

Prospective Teachers' Noticing with respect to the Student Roles underlined in the Elementary Mathematics Program: Use of Video-Cases

Öğretmen Adaylarının İlköğretim Matematik Programında Vurgulanan Öğrenci Rollerine Üzerine Fark Ettikleri Noktalar: Video Örnek Olay Kullanımı

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Abstract

The purpose of this qualitative case study was to examine what prospective mathematics teachers noticed with respect to the student roles underlined in the elementary mathematics program when video-case based pedagogy was employed in teacher education. The theoretical framework employed in this study was Learning to Notice framework developed by van Es and Sherin (2002). The data was collected through reflection papers and interviews from 15 senior prospective teachers enrolled at a large state university. The findings indicated that prospective teachers could notice several issues related to student roles underlined in the elementary mathematics program when they were provided with a learning environment to analyze real mathematics classrooms.

Keywords: Elementary mathematics program, Student Roles, Noticing framework, Video-cases

Öz

Bu nitel çalışmanın amacı, öğretmen eğitiminde video örnek olay kullanımı neticesinde, matematik öğretmen adaylarının ilköğretim matematik programında vurgulanan öğrenci rollerine üzerine fark ettikleri noktaları incelemektir. Çalışmada teorik çerçeve olarak van Es ve Sherin (2002) tarafından geliştirilmiş olan Fark Etme Teorisi'nden yararlanılmıştır. Veriler, büyük bir devlet üniversitesinde öğrenim görmekte olan 15 son sınıf matematik öğretmen adayından yazılı yansıtıcı görüşler ve mülakatlar neticesinde toplanmıştır. Bulgular, öğretmen adaylarının gerçek matematik sınıf ortamlarını analiz etme şansını yakaladıklarında, ilköğretim matematik programında vurgulanan öğrenci rollerine yönelik çeşitli noktaları fark edebildiklerini göstermiştir.

Anahtar Sözcükler: İlköğretim matematik programı, öğrenci rolleri, Fark Etme Teorisi, video örnek olayları.

Introduction

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In several countries, education systems have been changed. In Turkey, with the appreciation of the need for change in curricula, the Ministry of National Education (MoNE) took a step to change the elementary (1st to 8th grade) and secondary (9th to 12th grade) school curriculum six years ago. The elementary mathematics program is among those being changed and improved.

The new elementary mathematics program in Turkey aims to create an environment for effective, meaningful, and long-term learning via paying attention to students' cognitive levels (TTKB, 2006). The vision of the new curriculum is to raise students who can use mathematics in their daily lives and professional practices, solve problems, share their ideas and solutions, do group work; who have self-confidence in mathematics; and who feel pleasure from learning mathematics (TTKB, 2006). Such an approach to learning is expected to lead to a more meaningful learning (Bulut & Koc, 2006b; TTKB, 2006).

The new program provides opportunities for investigation, questioning, inquiry, discovery, willingness to participate, group work, and building new knowledge on previous one. The students are given several responsibilities to carry out in this program. They are expected to be more actively involved in learning via communicating with their teachers and peers (TTKB, 2006). They are supposed to be active during the learning process, be able to express their ideas, to question and inquire, to discuss, be responsible of their own learning, and to work together.

To achieve these targets, it is necessary that the teachers receive help with understanding the expectations of the program, and also they need to have opportunities to experience it. At this point, the use of cases might be one of the ways in teacher education to accomplish this goal (Mayo, 2004; Merseth, 1996).

In order to prepare the future teachers for reform-minded classrooms, the case idea (Sykes & Bird, 1992) as a pedagogical approach might be employed in teacher education programs. Case methods of teaching are defined as "...the methods of pedagogy employed in conjunction with teaching cases" (Shulman, 1992, p. 19) where teaching cases are case reports or case studies that prepared for teaching. Case-based pedagogy is an effective way to help teachers with getting prepared for the complexities of teaching (Harrington & Garrison, 1992; Mayo, 2004). Through case-based pedagogy, teachers have opportunities to connect their theoretical and practical knowledge (Butler, Lee, & Tippins, 2006), to analyze student thinking and reflecting on it (Masingila & Doerr, 2002), as well as to reason about teaching (Harrington, 1999). If observing other teachers is an effective way of teacher development (Moran, Dallat, & Abbott, 1999) and reflective teacher education is the kind of education novices should receive (Manouchehri, 2002; San, 1999; Stockero, 2008), it might be a feasible way prospective teachers reflect on other teachers' cases.

Video cases are one of the types of cases among text-based cases, multimedia cases, and hyper-media cases. According to Lundeberg and Levin (2003), video-based cases are identified as one of the several types of cases that are available to use in teacher education. Richardson and Kile (1999) define video cases as "...multimedia presentations of classroom actions and analyses that include moving pictures (usually on videocassette) of classroom action" (p. 122). There are several studies in the literature using video-cases in teacher education that indicate positive results (Alsawaie & Alghazo, 2010; Baran, 2006; Baran, 2007; Boling, 2007; Hill & Collopy, 2003; Llinares & Valls, 2010; Stockero, 2008; van Es & Sherin, 2010).

Literature suggests that cases allow both prospective and in-service teachers to analyze and reflect on student thinking and on how to facilitate student learning (Masingila & Doerr, 2002), and they are expected to prompt discussion and reflection (Arellano et al., 2001; Shulman, L., 1992). Furthermore, they provide a context for collaborative teaching and reflection (Arellano et al., 2001). In their study, Masingila and Doerr (2002) indicated that prospective teachers were able to frame several issues like using student thinking and focusing on difficulties when they were engaged in a multimedia case study. Van Es and Sherin's (2010) study also focused on teachers' attention to student thinking, and revealed how the video clubs influenced teachers' professional development. This study not only suggested that engaging in video clubs provided teachers with more focusing on student mathematical thinking, but

also with opportunity to change their instruction accordingly. Similarly, in Manouchehri (2002)'s study, prospective secondary mathematics teachers were able to explore mathematics, student learning, and curriculum innovation through interaction. As Baran (2006) suggests, in order to provide prospective teachers with opportunities to build their own knowledge as highlighted in the new program, and analyze teaching situations; teacher education programs should include new methods such as video-case based instruction.

The purpose of this study was to investigate what the prospective elementary mathematics teachers noticed in terms of student roles underlined in the elementary mathematics program in Turkey as they watched and discussed video cases. Accordingly, we wanted to answer the research question "To what extent the elementary prospective mathematics teachers' noticing with respect to the student roles underlined in the elementary mathematics program changes during video-case discussions?"

In this study Learning to Notice framework (van Es & Sherin, 2002) was utilized to support prospective teachers in learning to notice, and to analyse the data. Learning to Notice framework was developed by van Es and Sherin (2002) in the light of previous research on teachers' ability to notice classroom interactions with the aim of supporting teachers in learning to notice throughout their teacher education. Especially, with the use of this framework, the researchers aimed to help teachers learn to notice aspects of reformed classrooms. According to this framework there are three key aspects of noticing that are; identifying what is important or noteworthy about a classroom situation, making connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent, and using what one knows about the context to reason about classroom interactions (van Es & Sherin, 2002, p. 573). In this framework, there are five dimensions to analyse data. The first dimension is Actor that is the person the participants comment on (teacher, student, curriculum developers, self, other). The second one is Topic that is what the participants notice (mathematical thinking, pedagogy, climate, management, other). The third dimension is the Stance, which is how the participants analyse the practice (describe, interpret, evaluate). The fourth dimension, Specificity is about how the participants discuss the events they notice (general, specific). The fifth and last dimension is Video-focus which examines whether participants' comments are based on the video or not (video based, non-video based). It should be noted that in this study the first dimension that is the Actor was taken into account.

The studies in the literature utilizing this framework (Alsawaie & Alghazo, 2010; Star & Strickland, 2008; van Es & Sherin, 2008) indicate that via utilizing this framework it might be possible to understand the changes in teachers' thinking along a period, and also to investigate teachers' improvement in seeing meaningful patterns as they learn to notice. In this study, with the use of this framework, our aim was to help prospective teachers learn to notice the aspects of the elementary mathematics program. More specifically, through utilizing this framework, we aimed to examine what the prospective teachers' noticed related to the student roles underlined in the elementary mathematics program.

Method

The data were collected during 2008-2009 fall semester from 15 senior prospective elementary mathematics teachers in the Middle East Technical University [METU], Turkey while they were taking the School Experience II course. In order to investigate what the prospective teachers noticed throughout the semester, participants were asked to watch a video-case depicting real elementary mathematics classrooms each week (6 video in total), and then discuss the case in an online forum. The videos were 6th to 7th grade mathematics classes that were video-taped by the first researcher in addition to one 5th and one 6th grade videos taped by other researchers. To record videos in elementary mathematics classrooms, permission from 22 public schools in Cankaya district, Ankara was taken. Among the recorded videos, the 6 videos were selected with expert opinion received from an elementary mathematics teachers and a mathematics

educator. The videos reflected real classrooms with strengths and weaknesses, and were used to share teachers' real implementation processes. Since the nature and purpose of the present study required understanding prospective teachers' experiences in a video-case discussion environment, mathematics videos depicting real practices in elementary mathematics classrooms were preferred. In light of the expert opinions, the videos were considered as suitable to discuss issues related to the student roles underlined in the elementary mathematics program. When selecting videos and directing the discussions, the researcher did not have any "predetermined notions of what were acceptable interpretations" in mind (van Es & Sherin, 2008, p. 5). Through this, the aim was to let the participants talk about various issues related to the videos as well as creating an environment in which the facilitator and the participants played critical roles in shaping the discussions together. Our aim was to examine whether the participants could identify critical points in the video cases even if they did not match with the points identified by the researcher; whether they had any check points in their minds while analyzing the videos; and whether they could move from the specific events to the general and broader principles and relate the two.

To provide information on the selected videos, the first video was belonged to a female prospective teacher who was teaching the properties and the surface area of the cube to the 5th graders. This video was suitable to discuss on the student roles underlined in the new program as well as the classroom culture. The second video was again belonged to a female teacher, but this time an in-service teacher with 3 years of experience. In this video, the students were solving the stair-case problem related to the pattern subject, and the participants were asked to discuss on students' mathematical thinking, to evaluate the lesson in terms of student learning, and to share their suggestions to improve the lesson to enhance student understanding. The third video was on the ratios and proportion where a male teacher was teaching the 6th graders. This video was suitable to make discussions on the quality of instruction and whether the activities were proper for the aim of the lesson or not. In the fourth video, a male teacher with 15 years of experience was teaching measurement of liquids to the 6th graders. In this video, the participants were encouraged to discuss on the aim of the lesson and on the issues related to the vision and approach in the new program. The fifth video was belonged to a female teacher with 20 years of experience, where she was teaching the multiplication of decimals to the 6th graders. The participants were encouraged to discuss on what students learned and they were asked to adapt the lesson to the new program. Finally in the sixth video, a female teacher with 26 years of experience was teaching interest to the 7th graders, and the participants discussed on how the lesson was congruent with the new program, and what was needed to make students more active.

Each week, after the participants watched a video together in the classroom, they were given a sheet on which they were asked to individually answer the question "What did you see/notice in the video and what stood out to you?" (in terms of the student roles and classroom culture in relation with the new elementary mathematics program)? These reflection papers on each video were one of the data sources. The participants were given 15 minutes to write their reflection papers. After they reflected on the video, they discussed each video in the online forum for a week. The first researcher was the facilitator of the discussions where she raised discussion prompts and directed the flow of the discussions.

More information on the videos watched with the main questions raised for each video during the discussions is provided in Table 1 below. It should be noted that with the experience from the pilot study, the number of selected cases was decided to be 6 videos for the optimum effectiveness. Additionally, both in-service and prospective teachers' videos, female and male-teacher videos, and videos with different topics were selected in order to provide participants with different perspectives.

Table 1.

Videos watched and facilitator prompts in the main study

Teacher name	Status	Level	Content	Facilitator Prompts
Aydan	Prospective	5th grade	Geometry (Properties and surface area of a cube)	<ol style="list-style-type: none"> 1. First of all, let's talk about the teacher and student roles in this video. What can you say? How do you think the classroom environment and culture were? 2. In your opinion, did the students understand the 2D and 3D concepts? Do you think the transition between the dimensions was successful? Discuss with examples from the video. 3. Now, put yourself into the students' shoes who were trying to draw a cube on their notebooks. What were you thinking at that moment? What did you know?
Gizem	In-service with 3 years experience	6th grade	Patterns	<ol style="list-style-type: none"> 1. In your opinion, what was the aim of this lesson? What kind of instructional moves were made to reach the aims? Discuss with concrete examples from the video. 2. Now, imagine yourself as the students in the video, and try to understand what they were thinking. What they were thinking: the students who were making estimations for the given problem (min 02:27), the student who was drawing the blocks one under the other (min 11:47), the students who asked whether it could be 55x10 (min 12:59) and/or the group who told it was 15 for each 5 (min 14:13)? What can you tell if you compare these students in terms of their mathematical thinking? 3. Let's make a last evaluation for this lesson. What do you think the students learned/ could not learn in this lesson? How the activity might be improved to enhance student understanding? What other subjects it might be connected to or how it might be extended? Discuss what might be the next step in this lesson.
Mehmet	Prospective	6th grade	Ratios and Proportion	<ol style="list-style-type: none"> 1. What was the aim of this lesson? Discuss about the instruction in this lesson and whether the activities were proper for the aim. Provide examples from the video. 2. Now, think about the following part of the lesson in the video, and what the teacher might have been done. In your opinion, what might be the things to do in the following lesson? Then, I will share what the teacher did in the next part of the video so that we can talk about it together. 3. You may find the raw video and the second part of it attached. Let's see whether your predictions were congruent with the second part of the video. Let's evaluate this video together, what do you think? Please discuss with specific examples from the video, and raise questions as many as possible.
Metin	In-service with 15 years experience	6th grade	Measurement (Liquids)	<ol style="list-style-type: none"> 1. What do you think the aim of this lesson was? What kinds of moves were made to reach the aims? To what level the aims were attained. Discuss with examples from the video. 2. Please look at the teacher and student roles mentioned in the vision and the approach of the new program. Which of them you can see in this video? Which of them are absent? Let's evaluate this video from this aspect as well. 3. How do you think the assessment of this lesson should be? What might be the objectives of the following lesson?

Table 1. Continued

Nergis	In-service with 20 years experience	6th grade	Multiplication with decimals	1. What was the aim of this lesson? What the students learned/ could not learn in this lesson? 2. Let's take this lesson and adopt it entirely to the new program. What we should do? What we should change? How should we teach this lesson? Please explain with specific examples.
Gülşen	In-service with 26 years experience	7th grade	Interest	1. How do you think this video was congruent with the new program? From which aspects it was congruent and from which aspects it was not? Please discuss with examples from the video. 2. If you were the teacher in this video, how would you teach this lesson? Let's share different methods and ideas in detail. Discuss how it is given in the guide book, and what is needed to make students more active? What might be done to improve this lesson? Provide specific examples. 3. We talked about how the teacher gave instruction. Well, what do you think about the level of the teacher's subject matter and pedagogical knowledge? To what level she was successful at transferring her knowledge to real life?

*Pseudonyms for teacher names were used

Three interviews, which were administered at the beginning, in the middle, and at the end of the semester, constituted the main data sources. Participants were interviewed face-to-face to understand their noticing skills. More specifically, with the first interview protocol, our aim was to get information on what the participants noticed in the first video in terms of student roles underlined in the elementary mathematics program. The participants were asked to answer questions such as whether and how their noticing changed after the discussions, what their ideas on the student roles in the video were after writing reflection papers and making discussions, and how they would evaluate the video in terms of student roles after the discussions. With the second interview, we aimed to understand the changes on their noticing skills after watching three videos and discussing them in the forum. The participants were asked questions such as how their noticing shifted after 3 discussing 3 videos, what their ideas on student roles in the video after the discussions, from which aspects the video was congruent with the new program and not, whether and what they got from the experience as future teachers, and whether and how this experience influenced their observations they made in school experience. Finally with the third interview, we tried to understand how the participants analyzed the 6 videos in terms of student roles underlined in the elementary mathematics program, what kind of changes they went through during the experience, and whether and how the video-case discussions contributed to their professional development. The participants were asked what they noticed most during the experience with respect to the student roles underlined in the new program, whether and how their noticing shifted at the end of the study, how the experience influenced their observations in real classrooms during the school practice, whether and how this experience would contribute to their professional development, and to what degree the video-case discussions would help them implement the new program effectively. The interviews were about 45 minutes long, and they were all transcribed for data analysis. For the validity of the interview questions, opinion from two mathematics educators was taken.

For the data analysis, constant comparative technique (Glaser & Strauss, 1967) was employed. To create the coding framework, *Learning to Notice* framework (van Es & Sherin, 2008) was used. Among the five dimensions of this framework (actor, topic, specificity, stance, and video-focus), in this study the first dimension that is the *Actor* was taken into account. More specifically, the student as an actor was selected as the main focus of this study in order to be able to investigate what the prospective teachers noticed in terms of student roles underlined in the elementary mathematics program (see Appendix 1).

For the trustworthiness, the data was collected over an extended period of time (one semester for the pilot study and one semester for the main study), and multiple sources of evidence (interviews and reflection papers) and different evaluators were used. Additionally, direct quotations were presented to decrease the amount of inferences. To ensure reliability, the codes were discussed with a mathematics educator. Additionally, a Ph.D. student in mathematics education department coded the data as a second coder. The percentage of the agreement was around 70% at the beginning, and to increase this percentage, two coders discussed the coding in a two-way conference until full agreement was found.

Results

The analysis of the data gathered from the interviews and reflection papers indicated that prospective teachers were able to notice and reflect on student roles with respect to the elementary mathematics program under 3 main-themes; *Methodological Perspective*, *Attitudinal Perspective*, and *Classroom Culture* (see Appendix 1). Accordingly, the first theme includes student roles such as discovering, doing group work, and using materials; the second theme includes roles such as enjoying mathematics, and being relaxed; and the third theme includes student roles such as following the lesson and the rules, and expressing ideas.

Data analysis indicated that, among 15 participants, in the first interview 12 participants talked about *Methodological Perspective*, 13 participants mentioned *Attitudinal Perspective*, and 10 participants talked about *Classroom Culture*. In the second interview, all participants talked about *Methodological Perspective*, and 12 participants talked about *Attitudinal Perspective* and *Classroom Culture*; and in the third interview 12 participants talked about *Methodological Perspective* and *Attitudinal Perspective*, and 10 mentioned *Classroom Culture*.

Methodological Perspective

The first theme *Methodological Perspective* had 9 sub-issues that were “discovery”, “inquiry”, “using materials”, “group work”, “real life examples”, “constructing one’s own knowledge”, “connections”, “discussion”, and “new program”. In the first interventions (including interviews and reflection papers), only 3 of these sub-issues were noticed by the participants; “discovery”, “inquiry”, and “group work”. In the third interventions, 5 of these sub-issues were noticed; “inquiry”, “group work”, “using materials”, “constructing one’s own knowledge”, and “discussion”. Interestingly, in the second interventions, all of these sub-issues were noticed by the participants (see Appendix 1).

To provide an example, in the first interview, 11 out of 15 participants mentioned the issue “group work”. This role was the most popular role that the participants noticed in the first interview. For example, in the below vignette Participant-6 noticed that the students in the video were used to group work and they knew their responsibilities:

As far as I observed, the students did group work before. I wrote this here too. I mean I thought that they knew how to behave during group work, how to collaborate etc. Because they adapted very quickly. Besides, they worked with the ones who were just next to them, I mean they worked in groups of 4. They worked well [...] (P6-1)

With respect to another student role related to *Methodological Perspective* that is “constructing one’s own knowledge”, in the second interview Participant-15 reflected on this issue where she criticized the students for not trying to build their own knowledge, but instead waiting for the teacher to direct them to the answer:

[...] You know, they always expect things from their teacher. They do when they are told. Like; they don’t know anything. Like; this is given to me, but I don’t know what to do with that. They are always in that mood. (P15-2)

To sum up the issues noticed related to the Methodological Perspective, most of the participants were able to reflect on student roles related to this main theme throughout the three interventions. The sub-issue mostly noticed in all interviews related to Methodological Perspective was “group work”. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues.

Attitudinal Perspective

As stated before, the second theme related to student roles was *Attitudinal Perspective*. This theme had 4 sub-issues; “willingness to participate”, “being relaxed”, “enjoying mathematics”, and “excitement”.

In the first interventions, 3 of these sub-issues were noticed; “willingness to participate”, “being relaxed”, and “excitement”. In the second interventions, only 2 of them were noticed; “willingness to participate” and “being relaxed”. The sub-issues which were not noticed in the second interventions, on the other hand, were “enjoying mathematics” and “excitement”. In the third interventions, 3 of these sub-issues were noticed by the participants; “willingness to participate”, “being relaxed”, and “enjoying mathematics”.

To provide examples, in the first interview, 11 participants mentioned the role “willingness to participate”. This role refers to being willing and enthusiastic about lessons, participating actively and equally, and being willing to learn mathematics. It was the most common noticed issue in the first interview. To give an example, Participant-7 praised the students in the video for being active and willing to participate in the lesson as in the below vignette:

For example, at the beginning, at the very beginning, when the teacher asked a simple question, all of the students wanted to solve it and were willing to answer. What we mean by active participation is this. All of them tried to participate in the lesson; they all wanted to answer [...] (P7-1)

Similarly, 10 participants mentioned this role in the third interview. This role was the most popular role that the participants noticed in the third interview as in the first (11 participants) and second interviews (9 participants). For example, Participant-4 mentioned that students should be active and willing to learn mathematics while criticizing the students in the video for not being interested in lessons:

[...] I really get surprised when I look around. I saw it in some students in 6th grade, but only in a few students. But in 7-8th graders, no. I remember myself as an enthusiastic student in mathematics lessons. I wasn't like that. You know, you want to see them more interested in mathematics, willing to come to the board. I don't know whether you were like that. I was. (P4-3)

To sum up the issues noticed related to *Attitudinal Perspective* throughout the three interventions, most of the participants were able to reflect on student roles related to this main theme in the three interviews. More specifically, the student roles that the participants noticed in all interviews were “willingness to participate” and “being relaxed”. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues (see Appendix 1).

Classroom Culture

With respect to the third theme *Classroom Culture*, in the three interventions participants talked about 7 sub-issues related to this theme. In the first interventions, 6 of the sub-issues were noticed by the participants. These sub-issues were “responsibilities”, “aiming to understand”, “following rules”, “being respectful”, “expressing themselves”, and “mistakes”. Similarly, in the second interventions 6 of these sub-issues were noticed; “responsibilities”, “following the lesson”, “aiming to understand”, “following rules”, “being respectful”, and “expressing themselves”. While 6 of these sub-issues were noticed by the participants both in the first and second interventions, only 4 of them were noticed in the third interventions; “responsibilities”, “following the lesson”, “following rules”, and “being respectful”.

To give examples, in the second interview, 6 participants mentioned the role “being respectful”. This issue refers to student roles such as not interfering with peers’ learning, giving them chances to practice and learn, being respectful toward them, listening to peers, and establishing good relationships with their peers. This role was the most popular role noticed in the second interviews as in the first interviews (7 participants). To give an example, in the below vignette Participant-12 criticized the students in the video for suppressing and not listening to each other:

They don’t pick on each other, but for example when one of them tries to do something the other one is shouting. ‘No, it is not like that, it should be like this’. Or when one of them tries to say something the others shout at their seats. ‘No no, it is like this’. I mean it was not like that in the second video, because there was a group activity there. Ok there was a little bit, but it was more dominant in the others. Because all of them wanted to answer since it was question-answer type. The students a little bit oppressed each other naturally. (P12-2)

Similarly, in the third interviews, Participant-12 reflected on being respectful via criticizing the students for interfering each other:

[...] When their friends on the board made a mistake, the students were like running to the board, asking them to sit and do it themselves, and shouting that they were doing wrong. Or it is really bad that the students shout like ‘it is wrong, wrong’ when a student writes down something on the board [...] (P12-3)

To sum up the issues noticed related to *Classroom Culture* in the three interventions, most of the participants were able to reflect on student roles related to this theme in the three interviews. More specifically, with respect to this main-theme, the issues noticed in all interviews were “responsibilities”, “following the rules”, and “being respectful”. In the reflection papers, again the percentages were lower than that of the interviews (see Appendix 1).

To conclude, most of the participants were able to reflect on student roles related to the themes *Methodological Perspective*, *Attitudinal Perspective*, and *Classroom Culture* in the three interviews. In the reflection papers, although the percentages were lower than that of the interviews, the participants were still able to notice several issues with respect to the student roles.

Discussion

As indicated before, the aim of this study was to examine what the prospective teachers noticed with respect to the student roles underlined in the elementary mathematics program when video case-based methodology was employed. Literature indicates that the use of case-based pedagogy helps teachers notice and discuss student roles. Masingila and Doerr (2002) indicate that cases allow both prospective and in-service teachers to analyze and reflect on student thinking. In other words, through the use of cases, they can analyze student-centered teaching (Sowder, 2007).

In the present study, the prospective teachers noticed and talked about several issues related to students and their learning. The student roles that they noticed most throughout the three interviews were being able to do group work and cooperating with others; being willing and active in lessons; being relaxed, and having self confidence; and not interfering with their peers, and being respectful toward them. Among these roles, the majority of the participants discussed “group work” related to *Methodological Perspective*; and “willingness to participate” and “being relaxed” related to *Attitudinal Perspective*.

All the mentioned student roles above point to the responsibilities of students in the elementary mathematics program in Turkey. From here, it might be deduced that the participants did reflect on student roles underlined in the elementary mathematics program. More specifically, during the semester they received video case-based teacher education, as they took Teaching Mathematics Methods Course, started to do their internships, and get involved with students in real classroom environments, they saw the implications of what they have learned so far. They observed and focused on how a group

work could be effectively conducted in a lesson, how students' willingness to participate influenced their learning, and how it was important that students were relaxed in a learning environment.

As stated before, literature suggests that through the use of cases in teacher education, it might be possible to help teachers focus on students (Masingila & Doerr, 2002). To give an example, in Star and Strickland's (2008) study, prospective teachers developed their ability to notice after one semester. Similarly, van Es and Sherin's (2008) study revealed that teachers were more focused on student thinking and able to interpret classroom interactions in terms of student learning at the end of video club sessions.

An important point to underline is that in the present study although prospective teachers were able to notice and interpret several issues related to student roles underlined in the elementary mathematics program, it seems difficult to state that their noticing skills improved throughout the interventions as in Star and Strickland (2008) and van Es and Sherin's (2008) studies. In contrast with the study of Star and Strickland (2008), in the present study, prospective teachers were able to focus on some student roles from the beginning, while they started to notice some other roles later in the study. Some of the student roles were noticed with a decreased frequency such as "inquiry" and "group work" in *Methodological Perspective*, and "being respectful" and "expressing themselves" in *Classroom Culture*, although "group work" was the most noticed student role in all three interviews. That is, prospective teachers' noticing ability with respect to the student roles showed inconsistencies making it hard to conclude that the participants' noticing ability improved at the end of this study.

Why prospective teachers in this study had difficulty with improving their noticing skills related to student roles might be explained by the possibility that the participants in the present study were prospective teachers as opposed to in-service teachers. As stated in van Es and Sherin (2008), in-service teachers already have the skill to interpret classroom events, and what is expected from them is to focus on student ideas. This might explain why the participants in the present study as prospective teachers could not focus on students as much as the in-service teachers in van Es and Sherin's (2008) study.

Conclusion

To conclude, the use of video-cases in teacher education has the potential to help prospective teachers know the expectations of the elementary mathematics program, specifically the ones related to the student roles. From this point it might be deduced that video-case based pedagogy should be employed in teacher education. Through the use of cases, prospective teachers may learn to focus on student responsibilities and their roles underlined in the elementary mathematics program. Thus, it is recommended that they should be provided opportunities to engage more in video-case based discussions. If video-case based teacher education is conducted from the first to the last year of teacher education programs, then prospective teachers' awareness on student responsibilities in the elementary mathematics program might be maximized.

Finally, it should be studied whether prospective teachers start to focus more on student thinking when they enter the profession. Such a follow-up study might provide more information on the effectiveness of the use of cases in teacher education. It is also recommended that the influence of the use of video-cases in teachers' practices should be studied.

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Appendix 1. Student Roles

Main-Themes Interview and Reflections	Sub-issues 3rd Interview and	1st Interview and		2nd
		Reflections	Reflections	
Methodological Perspective (9 sub-issues)	DISCOVERY	Noticed(2;0)	Noticed(5;0)	Not-noticed
	INQUIRY	Noticed(5;1)	Noticed(4;0)	Noticed(3;0)
	USING MATERIALS	Not-noticed	Noticed(3;0)	Noticed(2;1)
	GROUP WORK	Noticed(11;4)	Noticed(10;0)	Noticed(7;0)
	REAL LIFE	Not-noticed	Noticed(2;4)	Not-noticed
	CONSTRUCTING ONE'S OWN KNOWLEDGE	Not-noticed	Noticed(5;0)	Noticed(4;1)
	CONNECTIONS BETWEEN SUBJECTS	Not-noticed	Noticed(2;2)	Not-noticed
	DISCUSSION	Not-noticed	Noticed(2;0)	Noticed(2;0)
	NEW PROGRAM	Not-noticed	Noticed(3;1)	Not-noticed
Attitudinal Perspective (4 sub-issues)	WILLINGNESS TO PARTICIPATE	Noticed(11;4)	Noticed(9;4)	Noticed(10;1)
	BEING RELAXED	Noticed(8;0)	Noticed(3;0)	Noticed(8;3)
	ENJOYING MATHEMATICS	Not-noticed	Not-noticed	Noticed(2;0)
	EXCITEMENT	Noticed(2;0)	Not-noticed	Not-noticed
Classroom Culture (7 sub-issues)	RESPONSIBILITIES	Noticed(2;0)	Noticed(5;0)	Noticed(2;0)
	FOLLOWING THE LESSON	Not-noticed	Noticed(5;0)	Noticed(6;1)
	AIMING TO UNDERSTAND	Noticed(2;0)	Noticed(2;0)	Not-noticed
	FOLLOWING RULES	Noticed(4;0)	Noticed(5;4)	Noticed(4;0)
	BEING RESPECTFUL	Noticed(7;0)	Noticed(6;2)	Noticed(2;0)
	EXPRESSING THEMSELVES	Noticed(3;0)	Noticed(2;0)	Not-noticed
MISTAKES	Noticed(2;0)	Not-noticed	Not-noticed	