mathematical thinking. As a difference from the first week, I distributed the related pages of the book and the sample activity material to make them argue about the alternative conceptualizations by imagining themselves as the teacher of that classroom.

It was important to note that, one of the preservice teachers did not write her reflection paper (PT-5) and also did not participate in the group discussion with two other preservice teachers (PT-2 and PT-7). The rest of the preservice teachers assumed similar roles in the discussion. While some of them directed the flow of the discussion by active participation (PT-1, PT-3, PT-4, PT-6, PT-8 and PT-9), others had peripheral participation (PT-10, PT-11 and PT-12).

4.2.3 Third week's noticing and discussions

The content of the third week video was measurement of liquids. As the teacher explained, the purpose of the lesson was to promote understanding in daily life problems about the topic. At the beginning of the lesson, there was a role playing activity with four students. In this activity, a daily life problem was stimulated. In addition, one of the students was solving the problem considering the student's explanations in the activity. During this process, the rest of the students were sitting on the back and observing what the students in the activity were doing. The teacher in the video did not interfere the activity much as the students were doing what they were expected. After the problem was solved, the teacher demonstrated the liquids that she had brought such as shampoo, yogurt drink and toothpaste and told the exact measures of those products and ended the lesson. There was a traditional seating arrangement with almost 25 students.

What preservice teachers noticed about the third week video in their reflection papers was interpreted compared to first two weeks' noticing in Table 4.17. Accordingly, an upward tendency in the total number of noticed issues was observed because of the increase in the frequencies of didactical teacher role and cognitive and behavioral student outcomes.

Table 4.17
Frequencies of Noticed Issues in the Third Week's Reflection Papers

		Weeks		
Components	Categories	1	2	3
Teacher Role	Subject Matter	1	3	1
	Didactics	71	101	104
	Pedagogical	16	7	20
	Self-referential	3	4	2
	Context	12	9	8
Student Outcome	Affective	40	27	22
	Cognitive	40	52	66
	Behavioral	10	25	31
Sum		193	228	254

Similar to the previous weeks, preservice teachers focused on the didactical expertise of the teacher in many different perspectives (Table 4.18). They evaluated the activity as effective or ineffective and interpreted it based on appropriateness to

the objectives articulated by the teacher in the video and objectives in the curriculum. In addition, they kept their attention on how the teacher conceptualized the topic, used questioning strategy, clarified the concept, gave feedbacks, used materials and considered level of students. Although they noticed many points related with the didactical role of that teacher, frequencies of problem solving and making real life connections were outstanding within the third week reflections. While all of the issues in problem solving were related with the content of the video, real life connection noticed issues were affected from the previous discussions.

Table 4.18
Frequencies of Didactics Noticing in the Third Week's Reflection Papers

			Weeks		
Components	Categories	Codes	1	2	3
Teacher Role	Didactics	activity	28	17	20
		appropriateness to the curriculum		4	5
		appropriateness the objective	2	10	8
		assessment	1	1	3
		clarifying	6	3	5
		conceptualization	3	6	9
		connection to real life	3	11	19
		connection between topics		2	
		group working	1		
		homework		3	
		inductive	2		
		level of the students	10	6	6
		materials	11	21	7
		mathematical communication	1		4
		questioning		4	8
		solving questions/problems			8
		student centeredness	3	4	1
		student differences		4	1
		summarizing		1	
		technology			
		visuals		4	

Preservice teachers noticed fewer points in other categories as can be seen in Table 4.19, because the main concern related with the role of the teacher was didactical. Related with the subject matter expertise, one of the preservice teachers, as in previous, weeks criticized the teacher since she did not give the necessary

knowledge before starting the activity. The frequency of noticing about activating all of the students as a pedagogical teacher role was higher in the third week since preservice teachers did not appreciate the teacher similar to the second week. In contrast to the previous weeks, preservice teachers did not notice anything related with the being a dynamic teacher; rather, two of the preservice teachers appreciated the teacher in terms of being a role model since she emphasized the brushing teeth's and drinking syrup. In addition, they continued their focus on arranging the psychical context of the classroom as a contextual teacher role.

Table 4.19
Frequencies of Other Teacher Role Noticing in The Third Week's Reflection Papers

			Weeks		
Components	Categories	Codes	1	2	3
Teacher Role	Subject Matter	transmitting knowledge	1	3	1
	Pedagogical	activating all	9	2	15
		equity			
		management	3	2	
		relationships with students	2		1
		verbal feedback_encouragement	2	3	4
	Self-referential	communicative		1	
		dynamic	3	3	
		role model			2
	Context	out of class/school activities	12	1	
		class size		2	
		class physical context		6	8

Preservice teachers focused more on the cognitive outcomes of the students, as seen in Table 4.20, similar to the second week**.** The important point in the cognitive outcomes for the third week was the increase in the number of noticing related with students' interpretation of the concept. In other words, it could be said that first two weeks' discussions directed preservice teachers to focus on the process of learning mathematics more. Nevertheless, they continued to focus on students' learning like a product of teaching.

Table 4.20
Frequencies of Student Outcome Noticing in the Third Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2	3
Student Outcome	Affective	attention	19	21	14
		confidence	3		
		enthusiastic	9	4	3
		like teacher			
		like/enjoy math	6		1
		prejudice/anxiety	1	1	1
		value math	2	1	3
	Cognitive	connect daily life	1	1	5
		connect between topic	6	4	
		interpretation	2	10	19
		learning	4	3	5
		learning by doing	3	6	5
		mathematical communication	3	1	6
		misconceptions	3	4	3
		permanent learning	8	11	11
		problem solving	1		3
		reasoning	7	6	5
		reinforcement	2	6	4
	Behavioral	express themselves			
		follow instruction	1	5	12
		participate	9	16	17
		peer interaction		4	2
		respect			

Gaining attention was the most noticed affective outcome as in the previous weeks. Such a trend was not observed in other affective outcomes. Related with the behavioral outcomes, in contrast to the second week, preservice teachers criticized the teacher in terms of providing opportunity to participate, following instruction and peer instruction.

When all of these noticing points were analyzed based on the Noticing Levels, a balance between the Level 1 and Level 2 noticing was observed as presented in Table 4.21. Preservice teachers continued to focus on teacher role related issues in the video, but this time they also equally noticed students' mathematical learning with. In addition, rather than describing and evaluating, they

were able to interpret what they had noticed. However, they did not elaborate what they had noticed about students' learning in Level 3.

Table 4.21
Frequencies of Noticing Levels in the Third Week's Reflection Papers

	Weeks		
Noticing Levels	1	2	3
1	57	55	45
2	19	26	44
3	2	4	6
4	-	-	-

As in the first two weeks, third week discussion was based on the preservice teachers' contradictory noticing and issues that I found important to discuss. In addition, what they had noticed positively or negatively were shared with the group to make them aware of what others focused on the video in general. In the following part, preservice teachers' noticed issues undertaken in the group discussion were explained.

4.2.3.1 Third week's noticed issues undertaken in the group discussion

The first noticing that I opened up for the discussion was related with the problem solving stages. Although the activity was based on a problem, problem related noticed issues were generally superficial. Only PT-9 made interpretations about the problem solving stages:

> *Since the teacher did not ask the problem by considering the problem solving steps, students did not reason and understand. Representing the second step of problem solving, the question of the student in the role of mother asked how much milk were left if the children drunk two mugs of milk. Student on the board said that if one mug is 220 ml then two mugs equals to 440 ml. This shows that the student unconsciously planned the solution and applied on the board.*

She focused on the mathematical aspect of the lesson with an interpretive approach. However, this approach demonstrated mixed level characteristics since she did not focus on particular students in the video, but also spoke for the whole class. To gain others' attention to problem solving stages and how problem solving

skill was considered in the curriculum, I distributed the related part of the curriculum and opened up the discussion with PT-9's noticing:

R: PT-9, you have emphasized problem solving steps. Can you share with us what these are?
PT-9: Reading and understanding the problem, planning the solution of the problem, implementing, checking the solution of the problem. ……
PT-12: Last one is evaluation.
R: Could you elaborate a bit?
PT-9: I do not know the details.
R: Okay, let's look at the curriculum together …
PT-9: I think the first step could not be achieved. I would like to see teacher's direction to the student in explaining the problem in their own words. In addition, I thought that the teacher could show another solution but she did not.
PT-3: Possible solving strategies should have been emphasized considering the individual differences.
R: Absolutely. We see that the solution was planned and done in practice, but the solution was not checked.
PT-12: I agree the last step was missing.
R: Then, which one were considered and which were not?
PT-9: 1 and 4 were not considered.
PT-3: 2 and 3 were considered.
PT-1: Only the student on the board considered them.

They agreed on the missing points in the video in terms of problem solving stages and started to discuss about a contradictory noticing after PT-1's statement about participation. In the reflection papers, almost all of them criticized the video since they thought that only the students who included in the role playing activity were active and rest of them were not. Therefore, they stated negative comments about the activation of all students as a pedagogical teacher role, and students' participation and following instruction as behavioral outcomes such as: *"Not all of the students were participating the class. I even noticed that some students were looking out of the window"* (PT-11). She offered general observations about the whole class and did not interpret how it might be affecting students' understanding. Hence, her noticing exhibited the features of Level 1.

In a similar noticing, they agreed on that while the role playing students were active, students sitting on their desk were not. PT-5 stated that students in the back were passive but cognitively active. In contrast to the rest of the group, she was thinking that all of the students were cognitively active in the process. Therefore, the following discussion took place:

R: Do you think that the students in the role playing activity were active, and rest of them were passive?
PT-7: Exactly!
PT-1: I said they were looking out of the window. Audiences can be considered active but as in the video.
PT-9: I do not think the audiences will be active. At least they have to answer the question to be active
R: Do you think the students taking role of the activity were active?
PT-3: They were actually implementing a scenario. They were not reasoning.
R: You are right, the students there were playing their roles.
PT-7: Then, who was active?
PT-3: The student who were solving the question and the student who were reading the question.
R: PT-5 stated that students in the back were passive but cognitively active.
PT-1: On the contrary, they were physically active but cognitively passive.
R: You can make students active only through asking question but it was not a physical participation that we aimed to do. Therefore, the students who were solving the question on the board were active the most, student in the role of mother was also active a little.

In the previous weeks and before this discussion in the third week, most of the preservice teachers were thinking that if students took a role in an activity, then they actively participated. They attributed this situation to the arrangement of the psychical context of the classroom. They indicated that seating arrangement in the video hindered most of the students' following instruction and interaction between students. Therefore, they concluded that a U shape seating arrangement was more appropriate for such an activity or at least the students participated in the activity should face the rest of the classroom. However, after the discussion, they realized that it was significant to make students cognitively active whatever the psychical arrangement would be.

Based on this argument, they started to talk about if the students in the activity were not cognitively active then was it a drama or role playing? They concluded that it was a drama activity because students were only playing the scenario given to them instead of reasoning about it. This was not noticed in any of the reflection papers and it appeared during the discussion. Only one of the preservice teachers stated during the discussion that she had noticed it while discussing the video with her roommate but did not write it in the reflection paper.

After they came to agree that the activity was not appropriate to drama and only the student in the board who was solving the question was active, they questioned the mathematical communication of that student. This was noticed by few of the preservice teachers in the reflection papers and categorized as Level 2. For example, PT-11 commented about the importance of representations in mathematical communication:

> *A student was writing solutions of the problem on the board. If the drama was only played without this, children could not transfer the daily life situation to mathematical processing. That's is why I am thinking that writing on the board is useful for students. In addition, I think that the student has used the mathematical language effectively considering the terms and the units that she used in the process.*

It was significant to discuss these noticing with the group because representation process, as an indicator of the mathematical communication skill, had been noticed for the first time throughout the three-weeks period.

R: Some of you said that mathematical language of the student on the board was good.
PT-3: She was using the units of each answer like ml, l…
PT-1: She was not only solving the question.
PT-9: She was explaining clearly the processes.
R: She was good at translating the steps into words. Some students can solve the question very quickly but not explain the solution. She was successful in that.
PT-3: Her explanations of each step in the solution also made it clear for the rest of the class.
PT-9: We observed similar situation during our internship (in scope of the teaching experience course), one of the children was solving each question in his mind but he cannot explain his strategy. Therefore, emphasis on the process is important for this kinds of questions.

Although the student, who was solving the problem in the board, could express her ideas and communicate well both in mathematically and verbally, preservice teachers thought that others did not have such a chance. Related with this student outcome, preservice teachers in their reflection papers had criticized the teacher in terms of lack of clarification and questioning as didactical teacher roles as in the first week's discussion. They agreed that teacher should have been more active through directing why questions. These noticing written in the reflection paper demonstrated the characteristics of Level 2 because the main concern was students' mathematical understanding and preservice teachers made interpretations about that as follows:

> *Teacher's direction in terms of the sentences that the students told hindered them in finding the solution through reasoning about. She should have performed necessary interventions, given some clues or interfered in mistakes. She should have asked why questions to make them think about the problem.* (PT-8)

Teacher's clarifications and questioning strategy were found as ineffective and shared within the group:

PT-3: I think she did not give feedbacks related with the students' problem solving processes.
PT-1: I agree.
PT-3: They only made step by step solution. There was no clarification about the steps.
R: PT-2 also thought that the teacher should have asked why and how questions to make them reason about the topic. Similarly, PT-6 and PT-8 criticized the teacher about answering the questions asked by herself or saying what should be done in the process. In addition, they added that the teacher should have asked questions considering all of the students in the lesson and make them reason.

In addition to the teachers' lack of clarification and questioning, preservice teachers criticized the teacher in terms of her communication skills both mathematically and verbally. They also noticed how the teacher communicated as a didactical role and a self-referential skill. These kinds of noticed issues were evaluated as Level 2 since the main concerns in these noticed issues were students' possible misconceptions or misinterpretations based on an evidence: "*The teacher stumbled a lot. She gave wrong answers and corrected frequently. These kinds of*

misusage of language might cause misconceptions" (PT-10). If PT-10 had interpreted the students' misconception, it could be evaluated as Level 3. However, preservice teachers did not discuss students' possible misconception in detail as in the noticing above. They shared their noticed issues and started to discuss another issue.

Preservice teachers criticized the teacher for real life connection in the reflection papers most of the time similar to the previous weeks. However, this time, the purpose of real life connection was not only gaining students' attention but also increasing their understanding, an evaluation based on students' cognitive outcomes. Accordingly, they indicated that the activity was unrealistic because the teacher did not bring a graduated cylinder as a material. They stated that if the teacher brought a graduated cylinder and let the students use it while making the activity, then the students could make interpretation about the measurement of liquids in daily life. These noticed issues were categorized under Level 2 because they criticized a didactical role of the teacher concerning students' mathematical learning. For example:

> *Instead of role playing, if the students used graduated cylinder in the activity such as in proving that 2L is equal to 2000ml, then the activity could be more complicated and students could understand transformation of units better.* (PT-8)

Although it was not a contradictory issue, it was shared with the group to raise their awareness about what other preservice teachers noticed about the video. It was an important noticing since it included alternative approaches for students' thinking but preservice teachers could not elaborate their noticing in the group meeting.

Based on all of the discussed points stated above, preservice teachers agreed on that the activity could not bring the students to the objectives. Then, the discussion was directed to the curricula. In the reflection papers, like in the second week, some of the preservice teachers (PT-3, PT-6, PT-8, PT-10 and PT-11) criticized the activity in the video based on the curriculum. The common point in these noticed issues was that the video was superficial in terms of the content included. They criticized it in terms of not including the other units of liquids.

Participants searched through the curriculum and concluded that the activity should have included problem posing. These noticed issues were categorized as Level 2, not Level 3, because preservice teachers did not primarily focus on the particular student outcomes with an interpretative approach. They also could not elaborate their noticing as they did in the second week. Therefore, I distributed the related part of the curriculum and asked them to investigate:

R: I brought the related part of the curriculum. Let's have a look. Congratulations PT-3, not only middle school mathematics curricula, but also you look at the primary school curricula, too. Could you also explain it to you friends?

PT-3: Since I could not found a related objective in the 2005 curriculum, I also look at the primary school curriculum. I found that the objective of the video was appropriate to the fourth grade. It says that students make ml-l transformations and pose and solve problems based on those transformations. The video was appropriate to this objective.

R: Some of your friends look at the middle school curricula and evaluated the video as incomplete. For example, PT-10 noted that it was missing since it only included ml-l transformations. If you consider 2013 curricula as you see in here, you can criticize it.

Since the preservice teachers apart from PT-3 who considered curricula in their reflections did not attend in the group meeting, they could not express their ideas. This resulted in a relatively superficial discussion compared to the second week discussion related with the curriculum.

It was important to note that at the end of the third week, preservice teachers used curricula as a tool to control the content of the video. They did not address other benefits of the curricula in their reflections. More precisely, they did not consider how the curriculum considered the problem solving skills included in the video. Rather, they tended to use KPSS books for other issues in the video. For example, PT-7 wrote advantages of problem solving for students which was quoted from a KPSS book. This was shared with other preservice teachers at the end of the group meeting as a summary of the discussion.

Summary of the third week noticing and discussion

Unlike the first two weeks, third week's discussion was not started through the contradictory noticing. I have chosen to start through problems solving skills since only one preservice teacher could focus on this issue. Although the salient point of the video was solving problem, most of the preservice teachers could not interpret the video based on students' cognition. Therefore, I showed the related noticing and distributed the related pages of the curriculum to raise their awareness about the problem solving skills. This made preservice teachers to canalize their arguments to the strengths and weaknesses of the activity in terms of problem solving strategies as emphasized in the curriculum. Although making real life connection was outstanding in the reflection paper, discussion about the issue were not rich. Preservice teachers only offered some alternative examples to the ones in the activity. Nevertheless, whether students were active or not were dominated the third week's discussion. At the beginning of the discussion, all of the preservice teachers were thinking that students sitting in the back were not active because of the arrangement of the classroom context. Then, I posed a question about who was active, all of the students in the drama activity or few of them? These argumentations facilitated to understand that participation is not only a behavioral outcome as they criticized before. They started to think about whether they were cognitively active or not. Then, they argued about the reasoning processes and mathematical communication among the students and how teachers could support these skills. In these processes, my role was facilitating group discussion as in the previous weeks. In other words, there was no difference in terms of the researcher role in the third week.

Although all of the preservice teachers abided by the rule of the community by writing their reflection papers, only five of them (PT-1, PT-3, PT-7, PT-9 and PT-12) participated in the group meeting. This situation did not affect the richness of the discussion much because the preservice teachers (PT-1, PT-3 and PT-9) who were more active in the flow of the discussion like in the previous weeks participated in the group meeting.

In conclusion, third week reflections and discussion were conducted based on the discussed points in the previous weeks. For example, they considered curricula and KPSS books as they did in the previous weeks. In addition, for the first time, preservice teachers used their observations gained in the school experience while writing their reflections. This indicated that other communities that the preservice teachers participated influenced their noticing.

4.2.4 Fourth week's noticing and discussions

The content of the fourth week video was circle and the students were fifth graders. In this video clip, the teacher stated that she aimed to teach definition of circle and the properties of circle components, such as center, radius, and diameter. She claimed that she aimed to conduct the lesson based on the principles of constructivism. At the beginning of the video, she entered the classroom with a hula hoop and asked the students what it is. One of the students answered as round and the teacher said "let us say as circle." Then, she asked the definition of a circle and another student answered as "it is constructed by points and it is closed and curved shaped." The teacher accepted this definition and continued the lesson. Then, she picked three students to put what they had already known about the circle to the pocket of the material called "smart pocket material (akıllı cep materyali)." In this process, students put it the concepts written in small cards to the pockets without saying anything. The teacher stated the name of those concepts without any explanation. Then, she continued the lesson with an activity. In this activity, few of the students constructed a circle through representing a point on the circle. One of the student on the other hand, put the man-shaped figure in hand called as "geometric man (geometrik adam)" and represented the center of the circle. In this activity, through guidance by the teacher, students were expected to discover the properties of circle. There was a traditional seating arrangement of the classroom with almost 20 students.

Fourth week video was a milestone for most of the preservice teachers because they admired the teacher from different perspectives and stated that she was

the best within the teachers observed so far. Some of them even stated that she was very close to the teacher that they wanted to become. Therefore, most of the fourth week noticed issues were positive in nature. They also criticized the teacher in terms of conceptualization of the circle concept and its possible conceptions and misconceptions based on the specific events in the video. These noticed issues were evaluated as either Level 2 or Level 3.

Table 4.22
Frequencies of Noticed Issues in the Fourth Week's Reflection Papers

		Weeks			
Components	Categories	1	2	3	4
Teacher Role	Subject Matter	1	3	1	2
	Didactics	71	101	104	111
	Pedagogical	16	7	20	26
	Self-referential	3	4	2	7
	Context	12	9	8	1
Student Outcome	Affective	40	27	22	30
	Cognitive	40	52	66	60
	Behavioral	10	25	31	20
Sum		193	228	254	257

As it was seen in Table 4.22, preservice teachers noticed different issues related with the teacher role and associated student outcomes. Although each category has specific trend for each week, the overemphasized points in the fourth week were related with the teacher's didactical expertise and students' possible cognitive outcomes similar to the previous weeks. For the didactical expertise of the teacher in the fourth week, dramatic changes in the frequencies of activity, conceptualization, connect real life, materials and student centeredness were observed. Preservice teachers tended to focus on how the teacher conceptualized the topic, applied questioning strategy, used materials and considered student differences and how students' understanding was affected from these didactical teacher roles instead of stating general comments for the activity and daily life connection, as seen in Table 4.23. In other words, preservice teachers' tendency in writing was changed from general to specific which was the main reason in changes

in the number of noticed issues about the activity. Most of these noticed issues were discussed with the group since they could raise others' awareness of students' thinking.

Table 4.23
Frequencies of Didactics Noticing in the Fourth Week's Reflection Papers

			Weeks			
Components	Categories	Codes	1	2	3	4
Teacher Role	Didactics	activity	28	17	20	5
		appropriateness to the curriculum		4	5	3
		appropriateness the objective	2	10	8	4
		assessment	1	1	3	
		clarifying	6	3	5	8
		conceptualization	3	6	9	19
		connection to real life	3	11	19	5
		connection between topics		2		1
		group working	1			
		homework		3		1
		inductive	2			1
		level of the students	10	6	6	11
		materials	11	21	7	22
		mathematical communication	1		4	5
		questioning		4	8	11
		solving questions/problems			8	
		student centeredness	3	4	1	12
		student differences		4	1	2
		summarizing		1		1
		technology				
		visuals		4		

Related with the pedagogical expertise of the teacher, most of the preservice teachers appreciated the way the teacher manages the classroom and activates all of the students in the classroom as displayed in Table 4.24. In addition, they liked the teacher's relationship with the students and her verbal feedbacks to encourage students while participating in the class discussion. However, two of the preservice teachers criticized the teacher in terms of equity in activating students. Being a dynamic teacher was the only noticed issue as a self-referential characteristic. Most of the preservice teachers thought that the teacher was dynamic in the classroom and therefore, successful in gaining students' attention to the topic. Related with the

subject matter expertise of the teacher, similar noticing with the previous weeks were observed. Same preservice teachers criticized the teacher since she did not transmit the knowledge before the activity started. Arrangement of the context did not gain preservice teachers' attention unlike the previous weeks.

Table 4.24
Frequencies of other Teacher Role Noticing in the Fourth Week's Reflection Papers

			Weeks			
Components	Categories	Codes	1	2	3	4
Teacher Role	Subject Matter	transmitting knowledge	1	3	1	2
	Pedagogical	activating all	9	2	15	8
		equity				2
		management	3	2		2
		relationships with students	2		1	5
		verbal feedback_encouragement	2	3	4	9
	Self-referential	communicative		1		
		dynamic	3	3		7
		role model			2	
	Context	out of class/school activities	12	1		
		class size		2		
		class physical context		6	8	1

Table 4.24 shows frequency of the teacher role noticing in the reflection papers. When how these teacher roles were associated to the student outcomes was investigated, it was seen that there was a similar pattern with the previous weeks in affective and behavioral student outcomes as seen in Table 4.25. The increase in the frequency of noticing about misconception and reasoning was remarkable for the fourth week. Preservice teachers started to focus on interpretation of students' possible thinking process in detail and elaborated what they had noticed based on students' possible misconceptions. This resulted in higher number of Level 2 and Level 3 noticing compared to the previous weeks.

Table 4.25
Frequencies of Student Outcome Noticing in the Fourth Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2	3	4
Student Outcome	Affective	Attention	19	21	14	16
		Confidence	3			2
		Enthusiastic	9	4	3	8
		like teacher				1
		like/enjoy math	6		1	3
		prejudice/anxiety	1	1	1	
		value math	2	1	3	
	Cognitive	connect daily life	1	1	5	
		connect between topic	6	4		
		Interpretation	2	10	19	13
		Learning	4	3	5	2
		learning by doing	3	6	5	8
		mathematical communication	3	1	6	1
		Misconceptions	3	4	3	16
		permanent learning	8	11	11	9
		problem solving	1		3	
		Reasoning	7	6	5	10
		Reinforcement	2	6	4	1
	Behavioral	express themselves				2
		follow instruction	1	5	12	2
		Participate	9	16	17	14
		peer interaction		4	2	1
		Respect				1

Accordingly, fourth week was also significant for level of noticing as seen in Table 4.26. Because of the change of the focused points in the videos, dominating noticing level was Level 2 and an upward tendency in the level of noticing was observed. Yet, preservice teachers still focused mainly on teacher's role and the attributed student outcomes, but they did not interpret and elaborate students' outcomes much.

Table 4.26
Frequencies of Noticing Levels in the Fourth Week's Reflection Papers

	Weeks			
Noticing Levels	1	2	3	4
1	57	55	45	53
2	19	26	44	47
3	2	4	6	5
4	-	-	-	-

Although what preservice teachers noticed about the video varied based on the teacher role and student outcome component of teacher identity, discussion was conducted on some of the points that preservice teachers overemphasized and on the points which were evaluated in higher levels based on the noticing trajectory. In the following part, preservice teachers' noticed issues undertaken in the group discussion were explained.

4.2.4.1 Fourth week's noticed issues undertaken in the group discussion

Teacher's conceptualization of the concept as didactical teacher role was the major topic of discussion. The first discussed point was related with the definition of a circle stated by a student at the beginning of the lesson and repeated by the teacher. In their reflection paper, two of the preservice teachers noticed that this definition was not complete for a circle. The point that they focused on was the teacher's lack of clarification to prevent possible misconceptions: *"Teacher's definition – a circle is a closed curved consisting of points – was effective but incomplete. If she gave the definition after she make the students discover all the necessary information, then she would have prevented the misconceptions about the concept"* (PT-9). This noticing demonstrated the characteristics of Level 2 because of the emphasis on students' understanding with an interpretative approach. Since the preservice teachers noticed that this incomplete conceptualization may cause misconceptions, it was shared and discussed with the group as in the following:

R: Let's look at the circle definition. It is made up of points, curved and closed. The teacher repeated that it is a closed curved line consisting of points.

PT-9: This curve can be trapezoidal or something like that. This may cause misconceptions.
PT-11: I agree.
PT-8: Saying that circle is a closed curve consisting of points is misleading. Having only these features did not mean that we defined circle. If the teacher emphasized this, she would not be misleading. Then she could pass to the terms – center and radius.
PT-12: The teacher first gave the definition and then taught the properties. I mean, she followed the path contradictory to what she has said.
PT-8: We have to define the radius first.

Based on this discussion, they concluded that the definition should have been constructed at the end of the activity and the teacher should have clarified students' definition to overcome possible overgeneralizations. In this discussion, they stated some critical comments about the appropriateness of the activity to the stated objectives, although they did not notice any negative points related with this issue in the reflection papers. They ignored this point and continued their discussion based on the teacher conceptualization about the other terms in the video.

Since PT-8 stated that radius of the circle should have been given before the definition, participants started to talk about teacher's conceptualization of radius. In their reflection papers, their comments about the way the teacher had chosen for explaining radius were contradictory to each other. Four preservice teachers commented positively such as *"the center of the circle and the distance between the center point and the edges were explained more clearly and it is very good that the students have seen the radius more clearly and practically*" (PT-3), which was categorized as Level 1 because of its descriptive and evaluative nature. On the other hand, five preservice teachers stated their critics based on students' possible misunderstanding. They mainly criticized the students' positions representing as a point on a circle and stated that distances of each student to the center of the circle were not equal. These kinds of noticing demonstrated the characteristics of Level 2 since they mainly focused on the teacher and interpreted misunderstanding as an outcome of teacher role rather than interpreting students' thinking in detail. For example:

> *The fact that each student does not seem to be equally distant from the student in the center can confuse other students' minds while showing the*

> *center of the circle. Instead, it would be better to draw a circle and mark the points on the ground and show the distance to the center in meters. Therefore, students would have seen that the student in the center was equally distant from the other students.* (PT-7)

These ideas were shared with the group while discussing how the teacher conceptualized radius:

> PT-4: I think it was good because it was demonstrating the equal distance between the center and the points on the circle.
> R: PT-8 does not agree with you.
> PT-8: The distance was not exactly two steps to each student on the circle.
> PT-9: I questioned it too.
> PT-8: Students would notice that the distances were not equal.
> PT-6: They would have measured with ruler. Otherwise, they could not understand the necessity of equal distances.
> PT-8: I agree. The student should have stood in the center of the circle.
> PT-7: In this case, students might think the inequalities of distances as normal.
> PT-4: You are right. The teacher should have explained it.

The following noticing also included that students should see the equal distances to understand the radius otherwise, they could think "*circle as a closed shaped composed of points. I wish the teacher has defined it as a two-dimensional shape made by drawing a curve that is always the same distance from a center"* (PT-6). In other words, PT-6 was able to explain students' mathematical thinking in detail. For this reason, her noticing in the reflection paper was evaluated as Level 3.

Similarly, PT-9 focused on the students' thinking process while making connection between the radius and diameter based on the teacher's definition:

> *When defining the radius, she said, "radius is a distance from a point passing through the center to the any point on the circle". However, passing through the center was not the right phrase, she should have said from the center to the any point on the circle because students might not understand the center as a starting point and thought as a line segment including center. This causes misunderstanding of diameter and radius.* (PT-9)

This noticing also demonstrated the characteristics of Level 3 because it overtly indicated students' thinking with evidence from the video. The same preservice teacher also focused on the definition of diameter, interpreted students' possible

misconceptions and provided the solutions for this misconception. Therefore, her noticing stated below was also evaluated as Level 3:

> *While making the diameter definition she said that the diameter of the circle is the distance passing through the center between the two points on the circle. If she had emphasized the necessity of the line segment, it would be a clearer definition. Otherwise, students might think that diameter is a distance between the two points on the circle and it does not need to be straight. (PT-9)*

Similarly, PT-6 stated a Level 3 noticing based on the definition of a diameter and its possible overgeneralization: "*Because of the definition of the diameter was made by the teacher, students might think that there is only one diameter in the circle. She should have underlined that all of the line segments between the two points on the circle that passed through the circle are diameter. Mathematical language of the definition was not appropriate"* (PT-6). Other preservice teachers, who could not notice this, stated positive comments about definition of diameter and the way the teacher used to teach the connection between radius and diameter: *"It is also good that the students themselves have to find out that the diameter is twice the radius"* (PT-12). Since some of them could not notice these important points for students' mathematical learning, it was discussed with the group to raise their awareness:

R: PT-9 and PT-6 noticed that the teacher should have emphasized the line segment in making the definition of diameter. In the video diameter was defined as a distance from the two points of the circles passing through the center.

PT-9: We can change the direction on the center and draw the shape but it would not be linear.

PT-6 Exactly, we need to emphasize that diameter is linear. Otherwise, they can draw at a right angle. In addition, while teaching the connection between the diameter and radius, we are saying that the dimeter is twice the radius. It is true operationally but it is not a diameter if the angle between two radius is 90^o

PT-9: In addition, she should have emphasized that the diameter divides circle in to two equal parts.

R: Exactly, this is the important property of a diameter. It is the symmetry axis of circle.

PT-1: But they could not know the term symmetry axis.

PT-8: You can say it divides in two equal parts.

R: You do not have to use the axis of symmetry. If you distribute circles cut from a paper and say that let's find the diameter. They

need to fold the paper into two equal parts. They you can say that since the two parts are equal, they are symmetrical. You don't need to say the term.

Based on the discussion about the axis of symmetry of a circle, they started to talk about what the students had already known about the concepts related with circle and whether the teacher considered level of students while planning the lesson. In the video, the teacher used a material and asked students to put what they had already known about the circle at the beginning of the lesson. The students put the terms circular region, diameter and compass into the pockets. One of the preservice teachers noticed this and questioned that if they had already known about a circular region, then why the teacher conducted this activity. PT-2 stated in her reflection that *"... that means that the circular region has been taught before, but the circle needs to be taught before"* which was evaluated as Level 2 since she considered the lesson based on appropriateness of the level of students. What she had noticed was shared with the group and their opinions were asked:

R: PT-2 has an idea about the previous knowledge and sorting of the subjects. What did they place the pockets? Circular region, diameter and compass. She thought that if they know circular region, they also know circle. What are you thinking?
PT-3: She has caught a very detailed point. Bravo!
PT-2: They placed circular region and diameter. I thought that if they know these terms than they should also know what circle is.
PT-8: It is not possible.
R: Yes, they know circular region and circle but they only know how they look like not the properties of them. This is an example of a zero level. This is a circle and this is a circular region that is it.
PT-8: … they only know the shapes of them, right?
R: We have passed through the Level 1.
PT-11: They were learning the properties.
R: So, PT-2, it was a very nice focus, but it's not the case. They learned the features and relationships in detail on this video.

In this discussion, fifth grade students' prior knowledge was emphasized based on Van Hiele' levels of geometric thinking referring to the previous weeks' discussions. Then, the discussion was directed to curriculum. In their reflection, like in the previous weeks, only four preservice teachers (PT-3, PT-6, PT-8 and PT-11) considered curriculum. The important point on their reflection was consideration of

time management where they considered the time-management related discussion from the second week and interpreted which objectives could be included in the lesson. Since they agreed on that the video was appropriate to the curriculum, related objectives were shared with the rest of the group and concluded that the teacher should have used compass while drawing a circle.

Preservice teachers also considered the previous week discussion while interpreting whether the students were active or not. As it was stated in the third week discussion, preservice teachers discussed that being cognitively active in the lesson was more important than taking part in the activity. Considering this discussion and the previous week's video, preservice teachers wrote positive comments about students' activation. Compared to the other videos that they watched so far, they stated that students were more active:

> *Instead of calling the hula-hoop as a circle, she asked students what was that. Students told the name of it as it is used in daily life. Then, the teacher asked which geometric shape it looks like. Both active participation and active learning have been achieved since she asked thought-provoking and open-ended questions.* (PT-7)

Since this noticing included both teacher and students' perspectives with an interpretive approach, it exemplified the mixed level of noticing (Level 2). Although contradictory noticed issues were not stated, it was shared to raise awareness of other preservice teachers who did not participate in the third week discussion. Two of the preservice teachers commented negatively during the discussion and started to discuss about being active:

R:	Were the students active? Do you remember the previous related discussion?
PT-9:	We said cognitively passive but physically active students. We said that the students who solved the problem were not cognitively active.
R:	Do you think students are cognitively active this week?
PT-1and7:	No.
PT-3,4,6,8,9and11:	Yes.
R:	Why?
PT-1:	Because I did not see any brain storming activity in the video.
PT-8:	But she was always asking questions. I mean, she made

student think.

PT-9: I think they were active. Students who were standing may seem physically active, but they were also cognitively active. They answered questions. They also made inferences.

PT-4: I think the teacher asked questions such as what is it, please define it.

PT-7: The teacher asked the whole class, but she took answer from only one student and passed the question. She could have promised more students and asked alternative definitions.

PT-8: But she wanted from student to show three features. The student said them so the teacher did not need to ask anyone else. She asked to whole class, anyone can answer it.

R: The student might think that the teacher will want me to answer. This thinking might cause reasoning about the subject. Then we can say that the video was aiming to make students cognitively active.

Although they agreed that students were active compared to the previous week video, PT-7 actually stressed on giving permission to different students in the class. Related with this, PT-7 criticized the teacher about being a facilitator who guides the students to construct their own knowledge. *"According to the constructivist approach, the learner needs to discover the knowledge itself. In some cases, however, the students did not discover the knowledge themselves, but the teacher transmitted the knowledge" (*PT-7). On the other hand, PT-1 stated a contradictory noticing about transmitting knowledge: "*It would have been better if the teacher first taught the subject, gave daily life examples and then passed to the materials*" (PT-1). The first noticing was evaluated as Level 2 because it focused on the students' learning with an interpretive approach. The second noticing has shown the characteristics of Level 1 because it directly criticized the role of the teacher with an evaluative approach, student outcomes were not the main concern. Although the frequencies of these noticing in the reflection papers were very low compared to the other aspects of teacher roles, it was discussed during the group meetings because of preservice teachers' contradictory ideas in this issue:

PT-7: The teacher was more active. She talked about the constructivist approach. However, the constructivist approach does allow students to interact with each other and construct their own knowledge. But, in this case, the teacher transmitted the knowledge.

PT-9: But, there was a way of discovery.

PT-6: She made them discover.

PT-7: She did, but it would be better if it was applied to all. For example, students constructed the definition of circle but I think that the teacher has directed too much.

PT-9: The teacher was at the fore front.

PT-8: I think the students should feel the presence of the teacher in the class.

PT-3: If the teacher does not give the concept anyway, he cannot teach. The child may be able to understand the concept but they cannot know the name of it. The teacher should have intervened somewhere as in the video.

PT-1: I think that pre-information section of the lesson was missing. The first lesson should not be like this, the teacher should have taught the subject first.

Before this group discussion, while PT-9 and PT-6 thought that the teacher was successful in guiding student centered classroom and PT-7 criticized the teacher that she was not giving necessary opportunities to the students. Then, they discussed and concluded that the teacher was very active and it was important to transmit necessary knowledge.

Teacher dynamics in the above discussion was considered important for managing the classroom as a pedagogical teacher role, and also students' attention and following instructions within the reflection papers. They wrote their reflections comparing the teachers in the previous videos and the teacher and the students in the practice school: *"...so we go to internship (schools). There is a student doing something. Another student is doing something. But all the students in this video were all focused on the same thing, the teacher was able to achieve it"* (PT-6). Similar comments were observed in preservice teachers' noticing. Nevertheless, they did not discuss classroom management since it was not emphasized in the reflection papers.

Students' attention was not only associated to teacher dynamics, but also reflected as an outcome of the materials used in the lesson as it was observed in the

previous weeks. However, fourth week noticing related with using materials were important because preservice teachers started to criticize the materials' function in terms of conceptualization of the topic. More precisely, they stated that the material was not necessary to define the topic and gaining attention was not enough to make it functional: *"I really do not understand what the geometric man is doing. It seemed like functionless. But it could have been used to attract attention. It would have been more useful if there was a geometric man who could do measurements of distances instead"* (PT-8).

Similar noticed issues were evaluated as Level 2 since they interpreted the material considering students' understanding. Nevertheless, some of the preservice teachers evaluated the material based on gaining students' attention to the topic which was evaluated as Level 1. Considering these contradictory ideas, the following discussion was conducted:

R: Some of you have seen the use of the geometric man material in the center as functionless. They though that one of the student could be center point.
PT-2: I agree.
PT-4: But it attracted attention.
PT-6: Exactly.
PT-9: She attracted attention to the geometric man as a figure, not to the center as a special point in the circle. If she did it, it would be more functional.

They concluded that the teacher should have emphasized the function of the material. Teacher's lack of clarification was associated to the nonfunctionality of another material - smart pockets - in the video. Preservice teachers criticized the teacher's lack of clarification considering students' skills in connection between what they have known and learned in the lesson, which were characterized as Level 2, because their main consideration was students' understanding:

> *The teacher should have explained the material before he started using it. I did not understand what was going on for a moment, and tried to solve the function of the material. He also gave me the impression that I would like to go to the main part of the lesson immediately. However, at the end of the course, the students would use the material with their learning, so it would be very appropriate if the teacher had motivated them to use the concepts at the end. (PT-3).*

Since the teacher did not explain the purpose of the material before using it, two of the preservice teachers misunderstood its function. They thought that the students put the unknown concept in the pocket of the material although they put what they had learned before. Therefore, they misinterpreted what they had noticed. However, they realized it while discussing whether the material was successfully used to measure students' prior knowledge and gave opportunities to the students to make connections between what they have known and learned in the lesson. The discussion was as follows:

R: PT-3's evaluated the usage of the first material as the biggest mistake in the video. Some of you have suggestions. Let's discuss them.
PT-3: She did not even inform the students about how these pockets are used and what they serve. I looked at the video for a while and I thought why it was being used
PT-8: I have not understood for a long time either.
R: She may have used the material in different units. They may have placed different concepts in the pockets. So they may already be familiar with how that material is used.
PT-9: Students are not even looking at the concepts in their hands.
PT-3: I think the video is just trying to show that these students already knew these concepts.
PT-11: Could be.
R: PT-7 and PT-6 are suggested as follows. The teacher should ask the definitions of the concepts first or remind them.
PT:8: Don't they put the concepts they will learn in the pockets?
PT-2: They put what they have already known.
PT-8: Usage of the material was not appropriate then.
PT-12: Exactly, students might not be aware of their knowledge.
PT-9: That is why the teacher should have reminded them.
PT-1: It should have been used at the end of the course, so the concepts would be summarized and reinforced.

In the fourth week, the main discussion points were related with the didactical expertise of the teacher. Nevertheless, preservice teachers also focused on other teacher roles in their reflection papers. For example, arrangement of the context was one of the noticed issues on which preservice teachers reflected similar to the previous weeks. They criticized the traditional seating arrangement in the fourth week video since it included rows of fixed seating. They associated this context to lack of sufficient interaction among the students and difficulty to see the

blackboard which limited students' following of instruction: "*The seating arrangement was traditional, communication among the students was limited, and everyone was not equally spaced to the board, so students in the rear cannot see the board and follow the lesson breaks*" (PT-8). Nevertheless, these kinds of noticing did not take place in the fourth week discussion in contrast to the previous weeks.

Summary of the fourth week noticing and discussion

Noticing and discussion based on the fourth week video was significant in many perspectives. At first, preservice teachers noticed more points in higher levels. More precisely, for the first time throughout the four-week period, Level 2 dominated all of the noticing. Preservice teachers were able to analyze teacher roles and associated student outcomes through interpretive lenses and started to focus on students' mathematical thinking more in the fourth week. Discussion proved the changes in preservice teachers' noticing. They mainly discussed what the teachers did for conceptualizing the topic and how it directed students' mathematical thinking, and what could be done for preventing students' misinterpretation. These topics dominated the group discussion. In addition, teacher's dynamism as a self-referential characteristic, which was the salient issue in most of the reflection papers, was argued during the group discussion. Preservice teachers constructed a shared vision and considered the teacher as a role model in terms of dynamism in teaching mathematics.

Preservice teachers considered curricula, KPSS books and also their school experience observations while writing their reflections in the fourth week, similar to the third week. By the fourth week discussion, preservice teachers showed their tendency in participation as well. While some of them directed the flow of the discussion with active participation (PT-1, PT-3, PT-6, PT-7, PT-8 and PT-9), some of them showed peripheral participation (PT-2, PT-4, PT-11 and PT-12). PT-5, on the other hand, hardly ever participated in the discussion. PT-10 did not write reflection and did not attend the group meeting. As the coordinator of the group

meeting, I had certain roles similar to the previous weeks. There was not any different intervention.

4.2.5 Fifth week's noticing and discussions

The content of the fifth week video was reflection and the students were seventh graders. The purpose of the video was to explore basic properties of reflections. As the teacher explained, the lesson started with a creative drama activity to gain students' attention to the topic. In this activity, one of the students represented an object and the other one represented the image of that object in an imaginary mirror. For example, while the object raised her right hand, image raised her left hand. All of the students took part of the activity. Then, they sat down and the teacher continued to the lesson by connecting the concept to real life. For this purpose, he first asked students to give their own examples. They exemplified reflection from the objects in the class. Then, teachers showed three reflection pictures from daily life with the power point slides. The lesson continued with another activity where students were grouped in two and sat face to face. They used symmetry mirror, grid paper and pattern blocks as materials and drew the reflection of the block that they have chosen. At the end of the lesson, as an alternative assessment technique, using mathematics diaries was emphasized. There were eight students in the classroom.

Preservice teachers noticed similar points in the fifth week video with the previous weeks as presented in Table 4.27. However, the important point was the decrease in the total number of noticing. More precisely, preservice teachers wrote shorter reflections compared to previous weeks especially in student outcome noticing. Preservice teachers could have thought that what they noticed had already been discussed in the previous weeks and therefore, not worthy to write. The frequency of noticing did not represent preservice teachers' ability to interpret what they had noticed. In other words, what they had noticed was decreased but it did not affect how they noticed based on the trajectory of Noticing Theory which will be explained in detail below.

Table 4.27
Frequencies of Noticed Issues in the Fifth Week's Reflection Papers

Components	Categories	Weeks 1	2	3	4	5
Teacher Role	Subject Matter	1	3	1	2	2
	Didactics	71	101	104	111	113
	Pedagogical	16	7	20	26	12
	Self-referential	3	4	2	7	1
	Context	12	9	8	1	10
Student Outcome	Affective	40	27	22	30	19
	Cognitive	40	52	66	60	55
	Behavioral	10	25	31	20	12
Sum		193	228	254	257	224

In terms of what preservice teachers noticed related with teacher roles and student outcomes in the fifth week, the video demonstrated the similar characteristics with the fourth week. Especially, for the didactical expertise of the teacher, like in the fourth week, preservice teachers tended to focus on how the teacher conceptualized the topic, clarified the important terms or students' questions, used materials for students thinking, used questioning strategy and provided opportunities to students in constructing their own knowledge in the concept of reflection as seen in Table 4.28. In addition, technology integration was noticed for the first time throughout the five-week period. Group working and using visuals were the noticing directly related with the content of the video which might not be highlighted in the following week. These noticed issues were discussed with the group to raise preservice teachers' awareness in addition to main discussion on teachers' conceptualization and clarifications.

Table 4.28
Frequencies of Didactics Noticing in the Fifth Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2	3	4	5
Teacher Role	Didactics	activity	28	17	20	5	12
		appropriateness to the curriculum		4	5	3	6
		appropriateness the objective	2	10	8	4	2
		assessment	1	1	3		8
		clarifying	6	3	5	8	14
		conceptualization	3	6	9	19	16
		connection to real life	3	11	19	5	9
		connection between topics		2		1	
		group working	1				7
		homework		3		1	
		inductive	2			1	
		level of the students	10	6	6	11	1
		materials	11	21	7	22	11
		mathematical communication	1		4	5	5
		questioning		4	8	11	8
		solving questions/problems			8		
		student centeredness	3	4	1	12	6
		student differences		4	1	2	1
		summarizing		1		1	1
		technology					2
		visuals		4			4

Table 4.29 shows that there were dramatic changes in the number of noticing related with the teacher's pedagogical expertise and his self-referential characteristics. This was probably because of the fourth week discussion which almost completely focused on the didactical expertise of the teacher. Subject matter expertise noticing were in similar frequencies to the previous weeks. Arrangement of context as a teacher role gained preservice teachers' attention because the seating arrangement and class size was different from the previous weeks.

Table 4.29
Frequencies of other Teacher Role Noticing in the Fifth Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2	3	4	5
Teacher Role	Subject Matter	transmitting knowledge	1	3	1	2	2
	Pedagogical	activating all	9	2	15	8	4
		equity				2	3
		management	3	2		2	2
		relationships with students	2		1	5	
		verbal feedback_encouragement	2	3	4	9	3
	Self-referential	communicative		1			
		dynamic	3	3		7	1
		role model			2		
	Context	out of class/school activities	12	1			
		class size		2			5
		class physical context		6	8	1	5

For the fifth week, associated student outcomes in the reflections showed similar patterns are presented in Table 4.30. More precisely, preservice teachers noticed nothing new related with any of the categories in student outcomes. However, the salient point in the following table is the decrease in the number of noticing related with students' possible misconceptions which were interpreted based on students' discussions in detail below.

Table 4.30
Frequencies of Student Outcome Noticing in the Fifth Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2	3	4	5
Student Outcome	Affective	attention	19	21	14	16	10
		confidence	3			2	
		enthusiastic	9	4	3	8	3
		like teacher				1	
		like/enjoy math	6		1	3	4
		prejudice/anxiety	1	1	1		
		value math	2	1	3		2
		connect daily life	1	1	5		7
		connect between topic	6	4			
	Cognitive	interpretation	2	10	19	13	18
		learning	4	3	5	2	3
		learning by doing	3	6	5	8	8
		mathematical communication	3	1	6	1	
		misconceptions	3	4	3	16	4
		permanent learning	8	11	11	9	7
		problem solving	1		3		
		reasoning	7	6	5	10	7
		reinforcement	2	6	4	1	1
		express themselves				2	
		follow instruction	1	5	12	2	1
	Behavioral	participate	9	16	17	14	4
		peer interaction		4	2	1	6
		respect				1	1

When all of the noticed issues in the fifth week reflections were analyzed based on the trajectory of Noticing Theory, it was observed that the dominating noticing level was Level 2 similar to the fourth week as shown in Table 4.31. More precisely, an upward tendency almost came to a stop. Preservice teachers did not elaborate Level 3 noticing. It is important to note that the total number of noticing based on the levels was decreased although not dramatic changes were observed in the total number of teacher role and student outcome noticing. This took place because of the scope of the idea units which was evaluated based on the trajectory. As it was explained in the method chapter, idea units representing one of the Levels in the noticing trajectory can include more than one code in teacher role and student outcome components of teacher identity. In other words, fifth week idea units included more hybrid codes in them.

Table 4.31
Frequencies of Noticing Levels in the Fifth Week's Reflection Papers

	Weeks				
Noticing Levels	1	2	3	4	5
1	57	55	45	53	30
2	19	26	44	47	36
3	2	4	6	5	5
4	-	-	-	-	-

In short, similar to the previous weeks, what and how preservice teachers noticed about the video varied. Therefore, the discussion was conducted on some of the points that preservice teachers overemphasized, which were mainly related with the didactical expertise of the teacher and its associated cognitive outcomes. In the following part, preservice teachers' noticed issues undertaken in the group discussion were explained.

4.2.5.1 Fifth week's noticed issues undertaken in the group discussion

Most of the preservice teachers emphasized the lack of mirror as a material in the first activity in the video. The preservice teachers criticized the activity since the existence of mirror was imagined in the video. They stated that mirror as a material was easy to bring the classroom so that the activity would be more real for the students. There were several reasons for the need to see a mirror in the activity. Some of the preservice teachers noticed that the mirror would have increased students' attention to the topic and also provided opportunity to see how it was used in the daily life, and would make them appreciate the value of mathematics: "*The mirror game was creative, but if there was a real mirror, the students would pay more attention and see the mirror in relation to mathematics*" (PT-2). These were the noticing concerning students' affective outcomes and stated with an evaluative approach, which demonstrated the characteristics of Level 1.

Some of the preservice teachers focused on the existence of mirror for conceptualizing the topic in a more appropriate way to overcome students' possible misconceptions related with the properties of reflections. One of the concerns was related with the congruency of the object and its reflected image on the mirror which

have to be in the same size and shape. However, in the activity, students representing the object and its reflected image were different individuals. Related with this concern PT-3 noticed that *"students' arms and legs are different from each other. Symmetrical things should be equal. This might cause misconception. The teacher should have made explanation."* Since this noticing focused on students' understanding based on the role of the teacher, it showed a mixed approach and was evaluated as Level 2. One of the preservice teachers was able to make deeper analysis about student thinking and to elaborate what she had noticed through providing alternatives. Therefore, her following noticing was evaluated as Level 3: "*Students' physical differences might hinder understanding the equality of the object and its reflected image in the mirror. Instead of this activity, she could have brought a real mirror to the class and asked questions to make inferences."* In contrast to these critics, one of the preservice teachers stated positive comments on the activity considering students' mathematical understanding: *"Through the mirror activity, she provided students to understand the logic of the reflection. Therefore, they could understand the reflected image as inverse of the object"* (PT-5). Based on these contradictions, the possible misconception was shared with the group as follows:

R: There are both positive and negative comments about the mirror activity mostly negative.
PT-9: The object and the reflected image was not equal. However, all things must be the same in reflection.
PT-1: Exactly, if I represent the object and PT-9 is the reflected object, I do not understand that they must be equal from this example. On the contrary, I might think that it may not be equal.
PT-12: That is why she needed to bring a real mirror to class.

While discussing the first activity, they also criticized the second activity in which students drew the reflected image of a pattern block by using symmetry mirror. The point that they focused on the second activity was that the distance between the object and the symmetry mirror had to be same with the distance between the reflected image and the mirror: "*He never mentioned the distance between the mirror and the object. He should have explained it or made students to count the squares in their grid papers*" (PT-1). These kinds of noticed issues were evaluated as Level 2 since they mainly focused on how the teacher conceptualized

the topic with an underlying reason of student learning. Another noticing of conceptualization of the topic was related with the position of the symmetry mirror. Specifically, PT-2 noticed that the students hold the symmetry mirror straight to the paper and did not try the alternative positions: *"The teacher did not explain the logic behind the topic. In this case, if we ask the students the symmetry line standing like a y=x line, they would probably have difficulties"* She focused on the students' difficulties but she could not analyze students' thinking process when the symmetry mirror was not straight, therefore, her noticing was evaluated as Level 2. In contrast to these critics, there was a positive comment about the teacher conceptualization and its associated outcomes by PT-5: "*The students discovered that symmetrical shapes are equally distant from the line of the symmetry*". Nevertheless, she could not explain her idea because she did not participate in the group discussion. Therefore, discussion continued as in the following:

R: Majority of you have said that equal distances were not stressed. PT-5 said that students discovered it. She is not with us right now.
PT-1: It is not possible. It was not highlighted during the course.
PT-8: I agree.
R: PT-2 noticed another point. What we do in these activities generally, we are put the symmetry mirror either vertically or horizontally because students have grid papers and they put it based on the lines on the paper. What could be done differently?
PT-2: The symmetry line could also be taken as y = x. It's going to be 45 degrees on grid paper. Students could think about how to get symmetry. So, they could realize the distance and reason about the angle.
R: PT-8 also wrote a similar comment.
PT-8: The curriculum notes that in addition to horizontal and vertical lines, oblique lines should be considered in symmetry but we could not see in it in the video.

PT-8's focus on the curriculum directed discussion to analysis of curriculum based on the properties of reflection. Accordingly, similar to the previous weeks, only few of the preservice teachers (PT-2, PT-3, PT-6, PT-8 and PT-11) wrote their critics about conceptualization by considering the curriculum in their reflections, which was already discussed with the group. They mainly focused on the objectives related with the transformational geometry and especially for the properties of

reflections. They did not notice different point from the points discussed above. Therefore, discussion about the appropriateness of the video to curriculum was not held. On the other hand, similar to the fourth week, they considered time management while interpreting which objectives could be included in the scope of the video:

> *We may think that some of the objectives can be given in the next lessons, but at least the conceptual information should be given and emphasized, such that the distances are equal to the symmetry mirror. Therefore, I think that the objectives were not fulfilled in the video.* (PT-8)

As it was said above, preservice teachers did not discuss the appropriateness of the video to the curriculum. Therefore, I shared the information related with the changes of transformational geometry in 2005 and 2013 curricula with the group:

> *In the 2005 curriculum, the transformation geometry was spread to 6th, 7th and 8th grade levels, and a little more emphasis was put on. It was a little lighter in 2013 but not much changed. Angel of rotations were more complicated in 2005 and now it is more simple like rotating a hexagon.* (R)

After providing preservice teachers with information about the curricula, I regulated the flow of the discussion by directing their attention to their noticing related with the daily life connection. Preservice teachers focused on what the teacher did to make connection to real life. The main criticism was related with the number of the visuals shown on slides. They stated that the teacher had chosen similar examples but reflections on the daily life should be more: *"Giving daily life examples through pictures on the slide was nice but it could have been more enriched"* (PT-6) and "*Asymmetrical examples should be shown*" (PT-9). These kinds of noticed issues were evaluated as Level 1 since they only focused on the role of the teacher with an evaluative approach. In addition, PT-3 noticed with an evaluative approach but she also proposed an alternative aiming to make students cognitively active while giving daily life examples which was evaluated as Level 2: *"it would have been better to talk a little bit about the pictures together with the students about their symmetry lines"* (PT-3). Considering this and possible other alternatives, daily life connection took place in the discussion:

R: Now you have your thoughts about the examples. First, he asks a student, he says that there is a symmetry in the closet. Then, she

shows some examples from the slide. PT-6 noted that they need to be enriched. PT-9 said that he could give examples without symmetry. PT-8 says that the case of the wardrobe given by the teacher was not spoken at all. The teacher had to explain how it is symmetrical. Okay, symmetrical, but on the one side, the books on the one side are different, just the glass? Which part of the wardrobe was symmetrical?

PT-9: The teacher had to ask though-provoking questions.

R: He could have asked the symmetry line and other properties of the symmetry. In addition, PT-8 thought that the examples were not from students' daily life since the students may not always go to the lake and see the reflections.

PT-8: One or two similar examples were enough. He should have given different examples. The examples in the lesson were appropriate to reflection. There should have been symmetry examples, too.

R: But what the teacher really wants to develop in the video is reflection. If we think so, the examples may be appropriate.

As in this discussion unit, also in their reflection papers, I realized that preservice teachers could not differentiate the relationship between the concepts in the transformational geometry. They used symmetry and reflection interchangeably while referring to the same concept. For example: "*He could have provided a better conceptual understanding if he explained the answers of the questions: What exactly does symmetry mean? Which properties were changed or not changed when the objects were reflected?*" (PT-6) and "*I think it would have been better if reflection was defined as in the books*" (PT-3). This was probably due to their lack of subject matter knowledge in transformational geometry. Yet, in order to understand the underlying reason, I asked them to clarify the concepts: transformational geometry, symmetry and reflection as in the following discussion unit:

R: They wanted from the teacher to make a definition and emphasize some of the properties. Before defining the concepts, I want to say something. Symmetry was considered in the primary curriculum, too even beginning from the 2nd grade. Students know symmetry and even the symmetry mirror and symmetry line. But when they go to the middle school, the name of the terms changes. Symmetry is now called the transformational geometry. Within the transformation geometry, there is symmetry, line symmetry, point symmetry, rotation, and translation and so on. Let's talk about this a little bit now. What is the

transformational geometry? What is the symmetry and reflection, is there any difference between them?

PT-2: The transformational geometry covers all.

PT-11: I agree.

PT-3: It is name of the unit.

R: What about symmetry and reflections? Are they identical?

PT-9: No.

PT-11: It is written as identical in some books but I think they are not.

PT-9: Symmetry can be by point, by a straight line. But for reflection, I am not sure.

PT-6: Reflection is a line symmetry, too.

PT-9: I give up. I could not make the definition right now.

PT-3: But we have not learned them in the primary or middle school.

R: But, you will to teach, right?

PT-11: The symmetry looks a little wider concept.

PT-8: Symmetry involves reflection because there is point symmetry, too.

PT-1: For symmetry, both sides were real, but for reflection, the image was not real.

R You're right about reflection. This is not the only difference. Symmetry or symmetry is a much broader concept …

In this discussion unit, they agreed on that transformational geometry is kind of an umbrella term for these concepts. In addition, they also agreed that symmetry was a broader concept than reflection but they could not explain the relationship between these concepts. Accordingly, one of the preservice teachers said that reflection is virtual, but symmetry is real and another mentioned about the point symmetry and line symmetry. However, they could not elaborate their ideas. It seemed that lack of subject matter knowledge about transformational geometry prevented preservice teachers from in-depth conceptual-related noticing, interpretation considering students' thinking process and developing instructional strategies for students' learning. For these reasons, I distributed the related pages of the curriculum and textbook and asked them to share their noticing with the group:

R: Now let's see the definition of symmetry? Are translation and rotation a kind of symmetry?

PT-12: I think translation is a kind of symmetry

R: Why?

PT-12: Because after translating an object, you can get the same thing.
PT-3: It should not change its appearance. I mean, when I pick up this paper, the paper is the same paper (she was translating the paper) or when I rotate it, again it is same.
R: When we said a transformational geometry, we mean symmetry. Symmetry is a kind of umbrella including line symmetry, point symmetry, rotation, and translation. Ok?
PTs Okey!!!
PT-9: Line symmetry and mirror symmetry are the same things, right?
R: The 7th grade MoNE textbooks says that reflected object is taking line symmetry of an object, so the it is called reflection. But there is no emphasis on what you see as reflection is virtual.

Since the aim of this discussion was not to teach the concept, I did not expand the definitions more. Notwithstanding, this discussion raised preservice teachers' awareness about their subject matter knowledge and directed their attention to the definitions in the curriculum and the textbook.

As it was stated, preservice teachers had difficulty in proposing alternatives to the activities in the video. Yet, two of the preservice teachers stated that teacher should have used dynamic geometry software instead of showing on the slides but they could not elaborate their noticing considering students' thinking and their noticed issues were evaluated as Level 1: "*It was nice but it would be more noticeable if dynamic geometric software was used*" (PT-6). This was shared with the group to raise their awareness and make them to think about integration of technology:

R: You have criticized the teacher not using technology and Geogebra.
PT-1: I think Geogebra was not suitable for the students. Because it's a little complicated, the student cannot use it.
PT-3: It may be confusing to you, but you will prepare it before the lesson and demonstrate the simple version to the students.
PT-1: If you just demonstrate in Geogebra, it will not be different form showing on the PowerPoint.
PT-9: How are you going to rotate 60 degrees? How can you show this on the slide?
PT-12: You do not have to do it, but if you do it in the Geogebra, it will be more permanent.

R: You can easily make the symmetry line as horizontal, oblique or vertical and show that the line segment from the point to its reflected point is perpendicular to the symmetry axis.

PT-12: You can show the equal distances.

R: Through the PowerPoint you can show the outcome of the reflection, but if you use Geogebra, you can also show the process of reflection.

In this discussion unit, what could Geogebra provide for the instruction was addressed and the lack of such a tool was criticized as a missing point of the video.

Similar to the integration of technology, mathematical diary as an alternative assessment technique was intrinsic to the fifth week video. Most of the preservice teachers noticed the usage of mathematical diaries in their reflections. Their noticing dominantly demonstrated the characteristic of Level 1 because they only wrote with an evaluative approach: "*Lastly, the mathematics diary has been a good practice in terms of evaluation"* (PT-1). In addition, some of them could interpret this assessment technique with a mixed approach (Level 2):

> *He asked the students to write a diary. Thus, we can get information about how useful the course is for the students and whether or not an effective learning environment has been created for them. It also allows the teacher to see if the course is suitable for the level of the students.* (PT-7)

How it could be used and what the advantages of diaries for students and teachers would be were discussed with the group:

R: You looked at the diaries from the perspective of the teacher. You wrote that diaries can help us identify students' misconceptions, let us see if the course is appropriate for the level of students, and tell us about how useful the lesson is for creating an effective learning environment. How can the diaries be used effectively?

PT-12: We need to read them occasionally.

PT-11: We have to give feedback so that the students can notice that we care the diaries.

PT-1: We should give feedback. If they can see that we are interested, they can write intimately. By having individual talk, we can reassure students about diaries.

R: After you read, you can write notes such as well done; you can also look at that…

PT-1: It should be scheduled.

PT-3: After reading, do we give them back to the students?

PT-9: Yes, they will write, we will collect, read and give them back to students

R: You should give them back to them as soon as possible. If you do not give them in 10 days, they do not want to write again. If you show how disciplined you are, the students can write it not to break you. It also has benefits for the students. They can revise their learning, think what they had learned or could not learn and so they create awareness.

Besides from these didactical concerns, after the third week discussion, preservice teachers tended to distinguish being cognitively active from taking a part in the activity. However, in contrast to the previous week, preservice teachers stated contradictory comments about active participation. While two of them agreed that students were active since they took part in the activity and responded to the teachers' questions, PT-1 criticized the activity as not being a drama and that students were not active:

> *In the drama technique, the student must be active, but in this video, the students were doing what the teacher said like a robot, and they do not add anything from themselves. If the teacher made groups in two, students would share their thinking.*

Based on these contradictory ideas, the following discussion was conducted:

R: You have contradictory ideas about the students' active participation.
PT-1: There was a female student who always answered the questions.
PT-6: I think they were participating.
PT-3: But active participation is not only speaking. Making an activity is a kind of participation, too and almost all of them are active in the group work.
PT-11: I agree.
PT-2: The teacher asked questions, too.
PT-1: It already has a group of 10 people - all working with material or involving in the activity. But when the teacher wanted everyone to explain what they did, I think that active participation was in that part. He cannot get a feedback from anyone.
PT-8: So you say that they were not cognitively active, then?
PT-1: Doing what the teacher asked from you is a kind of compulsory participation and I think it cannot be an active participation.
R: You said something about that. In creative drama, students need to be able to say their ideas, to carry out ideas and to share them.
PT-1: That is why it is called a creative drama not the drama itself.
R: Are you saying that the students were doing what the teachers asked from them?
PT-1: I say it exactly.
PT-6: But at the other activity, the students draw and discuss the

symmetries of the shapes by interacting with their peers. They are active there.

PT-1: For that part, they were but not for the first activity.

PT-11: That's right.

In this discussion, they came to agree on that in contrast to the first activity, students were active in the second activity in the video. These were the main discussion points related with the fifth week video.

Summary of fifth week noticing and discussions

In conclusion, preservice teachers' noticing in the reflection papers varied in terms of teacher roles and student outcomes. However, for the first time throughout the five-week period, they only discussed the didactical roles and student cognitions. Specifically, they focused on the conceptualization of reflection and how the activity could have been better for students' understanding of the concept. They offered alternative materials or interventions that teachers could have made in the existing activity. In other words, students' cognitive outcomes were the main discussion issue. Preservice teachers were in tendency to focus on what the teacher did or did not for students' cognition. However, they were still inefficient in interpreting on particular students' mathematical thinking processes because of lack of expertise in transformational geometry.

While reading their reflection papers, I noticed their deficiencies in the topic. Therefore, during the group discussion, I asked them to discuss about the definitions of the certain concepts in the transformational geometry. Then, I distributed the related pages of the curriculum to support them in making connection between the concepts. This was unique for the fifth week discussion since I did not want them to make their own definition in the previous weeks. This provided self-awareness among the preservice teachers. They realized their deficiencies in the topic. Other interventions were similar to the previous weeks.

Some of the preservice teachers did not abide the rule of the community. More precisely, one of the preservice teachers did not write her reflection paper (PT-10) and also did not participate in the group discussion with two other preservice

teachers (PT-4 and PT-5). PT-1 had been the core member of the community who had directed the flow of the discussions most of the time, but he did not show similar interest in the fifth week discussion because of concept related discussions as he stated. In contrast, all other preservice teachers showed great interest in the discussion and took notes while discussing the definition of concepts.

4.2.6 Sixth week's noticing and discussions

The content of the sixth week video was angles and arcs of a circle and the students were seventh graders. The aim of the video as the teacher stated was to teach central angle, inscribed angle and their relationship. She stated that she aimed to conduct the lesson based on the discovery method. At the beginning of the video, she stated that they have learned types of angles and asked students who remembered types of angles. One of the students told the name of the angles without explaining. Then, the teacher drew an angle on the board and measured the angle by using a protractor. She stated that measure of an angle does not change even if the arms of an angle are extended. Then, she asked degree of a full rotation to one of the students and then stated that the circumference of a circle includes an arc with 360 degrees. Then, she drew a circular angle without naming and asked students the vertex of the angle to make them discover the definition of circular angle. Then, she asked how the arc and the angle were related. One of the students explained it and the teachers clarified the relation for rest of the group. Then, she described the material that she prepared as a big circular area in which every one degree was drawn on it. She put the material on the floor of the class and called twelve students to represent the equal arc of the circle. One of the students explained that each of them represented a 30 degree of an arc of the circle. Then, she continued the lesson with drawing an inscribed angle without naming again and directed questions to make student to discover the name. Next, she attached the material to the board and asked one of the students to draw a circular angle. She emphasized the isosceles triangle with a vertex of the central angle and asked students to make connection between the arc of the circle and the measure of the inscribed angle represented as

one of the isosceles angles. Then, they continued with some exercises requiring using the knowledge of the relationship between central and inscribed angles. At the end of lesson, the teacher summarized the lesson. There was a U-shaped seating arrangement with almost 20 students.

Preservice teacher's noticing about the teacher role and student outcomes had similar weights compared to the previous weeks as presented in Table 4.32. The total number of noticed issues was slightly higher since all of the preservice teachers wrote their reflections. There were rather short reflections but this did not result in the low level of noticing as it did in the fifth week. Instead, upward trend continued based on the trajectory of Noticing Theory which will be explained in detail below.

Table 4.32
Frequencies of Noticed Issues in the Sixth Week's Reflection Papers

		Weeks					
Components	Categories	1	2	3	4	5	6
Teacher Role	Subject Matter	1	3	1	2	2	4
	Didactics	71	101	104	111	113	119
	Pedagogical	16	7	20	26	12	21
	Self-referential	3	4	2	7	1	1
	Context	12	9	8	1	10	8
Student Outcome	Affective	40	27	22	30	19	16
	Cognitive	40	52	66	60	55	57
	Behavioral	10	25	31	20	12	20
Sum		193	228	254	257	224	246

It is important to note that preservice teachers did not notice any different points from the previous weeks' noticed issues. Their sixth week noted points were coded under the list of already established codes of the categories of the teacher roles and student outcomes component of teacher identity. Specifically, what preservice teachers noticed related with teacher roles and student outcomes in the sixth week video demonstrated almost equal characteristics with the fourth week. This was probably due to the positive nature of noticing similar to the fourth week that preservice teachers admired the teaching from different perspectives, and focused on the conceptualization to provide better understanding or prevent possible

misconceptions. Some of them even stated that the teacher in the sixth week video was the best among the teachers.

Related with the didactical expertise of the teacher, preservice teachers noticed almost equal issues with the teacher in the fourth week as seen in Table 4.33. More precisely, they mainly focused on how the teacher conceptualized the topic, made connection between the mathematical concepts, used mathematical language in defining the concepts, applied questioning strategy, used materials and provided opportunities for students to construct their knowledge with consideration of student differences. On the other hand, as a difference from the fifth week, technology integration, group working and using visuals while teaching mathematics were not noticed.

Table 4.33
Frequencies of Didactics Noticing in the Sixth Week's Reflection Papers

			Weeks					
Components	Categories	Codes	1	2	3	4	5	6
Teacher Role	Didactics	activity	28	17	20	5	12	4
		appropriateness to the curriculum		4	5	3	6	3
		appropriateness the objective	2	10	8	4	2	5
		assessment	1	1	3		8	
		clarifying	6	3	5	8	14	5
		conceptualization	3	6	9	19	16	18
		connection to real life	3	11	19	5	9	4
		connection between topics		2		1		8
		group working	1				7	
		homework		3		1		1
		inductive	2			1		1
		level of the students	10	6	6	11	1	10
		materials	11	21	7	22	11	17
		mathematical communication	1		4	5	5	9
		questioning		4	8	11	8	16
		solving questions/problems			8			
		student centeredness	3	4	1	12	6	10
		student differences		4	1	2	1	2
		summarizing		1		1	1	6
		technology					2	
		visuals		4			4	

Related with the other teacher role categories, preservice teachers generally stated positive comments in their noticing as can be seen in Table 4.34. Especially, they liked the seating arrangement of the class because preservice teachers supported U-shaped arrangement to manage the classroom in a more effective way and also to enable students to follow instruction more easily even in the first noticing.

Table 4.34
Frequencies of other Teacher Role Noticing in the Sixth Week's Reflection Papers

			Weeks					
Components	Categories	Codes	1	2	3	4	5	6
Teacher Role	Subject Matter	transmitting knowledge	1	3	1	2	2	4
	Pedagogical	activating all	9	2	15	8	4	6
		equity				2	3	3
		management	3	2		2	2	5
		relationships with students	2		1	5		2
		verbal feedback /encouragement	2	3	4	9	3	5
	Self-referential	communicative		1				
		dynamic	3	3		7	1	1
		role model			2			
	Context	out of class/school activities	12	1				
		class size		2			5	
		class physical context		6	8	1	5	8

Considering these teacher roles, Table 4.35 showed that preservice teachers focused on the various student outcomes in the sixth week especially on cognitive outcomes. What seemed to be important among the cognitive outcomes was the noticing based on students' mathematical thinking.

Table 4.35
Frequencies of Student Outcome Noticing in the Sixth Week's Reflection Papers

Components	Categories	Codes	Weeks 1	2	3	4	5	6
Student Outcome	Affective	attention	19	21	14	16	10	6
		confidence	3			2		2
		enthusiastic	9	4	3	8	3	2
		like teacher				1		
		like/enjoy math	6		1	3	4	4
		prejudice/anxiety	1	1	1			
		value math	2	1	3		2	2
	Cognitive	connect daily life	1	1	5		7	
		connect between topic	6	4				4
		interpretation	2	10	19	13	18	10
		learning	4	3	5	2	3	
		learning by doing	3	6	5	8	8	10
		mathematical communication	3	1	6	1		5
		misconceptions	3	4	3	16	4	6
		permanent learning	8	11	11	9	7	7
		problem solving	1		3			
		reasoning	7	6	5	10	7	9
		reinforcement	2	6	4	1	1	6
	Behavioral	express themselves				2		
		follow instruction	1	5	12	2	1	8
		participate	9	16	17	14	4	9
		peer interaction		4	2	1	6	3
		respect				1	1	

Although preservice teachers mainly noticed and made interpretations about the conceptualization of the topic and how it provided students' mathematical thinking, they were not able to deepen their noticing which resulted in the low levels in the Noticing Trajectory as seen in Table 4.36. Their noticing could not go beyond the previous weeks and the weights of the levels were almost the same with the last two weeks' noticing.

Table 4.36
Frequencies of Noticing Levels in the Sixth Week's Reflection Papers

	Weeks					
Noticing Levels	1	2	3	4	5	6
1	57	55	45	53	30	43
2	19	26	44	47	36	60
3	2	4	6	5	5	5
4	-	-	-	-	-	-

Although what preservice teacher noticed varied as it was summarized above, the main points were discussed within the group. The influence of the fourth and fifth weeks' discussions were clearly observed in the preservice teachers' reflections and the content of the discussion of the sixth week. Preservice teachers discussed only the didactical roles of the teachers and its associated cognitions. In the following part, preservice teachers' noticed issues undertaken in the group discussion were explained.

4.2.6.1 Sixth week's noticed issues undertaken in the group discussion

Accordingly, sixth week discussion started with the noticing about possible misconceptions that the students might have based on the teacher's conceptualization. More precisely, they focused on students' interpretation process and discussed the reasons and also the solutions. As it was explained above, at the beginning of the lesson the teacher explained the measure of the angle by using a protractor and she stated that measure of angle does not change even if the arms of an angle are extended. In other words, she pointed out than the length of an angle's arms does not change the size of the angle. This was an important conceptualization for understanding measurement of angles. Accordingly, PT-5 admired the teacher based on students' thinking: "S*tudents would have thought that size of the angle and the length of the angle's arms are proportional. By using the materials students learned that even if the length increase, the angle does not change.*" Two other preservice teachers who focused on this conceptualization however, interpreted it considering possible misunderstanding for inscribed angle. Specifically, they stated that "*At the beginning of the lesson, she asked if there would be any change in the*

angle if the arms of the angle were extended. I think that question can cause confusion for inscribed angle because students can perceive the arc of the circle as an indication of the angle" (PT-8) and *"The method used in the video fits central angle, but not to inscribed angle. In inscribed angle, the angle of the arc is twice the angle seen but based on the teacher's first explanation students may say that the angles are equal. In other words, it may cause misconception"* (PT-11). All of these noticed issues were evaluated as Level 3 since they focused on a specific event in the video and interpreted this event with the main focus of students learning. This possible misinterpretation was shared with the group and let them to discuss:

R: Your friends have ideas about a possible misconception.
PT-8: She said that the measure of the angle does not change even if the arms of the angles are extended. She also demonstrated it on the central angle. It is true but student make overgeneralization and think that it is applicable to the inscribed angle, too.
PT-5: She can say that it is 10 degrees, too.
R: Is it a misconception?
PT-9: I never thought that.
PT-3: Could it be because the peak points are in different places?
PT-1: It is not a misconception, the teacher could not think that. I think the students could not think it either.
PT-11: I do not agree, it may be a misconception of students in this way.
PT-9: I think it is a misconception because one of them is angle another one is arc.
R: We are drawing a curve like this, or showing the angles, it is not any curve indeed. We are drawing a curve like this, or showing the angles, it is not any curve like that.
PT-12: We should draw it from a circle. That piece should be a part of the circle. These line segments are the radiuses of the circle.
PT-3: Is that a sector of a circle?
R: You are right this is a center of the circle and this is the arc.
PT-6: We were drawing it like any curve. I liked it.
PT-11: We were always drawing a curve like a semilunar.
R: Not really, it's an arc of a circle Therefore, the circle segment drawn in the part we are subject to as an inscribed angle is not the arc of that angle. We need to center it and create something with a radius equal to this.

As it is shown in this discussion unit, preservice teachers first discussed the reason about the misinterpretation. They decided that the arc of a circle, which was considered as a basement while relating the inscribed and central angle, actually did

not represent the arc of the inscribed angle. However, they had difficulties while making interpretations because they had not thought about this issue before this video. Therefore, they questioned this for the first time and noticed the importance of possible overgeneralization.

As it was seen, PT-1 disagreed with these kinds of in-depth analysis since he thought that students were not able to question the concepts. However, the rest of the group objected his thought and warned him that he was underestimating students' thinking. Therefore, they continued their arguments and stated that it was necessary to explain the arc of the circle for inscribed angle. Then, I asked them how it was conceptualized in the curriculum. Although four of the preservice teachers (PT-3, PT-8, PT-9 and PT-11) considered curriculum in their reflections, they investigated the curriculum superficially and focused on the list of the objectives related with this topic. However, they could not notice that the inscribed angle was not covered in the concept in the revised curriculum. I raised their awareness with necessary explanations:

R: Have you look at the curriculum?
PT-3: Yes, is it wrong?
PT-11: Or missing?
R: You actually looked at it. You looked at the appropriate objectives in the 2013 curriculum. There is a big difference between 2005 and 2013 curriculum in this subject. What is the difference?
PT-8: We have not looked at 2005 curriculum.
PT-3: I think 2013 curriculum emphasizes more reasoning and questioning skills. 2005 curriculum seems to have more topics.
R: Inscribed angle is not considered in 2013 curriculum.
PTs: Really?
R: You will not teach it.
PT-3: It is a very obvious difference.
PT-11: However, I liked the method of the teacher very much.
R: Why could it be removed?
PT-9: This may be due to the misconception of this concept.
R: We are not sure, but it might be. Operationally, we can compare the measure of the center angle to the inscribed angle but we cannot conceptually.

Then, the discussion continued with the definitions of the terms used in the video. In their reflections, three preservice teachers noticed the terms that the teacher used

while defining angle. They were doubtful about naming the peak point of an angle: "*The teacher called the starting point of angle as the peak point. I have not heard of a concept of peak point. It would have been better if he had pointed it out as the starting point*" (PT-2). Similarly, all of these noticed issues were evaluated as Level 1 since they only focused on teacher's mathematical communication without interpreting the outcomes of miscommunication for students' understanding. Therefore, it was shared with the group to raise their awareness about how curriculum named the term:

R: It was said that "if the peak point of an angle is on the center of a circle, then it is called as a central angle". PT-9, PT-7 and PT-2 thought that it should not be called as the peak point.
PT-8: I noticed it too but I did not write.
PT-6: Me, too.
PT-9: The peak I know is only in the parabola.
R: So is the peak point wrong?
PT-1: He can call it as the starting point.
PT-8: It could be true. I am not sure.
PT-9: It is wrong; peak point should be on the top.
PT-8: But angle may have a peak point.
R: Did you change your mind, PT-8?
PT-8: I thought it was wrong first, but then I thought I could not hear it.
PT-1: Is starting point more appropriate?
R: Do you think the peak point causes to a misconception?
PT-1: We do not think it is wrong, but there is more appropriate one. When it was called as peak point, I want to draw it like that.
PT-9: Exactly.
PT-8: From this perspective, this is the top of the angle.
PT-9: I have looked at the curriculum, but it does not write such a thing.
R: I think you could not notice because in the curriculum and the textbooks, these terms are emphasized.

As in this discussion unit, preservice teachers connected their noticing to their existing knowledge about the content. Preservice teachers' lack of in-depth content knowledge prevented them to interpret and elaborate their noticing. Therefore, as the coordinator of the group meeting, to raise their awareness, I needed to define or explain the related concepts based on the curriculum. Similarly, I explained that minor and major arcs were removed from the curriculum after reading PT-3's suggestion for the definition of circular angle in the reflection paper:

R: PT-3 thought that definition of central angle could not be made appropriately. She proposed that the angle formed by two radiuses is called as central angle.
PT-8: It makes sense.
R: I think it makes sense, too. There are even central angle constitutes two arcs - the minor arc and the major arc. These concepts were also removed from the current curriculum. Keep it in mind.

It was important to note that at the middle of the conceptualization related discussion, PT-1 stated that such a deep analysis of the conceptualization was not necessary because he thought that students could not reason as they did. He argued that teaching strategies should have been the main topics of the discussions in the group. Except for the PT-4, who mainly focused on the pedagogical teacher roles and student affective outcomes throughout the six weeks, the rest of the preservice teachers disagreed with him. They defended that without subject matter knowledge, a teacher could not teach the topic. In addition, they stated that focusing on the concept was important to discuss the appropriateness of the teaching strategy.

PT-1: Why we are so focused on these concept? We should focus on teaching strategies instead.
PT-4: I agree.
PT-9: Because if we do not define the concept exactly, how do we teach it?
PT-12: We do not focused on them in the first weeks.
PT-8: We need to discuss definitions, how to conceptualize before teaching them.
PT-9: I noticed that I did not know the definition of angle. How could you discuss discovering definition of angle unless you could define it.
PT-1: Then, why did not you consider in the first weeks?
PT-8: Because we were not aware of its significance.
PT-6: How could you describe it without knowing your definition?
PT-8: We're trying to find out, you're taking our time.

To end up this tension among the preservice teachers, I kindly reminded the implicit rules of the community that each preservice teacher was free to share his/her ideas as long as respecting others. Therefore, I warned PT-1 to participate in the discussion when it comes to teaching methodology. When the discussion related with the definition of the concepts ended, discussion was directed to the teaching methodology in the video. As it was stated above, the teacher aimed to teach the

concept using a discovery method as she stated. However, preservice teachers had contradictory noticing about the appropriateness of the lesson to this aim. While five preservice teachers stated positive comments, three preservice teachers indicated that the methodology was not discovery, rather it was questioning. Specifically, PT-1 stated that:

> *The teacher used the questioning instead of discovery because in discovery method teacher gives an example, students think about it, then the teacher gives another example, students think on the sample and associate it with the old sample and this system is finished in seven steps on average. For this reason, I think that the method of discovery was not applied in the video.*

Similarly, PT-3 thought that the activity was not based discovery and also stated that students made an inference about the concept: "*I do not think the method of the discovery has been used effectively. In the discovery method, students make a deduction by discussing on examples and information given in a dialectical and critical atmosphere. But there was an approval of the information not deduction*" (PT-3). These kinds of noticed issues were evaluated as Level 2 since participants argued the missing points of the teaching based on the intended student outcomes with an interpretive approach. Contradictory noticing was discussed with the group as in the following:

R: The teacher said that she used discovery method in the video. While most of you found it successful, PT-1 says that it was not.
PT-1: She was asking questions, but in the method of discovery, teacher gives a sample, the student understands the sample, gives one more sample, the student understands and associates it with the previous one.
R: Let's say I'm teaching trapezoid to you, but I do not give a definition of the it. First of all, I give you a square as an example and I say that the square is a trapezoid. Then I give you a rectangle, I say it is trapezoid, too. Then, you are examining the four shapes and trying to make an inference. Then, I say that the rhombus is not a trapezoid. Eventually you are finding the definition of the trapezoid yourself.
PT-1: So this is not the method of discovery, instead it was questioning.
PT-8: Absolutely.
PT-9: You may be right as a method, but I still think that students make their own definitions.
PT-1: What she intended and made were different form each other. Through questioning, she has increased students' participation but

permanence could not be achieved through this.

PT-8 That is, students are not aware that concepts are related.
PT-1: I think that students were not reasoning. They were saying what they see, they did not think.
PT-4: She taught on the board and passed it.
PT-12: It could be related with the limitation of the video. It was too fast, there were not enough time for students' thinking. I still liked the way the teacher used in the video.
PT-11: Me, too.

As it was seen in this discussion unit, preservice teachers focused on the teaching method considering students' cognitive outcomes. They argued that students did not reason about the concept as the teacher claimed. In other words, they agreed that students were not cognitively active in the process.

It was important to note that students' participation was implicitly discussed in the last week. Similarly, real life connection did not take such a place as in the previous weeks. However, it was discussed with the group since PT-12, who was one of the preservice teachers who admired the teachers' teaching, stated that the only missing point in the lesson was lack of real life examples. More precisely, he stated that *"The single thing that I evaluated as missing in the video was related with lack of daily life examples. She could emphasize the value of mathematics in daily life."* It was stated with an interpretive approach, which demonstrated the characteristic of Level 2. Since three other preservice teachers noticed that real life connection was missing in the lesson without any offering, PT-12's idea was shared with the group:

R: PT-12 said that the only missing point in the video was lack of daily life examples.
PT-11: Exactly, but how could she give an example?
PT-12: She could give an example of cake. She could demonstrate the central angle on it.
PT-11: Well, it's really logical.

This was the end of the sixth week discussion. Weight of this discussion unit was considerably less compared to the previous weeks' discussions.

Summary of the sixth week's noticing and discussion

In conclusion, in contrast to the previous weeks, sixth week noticing and discussion were not unique for several reasons. First one was related with the coverage of the reflections. Noticed issues were not different from the previous weeks. Instead, noticing showed almost equal weights with the fourth week. Similarly, some of the preservice teachers admired the teaching and stated that it was the best among the videos. Positive nature of noticing, on the other hand, directed preservice teachers offering suggestions instead of making criticism. Therefore, most of the discussion points were not about the contradictions, rather they evolved from the suggestions related with conceptualization and associated student learning. In addition, discussion points were not different from the fifth week that the only discussed points were related with the didactical roles and student cognitions. Specifically, they focused on the conceptualization of the angles of the circles and how it enables students' interpretations. The dominating level of the noticing was again Level 2, which could be shown as a third reason of the inauthenticity of the last week.

For the last week video, all of the preservice teachers sent their reflections via e-mail but one of them (PT-7) did not attend the group discussion. Preservice teachers had roles similar to their roles in the fifth week in the discussion. More precisely, during the conceptual related discussion, while some of the preservice teachers (PT-3, PT-6, PT-8 and PT-9) took notes and actively participated, others (PT-2, PT-5, PT-10, PT-11 and PT-12) listened and hardly ever participated. On the other hand, PT-1 and PT-4 did not show any interest to these points until the other issues came into the prominence. As the coordinator of the group meeting, I had certain roles similar to the previous weeks. There was not any different intervention.

4.2.7 Summary of preservice teachers' noticing in the video case-based community

The assumptions underlying the video case based community was that preservice teachers would notice and discuss based on their professional identity

orientations. They noticed and discussed what they thought as essential in teaching mathematics in terms of teacher roles and associated student outcomes. Nevertheless, preservice teachers were novice in noticing and interpreting at the beginning of the community. They developed their noticing repertoire and interpreting skills through the group discussion. Although the categories of teacher role and students' outcome components of teacher identity were not mutually exclusive, what and how preservice teacher noticed for each category throughout the six-week period was summarized below.

Table 4.37
Percentages of What Preservice Teachers Noticed

Components	Categories	Percentages
Teacher Role	Didactics	44,2
	Pedagogical	7,3
	Contextual	3,4
	Self-Referential	1,3
	Subject Matter	0,9
Student Outcome	Cognitive	23,5
	Affective	11,0
	Behavioral	8,4
	Total	100

As it is seen in Table 4.37, didactical expertise was the most emphasized teacher role throughout the six weeks. Preservice teachers noticed and discussed the didactical expertise of the teachers with different perspectives, which was expected considering the content of the videos. Therefore, there was a need to analyze the trends in the didactical noticing through the weeks. The analysis of the frequencies for each week showed that some of these noticed issues were not observed in an on-going basis. For example, *group working*, *technology integration*, *assessment*, *inductive teaching*, *solving questions*, *summarizing lesson* and *using visuals* were the noticed issues observed only in few of the weeks. This was directly related with the content of the videos because these points were not featured in each video. Therefore, preservice teachers generally commented positively about them or stated

their suggestions when they saw them clearly in the videos. However, they did not need to discuss the absence of these points in other videos.

The rest of the didactical points was observed in an on-going basis with different weights. *Making activity*, *using materials*, *clarifying concepts*, *mathematical communication*, *student centeredness*, *making connection to real life and between the concepts*, *using questioning strategy*, *designing the lesson to the objectives of the lesson and to the curriculum*, and *conceptualizing the topics* were observed in each week's reflections. At the first weeks of the community, the most emphasized didactical roles were *connecting daily life*, *making activities* and *using materials*. However, preservice teachers were novice in noticing and interpreting their noticing. Therefore, they mainly admired or criticized the teacher in existence or in absence of these points which caused the dominating noticing level as the Level 1. During the discussions in these weeks, I purposefully brought the contradictory didactical points in the forefront to create a discussion environment. Therefore, preservice teachers had opportunities to explain their ideas and interpret others' perspectives related with teaching mathematics. In addition, I emphasized conceptualization related noticing which evaluated in higher levels in the noticing trajectory to gain others' attention to those noticing and to improve their noticing repertoire. As another interruption to the discussion environment, I distributed the related pages of the curriculum and the books and asked them to investigate in order to provide understanding how the already noticed issues were handled in these tools.

First three weeks' discussions transformed preservice teachers' noticing to different issues in the followings weeks. Instead of stating *making an activity* or *using material* provided understanding for students, they started to focus on the process of teaching and learning which increased their noticing level. They started to notice about didactical roles to increase students' participation such as *student centeredness of the lesson* and *using questioning strategy* starting from the fourth week. In addition, they reasoned about how the teachers selected the *materials* or designed the *activities* for *active participation* and they commented about didactical roles of the teachers for making students cognitively active in the process.

Therefore, the frequency of behavioral student outcomes related noticing was decreased in the last weeks.

The fourth week noticed issues were critical in emphasizing the teacher's *conceptualization*. Preservice teachers focused on how the teacher defined the terms in the video and what could be the product of these conceptualizations. However, they generally stated that defining the concept as in the video may cause *misconceptions* for the students but they were not able to interpret the students' thinking processes in detail. Therefore, I posed questions about students' interpretation process and alternative conceptualizations during the discussion. Then, in the followings weeks, they started to interpret what they noticed about teachers' *conceptualization* based on the students' thinking processes.

Only few of the preservice teachers could increase their reflection skills about conceptualization to upgrade their level of noticing to Level 3. There were several reasons of this. First and foremost, preservice teachers could not elaborate their noticing because of lack of content knowledge. They noticed incorrect issues about the *conceptualization* which may cause overinterpretation and misinterpretation of the concepts for the students, but they could not analyze students' thinking processes in detail and offer alternative strategies. Therefore, the dominant noticing level did not go beyond Level 2 in six-week time.

Preservice teachers seemed to enhance their content knowledge benefiting from the curriculum to some degree. As it was stated, in the first week reflections, none of the preservice teachers considered curriculum in their analysis. Then, they started to reflect video in terms of *appropriateness to the curriculum*. However, generally the same preservice teachers benefitted the curriculum in their analysis and they were able to state noticing in Level 2 and Level 3.

In conjunction with the change in didactical noticing and the experience in noticing, preservice teachers focused mainly on the process of students' cognition. In the first weeks' noticing preservice teachers generally associated didactical roles to the cognitive outcomes but stated these outcomes as products generally with the following expressions: "since the teacher used …. (a didactical role), students could

learn/interpret/learn by doing or it provided *permanent learning*." They even stated students' *misconceptions* as a product of a teacher' didactical role, but they were not able to explain the students' thinking process in these products which brought about the Level 1 noticing dominated the fourth week. It was important to note that after the first three weeks, trends of what preservice teachers noticed about cognitive outcomes did not change unlike didactical expertise noticing. Nevertheless, how they noticed and interpreted were enhanced with the gained experiences. This resulted in differences in the dominating noticing levels in the first three and last three weeks.

While students' affect-related outcomes were in demand in the noticing and the related discussions for the first weeks, weights of the outcomes were changed toward behavioral and mainly cognitive outcomes in the last weeks. However, *students' attention*, which was evaluated under affective outcome category, maintained its importance because preservice teachers considered students' attention as a prerequisite for understanding the concept. In addition, gaining attention was generally stated in the group discussions through *using material* and *giving daily life examples* as didactical teacher roles.

Preservice teachers prioritized students' *enthusiasm* and *enjoyment* in learning mathematics and their understanding the *value of mathematics* in life almost in their reflections almost every week. These points were generally associated to *teachers' relationship with students*, *verbal feedbacks* as pedagogical teacher roles and *teacher dynamics* as a self-referential characteristic. These reflections generated Level 1 noticing.

Similarly, *following instruction* and *peer interaction* as behavioral outcomes generally demonstrated the characteristics of Level 1 noticing since they focused on students' outcomes in an indirect way through a descriptive or evaluative approach. On the other hand, *students' participation* was not considered only as a behavioral outcome after the third week discussion. Preservice teachers realized that the students in the role playing activity were not *reasoning* about the concept although they had an active role in the third week video. Therefore, they concluded that being

cognitively active through *making interpretations* and *reasoning* about the concept were more important for learning mathematics. They started to interpret *students' participation* as a behavioral outcome with students' thinking processes. Hence, preservice teachers' noticing about students' activeness generated more detailed codes which affected the trajectory of their noticing.

While thinking about making students behaviorally or cognitively active, preservice teachers reasoned about the equity in participating. Preservice teachers interpreted whether the teacher provided equal opportunities in participating the activity or in the class discussions by the *activating all* noticing, which was the most emphasized pedagogical teacher role in each week. In addition to *activating all*, *providing verbal feedbacks* to increase students' *confidence* or decrease their level of *anxiety* was an emphasized pedagogical role in each week's reflections. Together with the other points which were not continuously noticed, pedagogical teacher roles constructed only the 7.3 percent of what preservice teachers noticed. None of the noticed pedagogical roles demonstrated a specific trend throughout the six weeks.

In contrast to *providing feedbacks*, *activating all* of the students took part up to the fifth week discussion considering the contextual factors in the video. More precisely, students' behavioral outcomes were generally associated to arrangement of the context which covered up the 3.4 percent of the noticing. Although *class size* and the *out of class activities* were not in the scope of the reflections, *physical context of the classrooms* gained preservice teachers' attention in almost all of the weeks. These noticed issues were evaluated either as Level 1 or Level 2 based on the other noticed issues in the same idea unit.

Only 1.3 percent of the noticed issues were related with the self-referential characteristics of the teachers in the video. Preservice teachers stated their comments about the teachers' *dynamics* in the lesson which was stated in relation with the teachers' *relationship with the students* as a pedagogical role and with the students' affective outcomes such as *being enthusiastic*, *liking mathematics* and *paying attention*. However, it did not create a rich discussion environment; preservice teachers stated only what they thought about the issue.

Although the percentage of the teachers' subject matter expertise noticing in the reflection papers was very low, they were discussed with the group because of preservice teachers' contradictory ideas in this issue. The main contradiction was related with being a subject matter expert who directly gives the rules and definitions of the concepts or being a facilitator who guides students to construct their own knowledge. While some of the preservice teachers criticized the teacher as giving the knowledge directly, some of them considered *transmitting knowledge* as the center of the teaching. After the related discussion, most of them agreed that *transmitting knowledge* was the centre of the teaching mathematics and teachers had to transmit the knowledge when it was necessary. However, they did not conclude about the extent of the knowledge to give to the students directly. It remained as issue of conflict for the preservice teachers.

Even though the discussions were held mainly about students' outcomes, preservice teachers wrote their reflections and participated in group discussions with a teacher's eyes. They imagined themselves as the teachers of the classrooms and reflected on student outcomes through the roles of those teachers. Therefore, student outcomes were generally stated as a product of teaching in the reflection papers. This resulted in the dominant level of noticing as Level 1 or Level 2 even in the last week's reflections as seen in Table 4.38. Only few of the preservice teachers were able to focus on the particular students' outcomes and to interpret what they noticed. This was the reason for the low frequencies of Level 3 noticing in each week. None of the noticing, on the other hand, exhibited the features of Level 4.

Table 4.38
Percentages of How Preservice Teachers Noticed

Noticing Levels	Week-1	Week-2	Week-3	Week-4	Week-5	Week-6
1	73.0	64.7	47.4	44.8	42.3	39.8
2	24.4	30.6	46.3	50.5	50.7	55.6
3	2.6	4.7	6.3	4.7	7.0	4.6
4	-	-	-	-	-	-

First three weeks' discussions were important to raise preservice teachers' awareness about what others noticed and interpreted about the video. To increase their noticing repertoire, what they found as positive and negative was demonstrated to the preservice teachers before starting to discuss about them. Therefore, they realized others' perspectives and considered those perspectives in the following reflections. This increased the diversity of the noticing. Preservice teachers did not notice a new issue that was not discussed before in the last reflections.

Discussions were generally conducted based on the preservice teachers' contradictory ideas. Seeing contradictory ideas generally made preservice teachers enthusiastic to join the discussions and directed them to participate and explain their ideas. However, if the issue of conflict was not related with the concept of the video and how such conceptualization might cause misinterpretations, then preservice teachers insisted on their ideas. They tried to understand others' perspectives but they insisted on their ideas most of the time. Therefore, a common understanding was not achieved.

If the issue of conflict was related with the students' learning processes and their participation as an outcome of the teachers' conceptualization or the teaching strategy, then richer discussion environment was established. More precisely, preservice teachers made an effort to understand the ideas that they did not think about in their reflections because they generally attributed their ideas to the knowledge gained from a tool such as curriculum, textbook, KPSS books, KPSS dershanes or the courses taken. Conceptualization based discussions gained most of the preservice teachers' attention. They even took notes, asked further questions to understand the topic in detail and appreciated their friends for noticing such details in the video. These kinds of discussions generally developed a common understanding.

4.3 Preservice Teachers' Identity Orientations after Video Case-Based Community

In this part of the chapter, preservice teachers' professed identities after working with video cases were investigated. During the interviews preservice

teachers were not directly asked what they saw essential and valuable in teaching mathematics, which represented their professional identity orientations as in the initial interviews. Rather, their identity orientations were examined through comparing themselves as future mathematics teachers to the teachers in the videos.

During the interviews, as in the practices of video case-based community, preservice teachers expressed the positive and negative points of the videos in terms of teacher roles and student outcomes, representing the components of teacher identity in the present study. Also, they compared themselves as future mathematics teachers based on those negative and/or positive points. They mainly preferred to start talking about positive roles and student outcomes that they wanted to take in their future teaching. Some of them identified their favorite teacher(s) or considered positive sides of the teachers to describe themselves as in the case of PT-6:

> *Every teacher added something. We need to combine each of them. I think I should take the positive sides of the activities as an example. I cannot indicate a teacher because sometimes you like the material of a teacher, but you do not like the relationship with the class or vice versa. I can be a teacher who takes care of all this.*

Moreover, they criticized the teachers in terms of teacher roles and student outcomes that they wanted to fulfill. Therefore, both positive and negative points of the teachers that preservice teachers pointed out represented their identity orientations as future mathematics teachers because all of them indicated what preservice teachers saw essential and valuable in teaching mathematics.

Table 4.39 demonstrates the weights of the preservice teachers' focused points related to the teacher role and student outcome components of teacher identity before and after working with video cases. In this regard, preservice teachers' post identity orientations were explained compared to their initial identity orientations. In the following parts of this section, preservice teachers' identity orientations were presented with comparison to the findings reported in section 4.1.

Table 4.39
Percentages of the Preservice Teachers' Identity Orientations before and after Video Case-Based Community

Components	Categories	Before	After
Teacher Role	Didactical	30.1	31.8
	Pedagogical	12.5	16.1
	Subject Matter	8.8	3.6
	Self-Referential	6.0	10.8
	Contextual	7.8	1.8
Student Outcome	Affective	18.9	14.8
	Cognitive	8.4	12.6
	Behavioral	7.5	8.5
	Total	100	100

4.3.1 Preservice teachers' didactical orientations

Preservice teachers emphasized being a didactical expert the most both before and after working with video cases. Although weights of the didactical category were approximately the same, emphasized roles and the associated student outcomes were transformed in a considerable extent as represented in the Table 4.40. It is significant to note that some of the codes were not observed in the post orientations or some of them only appeared after the video case-based community. All of them were listed according to their weights to highlight the transformation in the orientations.

As demonstrated in Table 4.40 above, after video case-based community, preservice teachers emphasized several different didactical roles: Conceptualization of topic, mathematical communication, student centeredness, and clarifying. In contrast, consideration of level of students, technology integration, using visuals, solving questions and giving homework were not observed in preservice teachers' priorities after video case-based community. Other didactical roles were attributed as valuable both before and after the video case-based community. However, there was a considerable change in preservice teachers' emphasis. These didactical roles were using materials, making connection between topics, connecting real life, making activity, using questioning strategy, making assessment and consideration of student differences. In the following parts, preservice teachers' orientations after

video case-based community related with these didactical roles were explained compared to their initial orientations. Weights of the roles determined the flow of the following paragraphs

Table 4.40
Preservice Teachers' Didactical Orientations before and after Video Case-Based Community

	Before	After
Didactical Orientations	Making activity	Conceptualization[2]
	Use materials	Use materials
	Solving questions	Connection between topics
	Connect real life	Connect real life
	Level of students[1]	Making activity
	Assessment	Student centeredness[2]
	Student differences	Questioning
	Technology integration[1]	Mathematical communication[2]
	Using visuals[1]	Clarifying[2]
	Questioning	Assessment
	Homework[1]	Solving questions
	Connection between topics	Student differences
Attributed Student Outcomes	<u>Affective (44%)</u>	<u>Affective (18%)</u>
	Attention	Attention
	Like math[1]	
	Enthusiasm[1]	
	Prejudice[1]	
	Valuing Math[1]	
	<u>Cognitive (40%)</u>	<u>Cognitive (67%)</u>
	Permanent Learning[1]	Connection between topic[2]
	Reinforcement	Connection for real life[2]
		Misconception[2]
		Interpretations[2]
		Reasoning[2]
		Reinforcement
	<u>Behavioral (16%)</u>	<u>Behavioral (15%)</u>
	Participate	Participate
	Peer interaction[1]	Expressing themselves
	Expressing themselves	

1 the teacher roles or student outcomes not professed after the video case-based community
2 the teacher roles or student outcomes professed only after the video case-based community

Conceptualization of the topics, which was not an issue before the video case-based community, was the most emphasized didactical role in preservice teachers' post identity orientations. Preservice teachers compared themselves to the fourth, fifth and sixth weeks' teachers in explaining their conceptualization related

roles as future mathematics teachers. They admired the sixth week teacher the most because they thought that she was the best in organizing the concepts and making connections between them. Most of the preservice teachers stated that they wanted to be exactly like her in terms of conceptualization:

> *In the last week, although we were quite experienced in criticizing the videos, I could see very few deficiencies. The teacher planned it carefully and she associated the inscribed and central angel very well. We talked about a possible misconception, but I loved the content of the way the teacher handled the subject, there was no missing concept. It was as it should be. I said that I should be like this. (PT-3)*

There were not any negative comments about sixth week teacher's conceptualization in spite of the possible misconception-related discussions during the group meeting. However, fifth week and fourth week's teachers were criticized in terms of their conceptualization. Preservice teachers stated that they did not want to be teachers like them. Related with the fifth week teacher's conceptualization PT-11 stated that:

> *There was a concept related deficiencies in that video. There was no emphasis for some of the properties of symmetry and this could cause misconception as we discussed. I do not want to make mistakes that he does. Before I teach a topic, I will pay attention to consider all of the properties of a concept.*

Similar critics for the fourth week's teachers reflected preservice teachers' identity orientations: "*As a teacher, you need to pay attention to every word that comes out of your mouth. So if I say something wrong and incomplete like that teacher in the circle video, I could cause a misconception in the students. I will pay much attention to conceptualization"* (PT-1).

As in the above examples, teachers' conceptualization of the topics was generally stated together with making connection between topics and using mathematical communication appropriately, which were considered as other didactical roles. More precisely, preservice teachers focused on the importance of making connections between the topics and using mathematical communication appropriately to elaborate their ideas related with conceptualization. In all of the related orientations about conceptualization, connection between topics and

mathematical communication, and students' misconceptions were associated with possible outcomes of these didactical roles.

As the reason of their orientations, some of the preservice teacher referred to their friends who were successful in noticing students' misconceptions and attributing this to teacher's conceptualization. They stated that if they had not noticed such misconceptions, they would never understand the importance of conceptualization as future mathematics teachers: "*For example, I never thought about the misconception that PT-8 noticed regarding the inscribed angle. I have seen teachers' conceptualizations could cause misconceptions in the students"* (PT-2). In addition, one of the preservice teachers indicated my role related with curriculum awareness:

> *For example, if you did not say that the inscribed angle was removed from the curriculum and if we did not discuss the relationship between the inscribed and central angle, I would teach inscribed angle similar to the way the teacher did in the video. Now I know why I should not teach.* (PT-6)

PT-3 also associated my explanations as the reason of her conceptualization related awareness: "*For example, in the week of reflection, you asked us the difference between reflection and symmetry. I had not known the difference. Since many of us could not know explain, you intervened and explain it to us. I learned a lot from there."* Regardless of the reasons, video case based community seemed to increase preservice teachers' awareness in these issues and transformed their identity orientations.

In contrast to post orientations, using materials and making activities were the most emphasized didactical roles before the video case-based community. Preservice teachers generally stated that they could benefit from the materials before teaching the topic to gain students' attention and to make them enthusiastic about the topic or enjoy learning activities. Making activities, on the other hand, was for the reinforcement of the concept and to provide permanent learning. This showed that preservice teachers did not have deeper ideas about using materials and making activities for students' cognition before the video case-based community.

During the post interviews, they emphasized using materials and making activities once more. However, this time, the meaning of the activities changed considerably. They realized that teachers can use materials and make activities not only in the beginning and end of the lesson but also during teaching and learning process. Related with this, some of the preservice teachers stated that watching videos provided an understanding of how the theoretical ideas they learned in the teacher education could be implemented in the lesson:

> *We see many things in the courses, but here we see their implementations. For example, we learned creative drama in teacher education but we see how it can be applied to the lesson through one of the videos. I saw how the symmetry mirror can be used in the other video. I even had a chance to see the geometry board.* (PT-6)

Although the content of the videos was cited as the reason of the related didactical orientation, none of the teachers in the videos was referred as a role model by the preservice teachers. Preservice teachers stated the teachers' roles in the videos. Accordingly, second week video was stated as the worst video for using materials in teaching mathematics. Although they stated that they had opportunities to observe different materials in the concept of polygons, they criticized the teacher in terms of not using these materials effectively. They stated that in contrast to the teacher in the video, they will provide their students opportunities to interpret and reason about the polygons and construct their own knowledge by using those materials: *"We saw lots of materials about polygons, but all were allocated short time. If I were the teachers, I would ask questions about the materials and want students to generalize what polygon is"* (PT-8). Therefore, they could elaborate their material and activity related orientations after the video case-based community.

Providing students opportunity to construct their own knowledge as in the above example was another didactical role, student-centeredness, which was observed in some of the preservice teachers' orientations after the video case-based community. They described the role of a teacher in student-centered approach as a facilitator who applies questioning strategy and clarifies the concepts when it is necessary to develop students' cognition. Related orientations generally arouse while comparing themselves to the teacher in the third week video:

> *Unlike him, I should guide students more. So I should give the students the opportunity to create their own knowledge. I should support them in this process, I should give clues when necessary, I should not say direct result so students can think.* (PT-11)

As a similar orientation, PT-1 indicated students' independence in learning mathematics as an intention for his future teaching: *"To give autonomy to students. They can do something themselves, I'm basically aiming to build it."* They addressed group discussions as a reason of their students-centeredness related orientations. For example, PT-1 stated that group discussion developed self-awareness related with their previous experience:

> *I cannot be a guide, but I think that students learn better through guiding. No I am thinking that students also have the right to speak and should be allowed to express themselves. I should give clues, ask questions, give feedback. I'm actually showing the right side of myself. I cannot be a guide, I have to be a guide. I noticed that in this phase.*

In this orientation, PT-1 intended to make students active in their learning process which was analyzed as a behavioral outcome.

Using questioning strategy was also emphasized during the initial interviews. However, most of the related orientations were stated for the assessment of the students as another didactical role. They had a general point of view that teachers should question students to understand their mathematical level and arrange their lessons accordingly. Therefore, students' mathematical learning through questioning was indirectly intended before the video case-based community. Questioning was stated as a teacher role for students' cognitive related outcomes explicitly in the post interviews as explained above.

Although assessment as a teacher role was stated before and after the video case-based community, its weight in post didactical roles almost disappeared. Preservice teachers referred to the mathematics journals in the fifth week video as an example of an assessment technique that they might benefit in future: *"The only way I like it is those diaries, because students become aware of what they learn and repeat. I hope I can use them regularly"* (PT-1).

Making connection to the daily life was an important issue in preservice teachers' didactical orientations both before and after participating in the video case-

based community. However, while all of the preservice teachers mentioned the importance of making connection to real life before the video case-based community, only three of them prioritized real life connection in their post identity orientations. Similarly, these three preservice teachers stated that daily life connection is important for student' attention to the topic and to highlight the value of mathematics. Third week video, despite all other critics, was appreciated in terms of real life connection. PT-5 even indicated it as the best video that she also wanted to perform: "*I also liked the third video because it connected to daily life. Students often ask where they use the topic in daily life. It was nice for this reason. I want to do what she does. I mean I make connection to daily life.*"

Preservice teachers' post orientations were associated with students' cognitive outcomes to a great extent. Affective outcomes were associated in daily life connection and in using materials and making activities related orientations as stated above. Participating in lesson was stated as the only behavioral outcome while stating the importance of considering students' differences: "*When I was interpreting the videos, I focused on whether the teacher considered various ways for different students to make them participate in the lesson. It was important for me*" (PT-10).

4.3.2 Preservice teachers' pedagogical orientations

As in preservice teachers' initial orientations, pedagogical expertise was placed the second most frequent orientation after the video case based community. Although the percentage of the category was increased, preservice teachers did not mention a further pedagogical role in their post orientations as represented in Table 4.41. Relationship with students, activating all of the students, feedbacks, classroom management and equity were the issues in preservice teachers' pre and post orientations. In the following parts, preservice teachers' orientations after video case-based community related with these pedagogical roles were explained compared to their initial orientations. Weights of the roles determined the flow of the following paragraphs.

Table 4.41
Preservice Teachers' Pedagogical Orientations before and after Video Case-Based Community

	Before	After
Pedagogical Orientations	Relationship with students Equity Classroom management Giving feedbacks Activating all of the students	Relationship with students Activating all of the students Giving feedbacks Classroom management Equity
Attributed Student Outcomes	<u>Affective (39%)</u> Confidence Enthusiasm Like teacher Like math	<u>Affective (47%)</u> Attention[2] Like math Prejudice Confidence Like teacher
	<u>Cognitive (4%)</u> Learning	<u>Cognitive (3%)</u> Learning
	<u>Behavioral (57%)</u> Expressing themselves Respect[1] Follow instruction[1] Participate Peer interaction[1]	<u>Behavioral (50%)</u> Participate Expressing themselves

1 the teacher roles or student outcomes not professed after the video case-based community
2 the teacher roles or student outcomes professed only after the video case-based community

Establishing relationship with students was again the most emphasized pedagogical role. Preservice teachers maintained their orientations related with establishing relationship with students through balancing their role between being authoritarian and friendly: "*I try to arrange relationship with the students between very close to too distant like a friend to disciplined teacher*" (PT-2). Nevertheless, after the video case-based community, most of the preservice teachers elaborated their ideas by explaining their intentions of establishing such relationship with students and by referring to the teachers in the videos.

The teacher in the fourth week video was attributed as a role model since she was nice to the students in contrast to the other teachers: "*I want to be the teacher having good relationships with students. I want students to be able to ask questions and express themselves*" (PT-7). Preservice teachers who admired the fourth week teacher discussed that the teacher's success was related to her dynamism which was

categorized under self-referential category. They attributed a pedagogical role to the teacher's characteristics which was explained in detail in self-referential related orientations.

In similar conversations during the post interviews, preservice teachers criticized the other teachers in terms of their relationships with students. They stated that other teachers were very authoritarian and disciplined, and talked to the students as if they were giving orders:

> *I did not like the teacher in the last video. In fact, she used a lot of materials but she was very cold against the students and she was talking like a boss. I'll behave more warmly and more gently to the students so that the students can be comfortable, ask questions without fear and express themselves.* (PT-11)

As it was seen in the above examples, preservice teachers emphasized students' ability to express themselves without any hesitation and participate the class discussion in their post orientations. This demonstrated that the way the preservice teachers emphasized student-teacher relationship was transformed considerably because liking and respecting teachers were the only attributed outcomes before the video case- based community.

In contrast to the didactical roles explained above, in their student-teacher relationship orientations, preservice teachers not only addressed the video case-based community, but also referred to their mentor teachers in school experience course and the courses that they took during the same semester at the time of the video case-based community. Related with the courses, they stated that in *counseling* and *special education* courses, they learned how to approach students especially to the ones who need special education:

> *We learned how to approach children who need special education in special education course. If we did not take that lesson, we could not know how to behave to those students and our attitude might be different. We learned how to approach those students. In counseling course, we learned how we can understand the students and how much we can contribute to their problems because being a teacher is not only teaching mathematics.* (PT-6)

Accordingly, knowledge acquired within these courses raised their awareness about their role in relationship with their students as future pedagogical experts.

Preservice teachers also compared themselves as future mathematics teachers to their mentors in their relationship with their students. Some of the preservice teachers addressed their mentor teacher who had more than thirty years of experience as a role model for them: *"She was saying such as what do you feel like doing this and I really feel very sad or I am happy to see it - in communicating to the students. She became a role model for me in establishing relationship with students"* (PT-9). Other preservice teachers' mentor teacher was a young teacher having only three years of experience. Preservice teachers criticized him in terms of his relationship with students:

> *He was an authoritarian teacher. He was not smiling. Sometimes he gave harsh reactions. When the students asked a question, he yelled them. The students in the back were never interested in the lesson, the teacher was not interested in them, and he was just being good to the hardworking students. For me, he was not an example at all.* (PT-11)

In her criticism, PT-11 actually emphasized the importance of equity in student teacher relationship which was an important point in preservice teachers' orientations before the video case-based community. In that time, preservice teachers, by referring to their negative experiences as students, stated that they will treat every student equally in the classroom. This treatment also included providing equal learning opportunities. However, equity was not one of the main issues in preservice teachers' orientations after the video case-based community. Their focus was transformed from equity to activating all of the students. Activating all of the students was also derived from the equity related issues but, encouraging all of the students' participation to the lesson was the main issue.

Third week video and related group discussion were important in understanding this transformation because preservice teachers realized that taking part of the activity was not an evidence for students' activation:

> *I understood this during the discussion because the PT-5 said that all students were cognitively active. For that video, we thought that only the students who acted in the drama were active. Then we realized that even they were not active. I noticed that we criticized very superficial in the reflection papers. (PT-7)*

They understood that what was more important was to make all of the students cognitively active in contrast to the third week video. Therefore, activating all of the students were attributed to both behavioral and cognitive outcomes after the video case-based community in contrast to the initial orientations and the noticed issues before the third week discussions.

Preservice teachers' pedagogical orientations before and after the video case-based community shared similarities in terms of the way they emphasized feedbacks. Preservice teachers did not place special emphasis on this role and only referred it by elaborating their student teacher relationship orientations. Accordingly, the teacher in the fourth week video was attributed as a good example in giving feedbacks: "*She was giving feedback, such as she said Bravo. I think I will use them all the time"* (PT-8). In these kinds of orientations, students' enthusiasm and anxiety in learning mathematics were again the attributed outcomes. For example, PT-11, by comparing herself to the sixth week video teacher stated that: "*She was more formal. I want to be warmer. She just said thank you I would like to use a different reinforcement like bravo, well done to make my students enthusiastic and anxiety free.*" Therefore, video case-based community did not seem to directly affect preservice teachers' related orientations.

The last and the least emphasized pedagogical role after the video case-based community was related with classroom management. Similar to the initial orientations, classroom management was not directly related with student outcomes; rather they were expressed as a requirement for other teacher roles and especially didactical roles: "*Classroom management comes first. Although we pay attention to the conceptualization, make plans and be prepared, it does not matter unless we cannot manage the classroom*" (PT-1). One of the preservice teachers indicated school experience as a reason for emphasis on classroom management: "*It seemed to me that all the students would pay attention and listen to their teacher, but when I went to the internship, I saw the reality. I understood that teaching is not so easy and classroom management is essential to practice what I wanted to implement*" (PT-9).

4.3.3 Preservice teachers' self-referential orientations

The weight of the preservice teachers' self-referential orientations was increased after the video case-based community as seen in Table 4.39. Although the percentage of the category was increased, preservice teachers did not express some of the personal characteristics that they emphasized before the video case-based community. More precisely, being communicative, consistent, productive and self-confident teachers were not observed in preservice teachers' post orientations. Other self-referential roles were attributed as valuable both before and after the video case-based community. However, their emphasis was changed considerably. These characteristics were being dynamic, responsible and role model. All of these transformations were highlighted in Table 4.42. In the following parts, preservice teachers' orientations after video case-based community related with these self-referential characteristics were explained compared to their initial orientations. Weights of the roles determined the flow of the following paragraphs.

Table 4.42
Preservice Teachers' Self-Referential Orientations before and after Video Case-Based Community

	Before	After
Self-Referential Orientations	Dynamic	Dynamic
	Communicative[1]	Responsible
	Idealist[1]	Role Model
	Consistent[1]	
	Productive[1]	
	Self-confident[1]	
	Responsible	
	Role Model	
Attributed Student Outcomes	<u>Affective (85%)</u>	<u>Affective (77%)</u>
	Attention	Attention
	Confidence[1]	Like teacher
	Like math	Like math
	Like teacher	Enthusiasm
	Enthusiasm	Prejudice[2]
	<u>Behavioral (15%)</u>	<u>Behavioral (23%)</u>
	Respect[1]	Participate
	Study for the lesson[1]	Expressing themselves

1 the teacher roles or student outcomes not professed after the video case-based community
2 the teacher roles or student outcomes professed only after the video case-based community

It is important to note that being a dynamic teacher was the most emphasized self-referential characteristic. By referring to the teachers in the videos, preservice teachers stated that they wanted to be a dynamic teacher in the lesson. In other words, they wanted to be energetic and funny to attract students' attention to the topic. This is the main reason why the fourth week teacher was associated as the role model for some of the preservice teachers. They even ignored her deficiency in conceptualization because they focused on being a dynamic teacher like her: *"She had misconceptions and deficiencies, but she was good at attracting attention and increasing motivation because she was excited, eager and dynamic. I can be like her*" (PT-2). Similarly, PT-4 criticized the sixth week teacher in spite of appreciating didactical expertise of the teacher:

> *The teaching of the last weak video was good but it was monotone. It was intended to teach not to attract attention. Students want funny activities. They will be happier in such activities. She taught in good way but I want to make student enjoy. I would perform it like the dynamic teacher in the fourth week. For example, I want to be more active and more energetic.* (PT-4)

Being a dynamic teacher shares similarities in terms of the attributed student outcomes. As it was seen in the above examples, gaining students' attention, increasing their enthusiasm and making them to enjoy learning mathematics were the main intentions. Moreover, being a dynamic teacher was also stated as a requirement for establishing friendly relationship with students:

> *For example, there was a teacher who entered class with hullahop, she was a very lively. I also want to be like her. This is also important for relationships with students. There was not a distance between the teacher and the students. On the contrary, there was a more intimate and warm atmosphere in the classroom.* (PT-3)

Another personal characteristic that preservice teachers focused on was being a responsible and role model teacher, which was stated as a combined role. However, compared to their initial orientations, weights of these roles were decreased. Only two of the preservice teachers emphasized fulfilling their duty as a teacher by representing a role model for the students. For example, PT-4 stated that: "*I do not want to be a teacher who juts teaches mathematics. The teacher has some*

responsibilities toward the students. Students take their teacher as a role model for them, talk about and remember them even after years."

4.3.4 Preservice teachers' subject matter orientations

After the video case-based community, preservice teachers' subject matter orientations decreased considerably (see Table 4.39). Although all of the preservice teachers emphasized being knowledgeable and transferring knowledge to the students as future mathematics teachers in their initial orientations, being a knowledgeable teacher was not observed in the post orientations. The weight of transferring knowledge, on the other hand, decreased. These transformations were highlighted in Table 4.43. In the following parts, preservice teachers' orientations after video case-based community related with these subject matter roles were explained compared to their initial orientations.

Table 4.43
Preservice Teachers' Subject Matter Orientations before and after Video Case-Based Community

	Before	After
Subject Matter Orientations	Being knowledgeable[1] Transferring knowledge	Transferring knowledge
Attributed Student Outcomes	Cognitive (100%) Reinforcement	Cognitive (67%) Reinforcement Interpretation[2] Behavioral (33%) Respect[2]

1 the teacher roles or student outcomes not professed after the video case-based community
2 the teacher roles or student outcomes professed only after the video case-based community

As it was stated, the most significant difference in preservice teachers' subject matter related orientations before and after the video case-based community was the lack of knowledge related orientations. Before the video case-based community, preservice teachers stated several ideas such as "*as a future mathematics teacher, I need to know…*" or "*I should know …*". In other words, they

preferred to express themselves with the teacher knowledge perspective. On the other hand, after the video case-based community, preservice teachers expressed what kind of teacher they wanted to be by comparing themselves to the teachers in the videos. Therefore, the point of reference in their post orientations was other teachers' practices. It is important to note that they were not specifically directed to focus on the teachers' practice, rather they were only asked to think about the teachers in the videos. However, they did not prefer to focus on the teachers' knowledge. Preservice teachers' noticing experiences could be the reason of their preferences because teachers' knowledge was not discussed in any of the group meetings.

Although all of preservice teachers emphasized transmitting knowledge before the video case-based study, only three preservice teachers maintained their orientations. They stated that they wanted to transmit knowledge like the teachers in the videos after the video case-based community. They indicated the sixth week teacher as a role model for them: "*I think teacher's experiences were obviously seen in the last video. I would like to transmit knowledge like through connecting previous knowledge"* (PT-5). Although PT-5 was concerned about the teacher's ability in making connections between the ideas (which were evaluated in didactical expertise category), she stated that she wanted to transmit knowledge to the students through making connections between them. Similarly, PT-12 referred some didactical roles while explaining his orientation in being a subject matter expert:

> *Like her (6th week), there is need to teach through transmitting knowledge. To make students like mathematics, we have to make it concrete but for this, we have to express mathematically what the terms and concepts are. I think we should think about the every little detail of the concept.*

Therefore, their main focus was to be a subject matter expert like the sixth-week teacher.

As in initial orientations, preservice teachers could not elaborate their subject matter related orientations based on students' cognition: *"I would like to teach like in the last week. I mean I give information first, then use materials, and apply questioning strategy"* (PT-11). As it was seen in this example or in the examples

stated above, preservice teachers either did not mention any student outcomes, or just intended to make students like mathematics as an affective outcome.

4.3.5 Preservice teachers' contextual orientations

Similar to the subject matter expertise, contextual orientations decreased considerably after the video case-based community. While physical context of the class was considered both before and after the video case-based community, out of school activities was reflected from the experiences gained through the noticing practices. These transformations were highlighted in Table 4.44. In the following parts, preservice teachers' orientations after video case-based community related with these contextual roles were explained compared to their initial orientations.

Table 4.44
Preservice Teachers' Contextual Orientations before and after Video Case-Based Community

	Before	After
Contextual Orientations	Physical context of class	Out of class activity[2] Physical context of class
Attributed Student Outcomes		<u>Affective (71%)</u> Attention[2] Confidence[2] Like math[2] Enthusiasm[2]
	<u>Behavioral (100%)</u> Peer interaction[1]	<u>Behavioral (29%)</u> Participate[2]

1 the teacher roles or student outcomes not professed after the video case-based community
2 the teacher roles or student outcomes professed only after the video case-based community

During the initial interviews, preservice teachers associated their orientations to their expectations related with the context of the school. More precisely, they had indicated that they wanted to be teachers in the schools in a low socioeconomic area. This idea reflected their evaluations of the videos in the post interviews as in the following case:

The first video we watched was in a village and last one was in private school. I saw that those students' expectations from the teacher were different. I saw that students in the village were more enthusiastic. On the other hand, the students in the last video were different. We have seen many different students in very different environments. (PT-3)

After the video case-based community, preservice teachers stated that video-cases provided opportunities to observe different classrooms settings which could not be gained through school experience in the teacher education program. For example, PT-6 expressed that:

Some were grouped, some were U-shaped. Some of them were out of classroom, some were in normal class. They were different form each other. All of them added something to us. Since we did not observe different settings during the internship, we could think that group working is not possible. We observed and discussed arrangement of the classroom context in different settings. For example, we noticed that interaction occurs more in U shape not in traditional seating arrangement. Therefore, we have seen that the classroom context is important.

Therefore, reflecting on the videos increased preservice teachers' awareness about the importance of the context in teaching mathematics. Nevertheless, preservice teachers could not elaborate their contextual orientations on students' cognition even after the video case-based community. The only associated student outcomes in preservice teachers' post contextual orientations were interactions among students and following instruction which were considered under behavioral outcomes in the present study.

4.3.6 Preservice teachers' student outcome orientations

Preservice teachers, as in their initial orientations, mentioned several outcomes which were transformed in a considerable extend after working with video cases. The weights of the student outcome categories and the specific student outcomes in each category went through some changes. These transformations were highlighted in Table 4.45.

Table 4.45
Preservice Teachers' Student Outcome Orientations before and after Video Case-Based Community

	Before	After
Orientations in Student Outcomes	Affective (54%) Attention Like math Like teacher Prejudice Enthusiasm Confidence Value math	Affective (41%) Attention Like math Enthusiasm Like teacher Confidence Prejudice Value math
	Cognitive (25%) Interpretation Permanent learning [1] Reinforcement Mathematical independence Reasoning Connection to real life Connection between topics Learning Misconception Solving questions[1]	Cognitive (35%) Misconception Reasoning Interpretation Learning Reinforcement Connection to real life Connection between topics Mathematical independence
	Behavioral (21%) Express themselves Participate Peer interaction[1] Respect teachers[1] Study for the lesson[1] Follow instruction[1]	Behavioral (24%) Participate Express themselves

1 the teacher roles or student outcomes not professed after the video case-based community

Although most of the student outcomes were stated above while explaining preservice teachers' post identity orientations through the roles of teachers that they attributed themselves, it was not clear how student outcomes were transformed after working with video cases. In addition, preservice teachers in some of their statements only focused on the student outcomes without attribution to teacher roles. Therefore, all of them were summarized below.

After the video case-based community, preservice teachers still emphasized the affective outcomes the most. They maintained their emphasis in the affective outcomes: Paying attention, liking teacher/mathematics, enjoying learning mathematics, being confident in mathematics or being prejudice free and

appreciating the value of mathematics. In other words, they did not state a different affective outcome after working with video cases but, emphasis of each outcome was decreased. While the preservice teachers attributed a variety of affective outcomes to the teachers' didactical roles before the video case-based community, the main affective outcome in preservice teachers' post didactical orientations was students' attention to the topic which somehow was connected with the students' cognition. In this attribution process, preservice teachers referred different teachers in the videos. However, most of the affective outcomes were attributed to teachers' personal characteristics (self-referential) and their pedagogical expertise. Based on these roles and the attributed student outcomes, the fourth week teacher was stated as a role model by many preservice teachers.

Although cognitive outcomes caught preservice teachers' attention less than the affective outcomes even after working with video cases, the emphasis on cognitive outcomes increased in a considerable extend in post orientations. Some of the cognitive outcomes (interpretation, learning, reasoning, connection to real life, connection between topics, mathematical independence, solving questions, and reinforcement) maintained their emphasis in post orientations. In contrast to the high emphasis in initial orientations, permanent learning was not observed in post orientations. On the other hand, weights of the focus on misconceptions and reasoning skills were increased in significant amount. Almost all of the preservice teachers stated that they wanted to be careful in students' reasoning skills to overcome their misconceptions. They referred to the first week teacher as a role model in planning a lesson to increase students' reasoning skills. However, they referred to the teachers, especially the fourth week teacher, who they never wanted to be by arguing that these teachers' conceptualization would be the reason for students' misconceptions. They specifically stated that they will be careful for not doing same mistakes as these teachers did.

The weights of the behavioral outcomes before and after the video case based community were approximately the same. Studying for the lesson and respecting teachers were not emphasized in preservice teachers' post orientations. On the other

hand, participating lessons through taking part of the activities and expressing their ideas during the class discussions were the most emphasized behavioral outcomes. They also spoke about interaction between the students and following lessons, but their emphasis was considerably low compared to the other behavioral outcomes. Preservice teachers generally referred to the third week teacher in these outcomes but they argued that they did not want to be like her to develop their students' related outcomes.

4.3.7 Preservice teachers' self-evaluations

As in the initial interviews, preservice teachers were asked to evaluate their strengths and weaknesses as future mathematics teachers during the post interviews which were conducted after the video case-based community. Preservice teachers generally stated different strengths and weaknesses from their initial evaluations. For this reason, their initial evaluations were reminded and they were asked to reevaluate themselves to understand their current evaluations and attributed reasons.

While their main weaknesses were lack of curriculum knowledge, pedagogical knowledge and teaching experience before the video cases, preservice teachers attributed their content knowledge and teaching experiences as weaknesses after the video cases. How and why their strengths and weaknesses were transformed was explained below.

While lack of knowledge about curriculum was referred as a weakness before the video cases, none of the preservice teachers mentioned it in their post evaluations. When it was reminded during the post interviews, they stated that they increased their knowledge about the curriculum: "*I know the curriculum now, I had not known before. I know much better now*" (PT-2). Preservice teachers who did not utilize curriculum in writing reflection papers indicated the group discussions as the reason of their development but they did not elaborate their ideas much: *"I did not have enough time because of the KPSS dershanes, I could not look at the curriculum so much, but I have learned a lot from my friends. We have seen how objectives are addressed in curricula"* (PT-4). On the other hand, preservice teachers who worked

through curriculum in their reflections argued that my interventions during group meeting were very helpful. For example, PT-3 by referring to my intervention in the sixth week discussion about the content of the revised curriculum stated that: "*I have never noticed that I was surprised to hear that there was no inscribed angle in the curriculum, for example, I had never seen it before.*" Similarly, PT-11 stated that my recommendations about making use of curriculum while interpreting their noticing increased her knowledge about curriculum: "*I saw the objectives addressed in the curriculum. We will be teachers in a year. We need to know these things. If we did not look through these videos, we would not have seen the curriculum this year because there was KPSS examination. The videos increased our awareness."* Therefore, knowledge about curriculum was not considered as a weakness after the video case-based community. It was not stated as strength either. They only indicated that participating in video case-based community developed their awareness about curriculum.

Another weakness was about pedagogical content knowledge before working with video cases. At that time, preservice teachers blamed teacher education for not giving enough opportunity to develop their pedagogical knowledge. They specifically criticized the way the mathematics education courses were conducted in which every week one group of preservice teachers made presentations about a topic. What was seen as missing in these courses was the lack of interactions between the presenters and the rest of the classroom. By referring to the group discussions in the video case-based community, they stated that they learned a lot from their friends and my interventions, and increased their pedagogical content knowledge. For example, after reminding her initial self-evaluation, PT-9 stated that:

> R: *As a weakness, you had said that you could not think in concrete and had difficulties in teaching based on the level of students. For example, when you were describing a topic, you said that you were using equations with x and y's. What are you thinking now?*
> PT-9: *I learned a lot from the discussions of conceptualization and mathematical communication. I saw examples, I understood how a student could think, and I saw how we could behave. I think I have developed myself. I am not afraid anymore.*

This seemed to explain the increase in the frequency of students' cognition outcome because preservice teachers started to consider students' thinking in their post orientations. Nevertheless, they also criticized the video case-based community by limiting the content to the geometry and measurement area. They stated that it would be better if they had the chance to observe more videos in different learning areas: "*I wish it had been longer. I also wish to watch videos that we have weaknesses or in other strands"*(PT-5).

As it was explained in section 4.1, before participating in the video case-based community, preservice teachers were feeling competent in content knowledge in contrast to the weaknesses in pedagogical content knowledge and curricular knowledge. However, most of them stated that they were not sure whether they appropriately knew the subject, they would teach in their post evaluations: "*I think I'm not very good at in my field, in teaching mathematics. So I am very afraid of causing misconceptions and not meeting the students' expectations*" (PT-3). They started to criticize themselves in terms of what they really knew about the concepts by referring to the conceptualization related discussions: "*We were not aware of its significance before the group meeting. During the discussion everyone noticed something related with the definition of the concept. If we miss a word, for example, the meaning was changed"* (PT-12). Transformation from feeling competent to incompetent in the content knowledge could be seen also in the decreasing frequency of subject matter expertise orientations. In other words, preservice teachers did not orient towards teaching mathematics through transmitting knowledge in contrast to their initial orientations because they felt incompetent in being a knowledgeable mathematics teacher in their post evaluations.

It seems that video case-based community provided opportunities to preservice teachers in developing their knowledge about curriculum and their pedagogical knowledge, and raising self-awareness in their content knowledge. They evaluated that watching, interpreting and discussing about another teachers' practices developed themselves in many perspectives. Nevertheless, it was limited to the other teachers' practices, not preservice teachers' own practices. Therefore, even

after working with the video cases, they attributed lack of teaching practice as their weakness: "*I have idea how to teach certain topics. However, I still have worries about myself. Although I gave private lesson, I do not have whole class experience*" (PT-2).

As in the above example, they still had doubts about whether they will be successful in implementing their orientations into the practice. However, their doubts were not limited to the classroom management issues because of lack of teaching practice as in their initial evaluations. Working with video cases raised preservice teachers' awareness in their weaknesses about the content they will teach.

Preservice teachers also stated the possible pathways that they could follow to develop their weaknesses. In addition to gaining experiences through time as in their initial evaluations, preservice teachers indicated that watching more video-cases could help them in their development as a mathematics teacher: "*I can do more research, maybe watch other videos. For example, for circles, I can watch at the videos to see how it was conceptualized and what kinds of activities were utilized"* (PT-2). Similarly, PT-6 referred the videos as a possible pathway but she indicated that group discussions were more powerful than the content of the videos: "*In fact, I think I can improve myself through watching more videos, but as a result of our discussions in video class, we see our shortcomings and misconceptions. So we should have a group where we can ask questions and discuss like this group when we are teachers.*" Although she put emphasis on discussions about teaching mathematics, she could not elaborate the idea in terms of the possible communities that she wanted to be a part.

In summary, preservice teachers felt more incompetent in some of the points in their identity orientations after working with video cases. Nevertheless, they did not see these weaknesses as obstacles for the enactment of their identity into practice but they stated that they needed more support to strengthen their weaknesses. Similar communities for practicing teachers and getting experiences were attributed as possible pathways.

4.3.8 Summary of preservice teachers' identity orientations after video case-based community

To sum up, the emphasized teacher roles and attributed student outcomes as components of teacher identity were transformed considerably after working with the video case-based community. Before working with video cases, most of the preservice teachers professed themselves who emphasized more on the affective outcomes even for didactical roles. This was transformed to being a didactical expert who cares more on students' cognitions. Preservice teachers indicated different reasons for their identity orientations such as the content of the video itself, interactions during the group meetings or the experiences gained from other communities. Transformation in preservice teachers' identity orientations through noticing practices also influenced preservice teachers' self-evaluations and their beliefs in themselves to enact their identity orientations into the practice. Working with video cases provided more elaborated identity orientations and self-evaluations for preservice teachers. In the following chapter, these transformations were discussed considering the related literature.

4.4 Identity Orientations with respect to Noticing Practices

We integrated identity framework to the noticing framework and made the analysis based on these revisions. In particular, we analyzed what preservice teachers noticed based on teacher roles and student outcomes as the topic of the noticed issues. Therefore, we enriched the topic perspective of the noticing framework. On the other hand, other perspectives namely actor, stance and specificity were not revised and used as van Es's (2011) reported.

Revision in the topic affected the trajectory of noticing especially for the Level 3 and Level 4 noticing since we focused on whether the preservice teachers focused on the particular students' outcomes (not only mathematical thinking processes) which were explained in detail in the previous chapter (See Table 3.4). Therefore, if the preservice teachers focused on the particular students' behavioral or affective outcomes and interpreted what they had noticed, then these noticing were considered

as Level 3. As it was stated above, none of the noticing demonstrated the characteristics of Level 4 independent from the revision that we offered.

How did the revision affect the trajectory of noticing? or What was the relationship between two frameworks? To answer these questions, we run the "Code Relations Browser" of the MAXQDA program. As represented in Table 4.46, this analysis created a record of the intersection of codes in the reflection papers.

Table 4.46
Identity Orientations with respect to Noticing Levels

Components	Categories	Level 1	Level 2	Level 3	Level 4
Teacher Role	Subject Matter	9	3	1	
	Didactical	258	322	35	
	Pedagogical	72	28	2	
	Self-Referential	15	3		
	Contextual	38	10		
Student Outcome	Affective	109	44	1	
	Cognitive	96	206	31	
	Behavioral	80	38		

Before interpreting the relationships, it is significant to note that total number of frequencies for each level represented in the columns was not congruent with the total number of each level. For example, as seen in Table 4.36 which demonstrated the frequencies of each level for each week (see section 4.2.6), total number of Level 3 noticing was 27. It means that throughout the video case-based community, 27 idea units were labeled as Level 3 but they included more than one code from the identity framework. An idea unit in Level 3 could explain the point better: *"Because of the definition of diameter made by the teacher, students might think that there is only one diameter in the circle. She should have underlined that all of the line segments between the two points on the circle that passed through the circle are diameter. Mathematical language of the definition was not appropriate"* (Week 4, PT-6). This idea unit was coded as Level 3 and emphasized teacher's conceptualization and mathematical communication as didactical roles and students' possible misconceptions as cognitive outcomes. In other words, it included one code

from Noticing trajectory but three codes from the identity framework. Therefore, it was counted as three times in Level 3 column in the above table. Similar situation was valid for the Level 1 and Level 2 noticing because of the hybrid nature of idea units. Therefore, what is needed to focus on is the weights of the relationships between the categories of noticing and identity frameworks, not the total number of categories in noticing framework.

The salient point in the table is the dominance of didactical roles for each level. This means that independent from how they noticed, preservice teachers had a tendency to focus on teachers' roles about teaching mathematics. We already reached this conclusion from the other tables in this chapter. However, "Code Relations Browser" of the MAXQDA program also enabled us to see the relationships of the sub codes of the didactical category and noticing levels. Accordingly, noticing about teachers' conceptualization and clarification of the concepts directed preservice teachers referring to the specific events and interactions as evidences and providing interpretive comments. Therefore, these codes produced mainly Level 3 noticing.

Similar tendency was observed for the specific codes in the cognitive outcome category. More precisely, focusing on the students' possible misconceptions and their reasoning processes in learning mathematics promoted them to an interpretive stance. In contrast to cognitive outcomes, affective and behavioral student outcomes did not have much higher level of noticing. For affective outcome, only one of the noticing demonstrated the characteristics of Level 3: "*While solving the question on the board, the teacher said ''Yes we are waiting for an answer'. This could have stressed the student out or student might have thought that he could not do it. She could have said that you can do it another time"* (Week3_PT-4). On the other hand, students' behavioral outcomes were not observed in any of the Level 3 noticing. Preservice teachers could not interpret on student outcomes in these issues even if they noticed them as the topic of their noticing. This could be related with two main factors. The first one is the content of the video. The videos that we have chosen for the present study might have lack of content in directing preservice teachers to make

argumentations about them. Another possibility is the preservice teachers' lack of knowledge in these issues which was necessary to interpret and to elaborate their noticing. Possible impacts of these factors to the preservice teachers' noticing practices and identity orientations were discussed in the next chapter.

CHAPTER 5

DISCUSSION & CONCLUSION

The purpose of the present study was to investigate preservice middle school mathematics teachers' professional identities in a video case-based community. However, as it was explained in the previous chapter, preservice teachers' noticing practices and identity orientations do not represent a bilateral relationship. They were influenced from various personal and contextual factors. In the following parts, transformations of preservice teachers' noticing practices and how these practices transformed preservice teachers' identity orientations were discussed based on noticing and identity frameworks first. Then, overall interpretations were given from the Dialogical approach's lenses. Moreover, implications of this study for teacher education and for the literature, and recommendations for further studies considering the limitation of the present study were presented.

5.1 Transformations of Identity Orientations through Noticing Experiences

To understand how the experiences gained in the video case-based community influenced preservice teachers' identity orientations, there is a need to clarify preservice teachers' noticing practices in the context of the video case-based community. Therefore, in the following parts, trajectory of what and how preservice teachers noticed was discussed first based on noticing framework. Then, transformations of identity orientations were negotiated considering the revisions that we added to the Beijaard et al.'s (2000) identity framework.

5.1.1 Transformations of what and how preservice teachers noticed in the video case-based community

What and how preservice teachers noticed transformed considerably throughout the six-week period of the video case-based community. In particular, preservice teachers wrote reflection papers and discussed what they thought as essential in teaching mathematics in terms of teacher roles and associated student outcomes. These experiences directed them to develop their noticing repertoire, interpreting skills and even transformed their identity orientations. In particular, frequency of noticed issues and the level of their noticing were increased considerably. These findings were expected while the findings of the relevant studies which adopted the norms of noticing framework (van Es, 2011) were considered. Accordingly, it was concluded that video case-based community enhances preservice teachers' noticing skills from teacher related issues to students' mathematical thinking and from evaluative to interpretive stance (Friel & Carboni, 2000; Sherin & van Es, 2005, 2008, 2009; van Es & Sherin, 2002).

Preservice teachers' noticing practices showed similarities and differences with the existing research in terms of the *actor, topic, stance* and *specificity* of the noticing framework (van Es & Sherin, 2008). As it was stated in the previous chapters, while actor and topic categories represent the first dimension of the noticing framework – what they notice; stance and specificity determine how they notice as the second dimension of the noticing framework (van Es, 2011). In the following parts, how they are transformed based on range of individual and contextual factors were discussed.

Actor refers to who is identified in the video which can be the teacher, a group of students as a whole class or particular students (van Es, 2011; van Es & Sherin, 2008). For the present study, preservice teachers most of the time focused on teachers and reflected on the effects of teachers' roles on students. When the main actor was students, they generally attended the whole class. In other words, their focus was on the whole class rather than particular students. This tendency was also observed in other studies which investigated preservice teachers' noticing practices

(Güner, 2017; Jacobs et al., 2010; Osmanoğlu, 2010; Sherin & van Es, 2009; Star & Strickland, 2007; van Es, 2011; van Es & Sherin, 2008). Osmanoğlu (2010) explained this through preservice teachers' disposition to see themselves as teachers rather than students so that they mainly focus on teacher roles. This conclusion bears similarities with ours. In the previous chapter, we stated that preservice teachers wrote their reflections and participated in group discussions with teachers' eyes even though discussions were mainly held on students' learning. Most probably, preservice teachers imagined themselves as the teachers of the classrooms and reflected on student outcomes through the roles of those teachers. Therefore, student outcomes were generally stated as a product of teaching in the reflection papers. This could be one of the reasons but, it only explains the dominance of teachers as the actors of the noticed issues. It cannot, however, clarify the lack of attention on particular students' outcomes in the videos. It might be related with preservice teachers' expertise in teaching mathematics and the content of the videos (Sherin et al., 2009; Ulusoy, 2016; Ulusoy & Çakıroğlu, 2018; van Es & Sherin, 2002). These factors could possibly influence other categories (topic, stance, specificity). Therefore, they were explained in the related parts.

The *actor* and *topic* of the noticed issues were inseparable in the present study since we integrated Beijaard et al.'s (2000) identity framework to van Es' (2011) noticing framework. To be more explicit, what preservice teachers noticed about the teacher roles and student outcomes in the videos represents the *topic* of the noticing framework for the present study. Therefore, if the main topic of the idea unit was related with a teacher role, then the actor was automatically the teacher. Similar situation was valid for student outcomes as the topic and student as the actor of the noticed issues. Therefore, the main investigation of what preservice teachers noticed in the reflection papers was conducted based on the identity framework representing the topic of the noticing framework. Making this revision provided us to understand preservice teachers' identity orientations before, during and after the video case based community which was explained in detail in the next section (see 5.1.2). Therefore, what was discussed in this section is limited to salient

transformation of the topic which also influenced the other categories namely, specificity and stance of the noticing.

Accordingly, the topic of the noticed issues for the first three weeks demonstrated similarities with preservice teachers' initial identity orientations. Then, they started to focus on the process of teaching and learning mathematics through gaining experiences in noticing. This transformation influenced the *specificity* of the noticing which was significant in determining how preservice teachers noticed. To be more explicit, the specificity of the noticing was changed from surface level to in-depth analysis of the videos. It was parallel to the findings of the relevant studies which argued that participants paid attention to a range of issues with a broad perspective at the beginning of the study and narrowed down their attention through gaining experiences in noticing (Güner, 2017; Jacobs, et al., 2010; Sherin & van Es, 2009; Star & Strickland, 2007; van Es, 2011; van Es & Sherin, 2008).

On the other hand, narrowing down their attention to the specific part of the video also influenced the *stance* of the noticing. While preservice teachers generally stated what they liked or disliked in the video at the first weeks of the video case-based community, they started to make criticism about the strengths and weaknesses of the specific issues in the video. This shift transformed the stance of the noticing from describing and evaluating to interpreting similar to the other studies in the literature (Güner, 2017; Jacobs, et al., 2010; Sherin & van Es, 2009; Star & Strickland, 2007; van Es, 2011; van Es & Sherin, 2008). More precisely, preservice teachers were able to interpret the certain roles of the teacher by considering students' possible outcomes.

Then, how the trajectory in *actor*, *topic, stance* and *specificity* of the noticed issues was developed? DST (Meijer & Herman, 2018; van Loon, 2017) which underlines Akkerman and Meijer's (2011) dialogical approach could answer this question. Accordingly, through gaining experience in video case-based community, they developed a society of mind which acted as a filter in what and how they noticed. In other words, by writing reflection papers and participating in the group discussions, they developed a group vision for some of the issues. These experiences

were guided and facilitated by me as the coordinator of the community. Therefore, my interventions played a significant role in trajectory of *actor*, *topic, stance* and *specificity* of the noticed issues which were discussed in the following parts.

Topic of the noticed issues was directly influenced by two interventions. The first one was listing all of the noticed issues into the PowerPoint slide and starting the group meetings through reading the list in every week. This provided opportunity for preservice teachers to capture what others noticed in the related video and increased the diversity of the noticed issues in the weeks that followed. In addition, I called attention to the particular issues in the video, in the textbook or in the curricula as the second intervention influencing the topic of the noticing. In particular, I distributed the related pages of the curricula and the books and asked them to investigate how they addressed the issues in the video. Therefore, what preservice teachers could not notice or interpret in the reflection papers were highlighted during the group meetings. Moreover, they could see the alternative approaches or applications in the related tools. McDuffie et al. (2014) suggested that teacher educators need to provide ways to prompt preservice teachers to notice different points of teaching and learning. My interventions could represent the possible ways for those prompts that McDuffie and colleagues emphasized.

Utilizing curricula and textbooks as calling attention to the issues that I have found important guided preservice teachers to focus on teachers' conceptualization in the videos, and consider those tools, especially the curricula, in writing reflections related with teachers' conceptualization and associated student outcomes. This tendency of the topic of the noticing also influenced preservice teachers' approaches to the noticed issues namely, the *stance* and *specificity*. To be more explicit, preservice teachers began to watch the videos in detail, focused on the specific issues in the videos and wrote their reflections through giving reference to the discourses of the teachers and particular students. In addition, preservice teachers reasoned what they noticed based on the ideas in the curricula and changed the *stance* of the noticing from describing or evaluating to interpreting. In other words, they interpreted the noticed issues through considering the ideas in the curricula. It

was significant when the relevant studies' findings were considered. Accordingly, they concluded that preservice teachers were in tendency to watch the video in a general way without addressing the details of the events and evaluated them without reasoning and struggled to support their ideas (Güner, 2017; Sherin & van Es, 2009; Ulusoy & Çakıroğlu, 2018; van Es, 2011; van Es & Sherin, 2008).

As another intervention, some of the noticed issues which were written in the reflection papers were highlighted during the group meetings. In particular, I wrote them into a PowerPoint slide to attract preservice teachers' attention and develop their expertise in noticing. These noticed issues were something in common in terms of *actor*, *topic*, *stance* and *specificity*. They were interpreting particular students' outcomes by referring to the specific part of the video and therefore, they were evaluated as Level 3. Highlighting specific noticing that are worthy of attention, as I did in this intervention, was suggested by van Es (2011) since it plays a central role in helping preservice teachers canalize their attention to the particular issues in the videos.

The fourth intervention directly aimed to increase preservice teachers' interpreting skills as *stance* category. In particular, the discussion was mainly conducted based on the noticed issues which were contradicting to each other. Therefore, preservice teachers had the chance to explain their noticing, consider the counter ideas and reconsider their own. This kind of participation to the group discussion directed preservice teachers to make sense of their and others' thinking in the same issue. In other words, discussion based on contradictory noticing provided interaction among preservice teachers which was emphasized by the participative approach in teacher identity (Darragh, 2016; Wenger, 1998).

Although these interventions aimed to enhance noticed issues in terms of each category of the noticing framework as in other studies, the dominant level of their noticing could not go beyond Level 2 throughout the video case-based community. Preservice teachers tended to focus on what teacher did in the video through either describing, evaluating or interpreting without specific attention to the particular students' outcomes, as previously observed with preservice teachers'

noticing (Sherin & Han, 2004; Sherin & van Es, 2009; van Es, 2011; van Es & Sherin, 2008). To be more explicit, the frequencies of Level 3 noticing were considerably low and did not proceed throughout the video case-based community. None of the noticing, on the other hand, exhibited the features of Level 4. These findings of the present study have similarities with other studies. For example, as in Güner and Akyüz's (2017) study, preservice teachers could not reach Level 4 because preservice teacher were not able to make connections between students' mathematical thinking and broad educational principles as in this study. Low frequencies in Level 3 and Level 4 could be related with (i) preservice teachers' expertise in teaching mathematics (Amador & Weiland, 2015; Sherin & van Es, 2005; van Es & Sherin, 2002); (ii) the content of the videos (Sherin et al., 2009; Superfine, Fisher, Bragelman & Amodor, 2017; Ulusoy, 2016; Ulusoy & Çakıroğlu, 2018); and (iii) preservice teachers' attitudes toward video case-based community (Erikson, 2011; Huang & Li, 2012; Wenger, 1998). Each of them was discussed in the following parts.

In the present study, preservice teachers could not specifically focus on and interpret particular students' outcomes in the reflection papers. They were in tendency to approach student outcomes as the product of teaching. For example, they could not reason about the students' thinking process when they detected possible misconceptions. They generally stated that since the teacher practiced in a certain way, students might have misconceptions. Similar tendencies were valid for the other categories in the student outcome component of the teacher identity framework which represented the topic of the noticing. Preservice teachers' inability to focus and interpret particular students' outcomes in the video case-based studies was attributed to their lack of classroom experience and necessary knowledge (Amador & Weiland, 2015; Shein & van Es, 2005; van Es & Sherin, 2002). Studies which focus on the difference between expert and preservice or novice teachers' noticing practices concluded that expert teachers had better understanding of teaching and learning in their profession and thus, they could notice more classroom events, focus on the specific events in the classroom and be more interpretive in

their expressions (Erdik, 2014; Huan & Li, 2012; Krull, Oras & Sisask 2007; Miller, 2011). Therefore, limited knowledge and experience on student outcomes might be one of the reasons behind preservice teachers' failure in focusing and interpreting students' outcomes.

On the other hand, lack of attention to students' outcomes could be related with the videos chosen for the video case-based community. Sherin and colleagues (2009) expressed that what preservice teachers can notice depends on the cases highlighted in the video. Although the diversity of video cases, as in the present study, provided opportunity to notice variety of points related with teaching and learning mathematics and to understand the complexity of classroom context, they did not feature students' mathematical thinking as in the micro case videos (Ulusoy, 2016). For example, in her doctoral thesis, Ulusoy (2016) produced micro-cases in quadrilaterals and aimed to develop preservice teachers' mathematical knowledge for teaching by directing themselves to the students' thinking process in quadrilaterals. She found that micro-case video clips were useful and effective ways to enhance preservice teachers' knowledge in quadrilaterals. Accordingly, it was concluded that micro-case videos capturing students' mathematical thinking were effective in promoting content and pedagogical content knowledge for preservice teachers. Micro case videos were more appropriate for studies with a specific attention to promote preservice teachers' noticing abilities in students' mathematical thinking through isolating nonmathematical or non-pedagogical aspects of video cases (Superfine et al., 2017; Ulusoy & Çakıroğlu, 2018). Based on the arguments of the micro case, we could say that the videos chosen for the present study did not feature students' mathematical thinking but had the power to understand the multidimensionality of classroom, which was more important for investigating preservice teachers' noticing abilities from teacher identity perspective.

Nevertheless, the relationship between the categories of the identity framework and levels of the noticing framework showed that didactical roles and cognitive outcomes produced higher level of noticing. Preservice teachers had a tendency to focus on didactical roles of the teachers comparing to other roles

(subject matter, pedagogical, self-referential and contextual). Preservice teachers might have been directed to these roles and associated outcomes in two ways. The first one, similar to what Ulusoy and Çakıroğlu (2018) suggested through micro cases, was the production of video cases that feature didactical roles of teachers and/or cognitive outcomes of the students. Therefore, preservice teachers could notice those roles and make interpretation about the outcomes of those roles. On the other hand, designing lessons which integrated different aspects of teacher roles and using those videos within the scope of video case-based community might be the other way. This might have provided opportunity to focus on other teacher roles or other student outcomes like the emphasis of didactical and cognitive outcomes of the present study. These issues might be considered in follow up studies.

On the other hand, Erickson's (2011) approach could be another reason of the dominance of Level 2 in the present study. From a different standpoint, he explained the reason of this situation with the simplicity of attending to more common aspects of the lesson rather than paying attention to particular students' mathematical thinking. Therefore, writing general expressions about the teacher roles in the videos could be easier than attending and interpreting particular students' outcomes in the present study. For this reason, preservice teachers' insufficient willingness to write reflection papers might have influenced their noticing trajectory. Huang and Li (2012) reached similar conclusion for novice teachers and stated that expert teachers were more willing than novices in paying attention to particular students' mathematical thinking.

Willingness as an attitude toward the video case-based community also manifested itself during the group discussions through different forms of participation. As it was written in each week's summaries in the previous chapter, while some of the preservice teachers took the center stage of the group discussions and became the core members of the community, some of them played peripheral roles. Although conducting group discussions based the contradictory noticing provided opportunities for each participant to explain their ideas in the group, peripheral participants most of the time preferred to listen to others' arguments. On

the other hand, core members directed the flow of the discussions. This kind of hierarchy in participation was expected in the norms of community of practice theory (Wenger, 1998). However, through the apprenticeship model, the theory attributed this form of participation to the expertise of the individuals in the community by stating that newcomers learn from the old timers in the community (Wenger et al., 2003). There was no initial hierarchy among the preservice teachers in the present study and therefore, video case-based community could not be defined as a community of practice. Nevertheless, similar hierarchy was emerged during the video case-based community into the forms of participation. Therefore, independent from the title of the community, core members played significant roles in establishing common vision related with teacher roles and attributed student outcomes, and this was reflected on the noticing of almost all of the preservice teachers.

In summary, the way that preservice teachers developed their noticing trajectory arouse from the group discussions through the relevant interventions explained above. However, content of the videos, their expertise in teaching mathematics, and willingness to write reflection papers and to participate in group discussions limited their trajectories.

5.1.2 Transformations of identity orientations

Although how preservice teachers' noticing practices were transformed within the scope of the noticing theory and video case based pedagogy (van Es, 2011) was discussed in the previous part, there is a need to clarify the influence of these practices and experiences gained through the video case-based community on preservice teachers' identity orientations. In line with this purpose, this section focused on the transformation of preservice teachers' identity orientations considering Beijaard et al.'s (2000) identity framework with our revisions. To be more explicit, what preservice teachers prioritized in terms of teacher roles and student outcomes before, during and after the video case-based community was compared and possible reasons of these transformations were discussed.

Before participating in the video case-based community, preservice teachers prioritized didactical roles similar to other studies (Haser et al., 2015; Oksanen & Hannula, 2013; Oksanen et al., 2014). Haser and colleagues (2015) interpreted this finding as the reflection of the courses on mathematics teaching and learning in the 3rd and 4th year of the teacher education in Turkish context because the characteristics of mathematics teachers for students' learning was emphasized in these courses. However, unlike Haser et al. (2015), in this study, preservice teachers criticized the teacher education program at their university. They made self-evaluations and expressed that they had lack of pedagogical content knowledge and necessary teaching practice in guiding students' mathematical learning processes. This perceived weakness might be one of the reasons that they associated most of the didactical roles to students' affective outcomes rather than the cognitive outcomes. In other words, feeling incompetent in developing students' cognition in mathematics might be the important factor in the low frequency of cognitive outcomes before the video case-based community. This conclusion verifies the idea that preservice teachers' identity is developed through knowledge building through coursework especially through methods courses (Kanno & Stuart, 2011; Lee, 2013; Yuan & Lee, 2015) and the skills acquired in teaching practice (Beauchamp & Thomas, 2009; Lutovac & Kaasila, 2011).

Preservice teachers' perceived weaknesses related with didactical expertise reflected on their noticing practices. While for the first three weeks, they associated most of the didactical roles to students' affective outcomes similar to the orientations before the video case-based community, they started to focus on students' learning processes when they attended to the didactical expertise of the teacher. Interventions in the video case-based community and the group discussion provided a shared vision related with the didactical roles and associated student outcomes similar to what Akkerman and Meijer (2011) featured through the term society of mind. In other words, video case-based community developed preservice teachers' repertoire related with mathematics teachers' didactical roles and also transformed their priorities in didactical roles as future mathematics teachers.

Major transformation for didactical expertise was observed in associated student outcomes. It was transformed from being a didactical expert aiming to develop students' affective outcomes to being a didactical expert who cares more on students' cognitions as Beijaard et al's (2000) emphasized in the identity framework. Interventions discussed above and the group discussions related with students' mathematical thinking raised their awareness in these issues. It is significant to note that high frequency of affective outcomes was not the issue in the present study. However, associating most of the didactical roles to affective outcomes and lack of perspective in cognitive outcomes were the main problems. It was regarded as an inadequacy because preservice teachers needed to improve their understanding and interpretation of student thinking to be effective in teaching (Ball, Thames & Phelps, 2008; Carpenter, Fennema, Franke, Levi & Empson, 1999; Didiş, Erbaş, Çetinkaya & Çakıroğlu, 2014). Therefore, they can adapt their instruction to their students' needs in learning mathematics (National Council of Teachers of Mathematics [NCTM], 2000). However, as in the present study, several studies reported that preservice teachers have difficulties in focusing and making sense of students' mathematical thinking and they need professional development (Jacobs, Franke, Carpenter, Linda, & Battey, 2007; Kazemi & Franke, 2004). As it was suggested (Ball & Cohen, 1999; Didiş et al., 2014; Jacobs et al., 2010; van Es, 2011), use of video cases increased preservice teachers' awareness of the importance of students' mathematical thinking as future didactical experts.

In contrast to the didactical expertise category, the frequency of subject matter roles was decreased considerably after the video case-based community. While preservice teachers highlighted being knowledgeable teachers and transmitting knowledge as subject matter experts in their initial orientations, these roles lost their emphasis after the video case-based community. Relatively higher frequency in transmitting knowledge as one of the subject matter expertise roles before the video case-based community might be related with their perceived weaknesses in teaching mathematics. Since preservice teachers thought that they were not experts in guiding students' mathematical thinking processes as teacher

educators highlighted in the courses, they canalized their orientations to the way their teachers teach mathematics. This finding supports the idea that each preservice teacher enters the teacher education with already established beliefs about what it means to be a mathematics teacher (Flores & Day, 2006; Izadinia, 2013; Mac Gregor, 2009; Putten, Stols & Howie, 2014). These beliefs are attributed as significant because they constitute their core beliefs about what kinds of teachers they want to become (Löfström et al., 2010).

However, as Trent (2011) noted, unless preservice teachers reflect these core beliefs during the teacher education, they develop professional identity as naive assumptions. This explains preservice teachers' tendency to express some of the didactical roles emphasized in teacher education through transmitting knowledge as they used to observe in their teachers. For example, although none of their previous teachers used technology in teaching mathematics; preservice teachers emphasized this role through employing technology to transmit necessary knowledge to the students. In other words, the way they expressed the role refers to their teachers but it contradicts to the philosophy of the curricula, which places importance of integrating technology into the lesson to provide students in discovering the relationship between concept and developing reasoning, problem solving and communication skills (MoNE, 2013). Therefore, we can say that preservice teachers were aware of the roles emphasized in the teacher education program but they could not understand the philosophy behind the curricula and teacher education program.

During and after the video case-based community, the frequency of the subject matter expertise was decreased. While preservice teachers occasionally focused on whether the teacher transferred the necessary knowledge to the students, being a knowledgeable teacher was not observed in any of the video reflections. In other words, preservice teachers did not argue about teachers' mathematics knowledge during the video case-based community. One of the possible reasons might be the combination of the influences of two factors: The nature of the subject matter expertise and the content of the video cases. Since the videos were chosen from a national competition (Öğretmenler Üretiyor), teachers most probably video-

taped their best lesson that they felt competent. These videos might not have brought teachers' knowledge or lack of knowledge into a forefront and provide opportunity to preservice teachers to discuss about the subject matter expertise of the teachers. In other words, different videos such as focusing on actions and reflections of a teacher while working on a mathematical task might have featured the knowledge of the teacher. In addition, preservice teachers' beliefs toward the teachers in the video might be another explanation of the lack of noticing related to knowledge during the video case based community. Preservice teachers might have seen the teachers in the videos as experts in the subject matter and not need to focus on their knowledge, most probably because they believed that working for years made teachers professional in their subject (Okas, van der Schaaf, & Krull, 2014).

Although they did not focus on the knowledge of teachers during and after the video case-based community, their self-evaluations related with their own subject matter knowledge was changed. How could this be possible without concentrating on the teachers' subject matter knowledge during the video case-based community? After they gained experiences in noticing, preservice teachers focused on the definitions of the concepts in the videos. They started to discuss possible misconceptions arouse from teachers' conceptualization. However, they associated those weaknesses in the videos to the teachers' didactical preferences instead of lack of knowledge. This also justified the idea that preservice teachers were seeing the teachers in the videos as professionals (Okas et al., 2014). Nevertheless, these discussions let them imagine themselves as the teachers in the classroom and think about alternative conceptualizations. In other words, these discussions directed preservice teachers to make self-reflections and therefore, raised their self-awareness as future mathematics teachers. Hine (2015) reached similar conclusion in his study which investigated preservice mathematics teachers' self-perceptions after the teaching practicum. He concluded that preservice teachers asked for further training in mathematical content after they observed other teachers. Raising awareness through self-reflection in the video case-based community is significant for preservice teachers' identity development (Korthagen, 2004; Trent, 2011; Zembylas

& Chubbuck, 2015). They have opportunities to negotiate what they should know for being a professional mathematics teacher considering their existing knowledge (Binks et al., 2009; Izadinia, 2013). Therefore, reflection on present and future self-images guided them to develop self-awareness, which is significant to construct ways to empower themselves and overcome the feeling of personal inadequacy in teaching (Zembylas & Chubbuck, 2015).

Similar to subject matter orientations before the video case-based community, previous teachers were found to be highly influential in pedagogical expert roles. These findings highlighted the importance of narrative approach in teacher identity (Darragh, 2016; Sfard & Prusak, 2005) since preservice teachers' stories about their previous teachers reflected on their identity orientations. Specific to pedagogical expertise, most of the preservice teachers attributed their initial orientations to their primary school teachers or the teachers in other disciplines. However, not only the role model teachers as in other studies (Beijaard et al., 2000; Knowles, 1992) but also negative experiences as students (Ebby, 2000; Kang & Battey, 2017) influenced their pedagogical orientations. More precisely, preservice teachers stated that they did not want to resemble their teachers who discriminated students regarding the opportunities and relationships. These experiences guided preservice teachers to focus on pedagogical roles before the video cade-based community. Therefore, both negative and positive K-12 experiences should be explored in understanding preservice teachers' identity orientations.

Tendency in preservice teachers' pedagogical roles and associated student outcomes did not undergo considerable transformation. In their post orientations, preservice teachers did not mention any different pedagogical role from the roles in initial orientations. It might be related with the preservice teachers' perceived confidence in pedagogical roles except in classroom management before the video case-based community. Feeling secure in most of the pedagogical roles might have prevented preservice teachers to imagine themselves as the teacher in the video cases. In other words, preservice teachers might have written their reflections from the outsider perspective without internalizing these roles as the future mathematics

teachers. Therefore, the lack of self-reflections might have influenced what and how they noticed the pedagogical roles and thus, their noticing trajectory (Butler et al., 2006; Merseth, 1996).

Although the diversity of the pedagogical roles was not changed, their emphasis in the post orientations was increased. This might be related with the school experience course taken simultaneously with the video case-based study. Preservice teachers stated that school experience did not enhance their knowledge and skills in teaching mathematics but, influenced their vision about classroom management as one of the pedagogical roles. Okas and colleagues (2014) attributed preservice teachers' tendency in focusing classroom management during teaching practice to their perceived weaknesses. More precisely, feeling insecure in managing the classroom directed preservice teachers to pay attention to how their mentor teachers overcame the disruptive behaviors of students in the class (Okas et al., 2014). This brings up the question of why the preservice teachers paid attention to their mentor teachers but not to the teachers in the video cases in terms of classroom management. It was most probably related to the limitations of the video cases which could not bring forward to the nature of the interactions among the students (Clarke, 2000). In other words, what preservice teachers could see in video cases was limited to the direction of the camera which could not capture the interactions among the students in contrast to the real classroom experiences (Sherin, 2004).

Preservice teachers also highlighted self-referential characteristics of teachers that they wanted to possess but, the frequency of these roles before the video case-based community was the lowest unlike the similar studies in the literature. Portaankorva-Koivisto (2013) found that the most common metaphor was categorized in self-referential when preservice teachers refer to mathematics teacher's roles. Similarly, Oskanen and colleagues (2014) concluded that preservice teachers have more tendencies to use self-referential metaphors compared to inservice teachers. They interpreted this tendency to preservice teachers' competency in teaching mathematics and stated that lack of experience directed preservice teachers to focus more on personal characteristics of teachers. However, frequency

of self-referential category in the present study did not dominate preservice teachers' initial identity orientations in spite of their perceived weaknesses in teaching mathematics. This might be related with the difference of the present study from related studies in terms of data collection. Unlike metaphor studies (Haser et al., 2015; Oskanen et al., 2014; Portaankorva-Koivisto, 2014), interviews provided preservice teachers more opportunity to express their orientations as future mathematics teachers. This also revealed the need in revision in the identity framework (Beijaard et al., 2000) and provided us opportunity to add further revisions.

The weight of the preservice teachers' self-referential orientations was increased after the video case-based community although it was the least emphasized category in preservice teachers' noticing. Then, how did the weight of the self-referential category increase after the video case based community? One of the possible reasons of this finding is the salience of one of the teachers in video cases. The teacher was a young female teacher and attracted preservice teachers' attention with her dynamism in teaching mathematics. Most of them indicated the teacher as a role model for them in spite of her deficiency in mathematical conceptualization. In other words, preservice teachers imagined themselves as the teacher in the class and that fitted their orientations. Looking at the possible future might have given pleasure to the preservice teachers and enhanced their beliefs in ability to enact their orientations into the practice.

Although the frequency of contextual orientations was higher from self-referential roles, preservice teachers' orientations in this category did not vary as in other categories. This could be a reflection of the lack of teaching experience (Haser et al., 2015; Oskanen et al., 2013). Therefore, preservice teachers need to observe different classroom settings to enrich their contextual orientations. Although video cases provided opportunity to observe different classroom settings (Bayram, 2012; Morettini & Reddy, 2014; Yadav, 2008), what they featured was not the context of the classroom. For this reason, preservice teachers might have paid more attention to other teacher roles.

The major transformations were observed in student outcome categories. While preservice teachers especially prioritized the affective outcomes even for a didactical role before the video case-based community, noticing practices balanced the weights of the cognitive and affective outcomes. Behavioral outcomes did not undergo a considerable change. As it was discussed above, preservice teachers' perceived weaknesses in subject matter and pedagogical content knowledge might have hindered them to focus on students' cognition before the video case-based community (Jacobs et al., 2007; Kazami & Franke, 2004) and the experiences gained through video reflection increased their understanding of the importance of students' mathematical thinking as future mathematics teachers (Ball & Cohen, 1999; Didiş et al., 2014; Jacobs et al., 2010; van Es, 2011).

In conclusion, working with video cases provided transformation in identity orientations by raising and creating awareness in many issues. Although preservice teachers' lack of knowledge and practice in teaching mathematics limited their orientations, video case based community could resemble the alternative experiences for teacher education programs by increasing noticing, discussing and self-reflection skills.

5.2 Transformation of Identity from Dialogical Approach's Lenses

After working with video case-based community, emphasized teacher roles and attributed student outcomes as components of teacher identity were transformed considerably. It was expected as studies reported identity as dynamic, relational, multiple and changing over time under the influence of a range of individual and contextual factors (Vermunt et al., 2017; Zembylas & Chubbuck, 2015). Attributing the findings of the study to the discontinuity and multiplicity of identity would be a convenient way to discuss the reason of these transformations. However, what is needed in this discussion is to understand the bilateral relationships between multiplicity and unity, discontinuity and continuity and social and individual aspects of identity from Dialogical approach's lenses (Akkerman & Meijer, 2011). In the

following paragraphs, all of these relationships that emerged in the nature of the study were discussed.

As it was discussed above, preservice teachers wrote their reflections and participated in group discussions with teachers' eyes. They imagined themselves as the teachers of the classrooms and reflected on student outcomes through the roles of those teachers. Since the content and context of the videos were different from each other, the basis of preservice teachers' reflections was changed. In other words, preservice teachers professed their identity orientations in different contexts. Such changes in the context might create tension for teachers and influence their intentions (Akkermand & Miejer, 2011). Therefore, they may enact multiple I-positions because of the situatedness of identity (Akkerman & Meijer, 2011; Sfard & Prusak, 2005; Wood, 2013). For the present study, multiple I-positions manifested themselves through emphasizing different teacher roles and student outcomes throughout the video case-based community.

Multiplicity of I-positions in the present study might have caused to be seen as having discontinuous identity throughout the video case-based community. Represented as the social nature of identity, discussions during the group meetings enabled preservice teachers to be aware of different perspectives about teacher roles and student outcomes. More precisely, leading group discussions based on the contradictory noticing provided opportunity to make self-reflection and contributed to develop group voices among preservice teachers. These group voices might have served as a filter for preservice teachers' identity enactments for the following weeks. These processes were explained through self-dialogue and society of mind in DST (Akkerman & Meijer, 2011; Meijers & Herman, 2018; van Loon, 2017). Development of society of mind demonstrated itself in the last two weeks' group meetings of the video case-based community in which preservice teachers only discussed teachers' didactical roles and students' thinking processes. Therefore, dialogical relationship between the multiplicity-unity and discontinuity-continuity (Akkerman & Meijer, 2011) of identity became visible for the present study.

Akkerman and Meijer (2011) discussed that people negotiate their I-positions and attempt to synthesize and adopt these positions based on the context and the society. In other words, identity is defined neither a psychological, nor a sociological process entirely. For the present study, although preservice teachers' personal noticing and the way they participated the group discussions influenced the development of the society of mind, each preservice teacher negotiated those discussions. These negotiations demonstrated themselves during the post interviews by emphasizing different teacher roles and student outcomes. Therefore, they transformed their identity orientations in the social nature of video case-based community but they evaluated those experiences through self-reflections. These processes highlighted the individual-social relationships within the present study.

Akkerman and Meijer (2011) noted that making teachers be aware of their multiple I-positions and provide opportunity for them interconnect those positions is significant for development of identity. In addition, it provides researchers to consider the dilemmas and tensions of teachers while interpreting their identity developments.

5.3 Implications of the Study

Teacher education was attributed as the key context for preservice teachers to construct their professional identity (Flores, 2014; Timostsuk & Ugaste, 2010). Supporting them in creating clear vision for what it means to be a professional teacher is teacher educators' duty (Beauchamp & Thomas, 2009). However, several researchers stated that developing teacher identity is a challenging step for teacher educators (Beauchamp & Thomas, 2009; Flores, 2014; Leijen, Kullasepp, Katrin, & Anspal, 2014; Meijer et al., 2014). Therefore, development of intentional and structural pedagogies to support Turkish preservice teachers' professional identities was needed. I believe that present study has the potential to address this need because it considered the pedagogies offered in the literature (Flores, 2014; Leijen et al., 2014; Meijer et al., 2014) within the video case-based community. In the following paragraphs, which pedagogies were used within the scope of the present

study and their implications for preservice teachers, teacher educators and researchers were discussed.

First pedagogy was storytelling as suggested in narrative approach of teacher identity (Darragh, 2016; Sfard & Prusak, 2005). During the initial interviews, preservice teachers were asked to tell the stories about their experiences related with teaching and learning mathematics. In addition, as a response to the pedagogies of guided reflection procedure (Leijen et al., 2014) or designing collaborative reflection meetings (Meijer et al., 2014), a video case-based community was constructed. These two pedagogies increased preservice teachers' self-awareness in terms of their strengths and weaknesses as future mathematics teachers. In particular, they realized and reflected on their own motives and beliefs about their role as future mathematics teachers by comparing themselves to their previous teachers and the teachers in the video-cases. Therefore, teacher educators can enhance preservice teachers' self-awareness as in the present study for identity development.

These processes not only produced self-awareness for preservice teachers, but also increased their understanding of the complexity of teaching mathematics. During the video case-based community, preservice teachers had the chance to reflect on different classroom environment that they could not observe in their teaching practicum (Sherin, 2004). Therefore, they could imagine themselves as the teacher of the classroom within different contexts and negotiate their pedagogies for those contexts. In addition, they shared and discussed their ideas which helped them in realizing alternative approaches for the concepts of the lessons. Thus, their perspectives about the roles they are going to shoulder in teaching mathematics and the student outcomes they want to fulfill were enhanced. Therefore, similar communities can be constructed or video cases can be integrated to the scope of the teacher education courses to increase preservice teachers' skills in noticing, reflecting, interpreting and interacting.

Although teaching practice was found to be the most powerful predictor of teacher identity (Beauchamp & Thomas, 2009; Lutovac & Kaasila, 2011), studies investigated Turkish preservice teachers' perceptions regarding the teaching

practices highlighted the limitations of these courses in the program (Boz & Boz, 2006; Eraslan, 2009). On the other hand, Çakıroğlu and Çakıroğlu (2003) criticized teacher education programs in terms of the irrelevancy between teacher education programs and the realities of Turkish schools. Even recent revisions (HEC, 2018) in the teacher education programs did not take these problems into consideration. Therefore, video case-based community in the present study might be considered as complementary to teaching practicum to eliminate those limitations and might be integrated in the methods courses and to bridge the theory and practice.

The present study also contributes to the related literature in many perspectives. First off all, by using Akkerman and Meijer's (2011) dialogical approach as a theoretical framework for conceptualizing teacher identity, bilateral relationships between multiplicity-unity, discontinuity-continuity and social-individual perspectives of identity was highlighted and therefore, a comprehensive understanding of preservice teacher identity was ensured. Consideration of these perspectives guided the methodology of the study. In contrast to the many studies in the literature which investigated teacher identity either from a micro or macro frame, both of them were considered in the scope of the present study. They were integrated because without macro-frames, which take into consideration of teachers' narratives reflecting past, present and future stories, micro-context cannot be understood (Akkerman & Meijer, 2011). Similarly, Beauchamp and Thomas (2009) noted that macro frames are inseparable from the notion of discourses by indicating the way in which identity is positioned within a specific context which reflects micro-frames. In particular, while preservice teachers' identity orientations which were collected through interviews before and after the video case-based community represented the macro-frames in the study, noticing practices reflected their momentary positions of their orientations.

Video case-based community might represent an example of micro context and shed light to the identity researchers which wanted to investigate the situatedness of identity in teacher education context (van Putten et al., 2014, Wood, 2013). In particular, preservice teachers in the present study reflected on the video

cases as an indication of what they prioritized as future mathematics teachers. However, what they professed before the video case-based community and noticed through the video case were not identical. They were influenced by different individual and contextual factors such as preservice teachers' knowledge in teaching mathematics, their willingness to participate in the video case-based community, content of the video cases and interventions during the video case-based community. Therefore, the present study suggests considering these individual and contextual factors in interpreting transformation of teacher identity for the similar studies in the future.

Comparing to the existing literature, video case-based community was somehow different which provided advantages for preservice teachers and the coordinator of the community. Accordingly, in most of the studies, preservice teachers or teachers watch the video all together and share their ideas in the same group meeting (van Es, 2011). In this kind of a community, group leader generally preferred same prompt - what did you notice? - to initiate the discussion. Participants responded the question without in-depth thinking about the video. In other words, the flow of the group discussions cannot be planned. However, in the present study, videos were assigned to the preservice teachers one week before the group discussion. Therefore, both preservice teachers and group leader had enough time to write reflections and investigate all of the noticed issues respectively. This provided advantages for both sides. Preservice teachers had the chance to watch video and write reflection whenever they wanted and to make internet search or use other tools in their reflections. On the other hand, comprehensive knowledge about what and how preservice teachers noticed in the related weeks was obtained. Therefore, interventions and the issues to discuss with the group were managed. In this regard, researchers and teacher educators might take into account of this issue in planning their setting in the future.

In conclusion, findings of the present study highlighted that the video case-based community developed a professional vision for multidimensionality of classroom and complexity of teaching mathematics (Koc, Peker, & Osmanoglu,

2009) for teacher roles and the objectives that they want to fulfil (Izadinia, 2013), and raised their self-awareness. The collective influences of these experiences transformed their identity orientations. It also produced information from a Turkish teacher education context which is significant when the tendency of identity studies in the literature was considered (Izadinia, 2013). Therefore, teacher educators and researchers in teacher education might benefit from the findings of the present study through guiding preservice teachers' noticing practices and identity developments.

5.3.1 Implications of the revisions and integrations of the frameworks

As it was explained in detail in the methodology chapter, Beiajaard et al.'s (2000) identity framework and van Es's (2011) learning to noticing framework guided the data analysis of this study. However, further revisions were added to both of them before conducting the data analysis. In the following part, implications of these revisions were presented.

Preservice teachers' identity orientations in the present study were different from other studies in two respects. The first one is the data collection. While the former studies considering Beijaard et al.'s (2000) framework investigated the preservice or inservice teachers' identity through metaphors or surveys requiring short answers, the present study collected the relevant data through interviews. Since the verbal data produces more outcomes than the written data, preservice teachers' identity orientations did not represent a specific category. In other words, preservice teachers tended to profess themselves as future mathematics teachers who rely on the distinct aspects of expertise (Beijaard et al., 2000; Beijaard et al., 2004; Löfström et al., 2010), which could be defined as hybrid identity as in Löfström et al.'s (2010) study. Hybrid identity was not preferred as a term in the scope of the present study since there was no specific type of identity orientations. In other words, preservice teachers were not categorized based on their expertise areas as in the previous studies.

The second difference of the present study arouse during the data analysis of the pilot study. It was found that preservice teachers associated didactical roles not

only to students' learning in mathematics as what Beijaard et al. (2000) claimed, but also to other student outcomes. They mainly associated didactical roles to students' affective outcomes before the video-case based study and to cognitive outcomes after the video case-based community. This is why the further revisions added by the present study were significant in understanding preservice teachers' professional identity. In other words, the present study featured the need in considering intentions of the roles that teachers attributed themselves. Therefore, researchers could understand why preservice teachers attributed those roles to themselves or why the inservice teachers make particular decisions inside the classroom (Losano & Cyrino, 2017). Mathematics teacher educators might benefit from those findings and might assist preservice teachers in developing their identity orientations. Similarly, further studies which will investigated teacher identity based on Beijaard and colleagues's (2000) identity framework should consider our revisions to have a comprehensive understanding of intentions of teacher identities.

On the other hand, this study also made revision in the noticing framework (van Es, 2011). Therefore, it is different from the other studies which also investigated preservice teachers' noticing practices through video-cases. Identity framework was integrated to the noticing framework and the analyses were conducted based on these revisions. In particular, what preservice teachers noticed based on teacher roles and student outcomes was analyzed as the topic of the noticed issues. Interrelationship of these frameworks showed that some of the teacher roles and student outcomes in the identity framework produced higher levels of noticing. Therefore, enriching the topic perspective of the noticing framework performed well in the scope of the present study. It might represent an example for the future studies since the topic of the noticing framework was enriched as van Es (2011) suggested. In addition, integration of these frameworks showed that preservice teachers' identity orientations can be investigated through noticing practices in video case-based context. Further researchers and teacher educators can establish similar contexts in teacher education to develop preservice teachers' identity orientations through developing their noticing practices.

5.4 Limitations and Delimitations of the Study and Recommendations for Further Research

Although we could answer the research questions that guided the scope of the present study, there were some unavoidable limitations. The first one is related with the number of participants in the video case based community. Since we integrated the video case-based community into the scope of the practice teaching course, we could not determine the optimal number for group meetings. Similarly, we could not choose the participants in the study. As it was explained in the methodology chapter, pilot study was conducted with three participants. However, there were twelve participants in the main study. Although different perspectives produced variety in noticed issues and enriched the group discussion, it hindered the analysis of noticing trajectories of the communications during group meetings. Therefore, we could only speak from the trajectories of written noticing. I took reflective memos in each part of the study to overcome this limitation and to understand the core and peripheral participants of the discussions. Nevertheless, it would have been better if it was possible to relate what they wrote and discussed in term of the trajectory. Therefore, further studies might involve less participants to highlight the sociocultural aspect of the transformation of noticing.

Second, preservice teachers' overloaded work as the senior students in the teacher education program might have influenced their willingness to participate the video case based community. Preservice teachers in the present study were taking courses in teacher education program, going to the practice school and preparing for KPSS examination at the time of the data collection. They were complaining about the lack of enough time for watching videos and writing reflection papers. This might have influenced the lengths of their critics in the reflection papers and more importantly the depth of their noticing. To overcome this limitation, I encouraged preservice teachers to write longer and highlighted the noticed issues which served as example in terms of the depth. Nevertheless, preservice teachers' noticing trajectory might have been higher if they had more personal time to reflect on and/or

written longer. Therefore, researchers and teacher educators should find alternative ways to encourage preservice teachers in writing.

Moreover, videos chosen for the present study were in the area of Geometry and Measurement although the topic-specific noticing was not in the scope of the present study. Such a restriction reduced the diversity among the videos and provided convenience to preservice teachers in terms of using curricula in writing their reflection papers. Through these video cases, preservice teachers had the opportunity to observe and notice different classroom mathematics practices within different contexts and different class levels. In other words, preservice teachers' noticing practices were delimited to the geometry and measurement. Fındings of the present study demonstrated that preservice teachers' knowledge in the subject influenced what and how they noticed. Therefore, further studies should be conducted with other subject domains. They should consider preservice teachers' content and pedagogical content knowledge if they wanted to investigate subject-specific noticing.

Besides the topic, the nature of the video cases might have limited the findings of the study. The video cases captured a part of the mathematics lessons and demonstrated the multidimensionality of classroom. Therefore, preservice teachers had opportunities to notice and discuss multiple teacher roles and associated students' outcomes. It might have prevented preservice teachers to focus on a specific issue in the videos. Since the present study investigated preservice teachers' noticing practices from the teacher identity perspective, it did not pose a problem for the findings. Nevertheless, further studies might consider micro case videos if they wanted to promote preservice teachers' noticing abilities in students' mathematical thinking or in any other issue featured in the micro cases.

On the other hand, preservice teachers' noticing practices were limited by their expertise in the discipline which was also stated as one of the aspects in noticing skills (van Es & Sherin, 2002). Considering this limitation, I intervened in the process of group discussion as the coordinator of the community to increase preservice teachers' noticing repertoire and develop their interpretation skills.

Therefore, my intervention might have influenced the trajectory of preservice teachers' noticing. However, my researcher role might also have served as a catalyst in preservice teachers' noticing trajectories and might be considered as an example.

To sum up, it is significant to note that the present study investigated transformation of preservice teachers' identities in the video case based community. More precisely, noticing practices mediated the preservice teachers' identity orientations. Therefore, findings of the noticing practices should be evaluated from the perspectives of identity framework.

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APPENDICES

APPENDIX A: INITIAL INTERVIEW PROTOCOL

İsim- Soyisim: **Yaş:**

Cinsiyet: **Not Ortalaması:**

Bireysel Kimlik/ Personal Identity

Bu bölümde okul hayatından, öğrencilik hayatından bağımsız olarak, bireyin sosyal yaşamı ve bu yaşamın içinde kim olduğuna yönelik sorular yöneltilecek ve geçmiş tecrübeler/hatıralar sorgulatılacaktır.

1. Bana sosyal yaşamında/ günlük hayatında "…" nın kim olduğunu anlatabilir misin?
   a. Sen kimsin, nelerden hoşlanırsın?
   b. En belirgin karakteristiğin/özelliğin nedir?
   c. Kedinle ilgili değiştirmek istediğin bir huyun bir özelliği var mıdır? Niçin değiştirmek istiyorsun?
2. Okul hayatından bağımsız olarak, nasıl bir çocukluk yaşadığını anlatabilir misin?
   a. Nasıl bir çevrede büyüdün?
   b. Çocukluk yıllarının unutamadığın bir tecrübesi var mı? Var ise senin bugünkü …. olmanı ne derece etkiledi.

Öğrencilik Tecrübeleri

Bu bölümde okul hayatı ve öğrencilik hayatı ile ilgili bireyin geçmiş tecrübeleri/hatıraları sorgulatılacaktır.

3. Nasıl bir öğrenciydin tanımlar mısın?
4. Öğrencilik hayatında unutamadığın bir anını/tecrübeni paylaşabilir misin?
5. En sevdiğin ders neydi? Niçin bu dersi çok seviyordun?

Geçmiş Öğretmenler

Bu bölümde bireyin geçmiş öğretmenleri ve/veya yakın çevresinden öğretmenler sorgulatılacaktır.

6. Ailende veya yakın çevrende öğretmen olan birileri var mı ya da var mıydı? Yok ise bir sonraki soruya geç

Var ise:

a. Bu kişileri tanımlar mısın?

b. Bu kişiler senin öğretmenlikle ilgili görüşlerini etkiledi mi? Evet ise nasıl etkiledi?

c. Sana rol model olduğunu düşünüyor musun?

7. Sende olumlu veya olumsuz iz bıraktığını düşündüğün bir öğretmeninden bahsedebilir misin?

Olumlu Matematik öğretmeni ise:

a. Cinsiyeti: Yaşı:

b. Matematiği nasıl öğretiyordu? Matematiksel bilgi ve becerilerini nasıl değerlendiriyorsun? Derse nasıl başlardı? Sınıfta ilgi çekici aktiviteler yapar mıydı? Öğrencilerle olan ilişkisi nasıldı?

c. Bu öğretmeni diğer öğretmenlerden farklı kılan yönü neydi?

d. Bu öğretmenin senin öğretmenlikle ilgili görüşlerinde ve yapacağın sınıf içi ve dışı uygulamalarda rol model olduğunu söyleyebilir misin?

Olumsuz Matematik öğretmeni ise:

a. Cinsiyeti: Yaşı:

b. Matematiği nasıl öğretiyordu? Derse nasıl başlardı? Öğrencilerle olan ilişkisi nasıldı? Matematiksel bilgi ve becerilerini nasıl değerlendiriyorsun?

c. Bu öğretmeni olumsuz olarak değerlendirmende etki eden faktörler nelerdir?

d. O halde bu öğretmenin sergilediği tutum ve davranışları, öğretmenlik hayatında yapmamaya özen gösterecek misin?

Olumlu başka branş öğretmeni ise:

a. Cinsiyeti: Yaşı:

b. Nasıl bir öğretimi vardı? Öğretmeninin bilgi ve becerilerini nasıl değerlendiriyorsun? Öğrencilerle olan ilişkisi nasıldı?

c. Bu öğretmeni diğer öğretmenlerden farklı kılan yönü neydi?

d. Bu öğretmenin senin öğretmenlikle ilgili görüşlerinde ve yapacağın sınıf içi ve dışı uygulamalarda rol model olduğunu söyleyebilir misin?

e. Bana bir de sende iz bıraktığını düşündüğün (olumlu ya da olumsuz) matematik öğretmenini anlatabilir misin?

Olumsuz başka branş öğretmeni ise:

a. Cinsiyeti: Yaşı:

b. Bu öğretmeni olumsuz olarak değerlendirmende etki eden faktörler nelerdi? Açıklayabilir misin?

c. Bana bir de sende iz bıraktığını düşündüğün (olumlu ya da olumsuz) matematik öğretmenini anlatabilir misin?

Meslek seçimi

Bu bölümde bireyin öğretmenlik mesleğini seçme nedenleri sorgulatılacaktır.

8. Niçin öğretmenlik mesleğini seçtin?

a. Bu mesleği seçmendeki faktörler nelerdir?

b. Kendi isteğinle mi bu mesleği seçtin? Öğretmenlerinin, ailenden ve/veya çevrendeki birilerinin bunda etkisi var mı?

c. Peki hangisinin daha etkili bir faktör olduğunu düşünüyorsun?

9. Peki, niçin matematik öğretmenliğini seçtin? Elinde tüm imkanlar olsa başka bir meslek seçer miydin? Niçin böyle düşünüyorsun?

Öğretmen Eğitimi/ Lisans Yılları

Bu bölümde bireyin üniversite hayatı ve aldığı eğitim ile ilgili geçmiş tecrübeleri/hatıraları ve düşünceleri sorgulatılacaktır.

10. İlköğretim matematik öğretmenliği programı dahilinde aldığın, en sevdiğin ders veya dersler neler?

a. Niçin en çok bu dersleri sevdin?

b. Bu ders veya derslerin, senin meslek hayatına nasıl bir katkı sağlayacağını düşünüyorsun?

11. İlköğretim matematik öğretmenliği programı dahilinde aldığın, en sevmediğin ders veya dersler nelerdi?

a. Niçin bu dersleri sevmedin? Bu ders veya derslerin senin için eksik yanı neydi?

b. Elinde olsa bu dersler yerine başka nasıl dersler almak isterdin?

12. Üniversitede aldığın derslerden hangisi veya hangilerinin matematik öğretmeni olarak sana en çok katkıyı verdiğini düşünüyorsun? Neden?

13. Üniversitede aldığın derslerden hangisi veya hangilerinin matematik öğretmeni olarak sana en az katkıyı verdiğini düşünüyorsun? (veya katkı vermediğini düşünüyorsun?) Neden?

14. Sence öğretmen eğitiminde aldığın derslerin, gördüğün eğitimin ve edindiğin tecrübelerin (lisans yılları), seni nasıl bir matematik öğretmeni olmaya itiyor? Niçin böyle düşünüyorsun? Senin olmayı hedeflediğin öğretmen ile benzerlik gösteriyor mu? Peki bu durumdan hoşnut musun?

15. Genel olarak son 4 yılını yani içinde bulunduğun ilköğretim matematik öğretmenliği programını değerlendirecek olursan,

a. Bir öğretmen adayı olarak sana neler kattı, programın güçlü yanlarından bahsedebilir misin?

b. Bir öğretmen adayı olarak programın/aldığın eğitimin sence eksik yanları neler? (Programın eksik kaldığı noktalar ya da sınırlılıkları neler?

c. Mezun olduğunda öğreteceğin konular hakkında ne derece bir bilgiye sahipsin? Ne kadarına hakimsin? Bu bilgileri öğretmen eğitimi programında mı edindin yoksa başka yollarla mı?

d. Öğretim yapacağın müfredat hakkında ne derece bir bilgiye sahipsin?

Öğretmenlik Deneyimi

Bu bölümde bireyin varsa öğretmenlik deneyimi sorgulatılacaktır.

16. Öğretmenlik deneyimin var mı? (Özel ders, dershanede staj öğretmenliği, gönüllü öğretmenlik, eşin dostun akrabanın çocuğuna ders anlatmak gibi)
Var ise:

a. Nerede, nasıl, öğrenci grubu, süresi?

b. Bu deneyimlerin sana ne kazandırdı?

Mesleki Kimlik Yönelimleri

Bu bölümde bireyin mesleki kimlik yönelimleri sorgulatılacaktır.

17. Ortaokulda matematiğin nasıl öğretilmelidir? Peki nasıl öğretilmemelidir?

18. Bu görüşlerin senin matematiği öğrenme şeklinle benzerlik gösteriyor mu? Benzerlikleri ve farklılıkları söyleyebilir misin?

19. Matematiği öğrenmede öğrencinin sorumlulukları ve rolleri nelerdir? Bir öğrenci nasıl matematik öğrenir?

20. Niçin matematik öğretiyoruz?

21. Peki matematik öğretmenini sence kimdir? nasıl olmalıdır tanımlarsın? (İyi bir matematik öğretmeni sence nasıl olmalıdır?)

a. Matematiği öğrenmede öğretmenin sorumlulukları veya rolleri nelerdir?

b. Matematik öğretmeninin sahip olması gereken bilgiler nelerdir? Matematik öğretmeni neleri bilmeli? (Sahip olması gereken bilgilerden olmazsa olmaz dediğin üç veya beş tanesini söyleyebilir misin?)

c. Matematik öğretmeninin sahip olması gereken beceriler nelerdir? Neleri yapabiliyor olmalı? Niçin böyle düşünüyorsun? (Sahip olması gereken becerilerden olmazsa olmaz dediğin üç veya beş tanesini söyleyebilir misin?)

d. Öğretmen ders anlatırken hangi kaynaklardan yararlanmalıdır? (Öğretmen ders kitabından mı yoksa alternatif ders araçlarından mı yararlanmalıdır?) Niçin böyle düşünüyorsun?

22. O halde, etkili matematik öğretme-öğrenme ortamını nasıl tanımlarsın?

23. Mesleğine başladığında, nasıl bir öğretmen ve nasıl bir matematik öğretmeni olmak istiyorsun? (arada fark var mı? Varsa sebebi ve hangisi senin için daha önemli?)

a. Matematik öğretirken, temel hedefin/amacın ne olacak?

b. Öğrencilerinin neleri yapabilmesi sağlayacaksın? Onlarda neyi geliştirmeyi hedefleyeceksin?

c. Bu amaca ulaşmak için öğrencilerine karşı ne gibi sorumlulukların olduğunu düşünüyorsun? (Senin rollerin neler olacak?)

- Derse nasıl başlarsın, sınıf içinde neler yaparsın?
- Öğrencilerle nasıl bir iletişim/ etkileşim içinde olacaksın?
- Sınıf dışı ne gibi uygulamalar yaparsın?

d. Peki bunları yapabilmek için hangi bilgi ve becerilere sahip olman gerektiğini düşünüyorsun?

e. Peki bunların ne kadarına sahipsin? Eksikliklerin ve güçlü olduğun yönlerinden bahsedebilir misin?

24. Kendini bu şekilde bir matematik öğretmeni olarak değerlendirmeye ne zaman başladın?

25. Sende iz bırakan öğretmenle senin olmak istediğin (olacağını düşündüğün) matematik öğretmenini karşılaştırabilir misin?

a. Benzerlikler ve farklılıklar neler?

26. Peki atandığın zaman ya da öğretmenliğe başladığında idealindeki öğretmeni yansıtabilecek misin?

a. Evet ise bunun için neler yaparsın/ yapacaksın?

b. Hayır ise, olmak istediğin öğretmen ile olacağını düşündüğün öğretmen arasında nasıl farklılıklar var? Bunun nedenleri neler? Bunu gerçekleştirmek için hangi bilgi ve becerilere ihtiyaç duyuyorsun? Nasıl bir ortam/çevre gerekiyor?

Yorumlar ve Notlar

Eklemek istediklerin?

APPENDIX B: POST INTERVIEW PROTOCOL

İsim- Soyisim: **Yaş:**

Cinsiyet: **Not Ortalaması:**

A. Bu bölümde (yapılan uygulamanın dışında) öğretmen adaylarının staj okulunda yaptıkları gözlemleri ve bu süreçte aldığı eğitimleri ve görüşlerine olan yansımaları sorgulanacaktır.

Bu dönem boyunca (az da olsa) staj okuluna gidip gözlem yapma şansı yakaladın. Ayrıca bazı dersler aldın ve KPSS ye hazırlandın.

1. Okulu ve gözlemlediğin öğretmeni bana anlatabilir misin? Öğretmenin güçlü ve zayıf yönlerini değerlendirebilir misin?
2. Staj okulunda gözlem yapmak öğretmen adayı olarak sana bir şeyler kazandırdı mı?

   Evet ise, neler kazandırmış olabilir? Bunlar sadece stajda gözlem yaptığın için mi kazandığın şeyler?

   Hayır ise, nedenleri nelerdir?

   Kısmen ise, ne bekliyordun, ne buldun?
3. Bu dönem boyunca öğretmenlikle ilgili görüşlerinde/bilgi düzeyinde etkili olduğunu düşündüğün bir ders aldın mı?

   Evet ise, hangi ders, sana neler kazandırdı?

   Hayır ise, bir sonraki soruya geçilebilir.
4. KPSS dersanesine gitmek /veya KPSS ye hazırlanmak sana bir matematik öğretmeni adayı olarak ne kattı? Bu hazırlık sürecinde yaşadıkların, edindiğin bilgiler öğretmenliğe yönelik görüşlerini etkiledi mi?

   Evet ise, nasıl?

   Hayır ise, bir sonraki soruya geçilebilir.

B. Bu bölümde uygulamanın içeriği (video izlemek, reflection paper yazmak ve grup toplantısı ile videoları tartışmak) ve içeriğin öğretmen adayına kazandırdıkları ile ilgili görüşlere yer verilecektir.

5. Daha önce bu derste izlediğimize benzer, yani farklı öğretmenlerin derslerinden kesitler gösteren, videolar izledin mi?

Evet ise, detaylandırabilir misin?

Hayır ise, bir sonraki soruya geçilebilir.

6. Videoları izlemenin (yorum yazmayı ve grup toplantılarını bunun dışında tutuyorum) sana katkısı oldu mu? Hangi açılardan katkısı oldu? Nasıl?

7. Videoda yorumlarında birinci soruyu cevaplamak, yani videodaki öğretimin güçlü ve zayıf yönleri hakkında yazılı bir şekilde yorum yapmanın sana katkısı oldu mu? Hangi açılardan katkısı oldu? Nasıl?

8. Video yorumlarında ikinci soruyu cevaplarken, yani ben olsaydım bu konuyu-kazanımı böyle anlatırdım derken, neye dayanarak yorum yaptın? Bunun için, yani o konunun nasıl öğretilebileceğine dair, bir araştırma yaptın mı?

Evet ise, hangi kaynaklardan yararlandın? Müfredata, ders kitaplarına, diğer yardımcı kitaplara, daha önce aldığın bir dersin notlarına, internete baktın mı?

Bu araştırma sürecinin sana katkısı oldu mu? Hangi açılardan katkısı oldu? Nasıl?

Hayır ise, araştırma yapmamanın nedeni neydi?

Sadece videoda gördüğün eksiklikleri ben olsam bunlara dikkat ederdim şeklinde mi yorum yaptın? Eğer öyleyse, bu yorumları yapmanın sana katkısı oldu mu? Hangi açılardan sana katkısı oldu? Nasıl?

9. Grup toplantılarımızda video hakkında tartışma yapmanın sana katkısı oldu mu? Hangi açılardan katkısı oldu? Nasıl?

Öğretmen adayı arkadaşlarından bir şeyler öğrendiğini düşünüyor musun? Onlarla olan etkileşimin sana neler katmış olabilir? Örnek verebilir misin? (Arkadaşlarının bakış açıları seninkinden farklı mıydı? Örnek verebilir misin? Hangi açılardan sana katkısı oldu?

Hazırladığım sunumdaki ortak ve farklı bulduğunuz noktalara yaptığım vurguların ve bunlara dayanarak tartışmanız için yönelttiğim soruların neler sağladığını düşünüyorsun?

10. Genel bir değerlendirme yapacak olursan, yani bu grup çalışmasının öncesini ve sonrasını düşünecek olursan öğretmenlikle ilgili nasıl çıkarımlarda bulundun?

Bu süreç içinde nasıl bir gelişim gösterdin? (kavramsal olarak, öğretim yöntem ve teknikleri olarak, müfredat olarak (kazanım, beceri gelişimi…), öğretmen ve öğrencilerin rolleri olarak, sınıf içi etkileşim olarak, matematiksel dil olarak, fiziksel ortam olarak)

11. Bu çıkarımlarını/edindiğin tecrübelerini/öğrendiklerini öğretmenlik hayatında kullanabileceğin düşünüyor musun? Nasıl?

C. Bu bölümde süreç sonunda öğretmen adayının mesleki kimliği izlediği videolardaki öğretmenlerle kıyaslama yapılarak sorgulanacaktır. Ayrıca öğretmen adayının kendisini değerlendirmesini sağlamak için bazı sorular yer almaktadır.

12. İzlediğimiz videoları genel olarak değerlendirecek olursan ne söyleyebilirsin?

a) En çok hangi videoyu sevdin? Bunda etkili olduğunu düşündüğün faktör nedir? O video diğerlerine göre sence niçin daha başarılı?

Sen öğretmenlik yaşantında o videodaki öğretmen gibi dersler işleyeceğini düşünüyor musun?

b) Sence en başarısız, ya da en çok eksik yönü olan video hangisiydi? Niçin?

13. Videodaki öğretmenlerle (dilersen bir tanesi üzerinden de konuşabilirsin) senin olmak istediğin (olacağını düşündüğün) matematik öğretmenini karşılaştırabilir misin?

a. Benzerlikler neler?

b. Farklılıklar neler?

14. Bu süreçte bir öğretmen adayı olarak kendin hakkında neler öğrendin?

Bugün itibari ile kendini bir öğretmen adayı olarak değerlendirecek olursan, öğretmenlikle ilgili şu an zayıf ve güçlü yanlarının neler olduğunu düşünüyorsun?

15. Peki zayıf yönlerini nasıl güçlendirebilirsin?

16. Seneye bu çalışmaya daha uzun süreli olarak devam edeceğim biliyorsun, bana ne önerirsin? Sence niçin bu düzeltmeleri/değişiklikleri/eklemeleri yapmalıyım?

Bu sorular dışında sormamı beklediğin, ama sormadığım bir soru var mı? Sorsam cevaplar mısın? Eklemek istediğin noktalar var mı?

APPENDIX C: MANUAL FOR IMPLEMENTING TEACHER IDENTITY FRAMEWORK (LÖFSTRÖM ET AL., 2011)

Using the Manual

The manual is intended to support the researcher in the analysis of metaphors as research data using a theoretical framework based on Beijaard, Verloop, and Vermunt's (2000) model of teacher identity. The model is based on Schulman's (1986) ideas of teacher's content knowledge (CK), pedagogical knowledge (PK) and pedagogigal content knowledge (PCK). The authors of this manual have developed the use of the Beijaard, Verloop, and Vermunt (2000) model of teacher identity as an interpretative and analytical tool in the analysis of student beliefs about the teacher role.

The manual is primarily intended for researchers within the Nordic-Baltic mathematics research group (NorBa), to help researchers in the coding of their data as well as to facilitate uniform and reliable interpretations of the data. In addition, the manual may, of course, be utilised by other researchers who are interested in the analysis of metaphors. It is advisable that metaphors are analysed independently by two (or more) researchers to monitor inter-rater reliability. We recommend analysing metaphors and their explanations together as a unit of analysis as the metaphor itself may be used to express different meanings.

The Teacher Identity Model as an Analytical Framework

The Beijaard, Verloop, and Vermunt (2000) model identifies three aspects of the teacher's knowledge base reflecting teacher's professional identity. These are:

1. Teacher as subject expert

   Teacher has a profound knowledge base in his/her subject(s).

2. Teacher as didactics expert

Teachers need knowledge about how to teach specific subject-related content so that pupils can capitalise their learning. This is kind of knowledge is referred to as knowledge of didactics, and it is discipline- and subject specific in nature. Subject knowledge and knowledge about human learning are integrated with an understanding of how learning experiences are facilitated in a particular subject.

Emphasis is on the creation of learning environments that support the pupil's learning process, the optimal use of teaching and learning methods, scaffolding and other support techniques.

3. Teacher as pedagogical expert

   The understanding of human thought, behaviour, and communication are essential elements in the teacher's pedagogical knowledge base. Emphasis is on relationships, values, and the moral and emotional aspects of development. The teacher is seen as somehow who supports the child's development as a human being.

The above aspects are not exclusive of each other. Rather, all influence an individual's identity, but the knowledge base that the teacher primarily relies on in teaching may have implications for what is emphasised in teaching, and what is seen as the primary role of the teacher.

Examples Of Categories

The following categories are explained in more detail below along with illustrative examples:

- Teacher as subject expert
- Teacher as didactics expert
- Teacher as pedagogical expert
- Self-referential
- Contextual metaphors

The defining features, based on which categorisation is made, have been underlined.

1.1 Teacher as subject expert

Typical features in "Teacher as subject expert" –metaphors:

- *focus on the teacher*
- *subject content*
- *subject knowledge*
- *knowledge*
- transmission
- knowing details
- knowing everything
- having ready answers
- being smart

The following are examples in which the teacher is seen as a subject expert who possesses both vast and detailed knowledge, or as someone who transmits information:

> A well of knowledge, a living encyclopedia: a teacher needs to know everything in his or her subject in all details.
>
> Radio. Gives a lot of new information
>
> An encyclopaedia: He/she is full of knowledge, which we acquire from him/her.
>
> Computer: He/she should be the smartest person standing in front of his/her students. He/she should know the subject very well and be able to answer all questions in the subject area.

1.2 Teacher as didactics expert

Typical features in "Teacher as didactic expert" –metaphors:

- *focus on learning*
- *teaching methods/ways of teaching*

- *learning process*
- creator of learning environment
- support understanding
- assessment of learning
- pupils' self-evaluation
- meta-cognitive skills
- scaffolding
- explaining

In the following example the teacher is described as someone, who, by understanding the pupils' way of thinking ("squirm through the students' minds") and by chopping the content into comprehensible parts ("one must split the whole to make things better") facilitates the learning of the pupils:

> An assiduous cabbageworm, who tries to change rotten cabbage fresh: a teacher needs to squirm through the student's mind to make something clear to him or her. One must split the whole in order to make things better.

In the following example the teacher is described as someone who helps the pupil to evaluate his/her learning. He/she emphasis is thus more on the learning process and meta-cognitive skills than on subject matter, although the subject is mentioned in the metaphor:

> Mirror: shows the pupil his/her progress in the subject. If this were not so (if the teacher were not a mirror), the pupil would not be able to evaluate his/her progress.

1.3 Teacher as pedagogical expert

Typical features in "Teacher as pedagogical expert" –metaphors:

- *focus on caring and upbringing*
- *supporting growth of human beings*
- *caring and nurturing*

- *holistic development*
- *parental obligations*
- *relationship based on trust*
- availability
- communication
- person-related problem-solving
- teaching values
- being a role model
- support

The following are examples of metaphors that we have interpreted as "pedagogical". Typically, "mother" is used as the metaphor for a nurturing and caring teacher, but also other relations could be used to exemplify the caring and role-modelling aspects of the teacher's role:

> A second mother: I think school is a second home and teacher is a second mother, who teaches and loves.
>
> Second mother, whom you can rely on, count on and trust. My view and reasons are very much influenced by my own teachers, especially my elementary school teacher.
>
> A mother, a psychologist and a friend. Because the teacher needs to be always ready for these three jobs. Mother for a child, while the child does not get this care at home, a psychologist, in order to understand immediately the problem and to notice if something is wrong with the child; a friend, so that the child would always dare to come to you.
>
> Older brother. You can trust him, look up to him and you have a good relationship with him.

The next example describes the teacher as a tree, a growing ground that facilitates the children's well-being and holistic development as human beings:

A firm tree: Lots of different knowledge form one whole and an individual, which as a totality is understood. A tree provides shadow and it shelters, a tree gives new energy and faith to progress.

1.4 Self-referential metaphors

In addition, we have encountered metaphors that we have not lent themselves to analysis through the Beijaard *et. al* categories. Self-referential metaphors (Leavy & al. 2007) do not refer to acts central to teaching, students or classroom instruction. These metaphors focus on what teaching represents for the respondents as individuals. These metaphors described features or characteristics of the teacher's personality, with reference either to the teacher's characteristics (self-referential) without reference to the role or task of the teacher. One might say that the metaphors described who the teacher is.

Machine: always working.

A flag: changes according to the winds blowing, yet always remains there.

A candle that burns away while giving light: the teaching profession is difficult and demanding, stressful.

A person with all possible characteristics: A teacher needs to have all characteristics in order to succeed in school. Both with good and bad children as well as with youngsters and teacher colleagues.

1.5 Contextual metaphors

These metaphors described features or characteristics of the teacher's work/work environment, or in other ways referred to characteristics of the environment (contextual).. One might say that the metaphors described where (physically, socially, organisationally) or in what kind of setting or environment the teacher works. Both examples below indicate the teacher in a social context (class with pupils), but do not reflect any specific aspects of the teacher's knowledge base.

The king: because he rules the country just like the teacher rules the class, everything depends on him.

An actor in a big theatre: the teacher is a person who plays an important part in every pupil's life. Every lesson is as a small performance for the pupils.

1.6 Hybrids

In addition, we found that metaphors may include elements of more than one of the above categories. Typically, the hybrids includes the subject aspect with either pedagogical or didactical aspect. For example:

A tree: the teacher gives their students knowledge and clarifies them the material they go through, like a tree gives water and nutrition to its leaves and fruit.

We categorised the above metaphor as a subject and didactics expert metaphor. The 'knowledge giving' appears to refer to subject-specific knowledge. The clarification of material incorporates the idea of a didactical approach ("clarifying the material"). "Giving water and nutrition" appears to refer to providing knowledge, tools and skills that the pupils can use to make sense of what they are learning. This part could be interpreted as an expression of the teacher's pedagogical role, however, we connected it with the "knowledge" and "materials" which appear to be related to subject matter in this metaphor.

We have categorised the following metaphor as a subject and pedagogue metaphor. The teacher is described as caring, and as a person who is available to help when needed. The teacher is also some who helps the pupils to obtain knowledge. It is assumed in the metaphor that the teacher knows what is the "right knowledge" (subject expert):

A compass: The teacher helps children obtain the right knowledge; s/he directs them to the right path, helps when necessary.

The following is an example in which all three aspects from the Beijaard & al. (2000) model are evident. "Raising the child" and "knowledge of how to bring up

children" have pedagogical connotations. "Knowledge is needed about the subject" refers to the teacher's subject expertise. "Putting effort into the learning process" is related to didactics expertise.

> Gardener: the teacher raises the child, puts all his or her effort into the learning process, the teaching teacher job is a difficult and continuous process, in the teachers work, knowledge is needed about the subject as well as of how to bring up children.

1. Choosing The Category

We suggested working with the categorizations "from pure towards complex". Byt his we mean analyzing whether the metaphor + explanation (unit of analysis) fits into one of the basic categories, i.e. subject expert, didactics expert, pedagogue, self-referential or contextual. If the unit of analysis contains elements of two or more aspects, the researcher determines whether they seem to have equal emphasis or not. If the elements have fairly equal emphasis, we suggest categorising the metaphor in both/all relevant categories. If one of the aspects strongly dominates, we suggest categorizing the metaphor according to that aspect.

2. Coding

In order to handle hybrid metaphors in a simple way, we suggest coding each category separately. Hence, coding requires 5 columns in the observation matrix:

1- Subject expert
2- Didactics expert
3- Pedagogical expert
4- Self-referential
5- Contextual

For each observation, you need to check in each category whether the metaphor includes that aspect (1) or not (0).Each metaphor will then be coded as a five digit binary code (e.g. 0 1 0 0 0). Simple metaphors will have only one "1" in their code, while hybrid metaphors have 2 or more ones.

The categorization needs to be judged on a case-to-case basis. Therefore, we strongly recommend using two (or more) independent raters whose coding is compared at the end.

In many cases the metaphors are collected using paper-and-pencil questionnaires, and it may not be worthwhile to enter all metaphors into an SPSS (or other) matrix. For the purpose of manual coding, it is suggested that the raters use a sheet (Table 1) in which both raters categories are marked, and the final category decision, should the raters have disagreed first. Marking both raters' categorizations makes it easy to calculate inter-rater reliability. Only the final category decision needs to be entered into a data base for further statistical analyses.

Table 1: Sheet for manual coding of metaphors

Respondent number	**Rater 1 category**	**Rater 2 category**	**Decision: final category**	**Metaphor** (This column is for writing down metaphors that the researchers find as useful examples, for instance, for reports)
001				
002				
003				
....				

APPENDIX D: TURKISH SUMMARY / TÜRKÇE ÖZET

MATEMATİK ÖĞRETMEN ADAYLARININ MESLEKİ KİMLİKLERİNİN FARK ETME PRATİKLERİ ARACILIĞI İLE ÖZEL DURUM VİDEOLARI TEMELLİ TOPLULUK KAPSAMINDA GELİŞTİRİLMESİ

Giriş

Öğretmen eğitiminde mesleki kimlik üzerine yapılan çalışmalar genellikle "Ben öğretmen olarak kimim?" ve "Kim olmak istiyorum?" sorularına odaklanmaktadır (Akkerman ve Meijer, 2011, Beijaard, Meijer ve Verloop, 2004). Öğretmenlerin nasıl bir öğretmen olmak istedikleri ve öğretmen rollerini nasıl gördükleri hakkındaki bakış açıları (Beijaard, Verloop ve Verunt, 2000; Korthagen, 2004) öğretmen kimliğinin göstergeleri olarak kullanılmıştır. Bu göstergelere dayanarak, öğretmen kimliğinin özelliğini anlamak ve gelişimine katkı sunmak için pek çok çalışma yürütülmüştür (Beijaard vd., 2004). Bu çalışmaların birçoğunda operasyonel bir tanım bulunmamakla birlikte, bazı karakteristikler üzerine ortak vurgu söz konusudur (Beijaard vd., 2004). Bu karekteristikler çokluk (multiplicity), süreksizlik (discontinuity) ve kimliğin sosyal (social) yapısıdır (Akkerman ve Meijer, 2011). Buna göre, kimlik sabit ve mutlak bir yapı değildir (Settllage, Southerland, Smith ve Ceglie, 2009), daha ziyade deneyimlerin yorumlanmasını ve yeniden yorumlanmasını içeren dinamik bir süreçtir (süreksiz) (Meijer, Oolbekkink, Pillen, ve Aardema, 2014). Dolayısıyla, sosyal olarak yapılandırılmıştır (sosyal doğa) ve bağlama göre (çokluk) değişiklik gösterebilmektedir (Beijaard vd., 2004).

Akkerman ve Meijer (2011), öğretmen kimliğine yönelik bu yaklaşımı eleştirerek, kimliğin çokluk, süreksizlik ve sosyal doğasının yanında birlik (unity), süreklilik (continutity) ve bireysel (individual) doğasını da varsayan bir diyalojik yaklaşım önermiştir. Diyalojik yaklaşıma göre (Akkerman ve Meijer, 2011), bireylerin çoklu mesleki kimlikleri yoktur. Ancak, bireyler etkileşimde bulundukları diğer bireylere ve topluluk içindeki görevlerine bağlı olarak kimliklerini farklı

şekilde ortaya koyarlar (van Zoest ve Bohl, 2005). Farklı bağlamlarda farklı kimlik ortaya koymak, çokluk ve süreksizlik özelliklerini ön plana çıkarabilir. Ancak, bireylerin geçmiş tecrübelerine dayalı söylemlerine odaklanmak, o bireylerin kimliklerinin bulundukları bağlamla nasıl uyumlu bir bütün içinde olduğunu anlamayı sağlar (Akkerman ve Meijer, 2011; Beijaard vd., 2004). Böylelikle, kimliğin sürekli ve birlik özellikleri de vurgulanabilmektedir.

Öte yandan, kimlik bireylerin deneyimlerini nasıl anlamlandırdığı ile ilgilidir (Beijaard vd, 2004). Bununla ilgili olarak, Wenger (1998) yaptığımız şeyi nasıl yorumladığımızın bizim kim olduğumuzu şekillendirdiğini söylemektedir. Başka bir deyişle, bireyler aynı bağlamda ortak deneyimler yaşamalarına rağmen deneyimlerini farklı müzakere edebilir ve farklı kimlik geliştirebilirler. Bu nedenle sosyal bağlamla birlikte bireysel perspektiflerin de dikkate alınması gerekmektedir (Akkerman ve Meijer, 2011). Kimliğe yönelik bu ikili yapıyı dikkate alan bu çalışma, Akkerman ve Meijer'in (2011) diyalojik yaklaşımını benimsemektedir.

Akkerman ve Meijer'in (2011) diyalojik yaklaşımı, öğretmen kimliği oluşumunun karmaşıklığını açıklasa da, araştırmacıların veri analizi sürecinde neye odaklanacağı hakkında yardımcı olmamaktadır (Annese ve Traetta, 2018). Beijaard vd. (2000), bu bağlamda öğretmen kimliğini analiz etmede metodolojik bir yaklaşım sunmaktadır. Buna göre, öğretmen kimliği, öğretmenlerin kendilerini, *konu uzmanlığı*, *didaktik uzmanlık* ve *pedagojik uzmanlık (subject matter expertise, didactical expertise and pedagogical expertise)* gibi bilgi alanlarına göre kendilerini algılama biçimleri olarak tanımlanmıştır. Öğretmen mesleki kimliğini yansıtan öğretmen bilgi tabanının bu üç yönü, Shulman'ın (1986) alan bilgisi, pedagojik alan bilgisi ve pedagojik bilgi kavramlarına eş değerdir. Ancak, bu çerçevede ele alınan öğretmen kimliği, öğretmenlerin bilmesi gerekenlerin ötesindedir, bunun yerine öğretmenlerin mesleki çalışmalarında önemli buldukları konulara odaklanmaktadır (Beijaard vd., 2004). Löfström, Anspal, Hannula ve Poom-Valickis (2010) bu çerçeveyi kullanarak yaptıkları çalışmalarında öğretmen kimliğine iki kategori daha eklemişlerdir. Öğretmen adaylarının kişisel karakteristikleri - *özüne dönük (self-referential)* ve öğretmen adaylarının çalışma ortamları - *bağlamsal (contextual)*

kategorilerini temsil etmektedir. Bu çalışmada, Beijaard ve arkadaşlarının (2000) kimlik çerçevesi Löfström vd. (2010) tarafından yapılan revizyon da dahil olmak üzere öğretmen adaylarının nasıl bir öğretmen olmak istediklerini ve gelecekteki matematik öğretmenleri olarak rollerini nasıl gördüklerini anlamak için kullanılmıştır.

Öğretmen adaylarının öğretmen eğitimi sürecince elde ettikleri tecrübelerin mesleki kimliklerini inşa etmeleri için kilit noktası olduğu vurgulanmaktadır (Flores, 2014; Timostsuk ve Ugaste, 2010). Bu yüzden birçok araştırmacı odağını öğretmen eğitimi programlarına ayırmıştır. Öğretmen adaylarının öğretmen eğitimi sırasında ortaya çıkan kimliklerini anlamalarını sağlamak ve profesyonel bir öğretmen olmanın ne anlama geldiğine dair net bir görüş sağlamak için onları desteklemek önemlidir. (Volkmann ve Anderson, 1998). Öğretmen eğitimi programlarının içeriğinde yer alan öğretmenlik uygulamaları ile öğretmen adaylarına gözlem yapma ve öğretme fırsatı sunulmaktadır. Ayrıca öğretmen adayı olarak nasıl bir öğretmen olduklarına dair uygulama öğretmenlerinden ve öğretmen eğitimcilerinden geri bildirim alma şansı yakalamaktadırlar. Bu yüzden öğretmenlik kimliğinin en etkili öğretmenlik uygulamaları kapsamında geliştirileceği tartışılmıştır (Anspal, Eisenschmidt, ve Löfström, 2012; Beijaard vd., 2004). Öğretmenlik uygulaması ile öğretmen adaylarının öğretimin zorlukları ve karmaşıklığı ile yüzleştiği, öğretmenliğe hazır olup olmadığı ile ilgili öz değerlendirme yaptığı ve böylece kimliklerinin sağlamlığını gerçekliğe karşı test ettikleri söylenmektedir (Putten, Stols ve Howie, 2014).

Ancak öğretmen eğitimi programlarının içeriğinde öğretmenlik uygulamasını temel almak ve genişletmek mümkün görünmemektedir (Beauchamp ve Thomas, 2009). Bunun için öğretmen eğitim programları sürecince öğretmen adaylarının mesleki kimliklerini desteklemek için alternatif pedagojiler geliştirmeye ihtiyaç duyulmaktadır (Zembylas ve Chubbuck, 2015). Bu durum, birçok araştırmacı (Beauchamp ve Thomas, 2009; Flores, 2014; Leijen, Kullasepp, Katrin ve Anspal, 2014; Meijer vd., 2014) tarafından oldukça zorlu bir adım olarak nitelendirilmesine rağmen, alan yazında bu ihtiyacı gidermeye yönelik çalışmalar bulunmaktadır.

Flores (2014), Leijen vd., (2014) ve Meijer vd., (2014) ifade ediş şekilleri farklı olsa da öğretmen adaylarının mesleki kimliklerini geliştirmek için öğretmen eğitimcilerine bazı temel pedagoji önerilerinde bulunmuşlardır. İlk temel pedagoji, öğretmen adaylarına öz farkındalık kazandırmaktır. Yazılı ve sözlü anlatımlar aracılığı ile öğretmen adaylarının geçmiş yaşantılarına, mevcut tecrübelerine ve gelecekten beklentilere odaklanmak, öğretmen adaylarına var olan motivasyonlarını ve gelecekteki rollerine ilişkin inançlarını fark etme ve yansıtma imkanı verdiğinden öz farkındalık sağlayacağı belirtilmiştir. Bu pedagoji ile öğretmen adayları mevcut ve hedeflenen mesleki kimlikleri hakkında fikir sahibi olur ve ihtiyaçlarını belirleyerek kimliğin devamlılığını sağlamak için kendilerine bir yol haritası çizebilirler (Akkerman ve Meijer, 2011; Sfrad ve Prusak, 2005; Wenger, 1998). Bir başka deyişle, öğretmen adayının kim olduğu ve geleceğin öğretmeni olarak kim olmak istediğine yönelik paylaştıkları, öğretmen eğitimi bağlamında öğretmen olma sürecini anlamamıza yardımcı olur.

Topluluk içerisinde öğretime yönelik yansıtmalar yapmak öğretmen eğitimi programları için tavsiye edilen bir pedagojidir (Leijen vd., 2014; Meijer vd., 2014). İlk pedagoji öğretmen adayının öz yansıtma süreçlerini odaklanırken, ikincisi belirli bir bağlamda sosyal ilişkilere vurgu yapmaktadır. Bu pedagojiye dayanarak, örnek dersleri analiz etmek ve öğretmen rolleri üzerine ortak bir anlayış oluşturmak, öğretmen adaylarının kimlik gelişimi için önemli bir deneyim olarak görülmektedir (Leijen vd., 2014). Özellikle, öğretmen eğitimi programlarında videolardan yararlanmak ve öğretmen adaylarının kimlik oluşumunu desteklemek için video tartışmaları üzerine topluluklar oluşturmak önerilmektedir (Leijen vd., 2014; Maclean ve White, 2007). Bu kapsamda, ortaokul matematik öğretmen adaylarının mesleki kimlik gelişimlerine destek olmak amacıyla, video durum temelli bir topluluk oluşturulmuştur.

Video durum temelli bir topluluk içinde yer almak öğretmen adaylarına birçok fırsat sunmaktadır ve bu fırsatların hepsi mesleki kimlik gelişimine katkıda bulunmaktadır. Öncelikle, videolar öğretmen adaylarına gerçek sınıflarda neler olduğunu gözlemleme ve fark etme olanağı sağlar (van Es ve Sherin, 2002).

Böylelikle öğretmen adayları kendilerini farklı sınıf ortamlarında öğretmen olarak hayal etme ve öğretmenliğe yönelik geliştirdikleri pedagojileri o bağlamlarda müzakere etme şansına sahip olurlar. Buna ek olarak, video durum temelli topluluklarda, öğretmen adayları fark ettikleri şeyleri paylaşma ve ilgili dersin kavramına yönelik alternatif pedagojiler geliştirme imkânı bulmaktadır. Bu nedenle, video durum temelli toplulukların öğretmen adaylarının "üsteleneceği roller ve yerine getirmek istediği hedefler" doğrultusundaki perspektiflerinin değişeceği öngörülmektedir (Izadinia, 2013, s. 708).

Fark etme becerilerinin öğretmen kimliği geliştirmede önemli olduğu düşünülse de, öğretmen adaylarının video kritiklerinde, öğretime yüzeysel yaklaştığı (Star ve Strickland, 2008) ve öğrenci düşünmesine odaklanmaktan ziyade öğretmen ve öğrencinin davranışlarına odaklandığı (Levin, Hammer ve Coffey, 2009) bulunmuştur. Ayrıca fark ettiklerini yorumlayamadıkları ve öğretime yönelik yeni kararlar almakta kullanamadıkları gözlemlenmiştir (Sherin ve van Es, 2009; van Es ve Sherin, 2002). Bu bağlamda, video durum temelli topluluk içinde videoda fark ettikleri şeyler üzerine tartışmanın ve diğer öğretmen adayları ile etkileşime geçmenin, öğretmen adaylarının akıl yürütme, yansıtma ve karar verme süreçlerini ve videodaki öğretime yönelik ne ve nasıl fark etiklerini geliştireceği öngörülmektedir (Amador ve Weiland, 2015; Fernández, Llinares ve Valls, 2012). Öğretmen adaylarının video durum temelli topluluk içerisinde video durumlarında ne fark ettiği ve nasıl fark ettiği van Es (2011) tarafından geliştirilen teorik çerçeve temel alınarak incelenmiştir. Ayrıca fark etme ile öğretmen kimliği çerçeveleri birleştirilerek kullanılmıştır. İlgili güncellemeler yöntem bölümünde açıklanmıştır.

Özetle, öğretmen adaylarının mesleki kimlikleri, video durumları hakkında derinlemesine düşünme, fark ettiklerini paylaşma ve ortaklaşa düşünerek birbirlerinden öğrenme fırsatlarının sunulduğu video durum temelli topluluklarda gelişebilir. Bu nedenle, bu çalışma için öğretmen adaylarının kimlik dönüşümlerinin sağlanabileceği video durum temelli bir topluluk oluşturulmuştur. Akkerman ve Meijer'in (2011) diyalojik yaklaşımı öğretmen kimliği kavramının teorik yapısını ortaya koyarken, Beijaard ve arkadaşlarının (2009) öğretmen kimliği ve van Es'in

(2011) fark etme teorik çerçeveleri bu çalışmanın birleştirilmiş teorik çerçevesini oluşturmaktadır. Birleştirilmiş teorik çerçeve bir sonraki bölümde verilmiştir.

Araştırmanın Amacı ve Araştırma Soruları

Bu çalışmanın amacı, ortaokul matematik öğretmen adaylarının mesleki kimliklerini video durum temelli bir toplulukta incelemektir. Bu amaç doğrultusunda, aşağıdaki araştırma sorularına cevap aranmıştır:

1. Video durumları ile çalışmadan önce, ortaokul matematik öğretmen adayları geleceğin matematik öğretmenleri olarak kendileri nasıl tanımlıyorlar?
2. Ortaokul matematik öğretmen adayları video durumlarında ne fark ediyorlar?
3. Ortaokul matematik öğretmen adayları video durumlarında nasıl fark ediyorlar?
4. Video durum temelli toplulukta fark etme pratikleri, ortaokul matematik öğretmen adaylarının mesleki kimliklerini nasıl değiştirdi?

Araştırmanın Önemi

Varghese, Morgan, Johnston ve Johnson (2005) öğretme ve öğrenme süreçlerini anlamak için "öğretmenleri anlamalıyız, öğretmenleri anlamak için ise kim olduklarını anlamalıyız" (s. 22) demiştir. Bu fikir öğretmen eğitimine uyarlanırsa, öğretmen adaylarının nasıl geliştiğini anlamak için, öğretmen adaylarının kim olduğunu ve öğretmen olma duygusunu nasıl geliştirdiklerini anlamamız gerekir. Ancak özellikle matematik eğitimindeki öğretmen kimliğine yönelik alan yazın araştırıldığında, birçok eksiklik göze çarpmaktadır (Akkerman ve Meijer, 2011; Beauchamp ve Thomas, 2009; Darragh, 2016; Sfard ve Prusak, 2005). İlk olarak birçok çalışmada öğretmen kimliğinin tanımı tam olarak yapılamamıştır (Sfard ve Prusak, 2005). Bu nedenle, öğretmen eğitimindeki kimlik kavramını hem teorik hem de metodolojik olarak açıklanmaya ihtiyaç duyulmaktadır. İkincisi ortaokul matematik öğretmenlerinin mesleki kimlikleri, öğretmen eğitimi sırasında nasıl geliştiği ve öğretmen eğitimi programlarının bu süreci nasıl destekleyeceği henüz yeterince ele alınmamıştır (Beauchamp ve Thomas, 2009; Darragh, 2016). Öğretmen eğitiminde mesleki kimlik gelişimi için içinde bulunulan bağlamın önemi

hakkında pek az şey bilinmektedir. Bu ihtiyaçlar göz önüne alındığında, bu çalışmanın teori ve uygulama açısından potansiyeli aşağıdaki paragraflarda ele alınmıştır. Çalışmanın kimlik araştırmalarına olan katkısı ve öğretmen eğitimine yönelik yansımaları tartışılmıştır.

Pek çok araştırmacı öğretmen kimliğine bir çıktı gözüyle yaklaşmakta ve öğretmen adayları öğretimle ilgili bireyleri tecrübe ettikten sonra veri toplamaktadır (Akkerman ve Meijer, 2011; Wood, 2013). Ancak bu eğilim mikro bağlam olarak adlandırılan bağlamsal faktörler içinde öğretmen kimliğinin nasıl dönüştüğünün ihmal edilmesine sebep olmaktadır (Wood, 2013). Öğretmen adaylarının, mesleki kimliklerini bir topluluk içinde nasıl müzakere ettiklerini anlamak, öğretmen kimliğinin özellikleri arasındaki (çokluk-birlik, süreksizlik-süreklilik ve sosyal-bireysel) dengeyi yorumlamak açısından önemlidir (Akkerman ve Meijer, 2011; Zembylas ve Chubbuck, 2015). Bu çalışma, video durum temelli bir topluluk oluşturarak, öğretmen eğitimi için bir mikro-bağlam örneği sunmuş ve o bağlamın kapsamı çerçevesinde kimliğin nasıl ortaya konulduğunu araştırma fırsatı sunmuştur (Akkerman ve Meijer, 2011; Sfard ve Prusak, 2005; Wood, 2013).

Akkerman ve Meijer (2011), öğretmenlerin geçmiş, şimdiki ve gelecekteki hikayeleri yansıtan anlatımlarını dikkate alan makro çerçeveler olmadan mikro-bağlamın anlaşılamayacağını ve metodolojik olarak ihtiyaç duyulan şeyin mikro ve makro analizleri bir arada dikkate almak olduğunu belirtmiştir. Video durum temelli topluluğun öncesinde ve sonrasında görüşmeler yaparak, öğretmen adaylarının sadece kimliklerini ilgili toplulukta nasıl konumlandırdıklarını değil, aynı zamanda ortaya konulan kimliğin zamanla ortak bir söyleme nasıl dönüştüğünü de yorumlamayı amaçlamaktadır.

Video durum temelli bir topluluğun oluşturulması ve öğretmen adaylarının kimliklerinin bu bağlamda incelenmesinin öğretmen eğitimi programlarına da yansımaları bulunmaktadır. Öğretmen adaylarının öğretmen eğitimi programlarına girmeden önce matematik öğretmeni olmanın ne anlama geldiği ile ilgili tecrübelere sahiptir (Izadinia, 2013). Öğretmen eğitimi sırasında ise zihnindeki düşünceler ile öğrendiklerini harmanlayarak öğretmen olarak "olası kimlik" (Markus ve Nurius,

1986) ya da "ideal kimlik" (Sfard ve Prusak, 2005) geliştirirler. Ancak bu kimliklerin öğretmenliğe başladıklarında sınıfta ortaya koydukları kimlik ile uyumlu olmadığı bulunmuştur (Putten vd., 2014). Bu durum öğretmenlerin öğretimin karmaşıklığı ile başa çıkmak için yeterli tecrübesinin olmamasına atfedilmiştir (Flores ve Day, 2006). Bu eksikliği göz önüne alan bu çalışma, video durumları aracılığı ile öğretmen adaylarına matematik öğretimine yönelik gözlem yapma, eleştirme ve derinlemesine düşünme ile öğretimin karmaşıklığı ve sınıfın çok boyutlu yapısını tecrübe etme fırsatı sunmuştur (Koç, Peker ve Osmanoğlu, 2009). Buna ek olarak, video durumlarında fark ettiklerini toplulukla paylaşmak ve tartışmak, öğretmen rollerine ve yerine getirmek istedikleri hedeflere vizyon sağlayabilir (Izadinia, 2013). Bu vizyon öğretmen adaylarını matematik öğretmeni olarak nasıl bir öğretmen olacakları konusunda müzakere etmelerini sağlayabilir çünkü kendilerini videoda öğretmen olarak hayal etmeleri ve matematik ile ilgili öğretme ve öğrenme ile ilgili önceden var olan kavramlarını yansıtmaları için yönlendirilmişlerdir.

Farklı bir açıdan bakıldığında, Izadinia (2013) öğretmen eğitimindeki kimlik araştırmalarının niçin ABD, İngiltere ve Avustralya gibi batı kültürlerinde yoğunlaştığını sorgulamış ve bağlamsal faktörlerin bu derece önemli olduğu mesleki kimlik gelişiminde az gelişmiş ve gelişmekte olan ülkelerin öğretmen eğitimlerinde de incelenmesinin gerekli olduğunu vurgulamıştır. Bu ihtiyaca cevap olabilecek bu çalışma, gelişmekte olan ülkelerden biri olan Türkiye'deki öğretmen eğitimi bağlamından bilgi üretmektedir.

Sonuç olarak, bu çalışmanın hem öğretmen kimliği araştırmaları hem de öğretmen eğitimi için önemi bütünsel bir bakış açısının uygulanmasında yatmaktadır. Çalışmada kullanılan birleştirilmiş çerçeve ve yöntemi gereği öğretmen kimliğin daha geniş bir yelpazeden yorumlama potansiyeline sahiptir. Buna ek olarak, öğretmen eğitiminde kimlik gelişimini destekleyebilecek deneyimlerin ön plana çıkarılacağı ve gelecekteki çalışmalara ve öğretmen eğitimcilerine örnek olacağı öngörülmektedir.

Yöntem

Bu çalışmanın amacı video durum temelli bir toplulukta ortaokul matematik öğretmen adaylarının mesleki kimliklerini incelemektir. Öğretmen adaylarının fark etme pratiklerini ve fark etme tecrübeleri ile kimliklerinin nasıl dönüştüğünün bağlamsal faktörleri de dikkate alarak derinlemesine incelenmesi esas alındığından, nitel araştırma yöntemlerinden durum çalışması araştırmanın desenini oluşturmaktadır. Yin (2003)'in durum çalışması desenlerinden iç içe geçmiş tek durum deseni kullanılmıştır.

Bağlam ve Katılımcılar

Bu çalışmanın bağlamını ortaokul matematik öğretmeni yetiştirmeyi amaçlayan dört yıllık bir öğretmen yetiştirme programı oluşturmaktadır. Bu programa kayıtlı öğretmen adayları öğrenimleri boyunca, alan, alan eğitimi, eğitim ve genel kültür gibi çeşitli kategorilerde dersler yer almaktadır. Video durum temelli pedagoji 2015-2016 eğitim öğretim yılının Güz döneminde okul deneyimi dersine entegre edilmiştir. Araştırmanın verileri Ankara'daki bir devlet üniversitesinde ilgili dersi alan 12 (10 kadın, 2 erkek) son sınıf ortaokul matematik öğretmen adayından toplanmıştır.

Veri Toplama Araçları ve Veri Toplama Süreci

Araştırmanın verileri bireysel ön ve son görüşmeler, yansıtıcı düşünce raporları, grup toplantıları, değerlendirme formu ve araştırmacının yansıtıcı notları gibi çoklu veri kaynaklarından toplanmıştır.

Grup toplantıları öncesi gerçekleştirilen ön görüşmeler sırasında öğretmen adaylarının mesleki kimlik yönelimleri sorgulanmıştır. Bu görüşmelerde, nasıl bir öğretmen olmak istedikleri, önceliklendirilen öğretmen rolleri ve niçin bu rollere sahip olmak istediği üzerinden sorgulanmıştır. Ayrıca bu yönelimlerin kaynağını anlayabilmek için geçmiş okul tecrübeleri, öğretmenleri, öğretmen eğitimi ve öğretmenlik tecrübeleri gibi pek çok etkene yönelik sorular sorulmuştur.

Video durumlarında fark edilen şeylerin yorumlanabilmesi için öğretim programlarından yararlanmak önemli görüldüğünden, grup toplantılarının ilk haftasında video durumları incelenmesine başlanmamış, öğretim programlarının içeriği incelenmiştir. 2005 ve 2013 öğretim programlarının esas alındığı ilk haftada, programların felsefesi ve kapsamı karşılaştırılmıştır.

Video durumlarına dayalı grup toplantıları altı hafta sürmüştür. Öğretmen adaylarının videoları bireysel izlemeleri ve ne fark ettiklerine yönelik bireysel yansıtıcı raporlarını yazmalarını sağlamak üzere, her video bir hafta öncesinden öğretmen adayları ile paylaşılmıştır. E-posta aracılığı ile gönderilen yansıtıcı raporlar grup toplantıları öncesinde araştırmacı tarafından tek tek okunmuş ve öğretmen adaylarının videoda ne fark ettikleri, birbiri ile çelişen yorumları ve tartışma için önemli görülen yorumlar belirlenmiştir. Bu yorumlar üzerinden ilerleyen grup tartışmaları yaklaşık birer saat sürmüş ve öğretmen adaylarının video durumlarındaki öğretmen rolleri ve ilişkilendirilen öğrenci çıktılarına yönelik vizyonunun genişletmesi hedeflenmiştir. Grup tartışmalarından hemen önce ve sonrasında bireysel görüşmeler yapılmış ve çalışmanın her aşamasında araştırmacı tarafından yansıtıcı notlar alınmıştır.

Son hafta video tartışmasının sonunda öğretmen adayları isim yazmadan bir değerlendirme formu doldurmuştur. Bu değerlendirme formunda video durum temelli topluluğa katılmanın ne gibi katkıları olduğu sorgulanmıştır. Ardından gerçekleştirilen son görüşmeler aracılığı ile öğretmen adaylarının mesleki kimlik yönelimleri tekrar sorgulanmıştır. Ancak bu görüşmelerde öğretmen adaylarının videodaki öğretmenlerle kendilerini karşılaştırmaları istenmiştir.

Video durumları

Çalışma için seçilen videolar 2009 yılında ortaokul öğretmenleri için ulusal çapta bir yarışma düzenleyen eğitim şirketinin internet sitesinden alınmıştır (http://www.vitaminogretmen.com/videolar/12/1?konu=6&tip=29). İlgili sitede yayımlanması için izin verilen toplam 52 tane matematik öğretimine yönelik video

bulunmaktadır. Videoların hepsi izlenmiş ve Geometri Ölçme alanından altı video seçilmiştir. Videoların uzunlukları 8 ile 15 dakika arasında değişmektedir.

Her ne kadar bu çalışma konu temelli mesleki kimliği araştırmasa da, seçilen videoların bir alanla sınırlandırılmasının bazı nedenleri bulunmaktadır. Öncelikle videoların büyük bir çoğunluğu (21/52) ve yarışmada ilk 5 içerisine giren videolar bu alandadır. Bu durum araştırmacıya videoların içeriği ve kalitesi açısından çeşitlilik sağlamıştır. Bir diğer neden ise öğretim programının içeriği ile ilgilidir, geometri ve ölçme her sınıf seviyesinde bulunan bir alan olduğu için farklı sınıf seviyelerinden videolar seçilebilmiştir. Her video öğretmen rolleri ve öğrenci çıktıları ile ilgili farklı bir konuyu öne çıkarmıştır. Çalışma için içlerinde yarışmadan ödül alan videoların da yer aldığı videolar aşağıdaki tabloda grup toplantılarında yer aldığı sıra ile belirtilmiştir.

Tablo 1

Çalışmadaki kullanılan videolar

Haftalar	Video başlıkları
1	Geometrik şekiller ve cisimler *
2	Çokgenler
3	Sıvı ölçüleri **
4	Çemberler
5	Dönüşüm geometrisi: Yansıma **
6	Çemberde açılar **

* video yarışmada birincilik ödülü almıştır.

** videolar yarışmada ilk beş içinde yer almıştır.

Mesleki Kimlik Yönelimlerinin Analizi ve Teorik Çerçevedeki Revizyonlar

Ön ve son görüşmeler aracılığı ile öğretmen adaylarının video durum temelli topluluk öncesi ve sonrasında nasıl bir öğretmen olmak istediklerine dair toplanan verilerin analizi sırasında öğretmen kimliği teorik çerçevesi (Beijaard vd., 2000) temel alınarak metafor analizleri için Löfström ve arkadaşları (2011) tarafından geliştirilen kılavuz kullanılmıştır. Bunun için öncelikle öğretmen adaylarının ifadeleri kılavuzda yer alan öğretmen rolleri üzerinden ifade edilen kimlik kategorilere göre kodlanmıştır. Ardından aynı kategoride yer alan ifadelerin

öğretmen adaylarının kimlik yönelimleri için yeterli ve anlamlı bir açıklama sunup sunmadıkları açısından sorgulanmıştır.

Verilerinin analizi sırasında, öğretmen adaylarının öğretmen rollerine yönelik ifadelerinin aynı kategoride kodlanmış olmasına rağmen, bu ifadelere yönelik niyetlerinin farklı olduğunu fark edilmiştir. Örneğin öğretmenin rolü didaktik kategoriye uygun olsa da kılavuzda belirtildiği gibi bu roller öğrencilerin matematiksel düşünmesine yönelik olarak veya kılavuzun aksine öğrencileri matematiği sevdirmek gibi duyuşsal alanları da içeren hedefler saptanmıştır. Bir başka deyişle aynı öğretmen rolü farklı amaçlarla ifade edilmiştir. Bu nedenle, verileri daha iyi analiz etmek için "Atfedilen öğretmen rolü nedir?" ve "Atfedilen rollerinin amacı nedir?" sorularına cevap aranmıştır. Sonuç olarak, kimlik yönelimleri iki temaya ayrılmıştır: *Öğretmen Rolü* ve (ilişkili) *Öğrenci Çıktısı*. Öğretmen rolü temasına yönelik kategoriler aynen ele alınırken, öğrenci çıktısı temasına yönelik kategoriler (duyuşsal, bilişsel ve davranışsal) verilerin açık kodlamasından elde edilmiştir. Temalar ve kategoriler, pilot çalışmanın örnek kimlik alıntılarıyla Tablo 2'de temsil edilmiştir.

Tablo 2

Öğretmen Kimliği Teorik Çerçevesi (Revizyon)

	Temalar	Kategoriler	Örnek kimlik yönelimleri
Öğretmen Kimliği	Öğretmen Rolü	Konu uzmanlığı	*Tüm gerekli bilgileri öğrencilerime verdikten sonra bazı aktiviteler yapabilirim.*
		Didaktik uzmanlık	*Öğrencilerin dikkatini çekmek ve konuyu öğrenciler için somutlaştırmak için uygulamalı materyaller kullanacağım.*
		Pedagojik uzmanlık	*Öğrencilerle dengeli bir ilişki kurmak istiyorum.*
		Özüne dönük	*İdealist bir öğretmen olmak istiyorum.*
		Bağlamsal	*Küçük bir kasabada öğretmen olmak istiyorum.*
	Öğrenci Çıktısı	Duyuşsal	*Öğrencilerimin matematiğin değerini takdir etmelerini istiyorum.*
		Davranışsal	*Öğrencilerim konuşmaya başlamadan önce ellerini kaldırmalılar.*
		Bilişsel	*Öğrencilerimin konular arasında bağlantı kurmasını istiyorum.*

Bu revizyon, öğretmen adaylarının video durum temelli toplulukla çalışma öncesi ve sonrasında gelecekteki matematik öğretmenleri olarak kendilerini nasıl tanımladıklarını ve öğretmen adaylarının video durumlarında konu (topic) olarak ne fark ettiğinin analizini etkilemiştir. Bu yüzden ilgili revizyon da dâhil ederek kimlik çerçevesi ve fark etme çerçevesi birleştirilerek öğretmen adaylarının yansıtıcı raporlarında video durumları ile ilgili ne fark ettiği ve nasıl fark ettiği incelenmiştir.

Fark Etme Pratiklerinin Analizi ve Teorik Çerçevedeki Revizyonlar

Öğretmen adaylarının fark etme becerilerini yorumlamak için ise van Es (2011) tarafından geliştirilen, dört düzeyden oluşan bir teorik çerçeveden faydalanılmış ancak ilgili çerçevede bazı değişiklikler yapılmıştır. Aşağıdaki bölümlerde öncelikle çerçevenin orijinal hali tanıtılmış ardından da yapılan değişiklikler açıklanmıştır.

van Es fark etmeyi, öğretmenler ne fark eder ve öğretmenler nasıl fark eder şeklinde iki temel kategoriye ayırmaktadır. Kategoriler de kendi içinde iki boyutta değerlendirilmektedir. İlk kategori, yani öğretmenlerin neyi fark ettiği, Özne (Actor) ve Konu (Topic) boyutlarını içermektedir. Özne, öğrenci, öğretmen, kendisi, başkaları gibi kime odaklanıldığını belirten boyuttur. Konu, matematiksel düşünme, pedagojik stratejiler, sınıf yönetimi, ortam gibi hangi konunun tanımlandığını yansıtmaktadır. İkinci kategori, yani öğretmenlerin nasıl fark ettiği, Tutum (Stance) ve Belirginlik (Specificity) boyutlarını kapsamaktadır. Tutum, öğretmenin fark ettiklerini yorumlamadaki analitik yaklaşımıdır ve üç farklı (tanımlama, değerlendirme ve yorumlama) şekilde kendini gösterebilir. Belirginlik, öğretmenin fark ettiği şeye yönelik açıklamalarının detayı ile ilgilidir. Öğretmenin düşüncelerini yansıtırken genel izlenimlerinden mi bahsettiğine yoksa gerekçeleriyle ve detaylı bir şekilde mi ifade ettiğine odaklanmaktadır.

Bu çalışma çerçevenin orijinal halinde olduğu gibi öğretmen adaylarının öğrencilerin matematiksel düşüncelerini yorumlayıp yorumlayamadıkları değil, mesleki kimliğin göstergesi olarak atfedilen öğretmen rolleri ve öğrenci çıktılarına yönelik fark etme becerilerine odaklanmaktadır. Bu yüzden yukarıda belirtilen konu

(topic) boyutunu kimliğe yönelik temalar ve kategoriler oluşturmuştur. Diğer boyutlarda bir değişiklik yapılmamış olmasına rağmen fark etme becerisinin zaman içindeki gelişimini ortaya koyan düzeyler konu boyutunun değişiminden etkilenmiştir. Bu yüzden orijinal çerçeveye nazaran bu çalışmada kullanılan düzeylendirme kimlik çerçevesinden etkilenmiştir. Pilot çalışmanın örnek alıntılarıyla değişiklik yapılan fark etme çerçevesine yönelik düzeylendirme aşağıdaki tabloda (Tablo 3) detaylı olarak belirtilmiştir.

Tablo 3

Öğretmen Kimliği için Gözden Geçirilmiş Çerçeve

	Ne fark etti	Nasıl fark etti?	Örnek ifade
Düzey 1 (Baseline)	Öğretmen rolüne odaklanır. Öğrenci çıktıları tüm sınıfı kapsar.	Genel ifadeler kullanır. Tanımla ve değerlendirme tutumları sergiler. Videodaki olaylardan kanıt sunmaz veya çok nadir sunabilir.	*Etkinlik öğrencilerin ilgisini çekmek için iyi oldu.*
Düzey 2 (Mixed)	Öncelikle öğretmen rollerine odaklanır. Belirli öğrencilerin çıktılarına odaklanabilir.	Genel ifadeler kullanır ve videodaki önemli olaylara dikkat çeker. Genellikle değerlendirir tutumunu sergiler. Yorumlama da yapabilir. Videodaki belirli olayları ve etkileşimleri kanır olarak sunmaya başlar.	*Etkinlikteki öğrencilerin kollarının uzunluğu farklı olduğundan, öğrenciler simetri hakkında yanlış fikir sahibi olabilir.*
Düzey 3 (Focused)	Belirli öğrencilerin çıktılarına odaklanır.	Önemli olayları vurgular, yorumlar. Belirli olayları ve etkileşimleri kanıt olarak sunar.	*Aktiviteyi yapan öğrencilerin fiziksel görünüşündeki fark, nesne ve aynadaki görüntüsünün eş olmayabileceğini düşündürebilir.*
Düzey 4 (Extended)	Belirli öğrencilerin çıktılarına odaklanarak, bu çıktılara yol açan pedagojilere odaklanır.	Önemli olayları vurgular, yorumlar. Belirli olayları ve etkileşimleri kanıt olarak sunar. Olaylar ile öğretim ve öğrenim ilkeleri arasındaki bağlantıları yapar. Yorumlara dayanarak, alternatif pedagojik çözümler önerir.	*"... Bu yüzden belki de öğrencilerimizin değerlendirmesini yeniden düşünmemiz gerekiyor" (van Es 2011, s.146).* *

* Bu çalışmada fark edilenler Düzey 4 altında kodlanamamıştır. Bu nedenle Düzey 4 için verilen örnek van Es'in (2011) çerçevesinden alınmıştır.

Bulgular ve Tartışma

Video durum temelli topluluktan elde edilen tecrübelerin öğretmen adaylarının fark etme pratiklerini ve mesleki kimlik yönelimlerini nasıl etkilediği, öğretmen adayları ile yapılan bireysel görüşmeler ve grup toplantıları öncesi yazılan yansıtıcı raporlar analiz edilerek incelenmiştir. Fark etme pratiklerinin ve mesleki kimliklerinin dönüşümü olası bireysel ve bağlamsal faktörler göz önünde bulundurularak tartışılmıştır.

Öğretmen Adaylarının Video Durum Temelli Topluluk Öncesinde Mesleki Kimlik Yönelimleri

Tablo 4, öğretmen adaylarının video durumları ile çalışmadan önce her bir kategoriye verdikleri ağırlıkları göstermektedir. Buna göre en çok vurgulanan kategoriler, öğretmen rolü için didaktik uzmanlık iken, öğrenci çıktısı için duyuşsal çıktılardır.

Tablo 4
Öğretmen adaylarının mesleki kimlik yönelimleri

Temalar	Kategoriler	Yüzde (%)
Öğretmen Rolü	Didaktik uzmanlık	30.1
	Pedagojik uzmanlık	12.5
	Konu uzmanlığı	8.8
	Özüne Dönük	6.0
	Bağlamsal	7.8
Öğrenci Çıktısı	Duyuşsal	18.9
	Bilişsel	8.4
	Davranışsal	7.5
	Toplam	100

Öğrencilik deneyimleri ve geçmiş öğretmenler öğretmen adaylarının mesleki kimlik yönelimlerinde en etkili faktörler olarak bulunmuştur. Ayrıca öğretmen eğitimi programları, gelişen dünyada öğrencilerin talepleri, Türk toplumunda matematiğe yönelik görüşler, TEOG, özel ders deneyimleri ve kişisel kimlik öğretmen adaylarının mesleki kimliklerini atfettikleri diğer faktörler olarak gözlemlenmiştir.

Öğretmen adaylarının mesleki kimlik yönelimlerindeki dönüşüm ön ve son görüşmelerden elde edilen veriler karşılaştırılarak sunulacağından, video durumları ile çalışmadan önceki mesleki kimlik yönelimlerinin detayı bu bölümde verilmemiştir.

Öğretmen adaylarının fark etme pratiklerinin dönüşümü

Yöntem bölümünde açıklandığı gibi, öğretmen adaylarının yansıtıcı raporları van Es'in (2011) fark etme teorik çerçevesi ve Beijaard ve arkadaşlarının (2000) kimlik çerçevesi bir arada kullanılarak incelenmiştir. Bir başka deyişle, fark etme çerçevesinin konu (topic) boyutu kimliğe yönelik temalar ve kategoriler oluşturmaktadır.

Tablo 5

Fark edilen Konu Alanlarının Sıklığı

		Haftalar					
Temalar	Kategoriler	1	2	3	4	5	6
Öğretmen Rolü	Konu uzmanlığı	1	3	1	2	2	4
	Didaktik uzmanlık	71	101	104	111	113	119
	Pedagojik uzmanlık	16	7	20	26	12	21
	Özüne-dönük	3	4	2	7	1	1
	Bağlamsal	12	9	8	1	10	8
Öğrenci Çıktısı	Duyuşsal	40	27	22	30	19	16
	Bilişsel	40	52	66	60	55	57
	Davranışsal	10	25	31	20	12	20
	Toplam	193	228	254	257	224	246

Tablo 5, altı hafta boyunca öğretmen adaylarının video durumlarına yönelik yazdıkları yansıtıcı raporlarda konu olarak ne fark ettiğini göstermektedir. Bir başka deyişe, öğretmen adaylarının hangi konulara odaklandığını belirtmektedir. Bu tabloda dikkat çeken 3 temel nokta bulunmaktadır. Bunlardan birincisi, öğretmen adaylarının fark ettiği konuların zamanla artması ve çeşitlenmesidir. Bir başka deyişle, grup toplantılarında edinilen tecrübeler öğretmen adaylarının fark etme tecrübeleri arttırmıştır. Araştırmacının grup toplantılarının başında öğretmen adaylarının ilgili video ile ilgili tüm fark ettikleri konuları listelemesi ve fark edilemeyen noktalara dikkat çekmesi gibi müdahalelerinin, öğretmen adaylarının

videoda fark edilebilecek diğer konularla ilgili farkındalığını arttırdığı düşünülmektedir.

İkinci dikkat çekici nokta ise, öğretmen rolü temasında didaktik rollerin her hafta baskın olması ve diğerlerinin görece olarak arka planda kalmasıdır. Bu durumun iki olası açıklaması olabilir. Birincisi video durumlarının içeriği ile ilgilidir. Videolar bir yarışmadan seçilmiş olması sebebiyle, öğretmenlerin didaktik rollerinin ön plana çıkmış olabilir. Bu yüzden de diğer öğretmen rolleri görece olarak geri planda kalmış olabilir. Ancak video durum temelli topluluktan önce yapılan bireysel görüşmelerde de didaktik roller en çok vurgu yapılan öğretmen rolleri olmuştur. Dolayısıyla, öğretmen adaylarının tercihleri yani kimlik yönelimleri didaktik rolleri ön plana çıkartıyor olabilir. Bir başka deyişle, bu rollerin daha önemli olduğunu benimseyerek videolarda da bu roller üzerinden yorum yapmış olabilirler.

Tabloda öğrenci çıktıları temasında dikkat çeken nokta ise, duyuşsal çıktıların vurgusunun azalması, bilişsellerin ise artmasıdır. Öğretmen adaylarının video durumlarından elde ettikleri tecrübeler onları fark ettikleri didaktik roller için öğrencilerin bilişsel çıktılarına yönelik yorum yapmaya itmiştir. Bu durum da grup toplantılarında geliştirilen ortak vizyon ve bu vizyonun sonraki haftaların yansıtıcı raporlarında kendisini göstermesi ile ilgilidir. Öğretmen adayları grup toplantılarında en çok öğretmenin konuyu nasıl kavramsallaştırdığı ve bu kavramsallaştırması öğrencilerin konuyu öğrenmesine nasıl yardımcı olduğu veya olamadığı üzerinde durmuşlardır. Bir başka deyişle, öğrencinin matematiksel düşüncesini anlamaya çalışmışlar ve olası kavram yanılgıları üzerine tartışmışlardır. Bu tartışma ortamı, araştırmacının bu konuyla ilgili fark edilenleri ön plana çıkarması ile ilgili olmakla birlikte, daha çok öğretmen adaylarının bireysel yönelimlerinden kaynaklanmaktadır çünkü, araştırmacı birçok farklı konuyu ön plana çıkarmasına rağmen bu konu dışındakiler bu derece ilgi görmemiş ve tartışılmamıştır. Bu da öğretmen adaylarının kendilerini öğrencilerin matematiksel düşüncesini anlama ve destek olma konusunda eksik görmesinden kaynaklı olabilir. Bir başka deyişle, birçok çalışmada belirtildiği gibi öğretmen adaylarının bilgi ve

tecrübesinin eksik olması onların ilk haftalardaki fark etme pratiklerini sınırlamıştır (Amador ve Weiland, 2015; Sherin ve van Es, 2005; van Es ve Sherin, 2002) ancak, grup toplantılarında tecrübeleri artmış ve yorum yapmaya başlamışlardır.

Tablo 6

Öğretmen Adaylarının Fark Etme Seviyeleri

	Haftalar					
Fark Etme Seviyeleri	1	2	3	4	5	6
Düzey 1 (Baseline)	73,0	64,7	47,4	44,8	42,3	39,8
Düzey 2 (Mixed)	24,4	30,6	46,3	50,5	50,7	55,6
Düzey 3 (Focused)	2,6	4,7	6,3	4,7	7,0	4,6
Düzey 4 (Extended)	-	-	-	-	-	-

Tablo 6 ise fark etme teorik çerçevesi temelinde öğretmen adaylarının fark etme gelişimini göstermektedir. Buna göre ilk üç hafta düzey 1'in baskın olduğu gözlemlenmiştir. Öğretmen adayları videonun ayrıntılarına dikkat etmeden betimleme ve değerlendirme gibi tutumlarla öğretmenin rolü üzerinden yansıtıcı raporlarını yazmışlardır. Dördüncü haftadan itibaren ise öğretmen adayları yine öğretmenin rolüne odaklanmışlar, ancak bu sefer videodan ayrıntı vermiş ve yorumlamışlardır. Altı hafta boyunca, öğretmen adaylarının fark etme pratiklerinin odak öznesi büyük çoğunlukla öğretmen olmuş, öğrenciler ile ilgili yorumlarını öğretmen rolleri üzerinden yapmışlar. Bu yüzden de belirli bir öğrenciye odaklanmaktan ziyade, öğretmen rolünün tüm sınıf için çıktısını yorumlamışlar. Bu eğilim, öğretmen adaylarının fark etme pratiklerini araştıran diğer çalışmalarda da gözlenmiştir (Güner, 2017; Jacobs vd., 2010; Osmanoğlu, 2010; Sherin ve van Es, 2009; Star ve Strickland, 2007; van Es, 2011; van Es ve Sherin, 2008). Osmanoğlu (2010) bu durumun öğretmen adaylarının kendilerini o sınıfın öğrencisi olarak değil, öğretmeni olarak hayal etmelerinden kaynaklandığını belirtmiştir. Bu nedenle, öğrenci çıktıları genellikle öğretmen rolünün bir ürünü olarak belirtilmiştir.

Ancak bu eğilim düzey 1 ve 2'nin baskınlığını doğrulamasına rağmen, öğretmen adaylarının niçin videolardaki belirli öğrencilere odaklanamadığına, öğrencinin bilişsel, duyuşsal ya da davranışsal süreçlerini yorumlayamadığına ve geliştirmek için alternatif uygulamalar öneremediğine açıklık getirememektedir. Bir

başka deyişle, düzey 3'ün görece olarak düşük sıklığının, düzey 4'ün ise hiç gözlemlenememesinin olası bir nedeni değildir. Alan yazındaki öğretmen adaylarının fark etme pratiklerinin araştırıldığı benzer çalışmalarda da düzey 3 ve 4 için benzer bulgulara rastlanmıştır. Örneğin, Güner ve Akyüz'ün (2017) çalışmasında olduğu gibi, öğretmen adayları 4. düzeye ulaşamamışlardır; çünkü öğretmen adayları, öğrencilerin matematiksel düşüncesi ve bu çalışmadaki geniş eğitim ilkeleri arasında bağlantı kuramamıştır. Öğretmen adaylarının belirli öğrencilere odaklanama ve yorum yapamama eğilimlerinin (i) öğretmen adaylarının öğretmenlik tecrübeleri (Amador ve Weiland, 2015; Shein ve van Es, 2005; van Es ve Sherin, 2002), (ii) videoların içeriği (Sherin vd., 2009; Superfine, Fisher, Bragelman ve Amodor, 2017; Ulusoy, 2016) veya (iii) öğretmen adaylarının tutumları (Erikson, 2011; Huang ve Li, 2012; Wenger, 1998) ile ilişkili olabileceği düşünülmektedir.

Özetle, öğretmen adaylarının fark etme pratiklerindeki dönüşüm, araştırmacının yönlendirmesi ile grup tartışmalarından kaynaklanmıştır. Bununla birlikte, videoların içeriği, matematik öğretimindeki uzmanlıkları ve yansıtıcı rapor yazma ve grup tartışmalarına katılma konusundaki istekleri fark etme pratiklerini sınırlandırmıştır.

Öğretmen adaylarının mesleki kimlik dönüşümleri

Öğretmen adaylarının video durum temelli topluluk sırasında elde ettikleri tecrübeler ve farkındalıkların, mesleki kimlik yönelimlerini nasıl dönüştürdüğünü incelemek için, öğretmen adayları ile birebir yapılan ön ve son görüşmelerin bulguları karşılaştırılmıştır. Yapılan incelemeler sonunda aşağıda tartışılan ve Tablo 7 de özetlenen bulgulara ulaşılmıştır.

Tablo 7
Öğretmen adaylarının mesleki kimlik dönüşümleri

Temalar	Kategoriler	Önce	Sonra
Öğretmen Rolü	Didaktik uzmanlık	30,1	31,8
	Pedagojik uzmanlık	12,5	16,1
	Konu uzmanlığı	8,8	3,6
	Özüne-dönük	6,0	10,8
	Bağlamsal	7,8	1,8
Öğrenci Çıktısı	Duyuşsal	18,9	14,8
	Bilişsel	8,4	12,6
	Davranışsal	7,5	8,5
	Toplam	100	100

Tablo 7 de en dikkat çeken nokta, didaktik rollerin hem video durum temelli topluluk öncesinde hem de sonrasında en çok vurgulanan öğretmen rolleri olmasıdır. Bir başka deyişe öğretmen adayları öğretmenlik hayatlarında en çok bu rollere önem vereceklerini belirtmiştir. Bu bulgu öğretmen adayları ile yapılan benzer çalışmalarda da karşımıza çıkmaktadır (Haser vd., 2015; Oksanen ve Hannula, 2013; Oksanen vd., 2014). Bu durumun olası bir nedeni, öğretmen adaylarının öğretmen eğitiminde son sınıf olmasından kaynaklanmış olabilir (Haser vd., 2015). Zira öğretmen eğitiminin son iki yılında öğretmen adaylarının didaktik yönelimlerini etkiyebilecek matematik öğretimi ve öğrenimi üzerinde alan eğitimi dersleri ağırlıklı olarak verilmektedir. Ancak bu çalışmada öğretmen adayları bağlı bulundukları öğretmen eğitimi programını eleştirmişler ve kendilerini pedagojik alan bilgisi ve matematiksel öğrenme süreçlerine rehberlik etme konusunda eksik olduğuna yönelik öz değerlendirme yapmışlardır. Öğretmen adaylarının bilişsel çıktı doğurabilecek yetkinliklerine yönelik eksiklik algısı onları didaktik rolleri duyuşsal çıktılarla ilişkilendirmesinin olası bir sebebi olabilir. Başka bir deyişle, öğrencilerin matematiksel düşüncelerini yönlendirme konusunda eksik hissetmek, video durum temelli topluluk öncesinde didaktik rollerin bilişsel çıktılardan ziyade duyuşsal çıktılarla ilişkilendirilmesinde önemli bir faktör olabilir. Bu durum, öğretmen adaylarının mesleki kimliklerinin özel öğretim yöntemleri ve öğretmenlik uygulamaları derslerinde edinilen bilgi ve beceriler ile geliştiğini doğrulamaktadır

(Beauchamp ve Thomas, 2009; Kanno ve Stuart, 2011; Lee, 2013; Yuan ve Lee, 2015).

Video durum temelli topluluğun ilk haftalarında öğretmen adayları didaktik roller için benzer bir eğilim gösterirken, video tartışmaları öğretmen adaylarının didaktik öğretmen rollerinde ve ilişkilendirilen öğrenci çıktılarında önemli bir dönüşüm sağlamıştır. Hafta hafta yapılan analizler ve karşılaştırmalar öğretmen adaylarının videodaki öğretmenin konuyu nasıl kavramsallaştırdığı ve bunun olası bilişsel çıktıları üzerine yoğunlaşmışlardır. Bu da son görüşmelerine yansımış ve didaktik rollerin ağırlık andırması büyük bir değişikliğe uğramasa bile atfedilen didaktik roller ve ilişkilendirilen öğrenci çıktıları bakımından önemli bir dönüşümden bahsedilebilir.

Özetle, video tartışmamaları benzer çalışmalarda olduğu gibi öğretmen adaylarının öğrencilerin matematiksel düşüncesini anlama ve geliştirme konusunda anlayışlarını geliştirdiği gözlemlenmiştir (Ball ve Cohen, 1999; Didiş vd., 2014; Jacobs vd., 2010; van Es, 2011). Ayrıca öğretmen rolleri ve ilişkilendirilen öğrenci çıktıları konusunda farkındalıklarını arttırmış ve bu farkındalık öğretmen adaylarının kimlik yönelimlerine yansımıştır. Ayrıca video durumları ile çalışmak ve topluluk içindeki etkileşim öğretmen adaylarının güçlü ve geliştirmeye açık yönleri hakkında öz farkındalıklarını arttırmıştır.

Fark Etme Düzeylerine Göre Kimlik Yönelimleri

Bu çalışmada öğretmen adaylarının fark etme pratikleri yani video durumlarında neyi fark ettikleri ve nasıl fark ettikleri, van Es'in (2011) fark etmeyi öğrenme teorik çerçevesi, Beijaard ve diğerlerinin (2000) geliştirdiği teorik çerçeve ve bu çalışmada önerilen değişiklikler de dikkate alınarak analiz edilmiştir. Bir başka deyişle, iki teorik çerçeve bir arada kullanılarak öğretmen adaylarının mesleki kimliği, video durum temelli bir topluluk bağlamında fark etme pratikleri aracılığı ile incelenmiştir.

İki teorik çerçevenin birleştirilmesine yönelik ilişkiyi daha net görebilmek için MAXQDA programında ilgili analizler yapılmıştır. Tablo 8 fark etme düzeylerine göre öğretmen adaylarının kimlik yönelimlerini göstermektedir.

Tablo 8

Fark Etme Düzeylerine Göre Kimlik Yönelimleri

Temalar	Kategori	Düzey 1	Düzey 2	Düzey 3	Düzey 4
Öğretmen Rolü	Konu uzmanlığı	9	3	1	
	Didaktik uzmanlık	258	322	35	
	Pedagojik uzmanlık	72	28	2	
	Özüne-dönük	15	3		
	Bağlamsal	38	10		
Öğrenci Çıktısı	Duyuşsal	109	44	1	
	Bilişsel	96	206	31	
	Davranışsal	80	38		

Bu tablodan çıkarılacak iki temel sonuç bulunmaktadır. Birincisi her düzeyde didaktik rollerin en çok vurgulanan öğretmen rolü olmasıdır. Bu, iki teorik çerçevenin ilişkisinden daha çok öğretmen adaylarının kimlik yönelimlerini göstermektedir. İkincisi ise iki çerçevenin ilişkisini ortaya koyacak bir bulgudur. Buna göre, daha üst düzeydeki fark etme pratiklerinin çok büyük bir kısmı didaktik roller ve bilişsel çıktılar ile eşleşmektedir. Yapılan analizlerde belirli didaktik roller ve bilişsel çıktıların örneğin, öğretmenin konuyu nasıl kavramsallaştırdığı ve öğrencilerin kavram yanılgılarına yönelik ifadelerin hepsinin düzey 3'te olduğu bulunmuştur. O halde öğretmen adaylarının fark etme pratiklerinin incelendiği çalışmalarda, video içeriklerinde bu roller ve öğrenci çıktılarına yönelik imkanlarının sunulması, öğretmen adaylarının fark etme gelişimlerini etkileyecek bir içerik olabilir. Bu da ilgili alan yazında belirtildiği gibi, bu rollerin ve öğrenci çıktılarının ön plana çıkarıldığı mikro durum çalışmaları (Ulusoy ve Çakıroğlu, 2018) aracılığı ile yapılabilir. Öte yandan, bu çalışmada kullanılan video durumları bu rolleri ön planda tutuyor olabilir. Bu yüzden öğretmen adaylarına diğer öğretmen rollerine de odaklanmalarını sağlayabilmek için farklı öğretmen rollerini bütünleştiren daha kapsamlı videolar tasarlamak ve videoları öğretmen eğitimindeki

derslere entegre etmek başka bir yol olabilir. Bu durum, alan yazın için bir öneri olarak sunulmaktadır.

Sonuç ve Öneriler

Özetle, elde edilen bulgular öğretmen adaylarının fark ettiği öğretmen rolleri ve öğrenci çıktılarının zamanla çeşitlendiğini, özellikle bilişsel çıktılara yapılan vurgunun arttığını, aynı zamanda yorumlama becerilerinin geliştiğini göstermektedir. Video durum temelli topluluk matematik öğretiminin kapsamı, sınıf ortamının çok boyutlu yapısını ön plana çıkararak öğretmen rolleri ve öğrenci çıktılarına yönelik bir vizyon oluşturmuş ve öğretmen adaylarının öz-farkındalıklarını arttırmıştır. Bu kazanımların birlikte ortaya çıkan etkileri sonucu öğretmen adaylarının fark etme becerileri ve mesleki kimlik yönelimleri dönüşüme uğramıştır. O halde video durum temelli topluluk alan yazındaki benzer çalışmalarda belirtildiği gibi sadece fark etme pratiklerini artırmamış, ayrıca mesleki kimliklerini de dönüştürmüştür. Bu bakımdan, öğretmen eğitiminde mesleki kimlik gelişimini araştıranlar için ve öğretmen eğitimcileri için, bu çalışmanın bağlamı bir örnek teşkil edebilir. Bir başka deyişle, video analizlerinin yapıldığı ve tartışıldığı ortamlar yaratmak, öğretmen adaylarının mesleki kimlik gelişimleri için önem arz etmektedir.

Ancak, öğretmen adaylarının matematiği öğretme konusundaki bilgi ve uygulama eksikliğinin, öğretmen adaylarının fark etme ve kimlik yönelimlerinde bir sınırlılık olduğu göz ardı edilmemelidir. Öğretmen eğitimcileri ve araştırmacılar bu sınırlılığı dikkate alarak öğretici ve eğitici video durumları oluşturabilir ve öğretmen adaylarının kimliklerinin dönüşümünde aktif rol oynayabilirler. Ayrıca, video durumlarının içeriği de fark etme pratikleri ve kimlik yönelimlerinde etkin rol oynamaktadır. Bu bakımdan, çalışmanın amacına uygun ve kapsamlı video durumlarının kullanılması veya geliştirilmesi önerilmektedir.

Bu çalışma alan yazındaki benzer fark etme çalışmalarından araştırmacının müdahaleleri bakımından ayrışmaktadır. Öğretmen adayları bu çalışmada önce videoları bireysel izlemiş, bireysel yansıtıcı raporlar yazmış ve topluluğun koordinatörü olarak araştırmacıya mail atmışlardır. Böylelikle, araştırmacı

tartışmayı öğretmen adaylarının fark ettiklerini temel alarak yönetme ve müdahalelerde bulunma imkanı bulmuştur. Videoları öğretmen adaylarının fark ettiği noktalarda birbiri ile çelişenleri ön plana çıkarma ve tartışmayı bu çelişkiden yararlanarak yönlendirme, öğretmen adaylarının kendi fark ettiği noktayı gözden geçirme ve karşısındakinin düşüncesini değerlendirme imkanı sunmuştur. Bu şekilde yönetilen grup toplantılarının öğretmen adaylarının tartışmaya katılımını da artırdığı gözlemlenmiştir. Ayrıca, fark edilenler arasından, belirli öğrencilere yönelik çıktıları yorumlayan ifadelerin çelişkili olmasa dahi ön plana çıkarılması, öğretmen adaylarının dikkatini çekmiştir. O halde, araştırmacının grup tartışmasını yönetmesi ve yönlendirmesi açısından, bu çalışmada izlenen sürecin örnek teşkil edebileceği söylenebilir.

Son olarak, öğretmen adaylarının mesleki kimliklerinin video durum temelli toplulukta incelenmesi ve analizlerin fark etme ve öğretmen kimliği teorik çerçevelerinin birleştirilerek kullanılmasının hem bu çerçeveleri kullanacak araştırmacılar, hem de mesleki kimlik geliştirmek isteyen öğretmen eğitimcileri için ışık tutacağı düşünülmektedir.

APPENDIX E: CURRICULUM VITAE

Personal Information

Surname, Name: Çelikdemir, Kübra
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Date and Place of Birth: 21 June 1987, Gölcük
Marital Status: Married
Date of birth: 21.06.1987
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Educational Background

2009 – 2011	Middle East Technical University/ Ankara – TURKEY Master/ Secondary Science and Mathematics Education
2004 –2009	Middle East Technical University/ Ankara – TURKEY Bachelor's degree- Mathematics Education

Work Experience

03.2018 –	Turkish Education Association (TED) Education Specialist
01.2017 – 03.2018	Gazi University / Faculty of Education Research Assistant
08.2014 – 01.2017	Middle East Technical University / Faculty of Education Research Assistant
05.2013 – 08.2014	Gazi University / Institute of Education Research Assistant
2009-2010	SEBİT Education and Information Technologies Ins. Instructional Designer

Projects

ODTÜ Bilimsel Araştırma Projeleri. *İlköğretim matematik öğretmen adaylarının mesleki kimliklerinin incelenmesi.* (2015-2016, Researcher)

TÜBİTAK 1001 Araştırma Projesi 115K510. *Matematik Öğretmen Eğitimcisi Yeterliklerinin Belirlenmesi ve Matematik Öğretmen Eğitimcilerinin Yeterlik Algıları.* Bursiyer, 09.2015-

TÜBİTAK 4005. Bilim ve Toplum Yenilikçi Eğitim Uygulamaları, *Dinamik Matematik yazılımı Geogebra'nın Matematik Derslerinde Verimli ve Etkili Kullanımı*, Rehber, Ankara, 01-10 Eylül 2015.

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Given & Assisted Courses

Gazi University
Analytic Geometry, Geometry, School Experience, Teaching Practice, General Mathematics

Middle East Technical University
School Experience, Practice Teaching in Elementary Education, Research Methods

Academic Publishing

Haser, Ç., **Çelikdemir, K.,** & Arslan, O. (2017, Mayıs). Matematik öğretmen adaylarının gözünden matematik eğitiminde araştırılması gereken problemler. Türk Bilgisayar ve Matematik Eğitimi Sempozyumu–3 [3rd Turkish Computer and Mathematics Education Symposium] Bildiri Özetleri Kitabı (s. 582). Afyon, Türkiye.

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Appendix F. Tez Fotokopi İzin Formu / Theses Photocopy Permission Form

ENSTİTÜ / INSTITUTE

Fen Bilimleri Enstitüsü / Graduate School of Natural and Applied Sciences ☐

Sosyal Bilimler Enstitüsü / Graduate School of Social Sciences ■

Uygulamalı Matematik Enstitüsü / Graduate School of Applied Mathematics ☐

Enformatik Enstitüsü / Graduate School of Informatics ☐

Deniz Bilimleri Enstitüsü / Graduate School of Marine Sciences ☐

YAZARIN / AUTHOR

Soyadı / Surname : Çelikdemir.....
Adı / Name : Kübra.....
Bölümü / Department : İlköğretim.....

TEZİN ADI / TITLE OF THE THESIS (**İngilizce** / English) :FOSTERING PRESERVICE MATHEMATICS TEACHERS' PROFESSIONAL IDENTITY ORIENTATIONS THROUGH NOTICING PRACTICES IN A VIDEO CASE-BASED COMMUNITY

TEZİN TÜRÜ / DEGREE: **Yüksek Lisans** / Master ☐ **Doktora** / PhD ■

1. **Tezimin tamamı dünya çapında erişime açılsın ve kaynak gösterilmek şartıyla tezimin bir kısmı veya tamamının fotokopisi alınsın.** / Release the entire work immediately for access worldwide and photocopy whether all or part of my thesis providing that cited. ■
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