

EXPLORING CHANGES ON SCIENCE TEACHERS' CONCEPTIONS ABOUT  
PROFESSIONAL DEVELOPMENT

by

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*Dedicated to my son, Can...*

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## **ABSTRACT**

### **EXPLORING CHANGES ON SCIENCE TEACHERS' CONCEPTIONS ABOUT PROFESSIONAL DEVELOPMENT**

The purpose of this qualitative case study was to explore changes on science teachers' conceptions about professional development. How teachers' perceptions, experiences, and approaches about their professional development background, and plans for the future have been changed through the time of eight years were explored. The first phase of the study was conducted in the 2010-2011 educational year with 14 private school teachers. Data were collected with semi-structured interviews and analyzed using constant comparative method. After the open, axial and selective coding, four main themes (a) identity, (b) department, (c) school context and (d) national context, emerged that described teachers' conceptions about professional development. The second phase of the study was conducted in 2019 with three teachers purposefully selected among the participants of the first phase. Interview questions for the second phase were revised based on the four themes from the first phase. After the teachers were individually interviewed, the data gathered were analyzed in the light of themes which arose from the first phase. The results showed important changes in teachers' conceptions about professional development. Conclusions and implications of the findings are discussed.

## ÖZET

# FEN BİLİMLERİ ÖĞRETMENLERİNİN, MESLEKİ GELİŞİMLERİ KONUSUNDAKİ FİKİRLERİNİN DEĞİŞİMİNİN İNCELENMESİ

Nitel araştırma desenlerinden durum çalışması olarak planlanan bu araştırmanın amacı, fen bilimleri öğretmenlerinin, mesleki gelişimlerine ait fikirlerindeki gelişimi keşfet-mektir. Araştırmaya katılan fen öğretmenlerinin, mesleki gelişimleri ile ilgili anlayışlarının, deneyimlerinin, mesleki gelişim geçmişlerine ve gelecek planlarına yaklaşımlarının, 8 yıllık bir süre içerisinde nasıl bir değişimden geçtiği incelenmiştir. Çalışmanın birinci aşaması 2010-2011 eğitim öğretim yılında, 14 özel okul öğretmeni ile gerçekleştirilmiştir. Araştırmada elde edilecek veriler için yarı yapılandırılmış görüşmeler planlanmış ve sürekli karşılaştırmalı yöntem kullanılarak veriler analiz edilmiştir. Açık, eksensel ve seçici kodlama sonucunda, öğretmenlerin mesleki gelişime ait fikirleri ile bağlantılı olan dört ana temaya, (a) kimlik, (b) bölüm-zümre, (c) okul yapısı ve (d) ulusal yapı, ulaşılmıştır. Çalışmanın ikinci aşaması 2019 yılında, birinci aşamaya katılan 14 öğretmen arasından üç tanesi seçilerek gerçekleştirilmiştir. Birinci aşamanın analizi sonucu oluşan temalar dikkate alınarak, görüşme soruları geliştirilmiştir. Sonuçlar, öğretmenlerin mesleki gelişimlerine dair fikirlerinde önemli değişimleri işaret etmiştir. Sonuçlar ve bulgulardan edinilen çıkarımlar tartışılmıştır.

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## LIST OF SYMBOLS

|     |           |
|-----|-----------|
| $f$ | Frequency |
|-----|-----------|

## LIST OF ACRONYMS/ABBREVIATIONS

|       |                                                           |
|-------|-----------------------------------------------------------|
| ERG   | Eğitim Reformu Girişimi                                   |
| HEC   | Higher Education Council                                  |
| IST   | In-service Training                                       |
| MONE  | Ministry of National Education                            |
| ORAV  | Öğretmen Akademisi Vakfı                                  |
| PD    | Professional Development                                  |
| PISA  | Program for International Student Assessment              |
| STEM  | Science, Technology, Engineering and Mathematics          |
| TIMMS | The Trends in International Mathematics and Science Study |

## 1. INTRODUCTION

Science is one of the major subject areas that has a dramatic impact on the future goals of a society. However, in the last decades, there have been concerns about decreasing interests of students in science education and quality of science education (Simon, Campbell, Johnson and Stylianidou, 2011). In their review of literature about the attitudes toward science, Osborne, Simon and Collins (2003) claim that “one of the major causes of concern is the enduring ‘swing away from science’ in many countries” (p.1050). Thus, educational systems go through reform movements to find alternative solutions to these concerns about science education. Science teachers, who are the subject and object of the change, are at the center of these reform movements. Based on the review of various research studies by Osborne *et al.* (2003), one of the components interplaying with attitude to science is science teachers’ perceptions about their own subject. According to Mellville and Wallace (2007), the key concerns of science education are related to how science teachers construct knowledge of science in terms of subject knowledge, pedagogical knowledge and relationship between science and society. Teachers’ lack of subject matter knowledge or insecurity about teaching science may prevent them from maintaining a positive attitude towards the nature of science teaching and student learning (Buczynski and Hansen, 2010). Therefore, science teachers’ professional development (PD) has become a significant research and political agenda in that it may provide solutions to these general concerns about science education.

PD is a necessity for the development of inquiry-based science education. PD opportunities designed considering the key steps of reform movements can ensure the improvement of the quality of science teaching, curricula and student learning (van Driel, Meirink, van Veen and Zwart, 2012). In this regard, it is obvious that the quality of PD programs dramatically influences these goals that are intended to be achieved. Additionally, Guskey (2002) claims that there are three major goals for arranging PD programs. These are “change in the classroom practices of teachers, change in their attitudes and beliefs, and change in the learning outcomes of students”

(p.381). According to Harrison, Hofstein, Eylon and Simon, (2008), teachers should gain insight into their existing classroom practices by reflecting and learning from new practices to build up further experiences and to be able to increase the effect of PD. For the successful implication of PD programs, Guskey (2002) stresses on three principles. First, he claims that change is not an easy and rapid process. On the contrary, teachers' change needs time. Second, it is important to make sure that teachers receive constructive feedback about their students' learning progress. Third, an active follow-up and support system is important to keep teachers in this cycle.

Guskey's first claim that the change of science teachers is a long-term, ongoing process necessitates a thorough discussion of teacher identity. As members of society, throughout their profession, teachers interact with various incidences to change themselves and to be changed by factors surrounding them (Oruç, 2013). In line with this, individual teachers' perceptions about themselves as a teacher, their meaning-making and decision-making processes play pivotal roles in the change process (Hong, 2010). According to Hong (2010), when it is realized that how individual teachers have different reactions to the same situation, it makes more sense to understand one's individual meaning-making and value system.

Teaching is not a profession in which all the content knowledge, pedagogy and rationalized myths are acquired during pre-service university education. It is a journey that starts with the pre-service education and undergoes dynamic change once a teacher enters the class and meets the students. After that moment, reality gains a different meaning. Spencer, Harrop, Thomas and Cain (2018) refers to this stage as *reality shock*, which is a combination of challenges that forces teachers to expand their capabilities (Harrison, Dymoke and Pell, 2006). A teacher who enters the class with his/her identity, which includes personal history, social interactions, psychological and cultural factors (Cooper and Olson, 1996), experiences ongoing changes as a result of interactions within school and with broader communities.

Even though the profession itself is called teaching, the idea of teacher as a *life-long learner* is widely accepted (Borko, 2004; Harrison *et al.*, 2006). Teacher ed-

ucation and the development of professional identity are dynamic processes that are not restricted to pre-service education but continue during the profession (Harrison *et al.*, 2008). Significant reform movements from traditional learning approaches to constructivist approach in education in the last couple of decades also makes it evident that continuous PD of teachers is unavoidable (Supovitz and Turner, 2000). Since the rapid changes in education systems and science force them to change their way of understanding and acting as teachers, PD becomes a prerequisite to maintain the continuous development of professional identity (Oruç, 2013). As a result, the professional identity of a teacher is negotiated through experience during the developmental stages of teaching (Sachs, 2005 as cited in Oruç, 2013).

Therefore, instead of putting the blame on teachers, an urgent need to understand teachers' views, perceptions and expectations about PD and IST programs should be considered. In the last decade, there has been a renewed interest in PD and IST programs in Turkey. Besides the increasing number of IST programs designed by MONE, the contribution of non-governmental organizations to the teachers' PD is considerable. Moreover, recent studies show that there is a promising development about peer collaboration among the teachers (Yırcı, 2017). By keeping these positive movements about teacher PD programs in Turkey in the last decade in mind, this research study aims to explore the changes on science teachers' conceptions about PD. Considering the fact that the participants of this research study are teachers from private schools in Istanbul, Turkey; exploring the changes on participants' conceptions about PD in these last eight years would also help us gain a better picture of the changes about the professional identity of the teachers from different developmental stages.

## 2. LITERATURE REVIEW

In this chapter, a review of the literature that aims to uncover the goal of the study is presented. First, teaching as a profession is defined. Second, professional development (PD) is analyzed under the subtitles of the definition of PD, reasons for PD, change on the models of PD, the importance of PD for Science teachers and PD options in Turkish Educational System. Third, In-Service Training (IST) will be described. Definition of IST, options that are included in IST, the importance of IST, and IST options in Turkish Educational System are discussed. Fourth, previous research on teachers' views about PD and IST are explored. Then, professional identity development of teachers in general and specifically science teachers were presented. Finally, influencing factors such as school context and national context were outlined.

### 2.1. Teaching as a Profession

Understanding the nature of teaching as a universal profession can lead to a better understanding of the importance of PD of teachers. An outsider can mistakenly perceive that the *teaching profession* is one of the simplest professions. However, like Grossman, Hammerness, and McDonald (2009) pointed out “teaching is complex work that looks deceptively simple” (p.273). Teaching, unlike many other professions, is vulnerable to the pressure of high expectations from society. It is not only the transmission of knowledge from one to another but has also an important moral and ethical purpose (Day, 1999). Spencer, Harrop, and Thomas (2018) state that “teaching is not only a cognitive act, nor the enactment of competences, but involves the whole person” and “teaching is a holistic gestalt of skills, understandings and values” (p.36). The diversity of teachers' experiences, educational backgrounds, and personalities evolves and increases with age and experience, which in turn shapes their professional outlook as well (Lawler, 2003).

There are many different reasons such as the country of residence, background, economic circumstances, the inner satisfaction and challenges endemic to that pro-

fession, all interplaying with one's choice of being a teacher (MacBeath, 2012). The majority of teachers, regardless of whether their choice to become a teacher is a conscious one, express a need for being a member of a community which appreciates, recognizes and provides a professional judgment as well as giving teachers a sense of independence and autonomy (MacBeath, 2012). This also supports the idea of the teacher as a *whole person*. Korthagen and Vasalos (2005) propose the *onion model* to show the various levels that represent the teacher as a whole person. Their model suggests that teachers' behavior supported by competencies which are promoted by teachers' beliefs, identity and personal mission. The model also accepts the beliefs, identity and mission as the core of the teacher.

Regarding all these levels, Spencer *et al.* (2018) claim that teachers develop throughout their profession by reflecting on their own teaching and students' learning with the contribution of their moral and ethical purposes. Moreover, Korthagen, Kessels, Koster, Lagerwerf and Wubbels (2001) support that developing an identity and a mission as a teacher, making decisions and taking actions are not things that are instantly learned. Instead, they need time to develop gradually.

In this broad sense of professionalism in teaching, it can be clearly seen that the essence of professionalism has various links. According to Ingersoll and Collins (2012):

*“To some, the essence of a profession is advanced training, and hence the way to best professionalize teaching is to upgrade teachers' knowledge and skills through enhanced training and professional development. For others, the essence of a profession lies in the attitudes individual practitioners hold toward their work. In this view, the best way to professionalize teaching is to instill an ethos of public service and high standards-a sense of professionalism-among teachers. For even others, the focus is on the organizational conditions under which teachers work; in this view, the best way to professionalize teaching is to improve teachers' working conditions. As a result of this wide range of emphases, it is often unclear whether education critics and reformers are referring to the same things when they discuss professionalization in teaching (p.200)”.*

Teaching as a profession interplays with many factors and continuously develops throughout the profession. According to the OECD (2017) report, the most important three factors that influence the attractiveness and the quality of the teaching profession are working conditions, salaries and professional development opportunities. In the report, it is stated that it is significant to increase the standards and quality of the education system as a whole to attract high-quality teachers in the profession (OECD 2017).

It is clear that providing efficient and well-planned professional development opportunities is one of the important factors that have a significant impact on the teaching profession. In the following section, PD will be investigated by taking into consideration its definition, purpose, applications and importance.

## 2.2. Professional Development

Oxford Living Dictionaries (2018) broadly *defines professional development* as “the development of competence or expertise in one’s profession; the process of acquiring the skills needed to improve performance in a job”. Although this definition provides a general perspective about the term professional development (PD), it is inevitable to feel a need to clarify the term PD in terms of education and teaching profession. This need is also related to the intertwined interpretation of “*life-long learning, teacher learning, professional learning and professional development*”.

Wells (2013) prefers to use term professional learning since she claims that training and development are planned by outsiders while professional learning is something that teachers are actively involved in. She states that professional learning of a teacher is the long-term, well-planned experiences and opportunities to support the growth of a person in the profession. Simon *et al.* (2011) also argue that presenting the interpretation of the term teacher learning and professional development is a requirement to be clear about the perspectives through these terms. As Simon and her colleagues mentioned in their research, Hoban (2002) rejects the term professional development since it shows a linear way of learning which is inclined to solidify existing practice.

As an alternative, Hoban (2002) claims that teachers are seeking new ways to change their existing practices within a professional learning cycle.

Fraser, Kennedy and Mckinney (2007) show a clear difference between the term teacher learning and professional development.

*“Teachers’ professional learning can be taken to present the process that, whether intuitive or deliberate, individual or social, result in a specific change in professional knowledge, skills, attitudes, beliefs or actions of teachers. Teachers’ professional development, on the other hand, is taken to refer to the broader changes that may take place over a longer period of time resulting in qualitative shifts in aspects of teachers’ professionalism”.*

Since this study aims to explore the change on teachers’ views about PD over a relatively longer period of time, the term PD is found more relevant to the purpose and context of the study. Briefly, OECD (2014) defines the PD as a series of activities to develop not only skills and expertise but also other characteristics of a teacher. Guskey (2002) states that “professional development programs are systematic efforts to bring about change in the classroom practices of teachers, in their attitudes and beliefs, and in the learning outcomes of students”. Moreover, Greensfeld and Elkad-Lehman (2006) define PD as a long-term, continuous process in which experimentation and interaction with other teachers are fundamentals during a teacher’s career.

On the other hand, Day’s (1999) broad definition of professional development can be employed for this research study because it is not only restricted with a well-planned PD but also involves natural processes within and outside of the school.

*“Professional development consists of all-natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school, which contribute through these, to the quality of education in the classroom. It is the process by which, alone and with others, teachers review, renew and extend their commitment as change agents to the moral purposes of teaching;*

*and by which they acquire and develop critically the knowledge, skills and emotional intelligence essentials to good professional thinking, planning and practice with children, young people and colleagues throughout each phase of their teaching lives”.*

This definition by Day (1999) approaches teacher as a professional in the center of the process while also exploring the impact of the experiences of teacher on the students and colleagues as the counterparts of this process. As a result, this definition is found more appropriate for this study as the central definition of teachers’ professional development. To conclude, PD, regardless of the variation in its content and format, aims to bring a fresh breath to the in-class practices of teachers, their beliefs and attitudes continuously, either in a well-planned or natural way to improve the quality of education and students’ learning.

### **2.2.1. The Importance of and Reasons for Professional Development**

As Grundy and Robinson (2004) state, teaching is never complete; it is always developing and changing. Although the particular needs and the ways vary according to the circumstances including physical settings, economic status, personal and professional backgrounds, professional development (PD) is a crucial need for teaching. High-quality PD programs may be influential to develop teachers’ knowledge and transform their teaching (Borko, 2004). Besides, PD is not only a series of activities but also an intrinsic development for teachers (Guskey, 2002).

Dean (2006) argues that PD is one of the significant factors that can impact the quality of education at school by giving a degree of autonomy to teachers:

*“If we want to improve the quality of teaching and learning in schools, then teachers must come to be seen as professionals who are able to exercise some degree of autonomy. I suggest some degree of autonomy as, unlike other professionals, giving the teachers the ability to be able to work together as a community so they can improve the quality of education in a school”.*

Even though the common belief is that teaching well is possible only through learning by experience, Ball and Forzani (2009) argue that being a good teacher requires a carefully designed learning. While new educational approaches strongly support the idea of learning without direct instruction of teachers, Ball and Forzani (2009) state that it is a risky idea without active guidance of the teacher. Satisfactory guidance by a teacher is crucial to minimize the possibility of learning by chance. Because teachers are the key figures of high-level student learning, PD opportunities for teachers should be taken into consideration to improve teaching quality (Kuijpers, Houtveen and Wubbels, 2010). Therefore, it must be taken into consideration that for teachers, as Borko (2004) stated, learning occurs not only in a PD course or seminar but also in their everyday classroom settings in their school community. For this reason, it is valuable to gain insight into how an individual teacher learns and the social systems in which they are participating.

As Guskey (2002) stated, the success of a school directly depends on the quality of the teachers and administrators. He claims that professional development programs, regardless of their content and format, are mostly planned for a common goal, which is the improvement of student learning. Although teachers themselves desire high-quality student learning, many teachers can face various obstacles to reach that desired level (Garet *et al.*, 2001). This makes PD programs an important requirement to improve the quality of teaching.

PD is one of the most important tools to help teachers empower their reflective approach to their teaching and learning (Grieve and McGinley, 2010). According to TALIS (2008), PD experiences have an impact on how teachers implement the new teaching and learning methods in their classes by motivating, informing and supporting teachers. The majority of the PD programs are collaborative efforts which aim to develop, implement and share experiences, practices and knowledge, which focus on students' need and learning (Schlager and Fusco, 2003). A direct outcome, the improvement of the quality of the teachers, can be observed on the performance and learning level of the students (Darling-Hammond, 2000). This continuous deepening of knowledge and skills is a central part of the profession, which puts more emphasis

on understanding content knowledge, and how students learn this content knowledge in a better way (Garet *et al.*, 2001).

### **2.2.2. How Has the Context of PD Changed Throughout the Years?**

A review of literature into the reasons for professional development (PD) reveals that teachers' beliefs and practices are fundamental to develop high-quality standards in education. In this regard. In this section, various approaches and activities about PD are presented. Moreover, the recent changes in PD approaches are discussed.

The most familiar approach, which was widely accepted and implemented for more than a century about teacher education and learning, is the transmissive approach. According to Johnson and Golombek (2002):

*“For more than a hundred years, teacher education has been on the notion that knowledge about teaching and learning can be ‘transmitted’ to teachers by others. In the knowledge transmission model, educational researchers, positioned as outsiders to classroom life, seek to quantify generalizable knowledge about what good teaching is and what good teachers do. Teachers have been viewed as objects of study rather than as knowing professionals or agents of change”.*

For a long while, a majority of these programs failed because teachers were used to be viewed as the objects of the study. Guskey (2002) states that the two main reasons for this failure are poor understanding of teacher motivation and lack of deep understanding of internal and external factors in the process of teacher change.

In the last few decades, a considerable amount of research and literature has emerged on the structural features of professional development activities. Despite the recognition of PD as the most important requirement to improve education, the literature discusses the ineffectiveness of the programs (Guskey, 2002; Tanış and Dikilitaş, 2018). Among these, the most commonly criticized type is the traditional type of PD activities (Garet *et al.*, 2001). Traditional PD approach, also called the *Conventional*

*Approach* (Tanış and Dikilitaş, 2018) or *Transmissive Approach* (Kennedy, 2005), is a top-down method. Institutes, courses, conferences and workshops are some examples for the traditional form of PD activities, which are generally externally driven programs (Garet *et al.*, 2001). According to Van Driel *et al.* (2001), traditional PD programs can be successful to improve teachers' content knowledge and to present ideas behind the current innovations in education. However, these traditional forms of PD programs have been criticized for its failure to lead to a significant change in teachers' classroom practices due to insufficient time, activities and content (Garet *et al.*, 2001). Moreover, an externally delivered program concentrates on technical aspects of the job rather than focusing on values, beliefs and attitudes (Fraser *et al.*, 2007). As a result, there is no support for teachers' professional autonomy.

Most of the PD programs aim to change teachers' attitudes, beliefs and perceptions about teaching and their own classroom practices, which will result in better student learning. However, many PD programs, especially the traditional one, has a lack of consideration in terms of the process of teacher change (Guskey, p.382). This common concern leads to a renewed interest in and more awareness of *reform type* of PD which is also called *inquiry-based or socio-constructivist* approach (Tanış and Dikilitaş, 2018).

Unlike traditional PD approach, reform type PD supports the bottom-up structure. In this new approach, teachers have a chance to generate their own knowledge, set specific goals, determine the sources and the activities, and manage their time (Turhan and Arıkan, 2009). Reform type PD activities that are mostly self-directed include study groups, mentoring, coaching, peer observing and discussion boards (Garet *et al.*, 2001). According to the categorization and organization of PD models by Kennedy (2005), these PD activities are called transitional PD.

A better version of the transitional model is transformative model, which enables teachers to create a strong link between theory and practice; allowing them to internalize the concepts and reflections, construct new knowledge, and gain awareness of political and professional context (Kennedy, 2005). While the transitional model can

support either transmissive or transformative model, the transformative model provides teachers with the autonomy to be able to take action for their own learning and growth (Fraser *et al.* 2007).

### **2.2.3. Importance of PD for Science Teachers**

Educational reform movements in science education are investigated in the light of literature in order to be able to specifically explore the importance of professional development (PD) programs for science teachers.

Educational reform movements are the milestones to improve education and schools to be able to achieve a higher level of student learning. To meet the challenges of today's society, educational systems undergo progressive reform movements and informed decisions are made based on the research (Aksit, 2007). PD programs in science education are also developed in relation to reform movements and desired to improve the implementation of science education (van Driel *et al.*, 2012). Traditional science content and teaching approaches do not meet the needs and expectations of present-day students. It was realized that the traditional approach in science education contributes to students' low interest and engagement in science subjects (van Driel *et al.*, 2001). Teacher centered-traditional model has been transformed into student centered-constructivist model, which includes modern approaches such as inquiry-based science, science for all, science for public understanding, context-based science and science/technology/society (van Driel *et al.*, 2012). These approaches support the scientific literacy of students and the nature of science.

However, efforts to reform and innovate the curriculum to meet this need in science education has been criticized because of the top-down implementation of the reform. Many scholars claim that the significant measure of achievement of a reform movement is the effect on student learning as a result of teaching practices (Fishman, Marx, Best, and Tal, 2003; van Driel *et al.*, 2001; Guskey, 2002; Millar and Osborne, 2008). A significant shift from traditional teaching practices in science to inquiry-based science to promote critical thinking has been a big challenge for teachers. At

this point, how teachers have to adapt their teaching practices with regard to reform movement needs critical attention. Moreover, it is also pointed out by many researchers that changing teachers' ideas, teaching and learning styles, beliefs and attitudes is not an easy and rapid process. Mayer *et al.* (2005, cited in Wells, 2013) underline the importance of teacher inquiry and research as critical to school reform. Boyle, While and Boyle (2004) claim that teacher PD has to be accepted as the focus of such reform movements. Without continuous, quality PD programs, it is likely to face with challenges not only in students' learning but also in the successful implementation of reform movements (Aksit, 2007; Guskey, 2002; Fishman *et al.*, 2003; van Driel *et al.*, 2001).

However, efforts to reform and innovate the curriculum to meet this need in science education has been criticized because of the top-down implementation of the reform. Many scholars claim that the significant measure of achievement of a reform movement is the effect on student learning as a result of teaching practices (Fishman, Marx, Best, and Tal, 2003; van Driel *et al.*, 2001; Guskey, 2002; Millar and Osborne, 2008). A significant shift from traditional teaching practices in science to inquiry-based science to promote critical thinking has been a big challenge for teachers. At this point, how teachers have to adapt their teaching practices with regard to reform movement needs critical attention. Moreover, it is also pointed out by many researchers that changing teachers' ideas, teaching and learning styles, beliefs and attitudes is not an easy and rapid process. Mayer *et al.* (2005, cited in Wells, 2013) underline the importance of teacher inquiry and research as critical to school reform. Boyle, While and Boyle (2004) claim that teacher PD has to be accepted as the focus of such reform movements. Without continuous, quality PD programs, it is likely to face with challenges not only in students' learning but also in the successful implementation of reform movements (Aksit, 2007; Guskey, 2002; Fishman *et al.*, 2003; van Driel *et al.*, 2001).

When it comes to the reform movements in science education in Turkey, an overview of the results of PISA 2006 Science Competencies, which is very close to the reform movements in education in Turkey that was announced in 2005 (Talim Ter-

biye Kurulu, 2005), can give us a broader picture of the situation. By referring to the competency levels on Science in Figure 2.1 below and comparing these levels with Turkish students' percentage at each proficiency level on the science scale, it can be clearly seen that Turkish students' achievement level on science is significantly below the average. Among the 57 countries who participated in this survey of the knowledge and skills, Turkey was the 46th in the achievement level in science. Another important finding from these results can be discussed by looking at the percentage of students at each proficiency level. Based on these results, 12.9% of the Turkish students were below level 1, which is the lowest achievement level, 33.7% of the students were in level 1, 31.3% of the students were in level 2, 15.1% of the students were in level 3 and 6.2% of the students were in level 4. Only 0.9 percent of the students were able to reach level 5, while there were no students at level 6, which is the highest achievement level. When these results are compared with the results of 2012, a slight increase on level 2, 3, 4 and 5 can be observed. However, the overall achievement level of the country in science education is significantly below the OECD level (PISA, 2006). Reflecting on these percentages, it was stated in the report (2006) that "The number of students at the very low proficiency is also an important indicator-not necessarily in relation to the development of future scientific personal but in terms of citizens' ability to participate fully in society and in the labor market" (p.3).

After a general overview of science education in Turkey, science teachers' competencies and classroom practices can be criticized by the curriculum developers or authorities. However, instead of blaming teachers for the lack of success, curriculum developers' and authorities' perception about teachers, students and the culture has to be taken into consideration (Tobin and Dawson, 1992, cited in van Driel *et al.*, 2001). Before developing and implementing reform movements, conditions and current situations about teachers, students and the culture of the society has to be analyzed. High-quality PD programs, to which teachers can have equal access, needs to be developed as well as the reform initiatives.

High-quality PD programs which take into account both the factors that motivate teachers to participate in PD and the process of teacher change (Guskey, 2002) is a

requirement for successful reform. As Harrison *et al.* (2008) state, an effective PD can provide a teacher with valuable reflection and enable them to learn about how to implement new practices in their teaching or shape their existing classroom practices.

| Level    | Lower score limit | Percentage of students able to answer questions at each level or above (OECD average) | What students can typically do at each level on the science scale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|-------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>6</b> | 707.9             | 1.3% of students across the OECD can answer questions at Level 6                      | At Level 6, students can consistently identify, explain and apply scientific knowledge and <i>knowledge about science</i> in a variety of complex life situations. They can link different information sources and explanations and use evidence from those sources to justify decisions. They clearly and consistently demonstrate advanced scientific thinking and reasoning, and they demonstrate willingness to use their scientific understanding in support of solutions to unfamiliar scientific and technological situations. Students at this level can use scientific knowledge and develop arguments in support of recommendations and decisions that centre on personal, socio-economic, or global situations. |
| <b>5</b> | 633.3             | 9.0% of students across the OECD can answer questions at least at Level 5             | At Level 5, students can identify the scientific components of many complex life situations, apply both scientific concepts and <i>knowledge about science</i> to these situations, and can compare, select and evaluate appropriate scientific evidence for responding to life situations. Students at this level can use well-developed inquiry abilities, link knowledge appropriately and bring critical insights to situations. They can construct explanations based on evidence and arguments based on their critical analysis.                                                                                                                                                                                     |
| <b>4</b> | 558.7             | 29.3% of students across the OECD can answer questions at least at Level 4            | At Level 4, students can work effectively with situations and issues that may involve explicit phenomena requiring them to make inferences about the role of science or technology. They can select and integrate explanations from different disciplines of science or technology and link those explanations directly to aspects of life situations. Students at this level can reflect on their actions and they can communicate decisions using scientific knowledge and evidence.                                                                                                                                                                                                                                     |
| <b>3</b> | 484.1             | 56.7% of students across the OECD can answer questions at least at Level 3            | At Level 3, students can identify clearly described scientific issues in a range of contexts. They can select facts and knowledge to explain phenomena and apply simple models or inquiry strategies. Students at this level can interpret and use scientific concepts from different disciplines and can apply them directly. They can develop short statements using facts and make decisions based on scientific knowledge.                                                                                                                                                                                                                                                                                             |
| <b>2</b> | 409.5             | 80.8% of students across the OECD can answer questions at least at Level 2            | At Level 2, students have adequate scientific knowledge to provide possible explanations in familiar contexts or draw conclusions based on simple investigations. They are capable of direct reasoning and making literal interpretations of the results of scientific inquiry or technological problem solving.                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>1</b> | 334.9             | 94.8% of students across the OECD can answer questions at least at Level 1            | At Level 1, students have such a limited scientific knowledge that it can only be applied to a few, familiar situations. They can present scientific explanations that are obvious and follow explicitly from given evidence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Figure 2.1. Students Proficiency Levels in Science (PISA, 2006).

|                    | Proficiency levels in science |         |         |         |         |         |         |
|--------------------|-------------------------------|---------|---------|---------|---------|---------|---------|
|                    | Below Level 1                 | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 |
| Finland            | 0.5                           | 3.6     | 13.6    | 29.1    | 32.2    | 17.0    | 3.9     |
| Estonia            | 1.0                           | 6.7     | 21.0    | 33.7    | 26.2    | 10.1    | 1.4     |
| Hong Kong-China    | 1.7                           | 7.0     | 16.9    | 28.7    | 29.7    | 13.9    | 2.1     |
| Canada             | 2.2                           | 7.8     | 19.1    | 28.8    | 27.7    | 12.0    | 2.4     |
| Macao-China        | 1.4                           | 8.9     | 26.0    | 35.7    | 22.8    | 5.0     | 0.3     |
| Korea              | 2.5                           | 8.7     | 21.2    | 31.8    | 25.5    | 9.2     | 1.1     |
| Chinese Taipei     | 1.9                           | 9.7     | 18.6    | 27.3    | 27.9    | 12.9    | 1.7     |
| Japan              | 3.2                           | 8.9     | 18.5    | 27.5    | 27.0    | 12.4    | 2.6     |
| Australia          | 3.0                           | 9.8     | 20.2    | 27.7    | 24.6    | 11.8    | 2.8     |
| Liechtenstein      | 2.6                           | 10.3    | 21.0    | 28.7    | 25.2    | 10.0    | 2.2     |
| Netherlands        | 2.3                           | 10.7    | 21.1    | 26.9    | 25.8    | 11.5    | 1.7     |
| New Zealand        | 4.0                           | 9.7     | 19.7    | 25.1    | 23.9    | 13.6    | 4.0     |
| Slovenia           | 2.8                           | 11.1    | 23.1    | 27.6    | 22.5    | 10.7    | 2.2     |
| Hungary            | 2.7                           | 12.3    | 26.0    | 31.1    | 21.0    | 6.2     | 0.6     |
| Germany            | 4.1                           | 11.3    | 21.4    | 27.9    | 23.6    | 10.0    | 1.8     |
| Ireland            | 3.5                           | 12.0    | 24.0    | 29.7    | 21.4    | 8.3     | 1.1     |
| Czech Republic     | 3.5                           | 12.1    | 23.4    | 27.8    | 21.7    | 9.8     | 1.8     |
| Switzerland        | 4.5                           | 11.6    | 21.8    | 28.2    | 23.5    | 9.1     | 1.4     |
| Austria            | 4.3                           | 12.0    | 21.8    | 28.3    | 23.6    | 8.8     | 1.2     |
| Sweden             | 3.8                           | 12.6    | 25.2    | 29.5    | 21.1    | 6.8     | 1.1     |
| United Kingdom     | 4.8                           | 11.9    | 21.8    | 25.9    | 21.8    | 10.9    | 2.9     |
| Croatia            | 3.0                           | 14.0    | 29.3    | 31.0    | 17.7    | 4.6     | 0.5     |
| Poland             | 3.2                           | 13.8    | 27.5    | 29.4    | 19.3    | 6.1     | 0.7     |
| Belgium            | 4.8                           | 12.2    | 20.8    | 27.6    | 24.5    | 9.1     | 1.0     |
| Latvia             | 3.6                           | 13.8    | 29.0    | 32.9    | 16.6    | 3.8     | 0.3     |
| Denmark            | 4.3                           | 14.1    | 26.0    | 29.3    | 19.5    | 6.1     | 0.7     |
| Spain              | 4.7                           | 14.9    | 27.4    | 30.2    | 17.9    | 4.5     | 0.3     |
| Slovak Republic    | 5.2                           | 15.0    | 28.0    | 28.1    | 17.9    | 5.2     | 0.6     |
| Lithuania          | 4.3                           | 16.0    | 27.4    | 29.8    | 17.5    | 4.5     | 0.4     |
| Iceland            | 5.8                           | 14.7    | 25.9    | 28.3    | 19.0    | 5.6     | 0.7     |
| Norway             | 5.9                           | 15.2    | 27.3    | 28.5    | 17.1    | 5.5     | 0.6     |
| France             | 6.6                           | 14.5    | 22.8    | 27.2    | 20.9    | 7.2     | 0.8     |
| Luxembourg         | 6.5                           | 15.6    | 25.4    | 28.6    | 18.1    | 5.4     | 0.5     |
| Russian Federation | 5.2                           | 17.0    | 30.2    | 28.3    | 15.1    | 3.7     | 0.5     |
| Greece             | 7.2                           | 16.9    | 28.9    | 29.4    | 14.2    | 3.2     | 0.2     |
| United States      | 7.6                           | 16.8    | 24.2    | 24.0    | 18.3    | 7.5     | 1.5     |
| Portugal           | 5.8                           | 18.7    | 28.8    | 28.8    | 14.7    | 3.0     | 0.1     |
| Italy              | 7.3                           | 18.0    | 27.6    | 27.4    | 15.1    | 4.2     | 0.4     |
| Israel             | 14.9                          | 21.2    | 24.0    | 20.8    | 13.8    | 4.4     | 0.8     |
| Serbia             | 11.9                          | 26.6    | 32.3    | 21.8    | 6.6     | 0.8     | 0.0     |
| Chile              | 13.1                          | 26.7    | 29.9    | 20.1    | 8.4     | 1.8     | 0.1     |
| Uruguay            | 16.7                          | 25.4    | 29.8    | 19.7    | 6.9     | 1.3     | 0.1     |
| Bulgaria           | 18.3                          | 24.3    | 25.2    | 18.8    | 10.3    | 2.6     | 0.4     |
| Jordan             | 16.2                          | 28.2    | 30.8    | 18.7    | 5.6     | 0.6     | 0.0     |
| Thailand           | 12.6                          | 33.5    | 33.2    | 16.3    | 4.0     | 0.4     | 0.0     |
| Turkey             | 12.9                          | 33.7    | 31.3    | 15.1    | 6.2     | 0.9     | 0.0     |
| Romania            | 16.0                          | 30.9    | 31.8    | 16.6    | 4.2     | 0.5     | 0.0     |
| Montenegro         | 17.3                          | 33.0    | 31.0    | 14.9    | 3.6     | 0.3     | 0.0     |
| Mexico             | 18.2                          | 32.8    | 30.8    | 14.8    | 3.2     | 0.3     | 0.0     |
| Argentina          | 28.3                          | 27.9    | 25.6    | 13.6    | 4.1     | 0.4     | 0.0     |
| Colombia           | 26.2                          | 34.0    | 27.2    | 10.6    | 1.9     | 0.2     | 0.0     |
| Brazil             | 27.9                          | 33.1    | 23.8    | 11.3    | 3.4     | 0.5     | 0.0     |
| Indonesia          | 20.3                          | 41.3    | 27.5    | 9.5     | 1.4     | 0.0     | a       |
| Tunisia            | 27.7                          | 35.1    | 25.0    | 10.2    | 1.9     | 0.1     | 0.0     |
| Azerbaijan         | 19.4                          | 53.1    | 22.4    | 4.7     | 0.4     | 0.0     | a       |
| Qatar              | 47.6                          | 31.5    | 13.9    | 5.0     | 1.6     | 0.3     | 0.0     |
| Kyrgyzstan         | 58.2                          | 28.2    | 10.0    | 2.9     | 0.7     | 0.0     | a       |

Figure 2.2. Percentage of Students at Each Proficiency Level on The Science Scale (PISA, 2006).

Current reform attempts in science education require the deepening of science teachers' content knowledge and subject-specific teaching practices that match with how students learn (Dogan, Pringle and Mesa, 2015). Regarding the content specific

knowledge, Borko (2004) states that:

*“To foster students’ conceptual understanding, teachers must have rich and flexible knowledge of the subjects they teach. They must understand the central facts and concepts of the discipline, how these ideas are connected, and the processes establish new knowledge and determine the validity of claims (p.5)”.*

PD programs improve science teachers’ content knowledge and pedagogy and increase not only their confidence to teach science but also their skills to foster positive attitudes through the nature of science teaching and student learning (Buczynski and Hansen, 2010). Moreover, Boyle *et al.* (2004) state that PD programs that focus on subject matter content and how students learn that content is more effective in increasing student achievement level. Kennedy (1998) supports this argument by stating that PD programs which focus on the subject matter of teachers are more likely to increase student learning than programs which concentrate on teacher behaviors.

In their research study with science teachers from two different countries to investigate the processes that are required to help Science teachers to develop expertise specifically in teaching science, Harrison *et al.* (2008) claims that not only the pre-service training before starting the teaching profession but also continuous PD program during the career is significant to develop the educational system and practices of teachers.

#### **2.2.4. Professional Development in Turkish Education System**

Since the foundation of the Republic in 1923 till now, pre-service teacher training system has undergone important changes (Özer, 2004; Tarman, 2010; Şimşek and Yıldırım, 2001). Professional journey of Turkish teachers starts with pre-service education in the faculties of education in higher education institutions. Upon taking the university entrance exams, placement of prospective teachers is done by the Higher Education Council (HEC) to the faculties of education based on candidates’ choice and their exam results. To become a pre-school, primary or high school teacher, a four-

year undergraduate level degree and/or teaching certificate is required. During the pre-service training, candidate teachers take various courses about classroom management, the teaching profession, subject-specific areas, pedagogical formation, curriculum development and improvement, and general culture, all of which are planned and approved by HEC (Tarman, 2010). Besides the theoretical courses, pre-service teacher training programs are supported by observations, school experience, and intern teaching practices at schools.

After completing university education, candidate teachers have the chance to work in public and private schools in Turkey. Starting from 2002, those who would like to have a career in public schools are to take Public Personnel Selection Examination (Kamu Personeli Seçme Sınavı, KPSS), which is intended to cover the area of general culture, general skills and educational sciences (Güven, 2010). Selection of teachers based on central examination is often criticized in terms of its reliability and efficacy (Eraslan, 2006, cited in Güven, 2010).

On the other hand, in private schools, candidate teachers go through multiple steps before recruitment. Majority of private schools accept candidate teachers via personal job applications. If a candidate teacher can find a chance to be invited for an interview, he/she is interviewed by a committee which includes school administrators and the head of the department. Most of the time, after a successful interview, teachers are expected to plan and deliver a demo lesson to show their skills.

The Ministry of National Education (MONE) also introduced probationary training of intern teachers in state schools. Probationary training includes three sub-programs, which are basic training that covers subjects related to civil services; preparatory training which contains information of the organization of the MONE; and practical training which provides teacher candidate professional practice (Özer, 2004). An experienced teacher is assigned to each candidate teacher as a mentor from the same department. Although mentoring is a very important and effective way for the professional development of teachers, this program in Turkey is not a comprehensive one. At the end of this one-year-period, intern teachers are assessed through written and

oral exams. In the oral exam, teachers are expected (a) to be able to understand and summarize a topic, expression and reasoning skills, (b) to communicate effectively, have self-confidence and persuasion skills, (c) to be open-minded for scientific and technological developments and (d) to be able to speak comfortably in public and gain teaching skills. These are assessed by a committee that is assigned by MONE (Basic Law of National Education, 2014).

In the current Turkish Education System, teachers' PD programs are planned and organized by the department of In-service Training Office (Öğretmen Yetiştirme ve Geliştirme Genel Müdürlüğü) of MONE. Most of these programs are planned as short-term courses or seminars which are usually held at the beginning or at the end of the educational year. In the last decade, after considering the limitations, concerns and problems about PD of teachers, some actions have been taken. For example, School-Centered Professional Development (Okul Temelli Mesleki Gelişim) were activated in some pilot schools with a project between MONE and European Union Commission in 2002, (Bümen, Ateş, Çakar, Ural and Acar, 2012).

Besides the PD programs of MONE, various non-governmental organizations such as 'ORAV' (Öğretmen Akademisi Vakfı), 'ERG' (Eğitim Reformu Girişimi) and 'Intel' have been developing PD programs for teachers. Starting from 2008, Teachers Academy Foundation has been "the first NGO in Turkey focusing on the personal and professional development of teachers" (ORAV, 2017). Although there have been some positive changes, the literature about the PD of Turkish teachers generally highlights similar concerns and problems: (a) goal setting without consideration of teachers' PD needs, (b) insufficient content and context of PD to meet the needs of teachers, (c) lack of qualified instructors in the programs, (d) lack of budget to improve the quality of PD programs, (e) lack of motivational factors, and (f) lack of evaluation or follow-up systems (Seferoğlu, 2004; Güven, 2010; Bümen *et al.*, 2012; Elçicek and Yaşar, 2016; Özer, 2004; Uysal, 2012; Bayrakçı, 2009).

Seferoğlu (2004) states that to have qualified teachers in the national education system, not only the pre-service training of teachers but also the PD during the pro-

fession must be supported in various ways. To achieve this goal, he suggests that instead of organizing PD programs with ‘experts’ whose subject areas are not relevant to teaching, asking for teachers’ opinions, needs and ideas would make a significant change, which is claimed to positively influence the teachers taking initiative for their own development.

### **2.3. In-Service Training (IST)**

In this part of the literature review, in service training (IST) will be investigated under four subtitles by concentrating on definitions of IST, the content of IST programs, the importance of IST programs and IST programs in Turkish Education System. Since IST programs make up the majority of teacher professional development in Turkish Educational System, particular attention will be given to the IST programs for teachers in Turkey also with reference to the limitations and strengths of the system.

#### **2.3.1. Definition of IST**

According to Turkish Language Institution, in-service training is defined as “training which is provided during the working schedule to improve the professional knowledge and skills of workers-training during the work” (TDK, 2019). When this general definition is redefined within the context of educational science, in-service training of teachers can be referred as the series of activities delivered for teachers after they receive their certification and start to hold a formally assigned position in a school setting (Bayrakçı, 2009). These activities are usually examined under PD programs. While PD programs are long-term, ongoing processes, IST programs are short-term and single-subject activities. Yalın (2001) claims that IST -as a requirement for life-long learning- provides knowledge, skills and attitudes which lead teachers to be more successful, productive and happy in their profession.

Bayrakçı (2009) makes a distinction between the terms of “*teacher training and teacher development*”. According to the author, training is building specific teaching skills by addressing certain immediate needs. On the other hand, development is the

long-term process of reflection, investigation and change. This clarification is helpful to understand the slight difference between IST and PD.

### **2.3.2. What Does the Term IST Include?**

It seems that there is a significant difference between national and international literature's handling of in service training (IST) methods and models. IST approaches in international literature remarkably differ from those in national literature. Thus, it is important to highlight these distinctions in detail. In this section, IST models from the international area will be reviewed, while national IST model will be detailed under the title 'IST in Turkish Education System'.

Regarding definitions of IST provided in the previous section, IST requires teachers to be involved in training activities mostly in teachers' current school settings or the districts that they live in. In their research study to investigate the effect of IST on student motivation, Cherubini, Zambelli and Boscola (2002) stated that IST practices should be practical and placed in teachers' real activities. Based on this understanding, IST programs are not complex systems which require the participants, namely teachers, to bring their experiences and personal contributions.

Vukelich and Wrenn (1999, cited in Bayrakçı, 2009) state that IST should be consistent and sustainable; focus on a single subject; take participant teachers' needs into consideration; encourage teachers' active engagement in finding answers to real-life problems; support collaborative work; and allow for self-reflection of teacher participants. Based on these clarifications about IST; mentoring, study groups, peer observations and evaluations, designing action research studies and coaching can be accepted as valuable IST implementations in a school or an organization (Bümen *et al.*, 2012). As discussed before under the title of PD, these forms of IST are not different from high-quality PD programs. This also shows how IST programs serve as an effective tool for teachers' continuing growth and development.

### 2.3.3. What Is the Importance of IST?

In service training (IST) programs are as important as pre-service programs to immerse teachers into continuous PD throughout the profession (Özer, 2004). Saban (2000) claims that pre-service training of teachers is an essential part of teacher education but not enough alone to be able to cope with the progressively changing roles, missions and everyday practices of teaching. He suggests that IST is a requirement to support teachers' needs to help them grow through their profession. As mentioned in the previous section, the importance of PD, the goal of IST programs is to increase the effectiveness of teachers in their classroom practices and to contribute to student performance (Balta, Arslan and Duru, 2015; Bayrakçı, 2009; Saban, 2000; Özer, 2004).

In line with the reasons given so far, IST is a requirement for teachers to adapt to the ongoing changes. However, it is highly possible for traditional, top-down IST programs to fail in terms of their goals, since they are often too broad, which is undesired. These traditional programs show a similarity to the traditional teaching approaches that are based on listening rather than doing. Speck and Knipe (2001; cited in Bayrakçı, 2009) argue that teachers are tired of the training programs that they attend often in compliance with formal authority. Giving teachers a chance to be the owners of their own training and development will increase their willingness to actively participate in these programs and increase the efficacy (Saban, 2000).

Another important aspect which makes the effect of IST programs invaluable and long-term is the presence of an evaluation system to follow up the impacts of training on the participants (Uysal, 2012). This will also help plan such programs more effectively. For example, Tarrou *et al.* (1999) state that follow-up evaluation studies are remarkable as they provide perspectives which lead to revisions, improvements and information about the strength and weaknesses of the programs (cited in Uysal, 2012).

### 2.3.4. IST in Turkish Education System

In Turkey, in-service training programs are developed and planned by “Directorate for In-service Training Office” (Hizmetiçi Eğitim Daire Başkanlığı). This institution has been operating under The Ministry of National Education (MONE). At present, IST programs are planned annually by both national and local authorities concerning general educational issues and needs of the whole country. Participating in IST programs either at home or abroad is compulsory by the laws such as the Civil Servants’ Law No. 657 (Devlet Memurları Kanunu, 1965, a.214) and the National Education Principal Law No.1739 (Milli Eğitim Temel Kanunu, 1973, a.48).

IST programs in Turkey include conferences, seminars, courses, certificate programs, bachelor’s degree completion programs, and graduate programs planned by In-service Training Office. The department decides on the location of the programs, selection of instructors and trainees in subject fields or abroad in fields (Özer, 2004).

According to the findings of the study conducted by Bayrakçı (2009), it is found that the most important problems of IST in Turkey are (a) lack of professional stuff, (b) lack of collaborative partnership between teachers, (c) lack of provision for feedback and (d) lack of a systematic in-service training model. The author claims that there is no systematic research or survey conducted in order to understand teachers’ training needs for their professional development (Balta, Arslan and Duru, 2015). In terms of content and style of the IST programs, he states that most of the training programs depend on passive listening to the expert or trainer instead of being an active participant. This common concerns about IST programs in Turkey are also mentioned by various studies (Saban, 2000; Yalın, 2001; Hoşgörür and DüNDAR, 2003; Azar and Karaali, 2004; Tekin and Ayaş, 2008).

## 2.4. Teachers’ Views about IST and PD

To have a better understanding of teachers’ view about in service training (IST) and professional development (PD), reviewing both international and national research

studies provides one with a wider perspective. For this reason, first, the results derived from international literature will be explained. Later, Turkish teachers' views about IST and PD will be presented.

Besides the concerns about renewing contract or desire to strengthen resumes, a majority of teachers are willing to attend PD programs to become better teachers (Guskey, 2002). According to Guskey, becoming a better teacher means increasing students' academic performance. He states that although teachers are simply expecting practical ideas from PD to apply in their classroom, they also believe that long-term PD is an effective way to expand their students' achievement. As a result, the impacts of PD program on student performance and their classroom practices are critical for teachers' participation (McMillan, McConnell and O'Sullivan, 2016).

As discussed in the previous parts of the literature review, PD of teachers aims to change classroom practices, beliefs, and attitudes of teachers and thereby, the learning levels of students (Guskey, 2002). However, this change is not easy or instant. On the contrary, it needs progression and seems to be achievable when sufficient time and resources are allocated and long-term professional development is available (van Driel *et al.*, 2000). For this reason, teachers prefer long-term, ongoing PD programs more than short-term workshops, seminars or courses (Boyle *et al.*, 2004; Garet *et al.*, 2001; Tanış and Dikilitaş, 2018). According to a study conducted by Boyle *et al.* (2004), peer observations and sharing practice are the most popular long-term PD activities mentioned by teachers. They found that teachers who participate in a long-term PD program change at least one aspect in their teaching practices.

Teachers state that they cannot reflect on or implement their learning in their classrooms because most PD programs do not address teachers' needs and show relevance to teachers' previous classroom practices (Tanış and Dikilitaş, 2018; Elçiçek and Yaşar, 2016). Top-down PD programs that are planned by authority instead of employing a bottom-up process is another common concern (Wells, 2014). Teachers prefer bottom-up approach which makes them active, collaborative and reflective members of their own professional development (Tanış and Dikilitaş, 2018). Elçiçek and Yaşar

(2016) state that top-down approach to PD also causes teachers to develop negative attitudes against PD programs. In this regard, programs disregarding teachers' feedback are not only a waste of time but also a waste of resources.

Another important point which is frequently expressed by teachers is the culture of development in the community (McMillan *et al.*, 2016; Wells, 2014). Developing a collaborative culture that encourages teachers to provide feedback to colleagues, to receive constructive feedback from their colleagues and to involve in an active, sustainable learning community is highly effective on teachers' positive attitudes toward PD. In their research study, Simon *et al.* (2011) also stated that the opportunity to observe peers and be observed by them are highly valued by teachers. They found that a school culture which supports peer observation and feedback is mostly successful in creating a collaborative community. Providing this culture in the school gives teacher empowerment, which reduces the resistance of teachers to change (Wells, 2014; Grieve and McGinley, 2010). The collaborative culture among teachers constructs a powerful learning environment within the community (Meirink, Meijer, Verloop and Bergen, 2009).

In most aspects, Turkish teachers' views about IST and PD show strong similarities with teachers from the international arena. Turkish teachers are tired of PD programs which are planned by the authorities by concentrating on what teachers need to know instead of what they already know and how this prior knowledge can be improved (Bayrakçı, 2009; Tekin and Ayaş, 2008). It is not surprising to face with high resistance of teachers because of the repetition of current knowledge of teachers instead of asking their needs (Azar and Karaali, 2004; Uysal, 2012; Güven, 2010; Özer, 2014). Moreover, Bayrakçı (2009) states that there is no pre-research conducted to identify teachers' needs and preferences in terms of their professional development. Turkish teachers need to be given autonomy in order to be responsible for their own learning and growth (Saban, 2001; Uysal, 2015; Aygün and Bostan, 2019).

The lack of professional staff to plan and lead the PD programs for teachers is another major problem (Bayrakçı, 2009; Azar and Karaali, 2004, Aygün and Işıksal-

Bostan, 2019; Özer, 2004). IST programs are the most famous PD activity for teachers in Turkey, which is planned by MONE. Trainers who lead the IST programs are also assigned by MONE. Teachers believe that not only expertise in the subject area but also the presentation and leading skills of the trainers have a significant impact on the effectiveness of IST program (Azar and Karaali, 2004; Yalın, 2001). The conflict between the expectations about the constructivist approach in teaching and the employment of traditional approach in IST of teachers leads to questions and concerns among the teachers. As a result, Turkish teachers expect to be a part of active, hands-on, interactive and inquiry-based PD programs. Saban (2001) states that even though there is an increase in the number of IST programs, holding these programs out of school environment decreases its positive impacts. In his article, he supports sustainable, systematic, school-base IST models such as coaching, mentoring, study groups, peer assessment and action research. The majority of the studies in the literature stress on teachers' need for active, collaborative and inquiry-based PD options in schools (Balta, Arslan and Duru, 2015; Uysal, 2012). Teachers believe that collaboration among the teachers by sharing experiences and opinions has a big impact on the PD of teachers (Yırcı, 2017).

One of the biggest barriers to PD of teachers is the limited time for self-development due to heavy curriculum, routine expectations of schools and lack of opportunities provided by schools (Altun and Cengiz, 2012; Özer, 2004). According to the results of a research study designed by Altun and Cengiz (2012), teachers are aware of the connection between the school improvement and PD of a teacher through strong collaboration among the teachers. However, teachers believe that limited improvement of schools and inadequate facilities prevent the development of collaborative school culture, which also negatively affects the PD of teachers.

## **2.5. Teachers' Professional Identity**

So far, the literature review includes teaching as a profession, professional development (PD) and in-service training (IST), and science teachers' conceptions about PD and IST are presented. The goal was trying to figure out the important pieces

of this puzzle by considering various factors. However, there is still a piece which makes the puzzle complete. This piece is the teachers' decision making and meaning-making processes. All in all, teachers, as the base of this puzzle, are the ones who interact with all the other components. Thus, their sense of self, decision-making and meaning-making processes determine their professional practices, beliefs, values and actions (Luehmann, 2007; Sutherland, Howard and Markauskaite, 2010). This is called professional identity. In this title, the literature about teachers' professional identity in general and science teachers' professional identity specifically will be presented.

When teachers' opinions, views and experiences are asked for the same situation, it is highly possible for them to express different opinions or views. They can have different reactions to the same action. Therefore, it is important to know how and why teachers' decision-making and value systems are different. Hong (2010) states that a teacher's perception of his/her classroom practices and school experiences, how he/she internalizes external conditions, how his/her teaching career changes his/her self-perception as a teacher cannot be explained by examining external factors. As a result, a teacher's definition of himself/herself as a teacher and teaching as a profession is important to investigate.

Teachers' professional identity has been a separate and important research area since the 1970s (Beijaard, Mijer and Verloop, 2004). At the very beginning, researchers defined the identity as one's self which is fixed, stable, unchanging and not impacted by the external environment (Allport, 1955 as cited in Hong, 2010). Later on, these initial views were replaced with the relational aspect. The relational aspect of identity claims that identity is not something fixed and stable, just the opposite, is something dynamic, continually changing in relation to the external environment (Cooper and Olson, 1996; Watson, 2006). Professional identity of a teacher can be changed, positively or negatively, by classroom practices, the interaction with colleagues, the school context and other external factors (van Veen, Sleegers and van de Ven, 2005).

According to Watson (2006), the assumption of "who we think we are influences what we do" is the main idea which makes the professional identity crucial. This idea

also supports the mutual connection between teachers' professional identity and their actions. Moreover, Luehmann (2007) states that the professional identity of a teacher includes more than what he/she knows and believes. It includes his/her philosophy, desires, obligations, actions, interaction with others, values and ethics.

Trying on a new identity is not an easy and quick process. It needs time and experience (Luehmann, 2007; Oruç, 2013). As it is discussed before, the change in a teacher's beliefs, values and practices are difficult and time-consuming (Guskey, 2002). When people face a change, which can affect their self-image and personal identity, they intrinsically develop some strategies to cope with these changes (Nias, 1989 as cited in Beijaard, Verloop and Vermunt, 2000). The reason why people react to changes is that they do not readily perceive themselves in another way. It is highly possible and natural for teachers as a human, to show reactions against radical changes around their environment. As a result, the professional identity of a teacher needs to be considered when the goal is to lead to a change in teachers' practices. Teachers' perspectives about their roles, teaching and learning have an influence on their well-being, work ethics, and work efficacy (Rus, Tomsa, Rebega and Apostol, 2013). Thus, as Beijaard *et al.* (2000) stated teachers' professional identity impacts their professional development, willingness to cope with reform movements and implications of innovations for their own teaching practices.

### **2.5.1. Professional Identity of a Science Teacher**

Science teachers need to intertwine the practice of science and the practice of science teaching (Varelas, House and Wenzel, 2005). To be able to achieve this, it is important to understand how science teachers develop meanings for their identities as scientists and science teachers. Moreover, a subject area which experiences rapid changes forces teachers to deal with the challenges of these trends. As mentioned previously, how science teachers cope with these changes in their subject area, how they bring innovation to their class, how they perceive and imply reform are strongly related to their professional identity.

According to Parsons and Bailey (2019), students' science literacy and science identity development are two main concerns for reform movements in science education. As discussed earlier in this review of the literature, a significant decrease in students' achievement level in science and their interest in science-related careers lead countries to step back and think about the quality of science education and science teachers' classroom practices. Therefore, learning environments and classroom practices that support students' scientific literacy and identity development are to be taken into consideration to shape reform actions.

Students' science identity development needs facilitator teachers who implement science teaching practices to deepen students' understanding of the nature of science and to increase engagement in scientific literacy and science-related career paths. As a result, science teachers' identities, science teaching and learning practices are given importance along with their professional development.

Effective science teaching should create a connection between students' real life and what they are learning. Thus, science teachers' science histories, their understanding of science, attitudes toward science and science teaching all influence students' learning and science identity development. However, Luehmann (2007) claims that the number of reform-minded science teachers is very limited to implement this new vision of science to classroom practices. She also states that teacher pre-service education programs are not well-designed to prepare reform-minded science teachers for the profession. In her research study, she presented common challenges by trying to understand the professional identity development of science teachers.

Consequently, (a) the lack of reform-based science education history of science teachers, (b) the disconnection between the theoretical education at university level and the actual practice of teaching and (c) traditional school setting which provides limited opportunities for teachers are found to be the main reasons of these challenges (Luehmann, 2007). Since professional identity development is a dynamic process, all these factors mentioned above impact science teachers' professional identity development as well.

In their exploratory study, Beijaard *et al.* (2000) highlight the combinations of concepts such as teacher as subject matter expert, pedagogical expert and didactical expert to understand teachers' professional identity. When these three concepts are considered for science teachers, the perceptions about science teachers' professional identity can also be clarified. First, it is still agreed that teachers need a deep understanding of the subject area. However, there is also a growing need for teachers who can facilitate and manage meaningful student learning. Second, moral and ethical components of teaching as the pedagogical side of the profession are found more important than the didactic and subject matter sides of the profession by teachers (Beijaard and De Vries, 1997 as cited in Beijaard *et al.*, 2000). Third, with the shift from traditional teaching styles to student-centered style in the last decades, teachers' didactical expertise was re-shaped. Control over learning transferred from teacher to learner. As a result, teachers are the ones who initiate, guide and influence students' learning and thinking processes.

## 2.6. Influencing Factors

Studies present that teachers' professional identity development is a dynamic process which is formed and reformed with the interactions among cultural components (Vareles *et al.*, 2004; Buchanan, 2015). Since the external environment is an important component of understanding teachers' professional identity, studies about the two most important components of this interaction, school context (teaching environment) and national context, will be reviewed in this section.

### 2.6.1. School Context

School, where teaching takes place, is an important context in which teachers' professional identity develops (Buchanan, 2015). Beijaard *et al.* (2000) state that school culture leads the working standards of the participants who share ideas, standards and values. They also list the components of the school culture as the expectations of the participants, students, administrators, colleagues, the curricula that are applied and the physical settings. Thus, the interactions among these components can determine

the way a teacher perceives his/her professional identity.

According to the model proposed by Mockler (2011), teachers' professional identity formation and mediation include three main domains, namely, personal experience, professional context and external political environment. The domain of professional context is related to the school culture and the system that teachers hold positions. Professional context or school context, interacting with other domains, impacts teachers' professional learning and their activism.

School culture is also a powerful context for understanding teacher change. As Guskey (2002) mentioned, expectations and approach of the school to the change have the power to shape teachers' perceptions about change. Hamilton (2018) claims that teacher beliefs and identity interact with school context and national context, which lead to a change in teachers' pedagogical practices and belief systems.

### **2.6.2. National Context**

One of the domains that are presented in Mockler's (2011) identity formation is the external political environment. Mockler (2011) defines the external political environment as 'the discourses, attitudes and understandings surrounding education that exist external to the profession', especially through media and government policies. These policies have an impact on teachers' personal development and activism. Since educational systems are designed by policy makers in relation to the governments of countries, it is hard to evaluate educational systems without politics.

In the Turkish Education System, all the components of the system are controlled by the Ministry of Education, which is under the supervision of the government. This highly centralized structure is claimed to be one of the biggest problems in the Turkish education system by the prospective teachers in a research study conducted by Yılmaz and Altinkurt (2011). The reason why the system itself creates problems is often explained with the close interaction between political ideologies and the educational system. The main problem is the political leaders who have the power in this rational

educational system (Eres, 2004). According to Gedikoğlu (2005), Turkey has never had a chance to develop an educational system which is independent from prevalent political ideologies. Changes in the political and governmental systems always lead to changes in educational, which hampers consistency and sustainability. Thus, the educational system has been a jigsaw puzzle by teachers, students, parents and all the other components of this system.

In a study by Yılmaz and Altınkurt (2011), other major problems of the national education system mentioned by the teachers are given as central exams, lack of facilities in schools, traditional education system, quality of teachers and teacher education, inequality to reach education and teacher placement system. One of these problems, central exams, is one of the biggest challenges for teachers. Although the constructivist approach was accepted and implied in curriculums, there is still a tendency to adopt and employ traditional teaching and learning experiences due to the pressure of end-of-year exams and entrance exams. Students often believe that the main goal of education is to be successful in these central exams. This line of thought does not match with the philosophy of constructivist education (Yılmaz and Altınkurt, 2011).

Economic conditions are another problem for teachers. Even though there might be exceptions in some private institutions, Teacher salaries are at the poverty level (Gül, 2008). A continuous struggle for survival may have adverse effects on every aspect of teachers' professional life. In the Turkish education system, this has been a major problem for teachers.

When all these problems are taken into consideration, one can criticize the trust of teachers and other components of the system. Çetin (2017) claims that in a system which relies on insecurity and control, blames the teachers and students instead of the system itself is the biggest and the only barrier to a successful, equal and transparent education system.

### 3. SIGNIFICANCE OF THE STUDY

Human creativity, curiosity and ability to ask questions have brought the unpreventable changes through the years. Especially in science and technology, there have been remarkable developments that have significant effects on the social and cultural life of societies. Perpetual changing processes force people to constantly cope with these developments. Moreover, this developmental process can be a cycle since it causes people to ask questions that may initiate new paths for further investigations.

Societies need citizens who are scientifically literate and can interpret, discuss, analyze, apply, investigate, and contribute to these developments (Eskicumalı, 2003). Adaptation to and internalization of these changes requires an individual to be educated. Balay (2004) mentions that people have to learn to update themselves to survive in an ever-changing world. As a result, education, which is a reconstruction tool for humans and society, gains big importance for countries.

As expected, these improvements and changes in science necessitate change within the educational system. These educational changes are generally called educational reforms. One of the basic reasons for reform in science education is to improve education in an effective way for improvement in students' learning outcomes (Aksit, 2007). Driel, Beijaard and Verloop (2001) state that traditional teaching approaches in science education have been criticized. Science education should be presented as a way of knowing natural phenomena, instead of a rigid body of facts, theories, and rules (van Driel *et al.*, 2001). Traditional science content and teaching approaches do not meet the needs and expectations of present-day students. It was realized that the traditional approach in science education contributes to students' low interest and engagement in science subjects (van Driel *et al.*, 2001).

Another important point is the awareness of the requirement of effective science education for society. People who are scientifically literate can follow these scientific developments, discuss their positive and negative effects, and benefit from science in

their daily lives (van Driel *et al.*, 2001). All these abilities are strongly related to effective science education. The extent to which these societal needs are met in terms of science education depends on the quality of science teachers. Quality teachers are those who constantly learn and grow. In this regard, how a science teacher improves himself/herself as a teacher and person is highly important (Simon *et al.*, 2011).

In the past decade, Turkey has gone through a significant reform in science education in an attempt to keep up with the pace in an ever-changing global world. Due to its poor performance in international assessment programs such as PISA and TIMSS in science, mathematics, reading, and understanding, Turkey decided to re-examine the education system. A remarkable movement relating to primary school science education took place in the Turkish education system in 2005 (Talim Terbiye Kurulu, 2004-2005). These were followed by other reforms in secondary level physics, chemistry and biology subjects in 2007 (Talim Terbiye Kurulu, 2007). These movements led to positive and negative reactions to a reconsideration of certain points. Since these reforms were closely tied to their implementers, lots of questions have been asked through the years. Politicians, educational experts, academicians, school administrators are not only the decision makers, but they might also be affected by educational reforms, which may lead to resistance to change. Additionally, teachers, students, and their parents are directly affected by reforms.

It has been argued that teachers are both subjects and objects of the change within the educational systems (Villegas-Reimers, 2003; Avalos, 2011). Therefore, teachers play a pivotal role in the process as they implement reform movement, evaluate results and act as a bridge between students and reforms, which makes the PD of science teachers inevitable and of utmost importance. Science teachers' PD is a requirement for the development of professional identity and the ability to keep up with the recent trends of education. Moreover, since the only source of change is experience (Oruç, 2013), teachers' change through the different developmental stages of their profession and how these changes are influenced by PD programs gains importance. Thus, teachers develop throughout their profession by reflecting on their own teaching and students' learning with the contribution of their moral and ethical purposes (Spencer

*et al.*, 2018). This continuous process of change takes time and effort and have an influence on teachers' decision making, meaning making process (Wubbels, 2001). This gradual change of the development of professional identity needs time and interaction with multiple components of the system (Guskey, 2002). Professional identity of a teacher can be changed, positively or negatively, by classroom practices, the interaction with colleagues, the school context and other external factors (van Veen, Slegers and van de Ven, 2005).

## 4. STATEMENT OF THE PROBLEM

The purpose of this qualitative case study is to explore the change on science teachers' conceptions about professional development (PD). Science teachers from reputable private k-12 schools in Istanbul were interviewed in two different time periods to identify the changes on their views about PD in a time of eight years. In line with this goal, the present study consists of two phases. Besides the first phase which was designed in 2010-2011, the second phase in 2019 provides evidence for these changes in science teachers' perceptions as a follow up study. With the analysis of data from these two phases, teachers' perceptions, experiences and approaches about their PD background has been investigated. Additionally, how their professional identity developed after eight years and their plans for the future were shaped is also considered. Finally, teachers' views about PD programs and opportunities in Turkey and the effects of these programs on their professional development are explored. In the light of these aims, the following research questions and sub-questions were explored.

What are the conceptions of science teachers about professional development?

- (i) in phase 1?
- (ii) in phase 2?

How do the three science teachers' conceptions about their professional development change after eight years?

- (i) What is the relation between professional identity development and the change of the conceptions about PD?
- (ii) How does school context affect the conceptions about PD?
- (iii) How does national context affect the conceptions about PD?
- (iv) How does teachers' view change about the quality of the PD programs?

## 5. METHODOLOGY

This research study consists of two phases. The first phase was conducted in the 2010-2011 educational year. The second phase was conducted in 2019. Due to the differences between these phases in terms of the design, participant selection, instrumentation and procedure, each will be presented separately. First, research design, participant selection, instrumentation and procedure for the first phase are given. The same layout is also followed for the second phase of the study.

### 5.1. Phase-1

#### 5.1.1. Research Design

A qualitative approach was employed in the first phase of this study. The purpose of the first phase was to understand private school science teachers' conceptions about professional development. According to Merriam, the design can be called a qualitative case study if there is a bounded system (Merriam, 2009). Since the first phase specifically concentrated on the science teachers who were employed in private schools, this bounded system was investigated in order to gain an insight into the case under study.

#### 5.1.2. Participants

The first phase of this research study was conducted with the participation of 14 science teachers. Middle school science teachers and physics, chemistry and biology teachers from four different private k-12 schools were the participants of this first phase. More details about these participants can be found in Table 5.1 below.

Table 5.1. Demographic Information of the Teachers.

| <b>Participant Pseudonyms</b> | <b>Gender</b> | <b>Subject Area</b> | <b>Year of Experience</b> |
|-------------------------------|---------------|---------------------|---------------------------|
| Participant 1 - Beril         | Female        | General Science     | 5                         |
| Participant 2 - Ceren         | Female        | Biology             | 39                        |
| Participant 3 - Çise          | Female        | Chemistry           | 20                        |
| Participant 4 - Teoman        | Male          | General Science     | 8                         |
| Participant 5 - Nermin        | Female        | General Science     | 3                         |
| Participant 6 - Nazan         | Female        | Physics             | 13                        |
| Participant 7 - Yağmur        | Female        | General Science     | 9                         |
| Participant 8 - Merve         | Female        | General Science     | 8                         |
| Participant 9 - Kenan         | Male          | Physics             | 22                        |
| Participant 10 - Özgür        | Male          | Chemistry           | 6                         |
| Participant 11 - Nevin        | Female        | Biology             | 7                         |
| Participant 12 - Nora         | Female        | Physics             | 16                        |
| Participant 13 - Zuhall       | Female        | Biology             | 15                        |
| Participant 14 - Emel         | Female        | Chemistry           | 13                        |

Table 5.2. Frequency of the Participants by Gender, Subject Area and Years of Experience.

| Gender              | Female          |            | Male     |           |
|---------------------|-----------------|------------|----------|-----------|
| Subject Area        | 11              |            | 3        |           |
| Years of Experience | General Science | Physics    | Biology  | Chemistry |
|                     | 5               | 3          | 3        | 3         |
|                     | ( 0 - 5 )       | ( 5 - 10 ) | ( 10 + ) |           |
|                     | 2               | 5          | 7        |           |

There are several reasons why this research study was carried out with science teachers employed in private schools.

First, the researcher was also a science teacher. Being familiar with the science curriculum in middle and secondary schools in Turkey, the researcher, as an insider, had her own ideas, experiences and observations about in which ways these curricula need improvement and how teachers' personal attributions and extra strategies play a role to fulfill students' level of knowledge. Working in a private school and participating in in-service training and professional development programs, the researcher was personally aware of particular concerns of science teachers about the changes in the curriculum. Although the motivation behind this study was based on the researchers' background knowledge of these, the main concern was to understand the problem from the participants perspective, not just from the researcher's personal and professional perspective. This is also known as an *emic perspective*, in other words, an *insider's* perspective (Merriam and Tisdell, 2015), which is claimed to be more relevant in terms of understanding the culture, experiences and approaches.

Secondly, the reason for selecting private school science teachers as the participants were these schools' approach to the professional development of teachers. In Turkey, especially in Istanbul, there is often fierce competition among private schools to gain a competitive edge and attract students. They try to make a difference for their students and families not only in the area of education but also in students' social lives. To achieve this, private schools give extra importance to their teachers' professional development. They try to offer various types of training programs, seminars, workshops and so on, for their teachers. Therefore, private school teachers' point of views can show us a different and important perspective about teachers' professional development.

Snowball sampling technique was used for the selection of the participants. Merriam (2009) states that snowball sampling is one of the most common types of purposeful sampling. As Yıldırım and Şimşek (2005) argue, the snowball technique is an efficient way to determine information-rich individuals for the aim of the research. The researcher first began to interview some of her colleagues who, at the time of the study, was working as science teachers in different schools. The participants' relationship to the researcher were taken into consideration during the selection. Close friends of the

researcher, who have previous opinions about her perception of professional development were not included as participants. The first participant was asked to recommend other participants either from their school or from other schools and the same procedure was followed throughout the data collection process. Pseudonyms were used in order to keep the anonymity of the participants and all the information that may reveal their identities and tape recordings were kept secure for ethical considerations.

### **5.1.3. Instrumentation**

In the first phase, semi-structured interviews were conducted with 14 science teachers. There were 11 main questions in the interview. The researcher had also some supplementary questions or drilling questions to reveal the most important points if interviewees do not mention these parts in their first answers. the interview questions were formulated by concentrating on the main guiding question of this research study “What do science teachers do to provide an effective professional development for themselves and how do they benefit from the in-service training programs for this aim?”. After formulating the first questions that the researcher wanted to ask, the interview questions were put in an understandable and coherent order. The researcher also investigated existing literature and previous studies aimed to evaluate in-service training programs in Turkey (Yalın, 2001; Hoşgörür and Dündar, 2003). Although Likert-type surveys were used in these studies for data collection, the researcher specifically looked through which types of questions were asked to the participants. Then those questions were expanded and shared with some of the colleagues to evaluate the clarity. The interview questions were discussed and analyzed through the course of “Advanced Methods of Qualitative Research”. Additionally, the questions were shared with academics whose field of study was qualitative research methods, and classmates, who were Ph.D. students. After lots of feedback and discussions, a pilot interview with a female middle school science teacher from a private school was planned. During the interview, it was confirmed that most of the interview questions were easily understood and clear to answer. The interview questions of the first phase of the study can be found in Appendix C. There were a few additions that were made after the interview by considering the advice and reaction of interviewees. All those steps were noteworthy

to improve the reliability and validity of the instruments.

#### **5.1.4. Procedure**

The procedure that followed the first phase of the study is explained with specific reference to the details of data collection and data analysis steps.

5.1.4.1. Data Collection. Semi-structured interviews were conducted with 14 science teachers from private middle schools in Istanbul, Turkey. By providing an informed consent form and asking the permission of each participant, semi-structured interviews were audio-recorded and transcribed verbatim. Each interview took from half an hour to forty minutes. Both consent forms and interview questions were in Turkish, the native language of the participants. English versions of these instruments can be found in Appendix C.

The goal of the consent form was to give information about the research and to ask for their voluntary participation in the study. In the consent form, some sub-titles such as researcher, research topic, some details of interviews, potential benefits of this study to the participants and society, volunteering, security and confidentiality, and the methods that will be used through the interview were explained to the participants. Participants' consents were asked for the usage of a recording device. These consent forms were sent to the participants prior to meeting with them. Once they felt confident and wanted to be a volunteer participant of this research, meeting date and place was arranged by also taking into consideration their shifts, schedules, lifestyles and living conditions. The interviews took place in places where the participants could conveniently reach. Additionally, a suitable place for clear recording was chosen. Another important point was holding the interviews anywhere except the schools that the participants worked at the time. There are some reasons for doing so. First, the subject is not directly related to the schools but with the teachers. Secondly, there was the risk factor that teachers may have felt uncomfortable answering some of the questions in their own schools due to stress, anxiety or pressure.

5.1.4.2. Data Analysis. For data analysis, all the interviews that were recorded with the permission of the participants were transcribed to Microsoft Word documents. After completing the transcription process, all documents were printed. All the teachers who participated in this study were given pseudo names in order to ensure confidentiality.

After completing transcriptions, in the light of researchers' notes and memos, without any predetermined categories or themes, data analysis started by reading raw data to get familiar with the picture. Creswell (2012) claims that the data analysis process starts during the data collection so that the researcher can have a general idea about further data collection. By keeping this in mind, memos and notes obtained during the data collection process were seriously investigated. It is highly important to be as knowledgeable as possible about data to be able to find the similarities and common expressions among different participants. During the third cycle of the reading of the transcriptions, the researcher started coding by underlining important expressions and phrases and taking some short notes. During this simple coding system on the papers and with the help of pre-readings, it was not hard to find out repeated phrases which were expressed with different words but with the same underlying meaning. After this hands-on analysis, a second analysis was started to work on the Atlas.ti, which is a useful program for qualitative research studies. All the transcriptions were uploaded to the program and the researcher repeated the coding one more time. By this way, there was a chance to review and compare the previous coding and to re-evaluate all the information that data provided. It was easier and more beneficial to move forward in terms of the distribution of the codes with the help of Atlas.ti.

According to Merriam (2009), data analysis allows us to make sense out of data by consolidating, reducing and evaluating what participants have said and how the researcher has interpreted them. In order to understand the participants' meanings, the constant comparative method was employed in this research study as the data analysis method (Creswell, 2012; p.424), Constant comparative method was developed by Glaser and Strauss (1967, cited in Merriam, 2009, p.199). Creswell (2012) defines it as follows: 'Constant comparison is an inductive (from specific to broad) data anal-

ysis procedure in the research of generating and connecting categories by comparing incidents in the data to other incidents, incidents to categories, and categories to other categories” (p.434). The overall intent is to “ground” the categories in the data.

Corbin and Strauss (2007) suggest three phases of coding - open, axial, and selective. In line with this, data were broken down into manageable pieces by considering the similarities and differences. Data which repeats similar nature were grouped under the same conceptual title. This process is called open coding since it labels any unit of data that might be relevant to the study (Merriam, 2009; p.200).

Further analysis was done by axial coding, which is the process of evaluating the conceptual titles of open coding and organizing them under categories (Corbin and Strauss, 2007; p.27). According to Creswell’s (2012) explanation of axial coding, the researcher chooses one of the open coding theories to place as a central point and creates relations with other categories which arise from the analysis. He suggests showing this on a diagram which is called a *coding paradigm*.

The final process of coding was selective coding which helped verification of the findings from axial coding (Creswell, 2012; p.426; Merriam, 2009; p.200).

## 5.2. Phase-2

### 5.2.1. Research Design

For the second phase of this research study, again a qualitative inquiry design was chosen because the aim is to obtain a deep understanding of how science teachers’ conceptions about PD has changed in eight years. Qualitative research enables researchers to explore how participants construct the world around them (Creswell, 2003; Glesne, 2005), explore their inner experiences (Corbin and Strauss, 2015), and how meanings are formed and transformed (Merriam and Tisdell, 2016). Therefore, qualitative methods are appropriate to tap the meanings that science teachers assign to their PD experiences.

The second phase of this study is a qualitative case study. The case study involves individuals rather than groups and investigates these individuals in a deep meaning context (Creswell, 2012). According to the definition of Merriam and Tisdell (2016), a case study describes and analyzes a bounded system in-depth and the unit of analysis is not the topic of the investigation. In this study, each participating science teacher is considered as a separate case.

### **5.2.2. Participants**

The participants were selected purposefully to be able to have a wider understanding of the problem of this research. Merriam (2009) states that purposeful sampling is the attempt of the researcher to select the participants from which most details can be explored. Three participants of the first phase of this research study, which was conducted by the researcher in the 2010-2011 educational year, was contacted again for the second phase of the study. Although the first phase was carried out with fourteen science teachers from middle and high school, only three of them were invited to participate in this research by taking into consideration multiple factors such as conscious willingness to become a teacher, experience, pre-service education history, working in the same school and changing to an administration role. These criteria will be explained in detail for each one of these three participants. According to Beijaard *et al.*, (2000), teaching experience is one of the influencing factors in the development of teacher's professional identity. Thus, understanding the effect of the year of experience is only possible by comparing experienced and novice teachers. They claim that an expert teacher has more extended and well-organized knowledge, which in turn leads to better problem solving, and management skills compared to a novice teacher (Beijaard, *et al.*, 2000). For these reasons, the participants of the second phase are selected based on year of experience. Berliner (1988) described the developmental stages of teacher expertise in five stages. These are novice, advanced beginner, competent teacher, proficient teacher and expert teacher. Based on his evaluation of data, Berliner (1988) claims that there are differences between novice and expert teachers in terms of their interpretation of classroom experiences, perceptions of the importance of events, daily routines, predictions about classroom actions, judgments about typical and atypical

events and evaluations about students' works and academic tasks.

The first participant of the second phase, Nermin, is a female, middle school science teacher. She was in the third year of her profession when the first interview was planned on November 21, 2010. She graduated from a reputable Anatolian Teacher High School. This means that her pre-service education is significantly different than other participants. Being a teacher was her desire since her childhood. She states that attending to an Anatolian Teacher High School was a consciously planned goal for her to become a teacher. She also states she only preferred teaching in the Faculty of Education of various universities while she was given other alternatives upon taking the university entrance exam. In her first year of teaching, she started to work in a private k-12 school. She had been working in the same school during the first phase of the research and still working in the same private school, in Istanbul, Turkey. She is now in the 11th year of her profession. She is selected for the second phase of this study in order to explore the transition from advance beginner stage to proficient stage in teaching. She was an advanced beginner teacher within the third year of experience and became a proficient teacher with 11 years of experience. Another reason for selecting Nermin as a participant is her long pre-service teaching education starting from high school. Her conscious choice of being a teacher and planning a long educational path for this goal can contribute to a better understanding of professional identity development.

The second participant, Yağmur, is a female, middle school science teacher. She graduated from one of the oldest high schools in Istanbul, Turkey. She did not graduate from the Faculty of Education. After the university entrance exam, she attended the Faculty of Arts and Sciences in the Physics department. She became a teacher by completing a teaching certificate program. She states that she decided to be a teacher when she was in grade four because of the positive influence of her homeroom teacher. Through the years, she never changed her mind and was sure about her choice. In the first year of her profession, she started to work in a private school. She changed school in the middle of the year because of tough working conditions and started to work in her current school. She was in the ninth year of her profession and was working in her second school when the first interview was conducted on January 27, 2011. She is still

working in the same private school, in Istanbul, Turkey. She became the coordinator of the middle school science teachers in the same school in the 2012-2013 educational year. She is in the 16th year of her profession and still holding the same position. She is selected for the second phase of this research study since she was already a proficient teacher by the time the first interview was conducted and became an expert teacher during the second phase. To be able to understand the transition between these stages, her experiences and expressions were seen valuable. A second reason for selecting her as a participant for the second phase is the change in her position. Her experiences in this leadership position as head of the middle school science department can provide a different perspective about identity development. Another reason is her passion for teaching even though her major degree is not in teaching. This different path in her teaching background can provide other implications for professional identity development.

The third participant, Zuhail, is a female, high school biology teacher. She graduated from a private high school. Being a teacher was not her conscious choice. She states that she never planned to be a teacher. Even though she did not have any interest in her major when she started the Faculty of Education, she feels lucky that she became a teacher. She claims that students were not offered a qualified and mindful, expert-led counseling about university choices at the time. In her first year of teaching, she started to work in a private school. She was in the 15th year of her profession when the first interview was planned on March 1, 2011 and it was her third school. Later, she started to work in another private school in Istanbul, Turkey. She is in the 23rd year of her profession. She was selected for the second phase of this study since she was an expert teacher with 15 years of experience during the first phase. With 23 years of experience in teaching, she can show us the differences between a novice and an expert teacher. 23 years of experience in science teaching is also valuable to be able to see the big picture in terms of national context. She is also the one who has employed in four different private schools as a teacher. Her observations would be valuable in terms of gaining a deep understanding of different school contexts.

### 5.2.3. Instrumentation

Data for this research study were collected by means of semi-structured interviews. Face to face semi-structured interviews is an effective way to collect in-depth data that provide the researcher with the opportunity to reach valuable insights, based on participant responses to the questions. Semi-structured interviews are the mixtures of more and less structured open-ended interview questions (Merriam, 2009). The interview questions of this research study were developed in line with the themes which arose from the analysis of the first phase of the research study. The themes emerged from the first phase study is shown in Figure 5.1. According to the data analysis and findings of the first phase, ‘teachers’ conceptions about PD are examined under four main themes. These four themes were named as ‘Identity’, ‘Department’, ‘School Context’ and ‘National Context’.

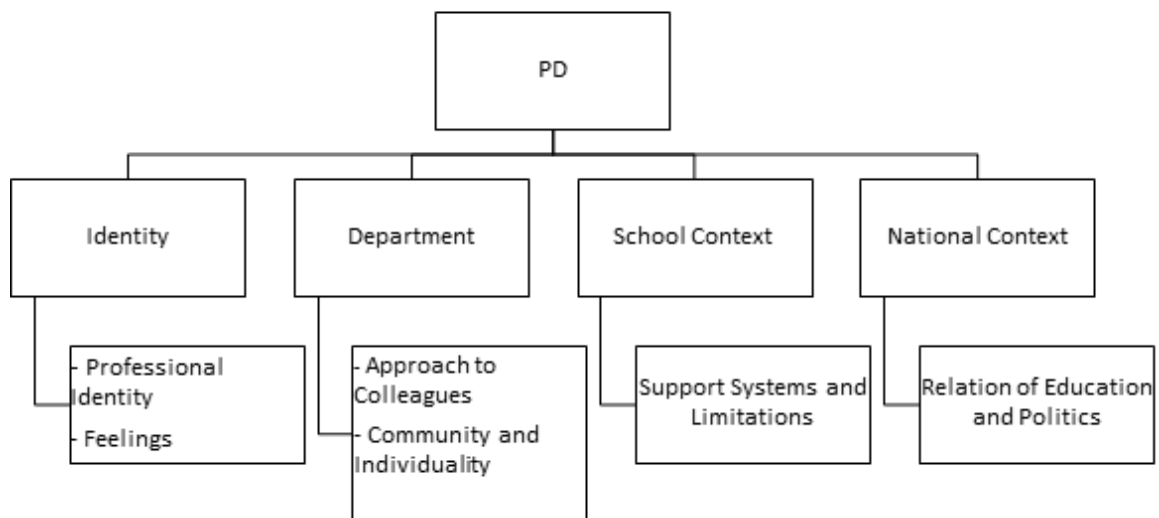


Figure 5.1. Themes and Sub-themes of Phase-1.

Based on these themes from the first phase of the study, seven questions were developed. There were also supplementary questions in case the researcher needs more details. Interview questions for the second phase of the study can be found in Appendix D.

The first question of the interview aims to obtain more details about participants' understanding and expressions of their own identity as a science teacher. This question is also one of the most common questions to make a smooth and soft beginning to the interview. The goal of the second, third and fourth questions of the interview are to understand participants' general conceptions about PD. Question five with supplementary questions concentrates on the themes of department and school context. Participants' perceptions about their colleagues, support systems and limitations in their school context are investigated through this question. Question six is aimed to understand participants' opinions, views and approaches about the national context. That is, how they relate the educational system in their country and in the world with politics and how this relation impacts the reform movements in education is explored through it. The last question of the interview aims to understand the participants' opinions about their own change as a science teacher for the last ten years of their profession. At the end of the interviews, if there are some points that show remarkable changes in comparison to the first interview, the researcher can ask them to evaluate this change by reminding participants about their first expressions.

The researcher had a chance to use the questions in a flexible way, which meant that no predetermined wording or order was needed. To take into consideration the sensitivity of ethical issues, a participant consent form was developed. Before each interview, participants were briefed about the purpose of the study and a consent form was given to them for permission for recording.

Additionally, before beginning the interviews demographic information was collected about the participants. This demographic information included gender, date of birth and age, high school and university they graduated from, their subject areas, tenure, and the type of school that they currently work.

#### **5.2.4. Procedure**

In this section, a detailed procedure of the second phase of the research study is described under two subtitles, which are data collection and data analysis.

5.2.4.1. Data Collection. The data for the second phase were collected by conducting semi-structured interviews with middle school science teachers working in private schools. In addition to the semi-structured interviews, the researcher also used memos as a data collection method to ease the initial process of data analysis (Creswell, 2012). Through the interviews and after the interviews, the researcher took notes to remember and analyze the most important points. These notes as a first moment analysis tool were intended to simplify the data analysis process.

The researcher developed an informed consent form for the participants to give information about the purpose of the research and to document their voluntary participation in the study. In the consent form, some issues regarding information about researcher, research topic, some details of interviews, benefits of this study to the participant and society, volunteering, security and confidentiality, and the methods used through the interview were briefly explained to the participants. Participants' consents were asked for the usage of an audio recording device. The researcher sent these consent forms to the participants before planning a meeting with them. Once participants felt confident and wanted to volunteer, meeting date and place was determined.

The interviews were planned with science teachers by taking into consideration their shifts, schedules, lifestyles and living conditions. Interviews took place in a convenient location for the participants. Additionally, a suitable place for clear recording was chosen.

It was of particular importance to plan the interviews anywhere except the schools that participants worked currently. There were some reasons for this situation. First, the research subject is not directly related to the schools but with the teachers. Secondly, the teachers may have felt uncomfortable answering some of the questions in their school settings.

Both consent forms and interview questions were in Turkish, mother tongue of the participants. English versions of these instruments can be found in the Appendix. After the interviews, audio recordings were transcribed verbatim.

5.2.4.2. Data Analysis. The data of the second phase of the study were analyzed by employing the themes that emerged from the first phase. That means three participant teachers' expressions were investigated in the light of identity, department, school context, national context. By comparing their expressions from the first phase with the expressions from the second phase, the researcher sought to understand the potential changes in their perceptions.

For the credibility and reliability of the results, one of the eight procedures that were proposed by Creswell (2008), member checks were used. Findings from the second phase of the study were shared with the participants to make sure about the accuracy of the analysis. Merriam states that even though the researcher uses different words of expressions, participants should be able to find her/her expressions in the researchers' sentences. To ask participants' feedback and final comments increased the validity and reliability of the results.

### **5.3. Role of the Researcher**

In the present research study, researcher has multiple roles. First of all, researcher was the one who developed the interview questions and went through multiple revisions based on experts' feedback. Second of all, researcher collected and analyzed data for each two phases of the study. During the process of data collection, researcher maintained a confidential setup to run the interviews. Third, researcher was also a moderator during the interview process to ask supplementary questions when needed. After the interviews, researcher was a transcriber to prepare data for coding. To be able to investigate participant science teachers' conceptions about PD, researcher had the role of a coder to find out main themes and sub-themes.

## 6. FINDINGS

The findings are presented for the first and second phases of the study respectively.

### 6.1. Findings of Phase-1

The findings from phase one are presented under four main themes. First, teachers' conceptions about professional development (PD) and in-service training (IST) are presented as the umbrella term so that one can develop a general understanding of the findings of this study. Based on the data analysis, it was found that teachers' views about PD and IST are related to four main themes. The following headings were derived from these emerging themes: identity, department, school context, and national context. For each theme, related categories are also presented accordingly.

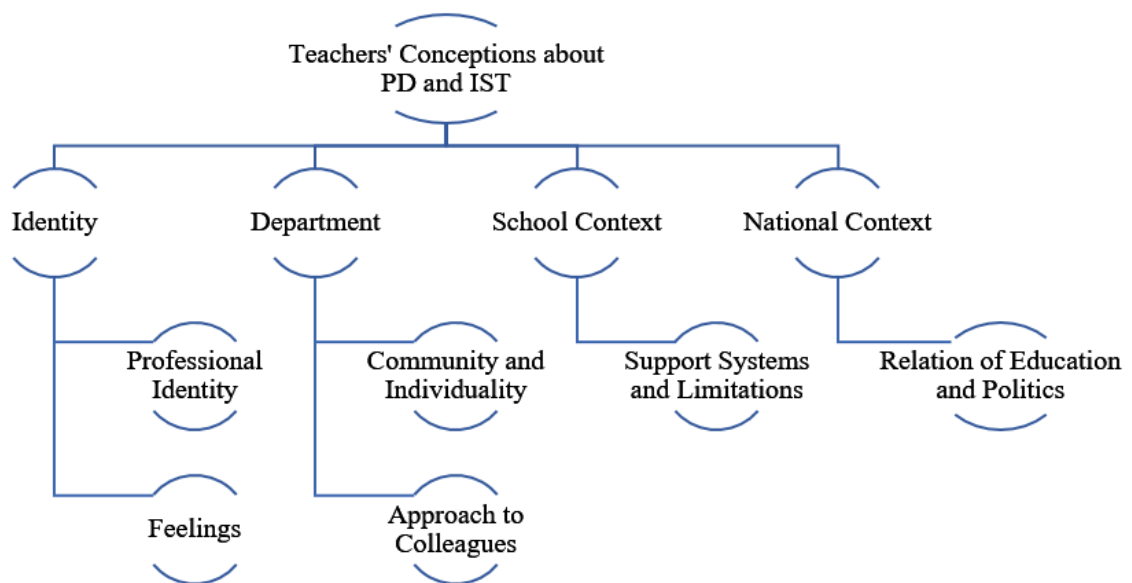


Figure 6.1. Themes and Sub-themes of the Phase-1.

Integral codes of these sub-themes can be seen in Table 6.1. Frequency of each code will be presented accordingly during the analysis of each sub-themes.

Table 6.1. Themes, Sub-themes and Codes of Phase-1.

| Themes                  | Sub-themes                         | Codes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Identity</b>         | Professional Identity              | Being a researcher<br>Being good at content knowledge<br>Having good pedagogic knowledge<br>Being a good communicator<br>Being open-minded<br>Being able to develop resources<br>Being a hard worker<br>Being universal<br>Being good at establishing authority<br>Being a person who can empathize<br>Being curious<br>Being creative<br>Being able to speak the same language as students<br>Being a role model<br>Being fair<br>Being funny<br>Being patient<br>Being responsible<br>Being honest<br>Being able to self-criticize |
|                         | Feelings                           | Love<br>Passion<br>Happiness<br>Motivation<br>Appreciation<br>Enthusiasm<br>Excitement<br>Self-esteem<br>Peace                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Department</b>       | Community and Individuality        | Working alone<br>Team-department<br>Experience                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                         | Approach to Colleagues             | Collaboration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>School Context</b>   | Support Systems and Limitations    | Private school and high expectations<br>Impact of the administrators<br>Workload<br>Autonomy<br>Money                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>National Context</b> | Relation of Education and Politics | Continuous change and limited improvement<br>The contradiction between government and private school<br>Pessimism                                                                                                                                                                                                                                                                                                                                                                                                                    |

### 6.1.1. Teachers' Conceptions About PD and IST

Teachers conceptions about PD and IST brought up five sub-themes that were entitled as life-long learning, beyond academic discipline, matching teachers' need and PD, quality concerns and impact on student learning. Codes for each sub-theme and frequency of these codes can be found in Table 6.2.

Table 6.2. Sub-themes, Codes and Frequency of the Codes for Teachers' Conceptions About PD and IST.

| Sub-themes                             | Codes                                                                      | f  |
|----------------------------------------|----------------------------------------------------------------------------|----|
| <b>Life-long Learning</b>              | Personal willingness                                                       | 10 |
|                                        | No limit for continuous development                                        | 7  |
|                                        | Teacher as a student                                                       | 4  |
|                                        | Staying young                                                              | 3  |
| <b>Beyond Academic Discipline</b>      | From theory to practice-application                                        | 6  |
|                                        | The contradiction between pre-service education and in-service experiences | 3  |
|                                        | Teaching skills                                                            | 3  |
|                                        |                                                                            |    |
| <b>Matching Teachers' Needs and PD</b> | Need for training and willingness                                          | 7  |
|                                        | Prejudice to IST                                                           | 5  |
|                                        | Resistance to training                                                     | 4  |
| <b>Quality Concerns</b>                | The qualifications and competencies of trainer                             | 9  |
|                                        | Techniques and methods of IST                                              | 9  |
|                                        | Quality of IST                                                             | 6  |
|                                        | The lack of organizations for teachers                                     | 6  |
| <b>Impact on Student Learning</b>      | The reflection of PD to the students                                       | 9  |
|                                        | Being traditional                                                          | 5  |

6.1.1.1. Life-Long Learning. When the participants were asked to define PD and explain what they understood from it, their responses showed some similarities. The participant teachers believe that PD is a systematic and dynamic process of devel-

opment in the profession. They stated that it is a long-term, continuous process to fulfill the needs of a teacher that requires improvement. At that point, the teachers' willingness to develop and embrace an open-minded perspective for development were frequently cited by the participants. The participant teachers support the idea of having ownership of the learning process. That is, they suggest that learning something new and participating in PD programs become more effective when the teacher shows personal interest in participating in the process. Teoman mentioned this by giving an example from his own experience. He stated that being aware of personal needs and making choices based on these needs is highly important to increase the benefit of these programs.

*“One thing that I seriously consider, as it has always been mentioned in in-service education programs, is that these programs must be based on what individuals need. The education must be provided on the condition that individuals believe that it will cater to their needs. Although it was not my primary goal, that education was quite beneficial for me as it served to my own needs. It caught my attention. I participated in the program thinking that it might help me at some point in my career but showing a willingness to take part in it was one reason why it was helpful. This was better than the others. Most of the time, in-service education programs at school, you know, are based on administrative decisions. They are more like mundane, regular meetings. In this regard, a program based on my own preferences is, of course, more useful” (Teoman).*

The second point expressed by many teachers is a long process of learning. For example, Zuhail defined PD as “a journey that someone maintains inside”. The participants believe that a teacher should never feel that there is an end point and limit for development. For example, Yağmur said:

*“I consider professional development a kind of development in my career. As I mentioned, graduating from school does not mean the process is completed. Especially in the teaching profession, you cannot say this. It is a profession that requires dynamism. That’s why we need to continuously improve ourselves” (Yağmur).*

On the other hand, Nazan made a really interesting definition of PD. She believes that professional development is a continuous process to catch up on things that need improvement. However, she claimed that since there are continuous change and improvement, one cannot talk about professionalism.

*“Professional development as a teacher ... I mean professionalism ... development is continuous ... In other words, professional and development are two distinct things. Development is the continuous process of narrowing your deficits, leveling up but we cannot talk about professionalism when development is the case. The term professional development, professional and development together, did not seem appropriate to me” (Nazan).*

The participant teachers claimed that being a teacher keeps them young. They indicated that being together with a younger population brings lots of advantages as well as challenges. They reported that they need to follow current social, cultural and technological developments to be able to catch up with students’ world. Zeal, for example, claimed that students are ahead of their teachers and continued:

*“Say the least of it, it is needed to keep up with the times and the kids because they are way ahead of use. Therefore, teachers need to follow the changes. Keeping up with scientific developments is already a must. Additionally, teachers must be equipped with the skills to keep up with other societal changes” (Zuhal).*

6.1.1.2. Beyond Academic Discipline. According to teachers, PD and IST programs are not restricted to certain areas. Another aspect that participants mentioned about PD is its broad content. They claimed that PD is not limited to the teacher’s content knowledge but also includes a wide range of areas that might need improvement throughout the profession. This range of areas can include pedagogical knowledge, communication skills, technological skills, new teaching methods and strategies. For example, Çise stated:

*“I believe that a teacher is more than professional knowledge or subject knowledge. A teacher has an audience of at least 20 students. Therefore, teachers need to employ both academic knowledge and other aspects including humanistic, psychological, social, and communicative aspects. In this regard, an improvement in professional skills, including academic knowledge and human relations, enables teachers to understand the child and act as a member of society. A teacher must have the ability not only to be on the same page with them but also see the bigger picture” (Çise).*

By taking into consideration of this broad content of PD, when teachers were asked to evaluate PD and IST programs, one of the most common concerns about it was its application in the class. Teachers stated that theoretical information about content knowledge or pedagogical knowledge is no more effective than being a reminder. They prefer to be in more practical, applicable and hands-on experience to make sense of PD and IST programs. For example, Beril stated that:

*“First of all, especially for science education, you need to have an impact. Our field is based on the application of knowledge so practice is fundamental. The programs can be delivered in the form of workshops. As we always mention, discovering and helping the child discover is important but there is no one to help us discover. I believe in-service education is not something during which you are inactively listening to presentations or writing down some key words. Just as we encourage students to actively engage in subject matter, these programs should do the same ... Constructivist ... I want these programs constructivist in the true sense. It must be application oriented. It must be based on discovery. It must widen my horizon, provide me with some new activities. I would like to leave the place with a different booklet. I want to feel excited about it. Following the education, I expect it will bring a fresh breath to my teaching practices” (Beril).*

This need for practical and applicable PD or IST programs is related to teachers' concerns about pre-service education. Teachers expressed a big gap between the pre-service education and its applicability in a real classroom environment. Most of them claimed that their training is not enough to be able to cope with problems emerging

during their day-to-day practices. Their line of thought is illustrated in such quotations:

*“In the teaching profession, when you first graduate from faculty, you do not know much about your field. What you know is mostly theoretical. In time you meet students and gain experience, learn from colleagues, see how others do things differently. That’s how you improve yourself” (Özgür).*

The majority consider the pre-service education they received at university highly theoretical. This explains teachers’ need for a more practical, applicable PD programs, by which they can compensate for the lack of it.

Another aspect that goes beyond academic discipline is one’s skills as a teacher. Although some teachers believe some skills develop with tenure and experience during the profession, others hold the opinion that teaching skills are inherent and is closely linked to the identity of the teacher. Zuhail states that if a teacher does not have these skills internally, participating in various PD programs might not make a difference.

*“Without classroom management or that empathy, in other words, if you don’t know how to ‘handle’ the class, it is pointless whatever seminar you are given. Without these, no matter what computer skills you have, it doesn’t change anything. First of all, you must provide an environment where you can transfer knowledge within the boundaries of the existing context. There are a lot of teachers who are well-equipped but when they go into the classroom, they don’t even look at the kids’ faces. A teacher must be able to do it and it is more about merit. It is something that you inherently have” (Zuhail).*

6.1.1.3. Matching Teachers’ Needs and PD. As discussed in the literature review section, one of the most important factors which make PD and IST programs effective is that it should be based on the individual needs of teachers. Both the previous literature and the findings of the current study indicate that teachers show more enthusiasm and higher interest if they are seeking for opportunities based on their interests and needs.

They want to be the owner of the process instead of complying with a predetermined set of objectives and content. For example, Çise stated:

*“The school administration dictates you to do it. It must be based on willingness. Teachers participate in in-service education programs, whether they are based on ‘obliging’ or ‘willingness’, for the purpose of narrowing their deficits or self-satisfaction” (Çise).*

Ceren’s comments support those of Çise. She also claimed that if someone wants to learn, he/she will find a way to learn it.

*“I participate in congress, panels, professional panels. I do it not because others force me to do so but because I enjoy it. I do it to catch up with the new trends. But I need to point out that if you do not believe that these will be helpful or you are forced to attend these, it will not be beneficial. If I am curious about something, I go and learn it at first hand” (Ceren).*

Unfortunately, because of the traditional approach about PD and IST programs, the majority of the teachers mentioned resistance to and prejudice against these programs. At that point, one of the participants, Çise’s statements are noteworthy since she was also a teacher trainer. A teacher’s observations as a trainer about teachers as trainees help us maintain a more balanced perspective towards the issue.

*“They are all sulky because the director of the school forced them to go there. Their body language makes it evident that they question who they are or what they are doing here. In such settings, I never mention I have a PhD, work in a private school or anything about myself except being a teacher. I tell them I am one of them, want to be together with them and would like to share my experiences. There is a huge resistance. The second module is indeed about coping with resistance ... That’s why, I am trying to overcome their resistance. Things might start to change when the resistance is broken ... It starts in the afternoon on the first day and I am often able to overcome the resistance until the evening. However, initially they have such questions*

*in their minds: Why are we here? Why do we have to spend the weekend with you? While they are at first quite against the fact that they will spend the weekend there, they change their ideas at the end, which is evident from their attitudes. On Sunday, when they are about the leave, they exchange their e-mails and build networks. Those who are relatively older wish they had had such opportunities in the past while those younger state that they will benefit from the program. For example, they send e-mails and want feedback about their cases: ‘Do you remember the kid I mentioned’ ‘I want to apply such and such methods’. ‘Do you think this material is appropriate for my case’” (Çise)*

In Çise’s case, the end of the story was positive. She claimed that teachers’ resistance is manageable depending on the content of the program. In her case, there was a special module just to break the resistance of teachers. However, this is not always the case. When the PD or IST program lacks this consideration, it seems highly unlikely to overcome barriers of resistance.

Although most of the teachers stated their own opinions and illustrated his/her own resistance and prejudice, Özgür mentioned about the resistance of experienced teachers. He said that witnessing this resistance or pessimism of other people in the community also impact one’s view during the PD. He said:

*“Everyone comments that this is not the right way to do and questions why they need to change their traditional way of practice. I believe it might be related to people’s characteristics. As far as I have observed, those older are more resilient though they may be exceptions. It is also related to personal traits. The young show more willingness as they are at the beginning of their career. This is the thing with the age. There is always some kind of resistance among older ones, and they find such programs unnecessary” (Özgür).*

6.1.1.4. Quality Concerns. When it comes to the quality and effectiveness of the PD and IST programs, teachers are expressing some common concerns such the qualifi-

cations of the instructor or trainer who runs the program, timing, location, content of the program, techniques used, lack of productivity and the existence of interactive communication. Almost all participants have a desire to be active during the PD and IST programs. To be able to achieve that, they expect the trainer or the instructor of the program to be an expert in his/her area who can involve multiple strategies to increase the effectiveness of the program. They also want to have more practical information on how to implement what they learn in their own classroom practices. With the curriculum change in 2005, during 2010-2011 educational year, implementing constructivist classroom practices were highly important for teachers and schools. For this reason, teachers were seeking for new strategies to enrich their classroom. The problem was that when the main goal was to learn more about a new approach, it does not make sense the training options are still traditional. Yağmur claimed that observing this conflict decreases the reliance on and belief in the trainer and program. She said:

*“... a simple and boring PowerPoint presentation which only delivers specific information does not affect me at all because it is a very old-fashioned one that has nothing to do with today’s education. Those who deliver these programs are also well-aware of this. If they themselves fail to apply what they tell in their own practices, how can they expect me to find it valuable. Such programs are often silly and lack credibility. I find it especially important that they need to internalize the information first. When they do that, I find those people more credible and confident” (Yağmur).*

Teachers are also tired with the repetition of the same content with the same teaching methods. They stated that they are expected to use multiple strategies to keep students active during the class, and they also want to be more active in such programs. Teoman stated that even though their expectations were asked at the beginning of a training, he did not believe that it was a sincere concern. He found this process as a formality. Teoman said:

*“You know, here is the thing. In most of these programs, there is always a direct flow of information. Someone reads what is written on paper or shown in the presenta-*

*tion. It does not mean much to me. In our teaching profession, we always point out the fact that the student must be active. However, in these programs, we are the students and we are quite passive. We just sit and listen to the lecturer. Such programs do not contribute to me. We just try to meet some standards and they pretend to be doing so. These programs are not tailored to the needs of the teacher” (Teoman).*

Another common concern about the quality of PD and IST programs is the lack of variety of these programs to please teachers’ needs. Teachers think that without adequate support in terms of facilities, materials, physical needs, and training; it is not realistic to expect a successful implementation of reforms. They stated that they lack organizational support. Due to lack of groundwork to prepare teachers for these types of radical changes, teachers lose their confidence in the system. For example, Merve stated:

*“Our biggest problem is that we just copy and paste another system to implement here but, in the end, it fails to fulfil its purpose. Without investing in infrastructure and making sure that all underlying dynamics are ready, you can’t guarantee success in any field. This is the mistake we have been doing. For years, we called ‘constructivism’ a great method, brought it, tried to employ it but we have failed to prepare the real practitioners of it: teachers. We haven’t been able to design the materials properly. All our attempts were futile without infrastructure. Materials and course books based on it are still problematic. We still have the same problem: what does it mean? What does it tell us? Which part should I teach? Where should I end?” (Merve).*

**6.1.1.5. Impact on Student Learning.** One of the most important criteria that makes PD and IST valuable is the impact of these programs on the students and their learning. Participant teachers mentioned this point and elaborated on how it contributed to a higher interest of students in their teacher and their courses. They believe that teachers’ putting extra effort to improve themselves is always recognized by students. An increase on teachers’ self-esteem and self-respect is found to be positively related with students’ respect for their teachers.

*“Sometimes, though we do not forget, we ignore certain points we have and acquired during our teacher training. These programs are valuable in that they are the opportunity to remind us of those points. It helps us go back that state of soul we had as fresh graduates. It is very important not to lose that soul in teaching profession. It reflects on students, too because students can make a perfect distinction between a teacher who puts effort to teach them something and an ignorant one that just conveys the information and does nothing else” (Yağmur).*

Although teachers are trying to implement new teaching methods and learning strategies to their classes, five among 14 participants mentioned the general acceptance of traditional teaching strategies by students. Nora stated that Turkish students expect and understand traditional teachers more than others and she justified her point based on culture. She claimed that the culture of authority makes traditional teachers more effective in class. She said:

*“Our students are used to the style of a traditional teacher. If teacher makes them study in a group and arrange the seating in that way, they are confused and inclined to think that they have learnt nothing. This belief has not changed much I believe. It is a dilemma for me. On one hand, we want to keep up with the times, innovate teaching and try to employ new methods. On the other hand, there is this national culture that does not change. Maybe, the family attitude has not changed. There must be some kind of authority dictating codes and everyone must comply with these. Here, there is the risk of negligence when the authority is not available. That is, we have this cultural thing and it is still prevalent” (Nora).*

### **6.1.2. Identity**

An expected and natural frame comes to the view when teachers' self-definition as a professional, their approach to teaching as a profession, professional development pathways and ideas about teaching and learning are evaluated together. According to the literature, it is called 'identity'. It is because teachers are indeed expressing their own identities when they are talking about all the points mentioned above. Identity

includes all the titles that they assigned to themselves, how they define themselves as a teacher and their existence as a human being besides their roles as teachers. Because of these reasons, the theme identity will be investigated under two sub-themes: *professional identity* and *feelings*.

6.1.2.1. Professional Identity. Teachers have some roles because of the nature of their profession. These roles that come to one's mind when he/she thinks about a teacher become an indispensable part of teachers during their professional lives. Even though there are certain roles that society assigns to a teacher, it is equally important to know how teachers describe themselves. When participants were asked to define themselves as a teacher, some common expressions emerged. How participant teachers self-defined themselves as a professional can be seen in the table below.

One of the most common aspects of professional identity was 'being a researcher'. Among the 14 participants, 10 participants define themselves as a good researcher who focuses on learning more about their subject areas and the profession. They emphasize a deep desire to learn more in order to share with their students and/or their colleagues. Ceren, with 39 years of experience stated:

*"I am a researcher. I have never felt satisfied with I already know. I add up my teaching all the time. When I first began teaching, there weren't enough resources. But I asked for books all over the country. I made us of at least 10-15 different resources while I am teaching a particular subject" (Ceren).*

Having a 'strong content knowledge' in the subject area is the second most commonly expressed aspect of identity. Teachers believe that content knowledge is an indispensable part of the teaching profession.

*"I am academically equipped. I can provide my students with satisfactory information about their field of study. I believe I am qualified as a teacher, as a physics teacher teaching in a private school" (Kenan).*

Table 6.3. Sub-themes, Codes and the Frequency of the Codes for Professional Identity.

| Sub-theme                    | Codes                                             | f  |
|------------------------------|---------------------------------------------------|----|
| <b>Professional Identity</b> | Being a researcher                                | 10 |
|                              | Being good at content knowledge                   | 9  |
|                              | Having good pedagogic knowledge                   | 9  |
|                              | Being a good communicator                         | 8  |
|                              | Being open-minded                                 | 7  |
|                              | Being able to develop resources                   | 7  |
|                              | Being a hard worker                               | 6  |
|                              | Being universal                                   | 5  |
|                              | Being good at establishing authority              | 5  |
|                              | Being a person who can empathize                  | 4  |
|                              | Being curious                                     | 4  |
|                              | Being creative                                    | 3  |
|                              | Being able to speak the same language as students | 3  |
|                              | Being a role model                                | 2  |
|                              | Being fair                                        | 2  |
|                              | Being funny                                       | 2  |
|                              | Being patient                                     | 2  |
|                              | Being able to self-criticize                      | 2  |
|                              | Being responsible                                 | 1  |
|                              | Being honest                                      | 1  |

In addition to Kenan's statements about content knowledge, Nermin's statement can show us the next frequent item of identity; which is having good pedagogical knowledge. According to the participants, being knowledgeable about the content is not enough. Çise, who was in her 20th year of the profession, claims that teaching is more than content knowledge; it is the combination of multiple skills and competencies. Teachers should also know how to transfer knowledge to the students by taking their level into consideration. Nermin called this ability to transfer knowledge as professionalism.

*"First of all, you want to be proficient in that regard. I mean you must always know more than the students ask for. But it doesn't suffice alone, how you transfer that knowledge is equally important. So, from my point of view, a combination of these two, subject knowledge and being able to transfer it successfully, is professionalism" (Nermin).*

The way of transferring knowledge to the students was also defined as being able to speak the same language with students. Three teachers mentioned that a teacher should know how to communicate with students by understanding their way of processing information. For example, Ceren claimed that when a teacher becomes competent at this special communication, he/she might be a qualified teacher.

*“Once you speak the same ‘language’ with the students and transfer what you know successfully, you become a teacher in the real sense” (Ceren).*

Communication is a key factor for teachers. Eight out of 14 teachers defined themselves as good communicators. Teachers’ expressions about communication can also be a sign of establishing a good relationship with students. In their statements about communication, having this strong relationship with students were mentioned frequently. For example, Emel said:

*“I believe the most important strength is communication with students. I am especially successful in communicating with high school students, who are relatively older. What do I mean by ‘strength’ It includes a balance between being friendly and keeping the distance at the same time. I encourage them to talk to me about anything they want. While doing this, I also keep my authority and maintain a distance that will interfere with my teaching and cause negativities” (Emel).*

Teachers also indicated that they must maintain their authority in class while building rapport with students. The literature refers to this balance as a classroom management skill but teacher responses revealed that they prefer to call it as establishing authority. It seems that the old social label of a teacher as an authoritarian figure is still prevalent. Early career-stage teachers, like Nermin, define themselves as well-disciplined. Nermin stated being disciplined is one of her strengths as a teacher.

*“First of all, I am disciplined. I also try to help my students be disciplined. In my teaching, I act accordingly” (Nermin).*

The participant responses also revealed that their ideal teacher figure is also open-minded. They did not use this label for themselves as a personal attribute of theirs, but they expressed open-mindedness as a crucial characteristic of a teacher. Nevin created a connection between open-mindedness and the definition of professional development. She said that a teacher must be open to new ideas without any resistance to improve him/herself in his/her profession.

*“Professional development means openness to continuous personal development. One should show willingness. A teacher shouldn’t assume that I know everything and there is no need to further development. We need to be aware that there is always more space to learn. We should never consider ourselves perfect. This is what I call professionalism” (Nevin).*

The ability to develop new resources instead of heavy reliance on orthodox methods and materials throughout the years was also cited as an important criterion for teachers. The findings suggest that while some teachers need to work on that criterion, some teachers define themselves really proficient in developing new resources. Kemal shared his last attempt for his professional development as the organization and development of a physics question bank for himself and his students. He also shared this source with his colleagues since he believes that collaboration is vital for teachers. On the other hand, as a young teacher, Beril stated that she needs more improvement in resource development. She said:

*“First, I believe I need to allocate more time to material design and resource development. For instance, if I have a more flexible schedule and less workload, I may make use of this opportunity. To be honest, I have some intervals between lessons, but I fail to use those efficiently. I think it would be better if I could use my spare time wisely like designing extra materials that may provide my students with more varied knowledge” (Beril).*

Six out of 14 teachers defined a teacher as a hard worker. They also complained about how this job interfered with and shaped their personal life. To be able to fulfill

the requirements of teaching, they usually need to allocate a significant amount of time out of school hours, which is believed to make the profession quite challenging. For example, Zuhail stated:

*“Well, I have been working hard and relentlessly to be a ‘complete’ teacher. But I realized that in teaching, the journey never ends. There are always new things to learn. Ours is a ‘living’ job. Sometimes I also tell my students, who sometimes underestimate being a teacher. I tell them that they will understand what being a teacher means when they start teaching. It may seem not that demanding at first glance but this is not the truth. You need to improve your qualifications in every aspect. It is a multidimensional process” (Zuhail).*

Teachers believe that a teacher should be universal. According to their expressions, what they mean in terms of being universal is being fluent in a second language—particularly English, to be able to catch up with global trends. Since the participant teachers work in private schools, they had increased interactions with their foreign colleagues.

A second language was important for them to maintain their ties with these people. Another reason why universality is mentioned is about their subject area. They believe that being a science teacher increases the importance of the second language. Due to the lack of reliable and rich resources in science in Turkish, there is a need to investigate international resources. Zuhail claimed that without being fluent in English, a teacher can rely on limited resources, which can decrease the depth of content. She said:

*“When approached with a globalized, international perspective, in all areas of teaching, there are musts. For example, whatever your field of teaching is, you need to know foreign languages because all of us need to be able to follow recent international literature. One needs to be able to go online and read articles. When you fail to do so, you become dependent on a few books by the same authors, who often provide a superficial and often incorrect account of things” (Zuhail).*

To be universal and willing to search for various resources, a teacher must be curious; which was another descriptive item for a teacher. They believe that curiosity keeps them active in the profession. For example, Ceren said:

*“Hunger for knowledge ... It is like being hungry all the time. What knowledge can I obtain? How can I expand my knowledge? With whom can I share what I know? There are two sides to the coin. It is not purely a willingness to know and share. It is also related to satisfaction of your ego, being proud of yourself” (Çise).*

Merve states that being a good researcher and maintaining curiosity is also related to creativity and productivity. According to her experiences, even though her account of creativity and productivity needs careful planning and studying in the early stages of the profession, she believes that this process becomes more intrinsic and natural with experience.

*“At the beginning of my career, I thought research-orientation, hard work and productivity were my key strengths. In time, though I do not deny that planning is still important, for example, in order to provide quality in-class activities, tenure and experience play a role. I realized that it is a self-evolving process, it is an intrinsic process which is also related to ability. I can feel it: I can suddenly create things and use my creativity in what I do, which I enjoy a lot. Creativity is one of my strengths... Trying to work out solutions to problems... I am also curious and eager to learn and find new methods. Other than these, my research skills can be another strength of mine as a teacher” (Merve).*

Empathy is cited as one of the central attributes not only for a teacher-student relationship but also for any type of relationship. Teachers stated that being a person who can empathize is crucial for the teaching profession. Yağmur shared a connection between empathy and patience. From her expression, it is understood that once a teacher has this ability to empathize, he/she will be more patient with students. *“I think I can show empathy. Without empathy and patience, you can't teach” (Yağmur).*

Only two teachers defined themselves as a fun teacher. These two teachers were middle school teachers and were working with a younger cohort of students; whose age range was from 10 to 13. Teoman was one of them and claimed that creating this exciting environment for students to increase the efficiency of learning. He said:

I believe I am capable of creating an entertaining learning environment, which makes learning effective (Teoman).

Two teachers pointed out self-criticism. Zuhail stated that teachers need to be able to self-criticize due to the common belief and acceptance among teachers that they are competent in everything. She stated her concerns that such false beliefs can be a possible barrier to further development of a teacher.

*“A teacher must be able to self-criticize. Self-criticism is the most important thing in teaching. It plays an important role in many settings such as social relationships but in teaching, it has a unique place. Generally speaking, teachers are a group of people who assume they know everything and despise being criticized. This is definitely wrong. Therefore, teachers must self-criticize, spot their weaknesses and take measures against them. Teaching is a process and you learn how to teach effectively in the process” (Zuhail).*

*“Being responsible is another characteristic mentioned by only one teacher. Although most of the teachers talked about various things that can be included as a part of the responsibilities of a teacher, only one teacher specifically focused on being responsible and how it impacts students. Nermin said: I am responsible and students are well aware of this. They understand I teach responsibly” (Nermin).*

Honesty and fairness were two attributes expressed by teachers. While two teachers defined themselves as fair, only one teacher defined himself as honest. These teachers expressed these attributes as their strengths. This can be seen from Nora’s and Kenan’s statements:

*“I am honest. I put effort to behave justly” (Nora).*

*“I behave justly towards my students” (Kenan).*

An interesting finding of the professional identity of a teacher expressed by Ceren who was in the 39<sup>th</sup> year of her profession mentions the image of a teacher for the students and the society. She stated that even the most personal decisions such as being pregnant or cleaning the house were important deals to protect the image of a teacher, which shows the sanctity of the profession. She stated the importance of a teacher as a role model from her perspective, especially considering her early career stages.

*“I didn’t have children for a while. Why? Because I thought my students would see me carry my baby, shop or leave the baby to my mother’s place. I cleaned my windows at night so that they wouldn’t see me. I did all of them in order not to spoil the teacher image in my students’ minds. This was what we used to do. We were that careful” (Ceren).*

Being a role model can change form depending on teachers’ perceptions. Merve, as a young teacher, mentioned her academic studies and skills as her strengths, which, she said, also had an impact on students.

*“I have a student called Hande. She is a seventh grader and I am teaching her for the first time this year. We had a very interesting conversation a while ago. As you know, sometimes students may have some kind of special interest in one of their teachers. For her, it was me. During break times, she often drops by and says I am her role model. She said ‘You can speak English and you went to Spain for a conference and made a presentation’. This was not something I mentioned in the class. She might have seen me in a newspaper or a website. This is something I am really proud of. As a teacher, as a researcher, as a role model for a student, it is a unique experience to touch one of my students’ life” (Merve).*

6.1.2.2. Feelings. From participant responses, it can be clearly seen that feelings are a significant part of their identity.

Table 6.4. Sub-themes, Codes and Frequency of the Codes for Feelings.

| Sub-Theme       | Codes        | f |
|-----------------|--------------|---|
| <b>Feelings</b> | Love         | 5 |
|                 | Happiness    | 5 |
|                 | Passion      | 4 |
|                 | Motivation   | 4 |
|                 | Appreciation | 4 |
|                 | Excitement   | 3 |
|                 | Self-esteem  | 2 |
|                 | Enthusiasm   | 2 |
|                 | Peace        | 2 |

While they were talking about their strengths as a teacher, most of the participants mentioned that teaching is a profession which cannot be done without love. They believe that a teacher should love not only the students but also the teaching to be fully successful and complete in the profession. For example, Nermin said:

*“I enjoy both teaching and learning” (Nermin).*

In addition to Nermin’s expressions, Merve presented a stronger argument. She believes that without love, the teaching profession is hard to achieve.

*“I love my students. Without love, you can’t keep teaching” (Merve).*

Besides love, happiness was the second frequent feeling mentioned by teachers. The reasons for happiness were believed to show some variations. While Nevin associated happiness with her team, Nora explained happiness with her interactions with students; and Merve claimed that teaching itself is a source of happiness for her.

*“Coordination with your team is very important in professional development. If you are happy with where you work and if you are not suffering from stress, it makes you happy and helps you improve yourself. But in an environment where you always feel nervous and behave cautiously all the time due to potential misunderstandings, it has a negative effect on your professional development efforts” (Nevin).*

*“As well as my compulsory teacher training program, I also attended willingly some events and made sure about my feelings about being a teacher before graduating. I understood that teaching gave a great amount of pleasure. When I graduated, I was sure that a career in teaching was my cup of tea” (Merve).*

*“I feel amazingly happy and satisfied if I can become a positive role model for a single student ... with my behaviour, my look or anything else” (Nora).*

Passion for teaching is another aspect of teachers’ feelings. Although none of the participants use the word ‘passion’ directly, they expressed their passion for teaching in different ways. Their passion for teaching can be seen from their account of how they decided to be teachers. For example, Yağmur said:

*“I decided to be a teacher when I was just a fourth grader. Our primary school teacher left when I was in the fourth grade and another teacher came. That teacher had a great influence on me. In time, I became more and more sure that teaching was what I wanted. I have never dreamed of doing another job” (Yağmur).*

Passion can be seen in different forms. For Nora, it was the outcome of her teaching, which was the impact she had on student learning. Nora stated that witnessing a student’s growth and future success is a source of personal satisfaction.

*“I feel satisfied when I see that I am able to teach someone something and they learn it. I feel even more satisfied when I see them graduate from school and build a bright career” (Nora).*

Motivation is another intrinsic feeling which keeps teachers active during their profession. Based on their expressions, motivation is found related to another aspect: appreciation. Most of the teachers stated that being appreciated especially by the administrators has a big impact on their motivation. It seems that just as students need the recognition of teachers to move forward, teachers also need this acknowledgment from other people including colleagues, administrators, students and their parents. For example, Ceren said:

*“You may do and achieve many things but if the environment, I mean people around you, do not admire you, it will reduce your motivation. Lack of support from your friends will do the same. For example, I have never allowed my personal and family matters to interfere with my job. I was teaching in my class only a day later my mother passed away. I delivered my baby during the summer holiday. This was my way of idealism. What we expect is not much. Following an achievement, all they need to do is to say congratulations. This is not a big deal but for a teacher, it means a lot. When it is not said, you are not admired, you become demotivated” (Ceren).*

On the other hand, Beril pointed out another aspect of motivation which is building rapport with students. She stated that her positive relationships with her students keep her motivated.

*“There is a deep, intrinsic bond between you and your students. That’s the thing that motivates you. For me, my inner motivation is important, and I have it” (Beril).*

Three participants emphasized that feeling excited about teaching is important and it brings joy to their lives. Emel said: *“It has been, let me think, 13 years since I started teaching but I feel as if I am just starting my journey. Each term, at the beginning of every semester, I feel very excited, as if it is my first day in teaching” (Emel).*

Enthusiasm about teaching was not directly stated by participants to define themselves as teachers. However, when participant teachers were asked to evaluate their

colleagues in terms of their approach towards PD and teaching, they mentioned enthusiasm as a key component. From their expressions, it was understood that teachers do not find their colleagues as enthusiastic as required.

*“There are those who, like me, modestly seek and try to make use of every opportunity to learn from others, make others happy and happy. There are also those who do what they do because they are obliged to do so. Some invest in professional development to keep up with the times though I don’t think they are eager. As far as I observe many teachers just see teaching as a normal job, which they have to do. They see it some kind of obligation and they just do what they have to do. There might be exceptions, but I believe such teachers constitute the majority” (Nora).*

Self-esteem was another feeling expressed by two teachers. Nermin observed an increase in her self-esteem especially after participating in PD programs. She thought that her self-esteem has a positive impact on her classroom practices. She said:

*“For me, it worked well. I know more now; I confide in myself more. When students ask something, I answer their questions confidently. I was able to do so before, but I am more comfortable and confident. Going into the classroom feeling in this way is really important” (Nermin).*

The last component of the feeling theme is peace. Only two teachers talked about the importance of peace in their profession. The participant responses revealed that working in harmony and feeling the support and trust of their colleagues are the key sources of peace. For example, Kenan stated:

*“I like working hard. I also enjoy doing research. What really matters is the peace of mind. What I refer to by saying peace of mind is that you should work in a team where your experience is valued, where there is mutual trust. We are capable of making a difference, I believe” (Kenan).*

### 6.1.3. Department

Because of the nature of the profession, communication and relationships are really important for teachers. The school environments, more specifically departments, where teachers can collaborate and communicate with others are seen a positive factor. When the participant teachers were asked to talk about being a member of a group, the idea of community and individuality emerged from their expressions. Moreover, their evaluations of colleagues are also noteworthy to mention.

Table 6.5. Sub-themes, Codes, and Frequency of the Codes for Department.

| Sub-theme                          | Codes           | f |
|------------------------------------|-----------------|---|
| <b>Community and Individuality</b> | Team-department | 5 |
|                                    | Working alone   | 4 |
|                                    | Experience      | 4 |
| <b>Approach to Colleagues</b>      | Collaboration   | 7 |

6.1.3.1. Community and Individuality. Teachers believe that harmony in the community decreases the level of stress and increases satisfaction with the working place. When members of the team are willing to collaborate, it has a positive effect on teachers' professional development. Nevin stated that team spirit is also a reason for happiness. She said:

*“Harmony with your team is crucial. If you are happy with your working environment; if you are not suffering from stress, then you can move on. However, if you are feeling nervous all the time or afraid of being misunderstood, then it has a negative effect on professional development” (Nevin).*

Zuhal also believes that development needs togetherness. However, she also complains about how people give priority to their personal benefit rather than the benefit of the community. This brings the second sub-theme individuality into the discussion.

*“Based on my observations, I believe many prioritize their own individual interests rather than institutional benefits. People do what they do for their own interest. For example, they participate in a program because it will be nice on their CVs. Therefore, people prefer individual work to teamwork. They approach things rather selfishly. The only one that matters are their own benefits. This is not teaching, being a teacher. Education cannot depend on this egoist approach. Education is being together, education is sharing” (Zuhal).*

Although the individuality of teachers might be related to their personal identity, there might be another possible reason for this. Working in a private school might be leading teachers to adopt a more competitive approach. Kenan was the only participant who mentioned this indicating that private school teachers are different from those in state schools.

*“The truth is that we, as teachers working in private schools, are more professional than those in state schools. In a private school, teachers must be really qualified. Why? Because the renewal of our contracts is based on our performances. In state schools, where they have job guarantees, as long as you don’t commit something against the law, nothing happens. Then, one asks ‘why would I try to improve myself’” (Kenan).*

The dynamics inside the department are also related to tenure. Based on Nermin’s expressions, it can be seen that being a young member of a group might have both advantages and disadvantages depending on the group dynamics. Nermin stated the advantages of being a young member, who was able to receive help when she needed from the other group members. However, Beril, who was also in her early stages of the teaching profession, talked about the lack of awareness about professional development as a group.

*“This is my second year in the same institution. Are we doing anything for professional development or how do we define it as a group’ My answer is it is not really promising. We are not in a professional development process. It may be a*

*development process but our awareness of it is really limited” (Beril).*

*“I am just at the beginning of my career. I have areas open to improvement. I always ask questions to everyone. I am the most inexperienced one here so I need to do so to learn” (Nermin).*

On the other hand, for experienced teachers, being a member of a group might be a motivation source. For instance, Çise, with 20-year experience, was a teacher trainer beside her teaching profession. She expressed her motivation and enthusiasm about being a leader for a group. When she talked about a PD program that she attended before, she led the group. She said observing the trust of other participants in the group made her delighted.

*“I had really enjoyed being the group leader. Having an influence on them, encouraging them to act together for a purpose, earning their trust... these were really great. The result was a success. It was a source of happiness for me” (Çise).*

Being an experienced teacher also have some disadvantages in the community. Ceren, who was in the 39th year of her teaching career, explained she was frustrated at being the one who needed to figure out everything alone and train others. In addition to the fact that she voiced the challenges of individuality, she also pointed out the fact that she made an effort to share.

*“I was alone. I mean, when I started teaching, there were also other teachers who taught the same grades as me. Still, everyone was only responsible for their own actions. There wasn’t a sense of community. Despite this, I showed a willingness to share with others and helped them develop themselves” (Ceren).*

6.1.3.2. Approaches to Colleagues. In the previous section, teachers’ opinions about their identity were examined. Besides their self-evaluation, how they evaluate their colleagues can provide us with an important perspective. When teachers were asked

to evaluate their colleagues in terms of their approach to PD, there was an interesting situation noticed.

Most of the participants divide the community of teachers into two different groups. They stated that the teachers from the first group are willing to improve themselves and taking the necessary steps to do so. However, they believe that the teachers in the second group are not willing to take initiatives both for their personal and professional development. The participants also think that the majority of their colleagues are from this second group.

*“Teachers have different attitudes toward professional development. Based on my observations, I can say that these attitudes are also related to teachers’ identity. There are teachers who feel happy to have an opportunity for self-development. There are also those who see it as a burden because they will be busy at the weekend or need to work extra. There are both lazy and hardworking people. I cannot tell you exactly. There are differences. There are teachers who have positive opinions about it. There are also those who see teaching just a simple profession and see such things as a burden. It is about personality” (Nevin).*

Based on Nevin’s expressions, it is evident that there is a sharp distinction between these groups. Nevin stresses on these two different groups in terms of their approach; and also creates a connection with the identity of the teacher. *“Some are enthusiastic about teaching, but they are not the majority, I admit. Some act as if their choice of the teaching profession was not a well-thought one. It is like they become teachers because it was better than doing nothing” (Zuhal).*

Zuhal also supports Nevin in terms of this division. Additionally, Zuhal believes that the majority of the teachers are in the second group, which includes teachers who are not willing to improve. According to Zuhal, the number of teachers who really love the profession and are willing to improve is significantly low. The participant response leads me to come up with another interesting finding of the study.

What makes teacher' evaluations about their colleagues interesting is their belief about Which group they are. When Zuhail mentioned that most of the teachers are in the second group, she implied that she is in the first one. That means teachers believe that they do enough for their professional development while their colleagues do not show the same effort. Other participant teachers also support that claim.

*“Well, there are those who consider professional development programs as something they attend because it will be impressive in their CVs. These teachers have one goal: being administrative. There are also those who attend the programs because they believe it may contribute to them. There are teachers, like me, who modestly expect to benefit from these programs, who see the programs as a source of happiness. Some do it out of obligation. Some do it because they want to keep up with. As far as I see most are not enthusiastic about these programs. Most teachers only want to do what is officially expected from them. They have boundaries; they don't want to put extra effort” (Nora).*

Nora is another teacher who complains about the unwillingness of other teachers compared to herself. She thinks that the number of teachers who are passionate about teaching is really low. To understand how and why teachers come up with these evaluations about their colleagues, another participant teachers' expression might be helpful.

*“At first glance, the number of teachers who consider in-service education programs an opportunity they can benefit from is quite low. Of course, there are those who are highly motivated, highly enthusiastic about them. I wish all thought so'. In time, with tenure, I don't why, may be because of tiredness, may be due to burnout, something happening, they become fed up. They might have valid justifications. It might be about something that doesn't run well in the system. It may be because of the education itself. If these programs were more appealing, they would feel more positive about them, I believe. This being the case, however, there are also a lot of teachers who are really open to learn and improve more, who try their best to be more effective in the class” (Emel).*

As can be understood from Emel's sentences, teachers seem to be forgetting about their own identity as a teacher while they are evaluating their colleagues. They are looking at the situation as an outsider. From their negative expressions about the teachers in the second group, who are not willing to improve, it can be understood that they strongly believe in the continuous growth in the profession. Their expressions clearly point out the indispensable requirement of professional development. While they are talking about their observations, they assume that they manage the situation wisely and do their best for their own development. When they evaluate their colleagues, without a mention about self-criticism, they outline a negative scenario. They also feel sorry about their colleagues. This leads to other research questions. Is teaching a profession which makes self-criticism harder for teachers? How frequently do teachers self-criticize and how do they use self-criticism to improve themselves?

#### **6.1.4. School Context**

Schools, where teachers hold their profession, are a big piece of this puzzle. When the participants were asked to share their conceptions about factors that affect their professional development, working conditions and expectations in their school and especially the administrators were in the first row. It is clear to see that administrators' attitudes toward teachers have significant implications for teachers' level of motivation. On the other hand, working conditions including working hours, salary, assigned responsibilities, duties, extracurricular activities and the assigned number of students to an individual teacher are just some of them in their list. This theme presents the role of the support systems and available limitations for teachers.

6.1.4.1. Support Systems and Limitations. Most of the limitations mentioned by the participants were concentrated on two main issues, administrators and non-humanistic working conditions.

Table 6.6. Sub-themes, Codes and Frequency of the Codes for School Context.

| Sub-theme                                  | Codes                                | f |
|--------------------------------------------|--------------------------------------|---|
| <b>Support Systems<br/>and Limitations</b> | Workload                             | 5 |
|                                            | Private school and high expectations | 3 |
|                                            | Impact of the administrator          | 2 |
|                                            | Autonomy                             | 3 |
|                                            | Money                                | 3 |

The findings indicate that working conditions limit teachers' creativity, passion and energy. Teachers are complaining about the lack of time for planning and because of unexpected duties that they need to manage. Moreover, the conflict between the weekly hours for science classes and the content of science curriculum do not allow them to enrich the quality of their practices. When considering the long-term, continuous PD of teachers with interacting colleagues, it is easy to realize how hard to accomplish this. For example, Nermin said:

*“To illustrate, I would like to indulge in more fun activities in the class. But our curriculum is tight that I barely keep up with it. Some lessons are quite dull, without any kind of activities because we have a curriculum to follow. Students get bored, I get bored. This is totally understandable. I admit that I feel bored. The weekly schedule is too heavy. Additionally, I am not able to provide my students with diverse activities due to time constraint. For science classes, we only have four lesson hours weekly, which I find quite limited and insufficient. We are always in a rush. I grade my students' projects, term papers, quizzes, experiment diaries. While doing this, I would like to provide extensive feedback. I would like to show them their mistakes and help them correct. Sometimes, it becomes possible but sometimes, I fail to do so. We must have some time to communicate with our students directly without pressure. This is about professional development. Teaching is not confined to in-class teaching, delivering your lesson. Teaching, in the professional sense, requires effective communication with every single one of them. I sometimes have spare times between classes, and I want to spend that time effectively, to do the things I have mentioned but something always comes up:*

*you become the substitute because another teacher couldn't show up" (Nermin).*

Teachers feel under pressure because of the heavy workload. Besides this major problem, administrators also increase these internal stress factors by decreasing the motivation of teachers, if they are not supporting or appreciating teachers' effort. Even though teachers are adults, it is important for everybody, regardless of their age, to be accepted, approved and appreciated. Feeling this external gratitude is a big motivation for teachers. As a result, the function of administrators gains big importance. Yağmur said:

*"Top management is not aware of what we are doing here, let alone being admired by them. We are all adults and in such a profession like teaching, which is a sacred one, being admired is not something we expect. Our product is human, the kids. We need to try our best to raise them. However, management's indifference to our good deeds might be one factor that decreases motivation" (Yağmur).*

In this regard, it would be helpful to take Zuhâl's suggestion into consideration. Zuhâl pointed out an important fact that teachers want administrators to also engage in professional development and would like them to be aware of its implications. She stated that administrators who are behind the closed doors and away from the natural environment of education will lose touch with teachers and students. Thus, she suggested that administrators be a part of each PD programs for teachers to be able to empathize with teachers.

*"What affects a teacher most negatively is the school principal. A highly motivated, influential principle who respects and understands the teachers, who inspire them to have a positive effect on their commitment to the organization and their satisfaction. On the other hand, if the administration creates problems, you do not even leave the class because you think the less I see them, the better it is. I agree that teachers play a huge role in shaping a school, but the primary actor is the principal. Therefore, all principals also participate in such programs, which I have never seen. They always have excuses; such as meetings. This is the case in all schools, not just here" (Zuhâl).*

Another factor which has a negative impact on teachers in the school context is the lack of autonomy of teachers. When teachers' identity and expectations do not match with the schools' expectations, it is generally assumed that teachers are the ones who are to sacrifice and follow the rule of schools. This creates a gap between the teacher and the school. Even though schools are big communities that need some consistent rules, teachers also need independence to be able to represent their uniqueness and differences. Merve commented on as follows:

*“External factors include the environment, school atmosphere, relationships, expectations and to what degree these external expectations match with school’s expectations. You would like to adopt a student-centered approach, but the school might be demanding something different, something that will boost its reputation. Such conflicts can be quite disappointing. Conflict of interest leads you to question, makes you disappointed. You ask yourself ‘what is the right thing to do’ ‘Do I have to do this’ Sometimes you comply with these demands. Sometimes you object to them. All in all, the discrepancy between your expectations and organizational expectations is a disadvantage” (Merve).*

Although private schools expect their teachers to be highly qualified, not all of them allocate sufficient budget for PD of their teachers. Furthermore, the participants also indicated that they are not able to afford some of the PD programs which require money since their salaries are just enough for them to survive. The financial constraints were referred by three participants. For example, Beril said:

*“The school I work in doesn’t motivate me. I don’t have many facilities. The rigid hierarchy in a private school may reduce motivation. Financial consideration may also do so. If you feel that your labor is mercilessly exploited, you become demotivated. There are a lot of factors interplaying with motivation: facilities, transportation, food...” (Beril)*

### 6.1.5. National Context

When the participants were asked to criticize and evaluate the Turkish education system, a link to politics emerged. Because of these common expressions about politics a sub-theme, I included politics as a sub-theme.

Table 6.7. Sub-themes, Codes and Frequency of the Codes for National Context.

| Sub-theme                                 | Codes                                               | f |
|-------------------------------------------|-----------------------------------------------------|---|
| <b>Relation of Education and Politics</b> | Continuous change and limited improvement           | 8 |
|                                           | Contradiction between government and private school | 8 |
|                                           | Pessimism                                           | 8 |

The participants think that although educational system should be independent of diverse political ideologies, education is one of the systems most vulnerable to political changes in Turkey. Because of this reason, it is crucial to hear teachers' opinions about these concerns. For example, Ceren and Zuhall stated that:

*“Education must be isolated from politics. It shouldn't be shaped by each government and its politicians. Teachers, students and parents all have the right to plan their actions according to a valid, sustainable system. You build the system in the correct way and it sustains. Every year, a new change, it is not right” (Ceren).*

*“Here, things are planned, changed and implemented based on a top-down approach” (Zuhall).*

**6.1.5.1. Relation of Education and Politics.** The system that teachers work in has a significant impact on their conceptions about PD. Because the teachers are the real practitioners of the curriculum, which is designed by MONE, they are dramatically influenced by the problems in this system in their daily teaching practices. According to the participants' statements, there is a shared concern about the frequent changes in the educational system. Almost all the participants indicated the danger of inconsistency

not only on the learning outcomes of students but also on the system itself. They also expressed a common concern about the way how these changes are introduced in the first place. They believe that implementing a system that belongs to a different country or culture fails to fit in a completely different culture and can end up with detrimental consequences. For example, Ceren stated:

*“No matter how wrong or right it is, it is not right to change the whole education system that frequently. People may also adapt to incorrect practices. They find ways to correct it. There is no justification for so many system changes in a few years. No one has the right to sacrifice a whole generation. It is silly, beyond comprehension. These people, the policy makes, need to stop and seriously consider how to build a solid system of education” (Ceren).*

Teachers think that a country’s educational system must be unique with close links to its own particular needs, traditions, and characteristics. They further elaborated that this requires a considerable amount of time and effort. Implementing a curriculum by directly adapting without proper groundwork and training of the staff, the system itself would possibly experience a failure in many areas. Çise shared her concerns as follows:

*“The States gave up a behaviourist approach to education, we adopted. The States gave up constructivist education, we just adopted. Now, we are waiting for what the States will give up. It seems as if it is a never-ending process. They give up, we take it. It is totally insensible to adopt something that is not unique to use or that disregard the internal dynamics of this country. These are destined to fail” (Çise).*

As it can be understood from Yağmur’s expressions these frequent changes were often planned without proper preparation studies such as teacher training, facility check, resource variety and readiness of the components of the system. Özgür supports Yağmur by stating “there is change but no development”. Based on participants’ interpretations, the Turkish education system looks like a puzzle with lots of missing pieces and some pieces from another puzzle.

*“If we compare now with the past, the education system in this country is being continuously updated and changed. The whole system is like a puzzle, where the pieces are always moved in one or another direction. It is not that we are against change, but this is something else’. In Turkey, change fails to bring improvement. We have this exam problem. The structure is not a solid one and there are inconsistencies. They just copy and paste systems from other countries, which does not seem right to me. Without training teachers, helping them internalize the underlying philosophy, all your attempts are in vain. You can change all the books but once they enter the classroom, teachers will still go on doing what they always do. I don’t think Turkey is likely to make a breakthrough considering its existing state and dynamics” (Yağmur).*

*“From my point of view, there is change, not an improvement. The change is not an organized, systemic one, either. Turkey imitates some parts from other countries’ systems and combines them, which is a shared line of thought among colleagues, too” (Özgür).*

Another concern of teachers is about the widening gap between state and private schools. Kenan believes that there is a sharp inequality between state schools and private schools, which decreases the quality of education. As the daughter of a teaching couple who worked in state schools, Nevin listed various problems about state schools such as the quality of the facilities and over crowdedness.

*“I don’t think the education delivered in state schools lives up to its goals. Crowded classes are one of the issues. In such classes, teachers cannot cater to students’ needs in a forty-minute class hour however qualified they are. I know they lack of necessary equipment. My parents used to teach in state schools and from my observation I can comfortably say that education in state schools fails to reach its goals. They have to pretend to be doing so” (Nevin).*

Zuhal depicted this problem by stating another major issue that not only educators but also society can face with in the future. She thought that this widening gap in terms of equalities and opportunities can lead to hostility among people.

*“When we take the whole country into account, we still have a very long way to go. Here, we are just an exception, only a part of the elites considering our facilities. But things are very different when you go out of here. During a group meeting, my partner, who is also a teacher, had the chance to talk to a teacher who works in high school as a biology teacher in Ümraniye region. He reported that that teacher said they use the school lab effectively, have all the materials and devices required and the classes are quite effective. However, another one in a different school told him that they did not have a lab; they had a projector, but they needed to take turns to use it because it is the only one. He stated that they were able to use it only a few times in a year. As long as there are such discrepancies and inequalities, we can’t change anything. These inequalities may also lead to hostilities among us” (Zuhal).*

There was a severe pessimism about the present and future of the education in Turkey, which can be because of teachers’ lack of trust to the system and government who designs the system. Merve and Kenan are just two of the participants to show this pessimism towards the system, although the rest of the participant teachers shared the same concerns.

*“No one seems to care about improving themselves and to be honest, there is not an available system that encourage teachers to do so. The whole system is at the hands of wrong people. I am not really optimistic about the future, either. It seems that everything is arranged in a way that supports the existing structure” (Merve).*

*“I don’t think there exists a bright future for Turkey. I agree that the amount of money spent per student seems high in relation to the overall population, but it is more about philosophy and that philosophy is not right” (Kenan).*

## **6.2. Findings of Phase-2**

The findings of the second phase of this research study are presented elaborating on three separate cases in the light of the themes emerging from the analysis of the first phase. By understanding the experiences and stories of the three participants of

the second phase, the potential changes of the science teachers' conceptions about PD within a period of eight years were explored.

### 6.2.1. Case 1

The first participant of the second phase, Nermin, is a female middle school science teacher. She had a tenure of three years when the first interview was planned on November 21, 2010. She graduated from a reputable Anatolian Teacher High School, which means her pre-service education is significantly different than that of other participants. Being a teacher was her desire since her childhood. She stated that attending to an Anatolian Teacher High School was a consciously planned career goal for her to become a teacher. She also stated she preferred studying teaching and thus she only chose faculties of education of various universities in her university preference form. In her first year of teaching, she started to work in a private K-12 school. She was working in the same school during the first phase of the research and is still working in the same private school in Istanbul, Turkey. She is now in the 11<sup>th</sup> year of her profession. She referred to her 10<sup>th</sup> year in teaching as her turning point. She said:

*“As a science teacher, or just as a teacher, I started to accept myself as a teacher in my 10th year. I went through a remarkable change in my 10th year. I can divide my teaching experience into two periods as before the 10<sup>th</sup> year and after. I just realized how hard being a teacher is. I just noticed how different a real teacher is then. It was such a hard experience to be a science teacher” (Nermin, Second interview).*

Her participation in this research study is significantly in that she is a key informant to understand this remarkable change in a teacher's identity and experience during this transition from beginner stage to proficient stage in teaching. She was an advanced beginner teacher teaching actively for three years when she was first interviewed and became a proficient teacher with 11 years of experience when the second phase was conducted. Observing and experiencing her outstanding change in terms of professional identity development has made a big contribution to this study.

6.2.1.1. Conceptions about PD and IST. The term PD was completely new for Nermin when she was asked to define it during the first interview. She felt so confused when she tried to find a definition for PD. She defined the professional development of a teacher considering professional identity development. Her very first answer was about content knowledge. She claimed that PD is one's development of content knowledge. This might be because of her year of experience. She was in her third year in teaching and apparently feeling so insufficient in terms of her content knowledge. She claimed that a teacher must know more than a student can ask. She also pointed out the fact that how and in what ways that knowledge is transferred knowledge plays a critical role in teaching. She said: *"Being able to transfer your knowledge to a student is professionalism. Is it like being open to development? I don't know, I couldn't summarize what I am thinking"* (Nermin, First interview).

After the initial confusion, she started to come up with more clear and wider explanations by providing relevant examples. She talked about her mentor teacher in her school and how open-minded she was. According to Nermin, her mentor teacher in her first year was a professional teacher because she was also trying to learn from Nermin. As a result, regardless of the year of experience and age, trying to learn from other teachers working with you was another definition of PD for her then. She, then, summarized PD as:

*"To be open-minded about everybody, everything and new trends"* (Nermin, First interview).

Nermin seemed like a teacher who strives for creating her own learning strategy. She self-criticized about her PD for the first two years of her teaching. She was not happy about her development, which doesn't live up to her personal goals and expectations about the profession. She said:

*"I mean, I do not find myself really successful. Compared to the majority of teachers, I might be a good one but, in reference to myself, I am not successful. I have still a long way to go; I am training myself. I find my mistakes and areas open to*

*improvement” (Nermin, First interview).*

She was trying her best to be able to reach to the point that she desired. For example, she was asking intern teachers to observe her class and provide feedback; letting intern teachers run the class so that she can learn from them; asking high school teachers to teach her the topics that were in their curriculum. It was clear to see her effort to benefit from the experience of her colleagues for continuous professional development. Her personal goals at the time were improving her skills in scientific project design, designing new resources and class materials and being active in extracurricular activities. To be able to achieve that, she volunteered to participate in all project seminars and started to collaborate with the project coordinator of the school, as well as asking for help from her colleagues. Even though she felt happy about her productivity in certain areas, she still believed she needed further development.

When she was asked about her future plans about her PD, she expressed that she needed further information about implementing different teaching strategies and developing effective classroom management strategies. She said:

*“I am struggling to apply my theoretical knowledge in my teaching. I have some future plans but, there are still some challenges ahead of me to deal with right now such as classroom management problems and occasional failure to understand students’ psychology. I will improve day by day” (Nermin, First interview).*

When it comes to evaluating the PD and IST programs, Nermin stated the deficiency of these programs in multiple aspects. For her, the first and biggest problem was the instructors of these programs who often fail to effectively transfer knowledge. She claimed that the reason for this problem might be their lack of experience in education and teaching profession. She expressed her unwillingness and boredom about these PD programs by stating her reasoning. She said:

*“I found PD programs important but insufficient. We have already covered all of their content during university education. In terms of my academic knowledge, I am so*

*competent. If they try to teach me theory, there is nothing in it for me. However, if they present something practical, I can enjoy the learning process at the same time. Because it is hard to successfully apply theory to practice. Someone's help at that point becomes valuable. There is a limited number of trainers who provide practical information. The success is to a large extent dependent on the qualification of the trainer and the content of the training" (Nermin, First interview).*

Even if she is not interested in PD programs, it seems that she found her own way for her PD, which is basically dependent on the self-realization of her needs. When she was asked to evaluate the impact of her PD on the students, she pointed out her self-confidence and the impact of it on her students. She claimed that her improvement and development of self-confidence had a positive influence on her students' respect and attitude towards the class. She expressed her students' awareness about the development of their teachers dramatically increased.

During the second interview, as stated before, she addressed her considerable change during the 10th year of her profession. Based on her expressions, it is understood that this change results from both internal and external factors. Internal factors include her awareness about the teaching profession and development of her professional identity, which will be explored in later parts of the paper. External factors are about the circulation of department members, changes in the academic program and working conditions of school throughout the years.

As explained above, in Nermin's personal PD pathway, the collaboration with department members was the most significant factor. She specifically mentioned two of her colleagues who helped her to improve throughout the years. When they transferred to other schools, Nermin found herself in a completely different situation. She said:

*"I was working with two precious teachers and I was learning from them though it was not deliberate. Without them, you must do everything on your own, without anyone's support. Regardless of the time that you need to spend, you should do everything alone. That's what I realized. Suddenly, both of them left and I stayed alone. Even*

*though I knew everything, I needed to practice all of them again and lost myself in the details. This influenced my development significantly” (Nermin, Second interview).*

Her opinions about PD and IST programs show certain similarities with the first interview. First, she still does not believe the efficacy of these programs. She claims that in PD and IST programs, trainers explain something, and participants passively listen. However, she believes in the effect of individual effort to learn something. For her, the biggest attempt for her PD was running the robotic club with her students. She states that she learned considerable information by researching, inquiring and investigating. The last PD program that she participated in was about STEM education, which she stated contributed to her club studies. This program had two phases. The first phase was an interactive study and the second was an online education which was based on guiding participants to undertake research about challenging questions. During the first phase of the program, teachers were active, on-task and productive. She says that they were so excited about the program and highly engaged in the process. Nermin also states that this PD program raised her awareness into her teaching practices and provided a wider perspective.

*“STEM education is very popular all over the world. It may be because of the trainer of the educational philosophy of the institution, this PD program was very effective for me. Besides the colleagues, you should always be in contact with experienced and expert people” (Nermin, Second interview).*

Regarding her expressions about these PD programs, she was asked to evaluate the changes in the content and context of PD programs. She stated that, during the last ten years, teachers have been offered more alternatives. She claims that when some of these PD programs are really effective, some of them do not have rich content. She feels positive about having a chance to choose her own PD program. She says:

*“There is a trend in Turkey about the slogans of PD programs which address the guidance of teachers to increase student engagement. How about their content? In the end, our school tries to choose the best ones and has a budget, so I have a*

*chance to make my own choice. How about public schools? From these meetings with public school teachers, we have an idea about the quality of these training programs. Who runs the programs? Who prepares the content? Public schools send one of their teachers to participate and want this teacher to train other teachers. Overall, there is a common attempt to increase the active participation of students and assigning the role of facilitator to the teachers in these PD programs” (Nermin, Second interview).*

From Nermin’s expressions, it is understood that there has been a change in the number and content of the PD programs. This discrepancy can be seen in the options for PD and IST programs from Nazan’s statements about the gap between public and private schools.

When Nermin was asked to evaluate the impact of her PD on her students during the second interview, she focused on a different perspective. While she was addressing the impact of PD on self-confidence and students’ respect to their teachers, this time she concentrated on mutual learning between her and her students. She believes that everything that helps the teacher to improve also positively influence students. She says:

*“As long as you renew yourself, students will also renew themselves. Actually, they always renew themselves. Children are interesting, they always ask something. Children are the ones who develop me. They are so curious, and they have amazing minds. They keep you alive and young” (Nermin, Second interview).*

6.2.1.2. Identity. Nermin’s professional identity development is one of the most remarkable changes in her professional development. Her expressions from the first and second interviews provide significant information about the development of professional identity in the developmental stages of teaching.

When she was asked to define herself as a teacher in the first interview, her first expression was about being a disciplined figure in the classroom. She addressed the

need for discipline for students. The reason for this special attention to discipline might be closely linked to being a new teacher and trying to maintain certain standards in the classroom environment. She also expressed that being responsible was one of her strengths. She claimed that students are aware of how responsible their teachers and easily figure out whether they are ready and well-equipped for the class. Another strength of hers was her ability to talk the same language with students, which can also refer to an advanced level of communication and closer relationship with students.

When she was asked to talk about the things that need improvement, she stated that she needs to employ different strategies in her teaching, design new resources and materials, become competent regarding content knowledge and have the skills to successfully transfer knowledge to the students; all of which are indispensable for a beginner teacher. However, it seems that there have been major changes in her reflection. For example, her self-definition of teaching has evolved in a way to include a broader perspective, which is confirmed by such statements as follows:

*“To be a science teacher, one must be able to observe everything in life, to think fast and to inquire more. These should be the philosophy of your life. I think my students can learn immensely from me. I feel that I have a great deal of contribution to their life. Instead of only teaching, I teach them how to learn by changing their mindset, by showing how to inquire. I find myself as a science teacher who teaches them how to break their barriers instead of memorizing facts. I can clearly understand the importance of saying ‘life-long learner’. Indeed, you cannot be a teacher if you are not a life-long learner. I think I am a teacher who always has a desire to learn, has a passion to teach. If I would have lost this passion, I couldn’t have been the person I am now” (Nermin, First interview).*

It is clearly seen that her professional identity development has transformed from basic needs into a deep internalization of the profession. As it was stated at the very beginning, she expressed the big impact of her 10<sup>th</sup> year in the profession as a turning point in her teaching life. Along with falling apart with her two valuable colleagues due to their transfer, she also found herself as an individual in the department. She

claims that this change made her realize the unique features of the teaching profession. She states:

*“I have always been good at my relationships with students. However, I think I have improved my communication and relationship with my students. Students used to love me but, I always believe in the need for a unique property. I just found this. I started to understand students from every aspect, not just academically but psychologically, too. I am now a teacher who can understand students, help them to grow, find their own philosophy of life, and become a respected member of the society. I am a science teacher who helps students in every aspect” (Nermin, Second interview).*

She believes that science teachers must not be the slaves of their ego. Since science and technology develop continuously, science teachers are the ones facing with various changes. The curricula might change or the concept that a teacher teaches might change. Even a fact in science might change depending on advances. Nermin believes that a science teacher must be open-minded about these changes and seek new resources to keep up with these changes. She also thinks about the content of the subject and mentions the importance of paying attention to the students' actions during the class hour. By considering safety issues during lab hours, she addresses the active supervision of a science teacher during the class.

Nermin claims that teachers must feel the excitement of teaching to be able to be a professional. She states that she wants to continue her profession as long as she feels this excitement. However, she also expressed her long-term plan for leaving the profession. She says:

*“No matter what happens, I will leave teaching. I mean, I want to continue to teach when I feel enthusiastic about it. It is not leaving teaching, because it becomes your lifestyle, but quitting the job. If I continue to teach, one of my future plans, since I really enjoy creating new and effective lesson plans, trying to help other teachers in terms of developing different lessons plans” (Nermin, Second interview).*

Even though Nermin seems to be in her most productive years in the profession, she still has a desire to leave the teaching. This might be the result of tough working conditions which will be presented under the title of the school context. To conclude Nermin's story in terms of her professional identity development, trying to analyze her statements about her self-evaluation about the last 10 years of teaching would be valuable. When she was asked to evaluate her change in the last ten years, she says:

*"I have never lost my passion. It is the only thing that never changed. If I lose it, I will stop teaching. There are times when I feel demotivated, depressed but, I never lost the passion. How did I change? I changed a lot. My mentor teacher used to tell me to wait for the fifth year of teaching. I went into a change in my fifth year in terms of my relationship and communication with students. However, in my tenth year, I experienced this big change. I realized how big the word 'teacher' is. The biggest addition of this tenth year is the increase in my patience level. It is not about getting mad at students. It is about being patient with their learning process, giving them the time they need. This awareness is my turning point. I am trying to improve myself and I am doing this just for myself. I need to satisfy myself first, otherwise, I cannot feel happy. I mean I feel insufficient if I do not develop myself. I do this for myself and it reflects on my students" (Nermin, Second interview).*

6.2.1.3. Department. As the youngest member of her department, Nermin defined herself as inexperienced. However, from her expressions, it is clear to see that she was a lucky young teacher who received support and help from her colleagues. The most important point to mention is how she created this culture of collaboration for herself. Striving for help and support let her be accepted in the community. During the first interview, she frequently mentioned her attempts to learn from experienced members of her department. She also expressed the positive impact of this collaboration on her profession. In the second interview, her focus on individuality can be understood after the changing dynamics in her department. She expressed her challenges and struggles she experienced after the transfer of two beloved colleagues who guided and supported Nermin in various aspects.

Although she feels sorry about their absence, she is also happy about the new young participant in her department. She expresses the influence of a young teacher's positive energy on her PD. She says:

*"It is a big chance to work with young teachers. There is a new teacher in our department this year, she is so curious and eager to discover. Her energy made me refresh. I am 34 years old, not an old teacher, however, a 25-26-year-old teacher who is determined to be a good teacher brings positive energy to life. As long as they do their job wisely by putting effort, I believe that young teachers have a big impact on one's PD" (Nermin, Second interview).*

She feels lucky about her new colleague after a challenging two years with different teachers. She expressed her frustration at the young generation of teachers. She claims that young generation teachers do not have a sense of family. She defines them as backstabbers and deficient in communication with an overrated self-confidence. She feels that people can easily complain about someone else by being selfish. She feels sorry about the ignorance of the culture of collaboration compared to previous years. From her point of view, teachers work harder but individually rather than embracing mutual sharing and teamwork.

6.2.1.4. School Context. Nermin has been working in the same school since she started teaching. In the first interview, her concerns were generally about the workload and tight curriculum. Her overwhelming schedule in her first couple of years was also a barrier for her PD. Despite her interest in improving the quality of her classes, in terms of activities, assessment techniques and alternative methods, the heavy curriculum of science education and the lack of planning hours for teachers added to her challenges. Unexpected duties such as subbing for an absent teacher or participating a last moment meeting was frequent in her school. She said:

*"To get into my class and teach is sometimes my escape. There are lots of extra work to do. While you are dealing with these formalities, you just want to take a look*

*at your plan before you enter the class. I sometimes can't have time to do, which makes me so anxious. I used to memorize the details of my classes one by one. After a while, I realized that my brain is so busy, and I cannot memorize anymore. I started to use an agenda, which was the only missing thing in my life. Now I am writing everything down word by word" (Nermin, First interview).*

After eight years, things seem more severe. Nermin is pessimistic and tired of the workload. She complains about the current changes in their system which require teachers to mark and assess every single student work. She says:

*"I read student papers every single day. How can I be unbiased' My mind is always occupied because of the anxiety. Due to burnout, I just want to come home and rest. I am not willing to go to the cinema or theatre. I just need to sleep and rest. I used to read scientific journals, now I don't because I don't have energy. Whenever I can, I just want to go out and walk to refresh. I feel that they organize everything to prevent teachers from rest and to breath" (Nermin, Second interview).*

Nermin feels that administrators, schools and system try their best to decrease teacher efficiency and motivation. She claims that under these adverse conditions it is impossible for teachers to develop. As well as these problems, lack of appreciation and recognition increase the impact of these stressful issues. She states that instead of administrators who search for mistakes and problems, teachers need leaders who support and appreciate their effort. She says:

*"I think the only factor which decreases teacher motivation and efficiency is the lack of leadership skills of administrators. I have a strong inner, motivation. I think administrators are the ones who affect me in a negative way" (Nermin, Second interview).*

Even though she expresses all these concerns, she also feels supported by the school in terms of her requests about PD programs. She says that administrators try their best to answer teacher needs as much as possible.

6.2.1.5. National Context. It was the third year of the curriculum reform in science education when Nermin started teaching. Even though her pre-service education was based on a constructivist approach, she pointed out the effectiveness of the traditional approach. She was not happy with the attempt of curriculum developers to simplify the content of the science curriculum. Her main concern was the insufficient implication of constructivist approach throughout the country. The inconsistency of classroom practices among the teachers and schools was a big deficiency of the system. She said:

*“The traditional approach, I think, is effective. We were used to this system and I believe that this system was appropriate for this country. When I say appropriate, I mean the contribution of the constructivist approach as well. I don’t believe that Turkey implements the correct constructivist approach everywhere, especially in public schools” (Nermin, First interview).*

Because of the simplicity of the program, she claimed that the expectations from students decreased, which in turn led to worsening of their cognitive level. She questioned the contribution of this system to students’ analytical and higher-level thinking skills. She was also concerned about the gap between public and private schools and their teachers. She was more optimistic about private schools but concerned about the practices in public schools. She said:

*“I feel really uncomfortable to use this word, but I feel that students are getting more stupid. Maybe, it is because of this program. Our generation was way more conscious. Some members of this new generation are conscious, but the rest is hopeless. The ones who attend private schools are fine. However, the ones in public schools are not doing well. We also graduated from public schools, but the level is not the same anymore. Teachers have a huge impact on the system as well” (Nermin, First interview).*

During the second interview, Nermin was so frustrated about the educational system in Turkey that she frequently expressed how hopeless she was about the current situation of science education in Turkey and how worried she was about the future of

the country considering the importance of science education for the community. With the significant political changes and its impact on education in the last decade, she addresses the severe danger young population will face as they fail to criticize, analyze and inquire. Since she is the one who participates in the meetings of national education councils of regions, she has a chance to witness the situations in various schools. She states the transformation of laboratories in public schools into normal classrooms, and the uncontrollable increase in the number of religious schools are the main enemies of science education in Turkey. She claims that proper science education is not possible with lack of laboratory practices. She says:

*“I do not feel that the future of Turkey is bright. Our students are brilliant. They are a smart, curious, and good researcher. However, there is an imposed reality which let them believe that math is hard, science is hard, and they cannot do well in these subjects. If you do not provide opportunities, how will they succeed” (Nermin, Second interview).*

She believes that the central exam system is another major problem for science education. She said:

*“I tutor students from other private schools. They spend the entire year by solving multiple choice test questions just to have a high score and find a place in a reputable school. They have never conducted a single experiment during grade 6 and 7” (Nermin, Second interview).*

Nermin claims that students who complete the entire year without conducting any experiment and concentrating on multiple choice test questions will not be able to understand the nature of science. Nermin shares the example of university students in medicine who have never used a microscope and prepared a slide. Although she seems at ease because of her effort to apply multiple strategies to increase the quality of her classroom practices, she feels so sorry about the future of the country and the young population.

### 6.2.2. Case 2

The second participant, Yağmur, is a female, middle school science teacher. She graduated from one of the oldest high schools in Istanbul, Turkey. She did not graduate from the Faculty of Education and did not master in teaching. After the university entrance exam, she found a place in the Faculty of Arts and Sciences to study physics. She became a teacher upon completing a teaching certificate program. She states that she decided to be a teacher when she was in grade four because of the positive impact of her primary class teacher.

*“When I was in grade four, our teacher transferred to another school. Another teacher came and she had a perfect influence on me. Later, when I got older, I thought that being a teacher was the best job for me. I have never dreamt of doing any other job” (Yağmur, First interview).*

In her first year of the profession, she started to work in a private school. She left her first school in the middle of the year because of the adverse working conditions and started to work in her current school. She was in her ninth year and was working in that school when the first interview was conducted on January 27, 2011. She is still working in the same private school, in Istanbul, Turkey. She became the coordinator of the middle school science teachers in the same school in 2012-2013 educational year. She is in the 16th year of her profession and still holding the same position.

6.2.2.1. Conceptions about PD and IST. When Yağmur was asked to define PD during the first interview, she defined it as one’s development in his/her profession. She claimed that teaching is an endless journey and must continue after graduation. She said:

*“Saying ‘I am done’ in a dynamic profession like teaching is a big mistake” (Yağmur, First interview).*

As a result, she emphasized the importance of lifelong learning for teachers and participated in courses, seminars, master programs and certified training programs. When she was asked to evaluate her professional development, she shared some of her attempts to take part in different programs. However, she also complained about workload and how this prevents her to be more active in her PD. She was also pregnant at the time and her priorities changed direction with this new phase in her life. In the second interview, she repeated her complains about the workload. As for her comments on PD, she said that she reads books about subject knowledge, follows scientific and academic journals, searches on the internet and follows courses. However, because of the workload and long and tiring procedures to request a day off for PD, she cannot participate in some of these programs. That is why, she prefers the ones which are scheduled at the weekend when she has also responsibilities for her family and personal deeds.

When Yağmur was asked what her last PD activity during the first interview was, she mentioned her presentation in an annual teachers' conference. She stated that she presented one of her classroom practices and listened to four other different presentations of teachers from various schools. She only found one of these presentations meaningful. When she was asked to elaborate on the features that make this presentation meaningful, she said that while the other three of them were repetitive, this one was an interdisciplinary study which meets the expectations and needs of multiple intelligences.

When the same question was asked during the second interview, it was noticed that her goal in terms of her career plan has changed within these eight years. She is now participating in a long-term certification program of Education Reform Initiative (ERG-Eğitim Reformu Girişimi), which is a non-profit organization for teachers. The program is about leadership. She says that her school funded this program for her. She states that with the help of people who are in the same program, she had a chance to get familiar with various options available for teachers in terms of her subject area and her future goal. Her future goal is to be in a leadership position. Therefore, regardless of certification, she is willing to attend any PD program which can help her to improve.

When Yağmur was asked to express her opinions about the quality of PD and IST programs, her expressions in the first and second interview show certain similarities. During the first interview, she expressed her concerns about the qualifications of the trainers and the needs and expectations of the participants in the program. She expressed that the content and training method of the instructor is also important for her. A PD program that heavily relies upon traditional teaching techniques was not acceptable for her. She said:

*“We participate in most of these programs hopefully as we are attracted by their fancy titles. However, when you are introduced with the content, you are often disappointed. It is not right to be prejudiced about that for me. I still should be open-minded and show a willingness to try different options” (Yağmur, First interview).*

In the second interview, she restates her concerns about the qualifications of trainers and states:

*“The instructor of the PD program must be competent and knowledgeable enough about what he/she is teaching” (Yağmur, Second interview).*

In the first interview, Yağmur claimed that PD programs make teachers refresh and bring the spirit of the first years of teaching back. She believed that this spirit must be consistent and available throughout the profession since it has significant implications for students. She said:

*“Teacher development has a significant impact on students, for sure! Students are able to identify the teachers who put extra effort and the ones who act just out of obligation. The latter is not enough today” (Yağmur, First interview).*

Unlike her reflections in the first interview, she addresses a different point about the present student population. She says that the motivation and interest level of students has been decreasing and students are more willing to choose easier paths. She states that this brings more challenge to a teacher’s life. Despite these challenges,

students also appreciate the teacher's effort to improve. She said:

*“First of all, they realize that teachers also develop. Students start to think about their development when they see their teacher has this developmental process. Since they are inclined to suppose that teachers are perfect and they know everything, it is interesting for them to experience a teacher in a developmental process. This observation impacts their attitude on the subject” (Yağmur, Second interview).*

6.2.2.2. Identity. When Yağmur was asked to define herself as a teacher, the very first expression was about her good communication with students. Secondary to it, she mentioned her strong content knowledge. She expressed her skills in term of being able to empathize and show patience. Moreover, she defined herself as a teacher who is open to change. She said:

*“I think I am able to empathize. I also believe that without empathy and patience, teaching cannot be possible. I am open to changes and developments. Since I have these skills, I am a good teacher” (Yağmur, First interview).*

During the second interview, her self-definition was different than that of the first interview. She defined herself as a determined teacher. She says that her perseverance is still high even though there are more challenges compared to past. She says:

*“I find myself so determined as a science teacher despite everything. What I mean when everything is lack of motivation and interest of a new generation of students. They usually choose the easier way in everything they do. At that point, I never say never mind if they fail to learn. Instead, I search for alternative ways to teach them in a different way. Since their cognitive functions are different, I find myself as a teacher who always seeks for alternative ways” (Yağmur, Second interview).*

After eight years, when she was asked to explain the competencies of a science teacher, her list has changed slightly. For her, the first important competency of a

science teacher is content knowledge. The second one is the pedagogical knowledge. She believes that a teacher should be aware of the differences between the students and plan accordingly. She also addresses the importance of scientific literacy by saying:

*“A science teacher should internalize 21<sup>st</sup>-century skills, be open-minded and be in the process of development continuously. Because this profession will exist as long as this world exists, there will always be development. Thus, a teacher should be able to adapt to the development” (Yağmur, Second interview).*

By referring to her busy working schedule, she claims that science teachers must know how to manage their time effectively. She recommends teachers improve classroom management strategies. Since she does believe knowledge acquired at university is prevalent but do not stand a chance on its own, she recommends new teachers learn about their subject area while they are actively working in the area. She says:

*“I realize that I internalize most of the topics while I am teaching them. People go through an active learning process while they are teaching something. When a new teacher starts to improve in the profession, they should be careful about the routines and repetitions, which are the biggest enemies of teaching. As long as they find opportunities to develop, they shouldn’t miss them” (Yağmur, Second interview).*

When Yağmur was asked to evaluate her change as a teacher for the last ten years, the very first thing she expressed was being a mother and how this experience impacted her teacher identity. She says:

*“First of all, I became a mother in these ten years. It is a turning point in my life. We talk about empathy, don’t we? It is a different type of empathy. I was able to see kids’ experiences at home and whether parents can have an impact or not. Because of that, I think I became a more tolerant and indulgent teacher. I think I have changed a lot as a teacher after I became a mother because my students are also my kids” (Yağmur, Second interview).*

Based on these expressions, it can be understood that feelings about the teaching profession are quite strong for Yağmur compared to her professional identity. Upon her strong emphasis on her feelings about teaching and students, she concentrated on academic knowledge and strategies for effective science teaching. She believes that she is more concentrated on the theoretical part of science education. She states that she has been paying more attention to skills such as application, innovation, inquiry and technology integration. She believes that by investigating the positive implications of technology for science classes, teachers can find practical and creative solutions.

6.2.2.3. Department. When Yağmur was asked to evaluate other teachers during the first interview, she described the situation for private and public-school teachers differently. While she was more optimistic about her colleagues in her school, she was hopeless about the public-school teachers. She said:

*“If I am to score teachers in my school with a scale from 1 to 5, where 1 is the minimum and 5 is the maximum, I will give them 3 or 4. There are teachers who deserve 5 of course, but I am talking about the arithmetic average. I can say they are 3,5 but not 4. If we talk about Turkey, we need to consider public-schools and teachers’ exhaustion. I will say 1 or 2. In general, I do not think that teachers in Turkey are open to development. I graduated, I know my subject, I have my teaching certificate, I am teaching in a class, doing my exams, marking them! That’s it! If I deal with some of their family problems, it is enough for being a teacher. That is how they approach teaching. They complain about the change of a course book since they were happy with the last one. Thus, my result will not be high, 1 or 1,5, but not 2” (Yağmur, First interview).*

According to her expressions, it can be understood that she tends to make a generalization of the situation for all public-school teachers and ignore their individual differences. She seemed quite hopeless about the teachers when it comes to state schools and teachers employed there. She was also not fully sure about the competencies of her colleagues as well. However, when she was asked to reflect upon the educational

system in Turkey, she also claimed that without proper and diligent handling of the situation, teachers can continue to heavily rely on their traditional techniques. She said:

*“Without well-planned teacher training, without allocating enough time for teachers to internalize reform movements, teachers will continue what they have been already doing regardless of the changes in course books” (Yağmur, First interview).*

Her above statement shows that she was aware of the big picture, however, she seemed worried about both sides of the story. When it comes to the second interview, she was more positive about her department and the atmosphere. She states that the biggest challenge for department members is the workload and lack of time when they can come together and collaborate. She says:

*“We are so lucky in terms of our collaborative culture. Solidarity, growing together and sharing... However, I still hold the same opinion, unfortunately. The simplest example, we used to come together at least once in a week as the same grade level teacher. Nowadays, the grade level leader prepares a plan and share with other teachers via email. Other teachers write back their comments or additions. Teachers are extremely busy so they cannot find time for even a single meeting. There was a time for us to share and come up with high-quality lesson plans. Now, every teacher has at least three levels which mean three different meetings. It is not possible. We are a good team, but the time constraints and conditions do not let us collaborate” (Yağmur, Second interview).*

It seems that Yağmur has experienced a remarkable change in terms of workload and working conditions during the last eight years. This issue will be explored in detail in the following section.

6.2.2.4. School Context. Yağmur has been working in the same school at the time of the study. Along with the changes in the educational system in Turkey, school

context has undergone significant changes during that period of time. During the first interview, when she was asked to identify the factors which affected her professional development, the first thing that she mentioned was the attitude of administrators in her school. She said:

*“Lack of recognition or appreciation by your administrators is a problem. We are adults, we do not expect appreciation especially for the teaching profession since we are working with children. However, I can’t admit it is something that negatively impacts your motivation. The lack of awareness of the administrators about your positive efforts has a negative influence on you” (Yağmur, First interview).*

Even though she did not explicitly mention any concern about her administrators, it can be understood from her expressions that it was important for her. During the second interview, she did not mention any concern about the recognition and appreciation. In contrast, her main concern was the heavy workload and economic conditions. She reported one of their team members was in her maternal leave and the other science teachers had to cover for her classes. This situation seemed to cause a sharp increase in their workload. Because of that, they were not even able to meet once a week. She also stated that this adverse condition was also related to the economic decisions of the school. She believes that school management usually makes choices based on financial concerns and disregard the adverse consequences of their decisions for teachers.

*“If PD requires financing, there is no support. They do not explicitly say it. They say they will try their best. However, you know your requests will never be approved. So, I was astounded when I learned that they chose me for this last certificate PD program, which was really costly. In Turkey, the budget demands for teacher training is the easiest thing to refuse since it is an abstract issue. However. It is the best way to improve quality and experience the positive impacts in the long-term” (Yağmur, Second interview).* Adverse working conditions and tight schedules are the issues most of the private school teachers complained. In Yağmur’s case, it is obvious there has been a gradual deterioration in the last eight years.

6.2.2.5. National Context. During the first interview, when Yağmur criticized the education system, she expressed her opinions in general by considering teacher training, curriculum, central assessment system and the future of the education system. Her biggest concern was the copying of different systems without tailoring it according to the national context. She was hopeless about the future of the Turkish education system. It was evident from such statements.

*“If we compare now with the past, the education system in this country is being continuously updated and changed. The whole system is like a puzzle, where the pieces are always moved in one or another direction. It is not that we are against change, but this is something else ... In Turkey, change fails to bring improvement. We have this exam problem. The structure is not a solid one and there are inconsistencies. They just copy and paste systems from other countries, which does not seem right to me. Without training teachers, helping them internalize the underlying philosophy, all your attempts are in vain. You can change all the books but once they enter the classroom, teachers will still go on doing what they always do. I don’t think Turkey is likely to make a breakthrough considering its existing state and dynamics” (Yağmur, First interview).*

She was also worried about the inconsistent implementation of these changes in public and private schools. She claimed that private school teachers attempt more to implement new teaching strategies and reform-based teaching in their classroom practices while public-school teachers just save the day. As a result, she addressed the importance of teacher training before introducing significant changes. Compared to the first interview, Yağmur expressed her personal projections and expectations about the Turkish education system, particularly about science education, during the second interview. She thinks that instead of knowledge-based science education, comprehension, analysis and evaluation of knowledge must be the objectives. Due to Turkey’s developing economy, she believes that innovation in education can be a solution to economic challenges. She says:

*“Turkey is a developing country. To be able to overcome economical struggles and to take a big step forward, there must be innovative attempts. Innovative attempts are*

*only possible with an innovative youth population. Thus, I think that they will improve the curriculum based on this goal. They will decrease the theoretical part and will pay more attention to marketing and innovation” (Yağmur, Second interview).*

She does not think that the central assessment system will change. Her only prediction about the change in the assessment system is the inclusion of open-ended questions. However, she has reservations about the unbiased evaluation of these questions. According to her expressions, it seems that she is aware of the changing needs in the educational system along with the change in the dynamics of the country and world. She shows her open-minded perspective by overseeing and suggesting new possibilities.

### **6.2.3. Case 3**

Zuhal, is a female high school biology teacher. She graduated from a private high school. She did not consciously choose to teach. She was planning to be a dentist so her choice before was Faculty of Dentistry. She states that she never planned to be a teacher. Even though she did not have any interest when she attended the Faculty of Education, she feels lucky that she became a teacher. She claims she had lacked counseling by qualified and expert staff when she applied for university and made preferences, which was also the case when she graduated. Even though she graduated as a valedictorian, she was not informed about options available for top students such as the master’s program in the same department. *“If I could have attended the master’s program, I would have continued with my academic life and would not have returned to the teaching profession” (Zuhal, First interview).*

In the first year of her teaching, she started to work in a private school. Even though her major was biology, she started to work as a middle school science teacher. She says that she studied so hard to be able to acquire content knowledge.

*“After you graduate from the university you realize that most of the things that you learned at university have nothing to do with what you are supposed to teach” (Zuhal, First interview).*

Zuhal was in the 15<sup>th</sup> year of the profession when the first interview was planned on March 1, 2011, and she was working in her third private school. Later, she started to work in her fourth private school in Istanbul, Turkey. She is now in the 23<sup>rd</sup> year of her profession. The change in her conceptions about PD, identity, department, school context, and national context will be presented in detail.

6.2.3.1. Conceptions about PD and IST. When Zuhal was asked to define PD during the first interview, she stated: “PD is achieving the plans for the profession”. She stated that she never had a long-term career plan. Her main goal was to work in reputable schools by trying her best as a teacher. She expressed that she never planned to hold an administrative position. She believes that “teaching should take place in the classroom”. After an eight-year time period, she still supports her previous opinions. It is evident from her statements below:

*“Professional development will continue for sure, but I have never considered any long-term plan because of my age. Professional development will continue but I have never thought of continuing my profession as an administrator since I began my profession. I will continue to teach and learn as always” (Zuhal, Second interview).*

From her focus on an administrative role, it can be understood that long-term career plan or PD means a position change from being a teacher to an administrator for her.

Her professional development attempts are following the literature about her subject area, biology and general science, following international resources and magazines and collaborating with colleagues. She states that her learning experience with her daughter who started university also contributes to her professional development. She states:

*“I learn a lot from my daughter. Learning from my own child is my most favorite thing. Since my twelve graders will attend the university entrance exam, they are eager*

*to learn more. As long as they ask me more, I learn more. I will continue to learn” (Zuhal, Second interview).*

When she was asked to evaluate the PD steps of a novice science teacher, her expressions show both similarities and differences compared to her perceptions eight years ago. She used to believe that teachers can handle the teaching profession intuitively.

*“I do not believe that the training programs will work. I think that teaching is something intrinsic so one’s intuition plays a key role. You either have it or not” (Zuhal, First interview).*

What she meant by these intrinsic skills of teaching was her disregard of the impacts of PD and IST programs. However, the second interview with her yielded findings that suggest there is a remarkable change in her views about the development of teachers, depending on their developmental stage in teaching. During the second interview, she stated that the first five years of teaching should be evaluated in a different way. Since she believes that the pre-service education is neither enough nor useful for beginning teachers to be able to cope with actual classroom practices, teachers need to focus on being competent in their subject area and gaining classroom management skills in their first five years.

*“The first five years of a new teacher is a period during which they get to know and find out more about himself/herself. You will learn from the beginning, prepare yourself and improve your qualifications. The first five years are marked by trial and error. Then, your classroom management will be more stable. From five to ten years, you will improve in all aspects. Then, you can enjoy more with your students. This is the best thing that experience brings to you. You will not suffer, and neither will your students” (Zuhal, Second interview).*

She suggests some compulsory induction programs for the beginning teachers. She thinks that these training programs can range from using proper language for communicating with parents to what to write on report cards. She strongly believes

that PD or IST programs about pedagogic knowledge are very important for beginning teachers. She addresses specific PD programs regarding the developmental stages of the teachers.

*“PD programs can be planned in relation to every five years of teaching depending on teachers’ needs. The first five years and from five to ten years are not the same so my needs are not the same, either. For example, I need more detailed, experimental and international experiences” (Zuhal, Second interview).*

Although Zuhal believes the importance of PD programs, she has some concerns about the quality of them. Her concerns show some similarities with her expressions from the first interview. Her major concern was about the training programs designed by MONE. She claims that providing the same training options for teachers with different qualifications, expectations, needs and working conditions is a mistake and will fail to meet the goals. Offering the same content for a teacher at the beginning of the career and one who has been in teacher for years decreased the efficacy of programs. She states:

*“A teacher who works in a public school has different needs than one who works in a private school. For example, they want us to transfer our resources to other teachers. It is ok, no problem for me! I have a lot of resources right now. I can share but who will benefit from it? None of these teachers know English. There must be a collaboration, however, the language of the materials is not the same” (Zuhal, Second interview).*

By giving this example, she tries to explain the conflict in terms of expectations and actual conditions.

Regarding the impact of PD of teachers on student learning, Zuhal was asked to evaluate her students’ attitude towards science. Eight years ago, she said that “You just start to say ‘we’ instead of ‘I’. Your classroom management is changing”. During the second interview, she mentioned about the students with different levels of interest towards biology. She thinks that the ones with higher levels of interest will seek for

various sources and will keep learning even after school. However, she says:

*“I can get the attention of students with lower levels of interest inside my own classroom. Because of this, my efficacy should be at the highest level during the class to be able to reach everybody” (Zuhal, Second interview).*

It is obvious to see that her perspective has improved in a more inclusive way. The central focus of her perception about PD has changed from classroom management to student learning outcome.

6.2.3.2. Identity. During the first interview, when Zuhal was asked to define herself as a teacher, the first thing she mentioned is her strong classroom management skills. For her, effective classroom management was being a ‘power/authority figure’ for students. She stated that it is not something you can achieve with words. She claimed that it is achieved by the body language of a teacher. She said:

*“If you do not have the skill of handling the class, even though you participate in various seminars, none of them will work. It is like a superiority. It is a personal trait” (Zuhal, First interview).*

Her second strength was her content knowledge. Unlike her points in the first interview, she stated content knowledge was her first priority. She believed that if a teacher is good at his/her subject area he/she can transfer that knowledge. However, in the second interview, she stated that not every teacher who is really good at content knowledge is a good teacher. She claims that the first important competency of a teacher is communication skills. She said:

*“You can reach out and touch someone and transfer your knowledge as long as you have successful communication skills. Because ‘to know’, ‘to transfer’ and ‘to teach’ are not the same. You internalize it in time. You also understand better as you see lots of examples” (Zuhal, Second interview).*

During the first interview, one of her remarkable definitions about the identity of teachers was related to self-criticism skills of teachers. She mentioned the importance of self-criticism in teaching. According to Zuhail, since teachers are the ones who claim that they know everything, it is not a pleasure for them to be criticized by someone else. However, she believes that teachers should self-criticize and take actions to maintain growth in the profession.

In the second interview, instead of using the term self-criticism, she preferred to use ‘being open to modification’. She claims that it is hard to change people with fixed ideas. She thinks that these teachers resist changing their classroom practices and make life harder for students. She says:

*“When you observe your environment, the ones who interact with students are those who are open to change and have higher communication skills. If he/she is not one of them, he/she hides away from students, abstains from eye-contact with people and lives in solitude” (Zuhail, Second interview).*

Zuhail’s opinions about being open-minded and curious about the developments in the profession show certain similarities to her previous opinions. While she stated that teachers should keep up with today’s world to be able to understand the young generation, she still holds the opinion that competency in English is important. She frequently emphasized the importance of English both in the first and second interview. The reason for this might be the medium of instruction. Since the medium of instruction in high school is English especially in private schools, she addresses language factor multiple times. Moreover, during the first interview, she expressed that she found it particularly challenging to teach biology in Turkish for the first time. It was her professional development goal to improve these skills in terms of getting used to Turkish instruction and tailor her teaching based on exam performance.

**6.2.3.3. Department.** During the first interview, Zuhail did not refer to the department and the relationships with the members of the department. She evaluated her colleagues

in terms of their perception of PD and IST. She claimed that there was a small group of teachers who were passionate about teaching. She stated that for some of the teachers teaching is just an easy profession with holidays and reasonable working hours. She also mentioned that for another group of teachers, the personal benefit is more important than community interest.

*“In terms of advantages and disadvantages, personal benefits are stronger for people. So they would rather work individually instead of collaborating. However, this is not teaching or education. Education is a team work which includes feelings. If you don’t do it with passion, you won’t be able to do it properly” (Zuhal, First interview).*

Besides people’s selfish characteristics, her other major concern was the administrators, who will be analyzed in the following part. However, during the second interview, when she was asked about the factors affecting the professional development of a teacher, she mentioned her colleagues as having the second biggest impact on her professional development.

*“The second important thing is your colleagues that you work with, their qualifications and their support. They support your psychology. It is not just about education. You need support not only as a teacher but also as a human. Good relationships, friendship, a place that you feel peaceful will bring you one step forward” (Zuhal, Second interview).*

She states that especially the individual branches of science such as physics, biology and chemistry usually have smaller departments consisting of two or three teachers. In her current school, she is working with a younger teacher in the biology department. She says that she tries her best to help her and her professional development. On the other hand, by referring to her previous experiences with her colleagues, she expresses her disappointment. She says:

*“It is good to learn from your personal experiences, especially from backstabbers. The thing that you left behind always adds one more thing to you. You learn something*

*new and you make new decisions” (Zuhal, Second interview).*

It can be understood from Zuhal’s expressions that the relationship among the members of the department can have positive and negative impacts on teachers’ professional life. This shows the intersected harmony of the personal and professional identity of teachers.

6.2.3.4. School Context. Zuhal did not use to work in her current school eight years ago. Thus, her expressions, feelings, approaches toward school context show significant changes. During the first interview, she had strong opinions about leadership positions in a school. For example, she said:

*“Administrators are the only ones who affect teachers in a negative way. If the administrator is someone who is motivated, inspiring and unprejudiced, not only your loyalty increases but you also work more passionately. If the case is just the opposite, you do not leave your class and avoid contact with them. The less I see administrators, the better it is for me. Therefore, teachers are definitely the ones who create schools, but administrators play a more important role” (Zuhal, First interview).*

It was evident that she was frustrated about the school, especially the administrators. It was clear that she was not feeling safe. She addressed the importance of administrators’ open-mindedness and empathy. She underlined the importance of autonomy and the freedom of expressions for teachers.

*“I should not think and worry when I need to express my feelings to any of my administrators. I should not have any fears about the renewal of my contract. There should have been a transparent and open leadership system so that you can comfortably state your ideas” (Zuhal, First interview).*

One of her suggestions in the first interview administrators’ unwillingness to participate in PD and IST programs. She claimed that administrators should be trained in

terms of empathy, communication, presentation and public speaking. She also added that administrators should not be behind the closed doors. She expected them to be active and effective.

In contrast to her point of view in the first interview, she is more optimistic and positive about her current school. She says that the school takes her needs into account and provides support in case she demands anything for her professional development. When she started talking about leadership teams, she stated that all leadership members are inside the school and share the same physical environment throughout the day.

*“For example, the thing that I like most is that you can open the superintendent’s door and say good morning. You can open the academic coordinator’s door and say good morning. If you don’t, no worries, he is always waiting in front of the main gate and says good morning to all students who get out of the school bus. All administrative team waits there to say good morning or to ask how you are doing. If they have anything to say to teachers, they have this short conversation with them. Of course, this makes you feel important and valued. In one way or another, you want to be noticed. You feel important and you work happily” (Zuhal, Second interview).*

Zuhal expresses commitment to her school by addressing all these factors. She believes that they have a common culture of collaboration at school, which brings happiness and peace.

6.2.3.5. National Context. Zuhal, as a biology teacher, states that biology is one of the most important branches of science, but it is also the pawn. She believes that biology must bring a global perspective to students’ mind. However, changing the curriculum depending on the ideologies of the leaders of the country makes the content of the lesson become more incomplete. Eight years ago, the biology curriculum was just an adaptation of another international system. Zuhal believes that the lack of English is a big handicap for teachers in terms of being able to use international resources. She

stresses the importance of language and pre-service education for teachers in a national context.

During the first interview, Zuhall was demotivated and pessimistic about the education system in Turkey. Her main concern was the widening gap between public and private schools. She claimed that as long as there are inequities in education, there will be limited achievable steps. She was also worried about the growing hostility among people because of the lack of opportunities. For example, she said:

*“We represent an elite population here, even in terms of our facilities and opportunities. On the other hand, based on what we learned from common meetings with public school teachers, some schools have laboratories. Students come to labs and teachers design everything there, so effective education takes place. However, there are schools with no laboratories. There is a projector, but you need to sign up to use it because the entire school uses the same projector” (Zuhall, First interview).*

Eight years later, during the second interview, she seems to have a wider perspective. She expresses her concerns about the centralization of curricula and assessment strategies in such a big country where there are significant regional differences and gaps. She says: It is impossible for us to provide the same education from Agri to Izmir in this country. We need to consider this variety. It is not just about science. Each region has their own needs and conditions, so they need to be evaluated based on these differences. There is a huge gap between them. When you have this huge gap, it is so absurd to have a central assessment system. Even in Istanbul, there are remarkable differences. Do you think that the opportunities that this school offers are the same as those of other schools (Zuhall, Second interview)?

Her ideas about centralization in curriculum and assessment strategies in Turkey are in line with the studies in the literature review. This one-fit-all approach brings about major problems for students’ academic lives and teachers’ professional lives. With the latest political changes, MONE tries to develop a system which highlights the learning objectives for each subject. Their reasoning for stressing on learning

objective is trying to maintain equality for central assessment system. However, Zuhall states that the details of these changes have not been shared with teachers yet.

#### **6.2.4. Comparison of Three Cases**

A detailed analysis of the cases of Nermin, Yağmur and Zuhall in previous sections a critical comparison of these cases to gain a holistic perspective into them. This comparison is especially valuable in that one can understand different and similar perspectives of teachers about PD in Turkey and in different school contexts. It can also present details about the changing needs of teachers along with the changing developmental stages of the teaching profession.

These teachers are working in reputable private schools in Turkey that have been offering educational services at least for 20 years. The impact of school context, which is one of the most important factors on teachers' decision making and meaning-making processes, can be evaluated by comparing the cases of these teachers. Although the participants work in different schools, they are all work in the same national context, implement the same curriculum, prepare their students for the same central exam though there exist slight institutional differences. Understanding their approaches towards national context is important to realize the similarities and differences of their reactions under the same conditions.

Furthermore, these teachers went through various developmental stages during this research study. The purposeful selection of these teachers depending on their tenure provides an understanding of the development of professional identity. The comparison of their self-definitions about teaching and how these definitions shift within that eight-year period is meaningful to understand their perceptions about teaching and being a teacher.

First of all, how these three teachers decided to be a teacher can provide us with preliminary information about their professional identity. While Nermin and Yağmur have consciously planned academic goals and always desired to be a teacher, Zuhall's

career path was different but she found herself teaching profession by chance. Even though Zuhail did not have a special interest to be a teacher, she is also happy being a teacher and expressed her love for teaching both in the first and second interviews. Nermin is the only teacher who has the longest pre-service education about teaching starting from her high school years due to the type of the school that specifically focus on raising teachers. Yağmur, who had dreamt to be a teacher since grade 4, did not study in the Faculty of Education at university. She became a teacher upon completing an alternative teacher certification program after graduation. The reasons behind this situation were not identified and explained by Yağmur. Overall, regardless of their pre-service academic background, all three teachers frequently reported that they are enthusiastic about their jobs and express their love and passion for the profession.

When Nermin, Yağmur and Zuhail were asked to define themselves as a science teacher, Nermin's self-definition was a lot different than those of others. This is strongly related to the change of her developmental stage in teaching. While she was in her third year during the first interview, she had been teaching for eleven years when the second interview was held. During the second interview, Nermin highly focused on the change of her perspective about teaching by addressing the fifth and tenth years of her profession. She expressed these years as her milestones in terms of her shifts in teaching. Such remarkable expressions were not expressed by Yağmur and Zuhail, who had been teaching for 16 and 23 years respectively. Since they did not go through this noteworthy period of teaching from early career to expertise, their self-definitions in the second interview were more consistent with the first ones. Both Yağmur and Zuhail addressed the importance of content knowledge, pedagogical knowledge and communication with students as well as developing a rapport during the first and second interviews. They also focused on the need for professional development by pointing out the ever-changing nature of science education. They stressed the importance of scientific literacy and open-mindedness by referring to these PD attempts. However, this self-definition shows a significant variance in Nermin's case. While she defined herself as a disciplined and responsible teacher who can talk the same language with students in the first interview, in the second interview she described herself as a good observer, quick thinker, inquirer, life-long learner, and a passionate teacher who is

competent at increasing students' curiosity to learn, which are reported to be achieved by establishing good relationships with students. Nermin's case clearly shows how a beginner teacher survives and handles the multiple demands of teaching by trying to create consistent classroom management responsibly. In addition, it is clearly seen how the professional identity of a teacher develops with experience. The effect of tenure on a teachers' competency in many areas can be seen in Zuhail's case. She refers to this by stating: 'If I was playing with my students before, now I am dancing with them'. She finds herself at the peak of her profession without disregarding the need for development.

In the development of professional identity, teachers' learning process and PD are effective. Nermin, Yağmur and Zuhail described similar concerns and opinions about PD and IST options of teachers in Turkey. First of all, all three of them strongly believe in the importance of and need for PD and IST programs for teachers. They state that these programs are meaningful in that they remind teachers of their previous knowledge about teaching, update them about current changes in the education and foster collaboration and sharing among the teachers. However, contrary to their generally positive attitude for PD and IST, they find these programs ineffective because of some common concerns. First, they state that the majority of these programs are not run by competent trainers or instructors. They all stated that most trainers or instructors of the PD programs are not qualified enough to make teachers active and engaged in the learning process. They believe that having the title of 'expert' or 'professional' is not enough alone to be a teacher trainer in the real sense. This partially explains their lack of trust for and prejudice against PD and IST programs.

Another point is that they all stated the importance of being the owner of their own learning. They strongly believe PD and IST programs have a greater influence if they are designed based on teachers' needs. Unlike Nermin and Yağmur, Zuhail claimed that these needs must be met depending on the developmental stage of teachers. Zuhail, as an expert teacher, believes that her needs are totally different from those of an early career teacher. Thus, she claims that not all PD and IST programs are suitable for her. In this stage of her profession, she specifically concentrates on her subject area by

considering international programs and the different applications in these programs. On the other hand, Yağmur has different ideas. Because of her future plans to be in a leadership position, she is not only concentrating on subject-specific PD programs but also on certification programs about leadership. These individual examples of teachers show the various needs of teachers depending on their goals and developmental stages in teaching.

All three teachers find themselves lucky in terms of working in private schools, which offer various PD and IST options for teachers or try to support them financially if teachers demand to participate in such programs. Although the financial support can be limited because of the economic challenges of private schools, they believe that they are still privileged to be private school teachers as it is not possible, if not impossible, for public school teachers. They all addressed the inequalities about teacher training and opportunities provided between public and private school. Even though they do not explicitly blame public school teachers for obvious lack of opportunities, they also find them irresponsible and unwilling to take actions for students. Public school teachers have job guarantee as they are civil servants working for MONE. Therefore, the participants believe there is not much pressure on them to engage in such activities. They also expressed their concerns about how this flexibility decreases the quality of the system. They believe that unless a public-school teacher is personally passionate and diligent, he/she puts the minimum effort to develop himself/herself. On the other hand, private school teachers have to consider their annual contract renewals and meet high expectations from school administrators and parents. As a result, as well as their internal desire to develop in the profession, there is an external pressure that leads them to invest in PD.

When it comes to their evaluation of school context in terms of collaborative culture among the members, working conditions and opportunities, Nermin, Yağmur and Zuhail not only express some similar concerns but also describe a change in their perspective throughout the years. All three teachers have the positive approach about a collaboration among department members. They both mentioned the positive influence of collaboration and open communication on the motivation of a teacher. Except

Yağmur, Nermin and Zuhall tend to share some of their challenging experiences with their colleagues. While Nermin started the profession with two experienced and highly supportive colleagues, she experienced some negative situations with her colleagues after their transfer to other schools. She complained about especially the young generation of teachers who she finds selfish and ambitious. She believes that if the outcome of education is students' learning, teachers must collaborate and take action together to achieve that goal. In the second interview, she was optimistic about her partner, who is also an early career teacher and willing to share, to learn and to help. Like Nermin, Zuhall also shared a similar story. She believes that she learned a lot from 'backstabbers' but had a chance to work with a young, enthusiastic teacher for the last few years. Zuhall claims that working with a collaborative colleague and feeling peaceful lead teachers move forward. In Yağmur's expressions, there was not any negative comment about the culture of collaboration among the members of department and school. This might be related to her role in the department since she started to hold the position of head of the science department for middle school. When we consider the integrative role of department heads, Yağmur's focus on positive and cooperative community in the department and school gain a different insight. Because she complains about extreme working conditions in her school at the same time. Especially in the second interview, it is realized that her concerns significantly increased. Even though she mentioned about a new attempt to apply a school-wide interdisciplinary planning system by including all subject areas, she has also hesitations about the feasibility of it due to very limited time for collaboration.

Nermin also shares the same concerns with Yağmur in terms of time constraint, stressful working conditions and workload. Nermin talked about their responsibility to read and assess all student papers to provide feedback, which comes with the current changes in their system. She discussed how challenging it is to manage time to live up to these expectations. She worries about the fairness of her assessments because of her constantly busy mind. As a result, both Nermin and Yağmur state that it is the biggest barrier in front of their professional development and collaboration with colleagues. On the other hand, Zuhall did not specifically mention this time restrictions in the second interview. During the first interview, she shared her frustration about being a grade

12 teacher mostly due to insufficient weekly class hours of biology subject. Also, high school biology teachers were teaching more than one grade level in her school. At that time of the study, she was teaching grade 10, 11, 12 and also two different sub-branches in grade 12. She said that each grade level requires specific preparation and particular attention, which force them to work extra even after school. She suggested fewer class hours for biology teachers. However, during the second interview, she did not mention any of these concerns. Even though the reasons why she did not mention any of her previous concerns about workload and timing were not asked and identified in the second interview, the change in her concerns can be explained by some factors. Since Zuhale started to work in another school after the first interview, the school may have a role. This might be also related to various factors such as year of experience, the policy of the school about scheduling or dynamics in the department. Compared to her reactions about her former school, her positive attitude about the new one supports these claims.

As mentioned at the very beginning, these three teachers are working in different schools but under the same national context. No matter how unique policies their schools have, they must cover the same curriculum which is the same all around the country and their students enter the same central exams as all the students in Turkey. When their opinions were asked about the national context during the first interview, Nermin, Yağmur and Zeynep expressed the same pessimism and hopelessness about national education system by considering the impact of political ideologies on the educational system, centralization, inconsistent changes in the system without prerequisite preparation of the components, and inequalities in public and private institutions. Surprisingly, Nermin, as a new teacher, was worried about the constructivist approach in Turkey because of the insufficient and incorrect application of the system by teachers. Moreover, she used to support the traditional approach and recommended a professional mixture of constructivist and traditional approach for Turkish students and teachers. Yağmur expressed her concerns about the rapid changes and ‘copy-paste’ adaptations of different systems to the Turkish education system. By keeping herself and her school out of the system, she proposed a decline in the quality of the education in Turkey. On the other hand, besides all her concerns, Zuhale was the only one who

was also hopeful about the education system. She claimed that a group of people try to take some positive actions, especially about pre-service teacher education in some universities.

When it comes to the second interview, Zuhale mentioned the problems about the centralization of curricula and assessment strategies. She said that this highly centralized system puts all the components such as students, teachers, parents and administrators in a restricted mechanism. She talked about some new attempts that MONE has been working on currently to change the education system. However, this time, she did not share any positive feelings and instead complained about uncertainty. Nermin was more pessimistic than Zuhale. She said that there is no hope for science education and the future of this generation. She claimed that the entire system was designed to prevent students' curiosity, thinking and inquiry skills. She claimed that Turkish students are intelligent and capable, but it is underestimated due to the unfortunate design of the curricula and assessment system. She even does not believe there is a possibility for any positive short or long-term plan with the current change of the minister of education, who is a well-known academician and educator. She says that it is easy to understand the current situation in Turkey by reading newspapers and magazines. On the other hand, Yağmur just detailed her predictions about the future of education in Turkey. She expressed the need for an innovative education system to be able to find a sustainable solution for the economical concerns. She also believes that instead of memorization of factual knowledge, analysis and evaluation of knowledge will be more valuable in the future education system. However, she does not expect any change in central exams. Even if there is a possibility of including open-ended questions, she is not hopeful about the fair evaluation of these type of assessments. Overall, all these three passionate and enthusiastic teachers are not projecting a bright future for the Turkish education system and feeling sorry about the next generations.

#### **6.2.5. Interpretations of the Changes of Conceptions about PD**

The first research question of this study was answered during the analysis first phase and second phase of this study. After this detailed description of two phases,

the second research question and its supplementary questions will be answered by considering the overall analysis of data as researchers' interpretations about the changes of conceptions about professional development (PD).

- The change of three science teachers' conceptions about PD after eight years.

Based on the analysis of present data, it is realized that change of conceptions about PD is related to the identity of teacher, department that teachers work in and relationships among the members of the department, school context, and the national context of the country. Participant teachers believe that PD is a continuous, long-term and dynamic process to fulfill the needs of a teacher that requires improvement throughout the profession. When three science teachers' perceptions about PD are compared with their expressions from the first phase to explore the change, considerable similarities are found between these two phases. First of all, it is found that the concept of PD is mostly understood as the implementation of short-term in-service training programs. This shows that traditional PD model is still the most common type of PD program. Even though participant teachers have some certain attempts for transitional and transformative PD models such as peer learning, mentoring and class observation, they do not recall this as PD. For participant teachers, PD is series of learning opportunities that takes place out of school which includes seminars, courses, annual conferences, workshops or certificate programs. This perception about PD is found to be the same in both phases of this study. Second of all, after eight years, they express the similar concerns about PD programs. These concerns can be listed as lack of ownership of the learning process, lack of autonomy about PD, and traditional top-down approach about PD.

- The relation between professional identity development and the change of the conceptions about PD.

Participant teachers' professional identity development shows significant variations depending on the years of experience. Thus, experience is found to be one of the most important factors interplaying with the development of professional identity.

It is realized that with the increasing years of experience, teachers' focus shifts from management issues to learning and teaching concerns. Regardless of their pre-service experiences by including the decision-making process to become a teacher, all three teachers are enthusiastic about their jobs and express their love and passion for the profession. However, when teachers were asked to define themselves as science teachers, their expressions from first and second interviews provided an important finding about the professional identity development in different years of teaching profession.

After eight years, Nermin's self-definition was a lot different than those of others. She described herself as a good observer, quick thinker, inquirer, life-long learner, and a passionate teacher who is competent at increasing students' curiosity to learn, which are reported to be achieved by establishing good relationships with students. This significant change on professional identity reflects on her conceptions about PD. Thus, while her personal PD attempts were about content knowledge and classroom practices during the first phase, after eight years, these efforts were linked to her personal interests such as coding, robot design and STEM (Science, Technology, Engineering and Mathematics) activities. On the other hand, both Yağmur and Zuhail addressed the importance of content knowledge, pedagogical knowledge, communication with students, developing a rapport, the need for professional development, the importance of scientific literacy and open-mindedness during the two interviews. Their professional identity development demonstrates a consistent similarity to their change of perceptions about PD. Their perspectives about PD change along with their changing needs in their profession. For example, while Yağmur concentrates on PD programs about leadership since she is willing to her position in school, Zuhail is interested in international educations programs since she wants to learn different approaches about science education.

- The influence of school context on the conceptions of PD.

The school context has been found to have considerable influence on teachers' PD. The culture of collaboration in school, working conditions and facilities affect teachers' involvement in the PD programs. In the present study, since the participant teach-

ers work in private schools, it is found that private school teachers face with harder conditions compared to public-school teachers in terms of expectations, roles and duties. All three teachers mention the general concerns about working in a private school such as workload, time constraints and recognition and appreciation of administrators. After eight years, both Nermin and Yağmur highlighted the time constraint, stressful working conditions and workload as their biggest barrier in front of professional development and collaboration with colleagues. Since Zuhail started to work in another school after the first interview, her approach was more positive about her new school. While her biggest concerns were about administrators during the first interview, with the change in school context she expressed her positive feelings and approach toward administrators and school atmosphere.

- The influence of national context on the conceptions about PD.

Based on the participant teachers' expressions, it is found that science as a compulsory subject in education needs to be evaluated by taking into consideration the national curricula, assessment strategies, and science teacher training. There is limited research designed to understand the problems of science education and science teachers. It is also realized that teachers experience conflict between proposed educational approaches and assessment strategies.

Nermin, Yağmur and Zuhail expressed the same pessimism and hopelessness about national education system by considering the impact of political ideologies on the educational system, centralization of the system for all components, inconsistent changes in the system without prerequisite preparation of the components and inequalities in public and private institutions. These common problems that are listed by teachers significantly decrease their trust to the system. Moreover, these teachers have an opportunity to participate quality PD programs because of their schools' special effort to provide current PD opportunities to their teachers. However, they are highly pessimistic about the programs which are offered by the Ministry of Education. They do not believe in the efficacy of these programs.

- The change of teachers' view about the quality of PD programs.

During the second phase of this study, it is found that there have been some positive changes in PD programs in the last decade. The positive shift of these programs seems to be in their content and trainers. Especially, private school teachers have a higher chance to reach these opportunities. Even though most of these PD programs are still traditional seminars, courses, certification programs or conferences, it is expressed by participants that their quality is higher, and trainers are better. Additionally, teachers' being given a chance to choose the programs to attend also increases its positive influence on private school teachers.

On the other side, there is a significant need to expand transitional PD (Kennedy, 2005) opportunities for teachers. The idea of PD out of school, or after working hours needs to be changed to a PD idea during the school hours, inside the class or school by interacting with multiple components such as students, colleagues, counselors, administrators or coordinators.

## 7. DISCUSSION

The current study was designed for two main goals. The first was to understand the conceptions of science teachers about professional development (PD). The second was to understand the change of three science teachers' conceptions about their PD after eight years. For this purpose, a qualitative case study was conducted in two different time periods. The first phase was completed during the 2010-2011 educational year by planning semi-structured interviews with 14 science teachers from different private schools in Istanbul, Turkey. The second phase of the study was designed in 2019 by conducting a second semi-structured interview with three of the teachers from the first phase. In this section, the results of the current study are discussed in the light of the findings and literature. In the final section, limitations of the study and the recommendations and implications for further studies are presented.

The studies about PD revealed that it is not only externally planned activities during the educational year but also a natural development of teachers. PD is not only a series of activities but also an intrinsic development for teachers (Guskey, 2002). As Grundy and Robinson (2004) state, teaching is never complete; it is always developing and changing. During this learning process of teachers, they interact with multiple components such as students, colleagues, parents and administrators that have an impact on teacher learning. Therefore, it must be taken into consideration that for teachers, as Borko (2004) stated, learning occurs not only in a PD course or seminar but also in their everyday classroom settings in their school community. For this reason, it is valuable to gain insight into how an individual teacher learns and the social systems in which they are participating. Present study supports this idea of continuous learning process of teachers. After eight years from the first phase of this research study, participant teachers expressed their learning and development in different perspectives. However, it is also realized that current PD programs in Turkey do not have a significant impact on this learning process. Since majority of these programs are still short-term, traditional PD activities, teachers only have a chance to experience and get familiar with recent developments in education. According to Van

Driel *et al.* (2001), traditional PD programs can be successful to improve teachers' content knowledge and to present ideas behind the current innovations in education. However, these traditional forms of PD programs have been criticized for its failure to lead to a significant change in teachers' classroom practices due to insufficient time, activities and content (Garet *et al.*, 2001). It is also found in this research study that participant teachers expressed their change by interacting with students, colleagues, administrators or national context. In contrast, PD programs were not mentioned as a main source of change.

PD is a life-long learning process as stated by Borko (2004) and Harrison *et al.* (2006). According to the expressions of the participant teachers, PD of a teacher is not an independent aspect of the teaching profession. It starts with the beginning of the teaching profession and continues throughout the profession. Based on the participants' expressions, the reason for that is especially the gap between the pre-service education and in-service experiences of teachers. Teachers desperately need to create a link between their theoretical knowledge about education and teaching and the practical applications of these theories. This gap and its impact on teacher development can be seen in Nermin's experiences. As a beginner teacher, her main concerns were about content knowledge and the ways to transfer of knowledge to the students. Nermin's case shows that teachers' daily practices are beyond their academic background. This makes PD a necessity for the advance of these practices. Spencer *et al.* (2018) claim that teachers develop throughout their profession by reflecting on their own teaching and students' learning with the contribution of their moral and ethical purposes. Moreover, Korthagen *et al.* (2001) support that developing an identity and a mission as a teacher, making decisions and taking actions are not things that are instantly learned. Instead, they need time to develop gradually. The findings of this study also support the relation between the development of professional identity and perceptions about PD.

Dean (2006) argues that improving the quality of teaching and learning in a school can be possible by accepting teachers as professionals and providing some degree of autonomy for their own learning and developmental process. The lack of autonomy

was one of the biggest concerns stated by the participants in terms of their PD. Turkish teachers need to be given autonomy and asked for their feedback in order that they feel responsible for their own learning and growth (Saban, 2001; Uysal, 2015; Aygün and Bostan, 2019). Teachers' personal willingness to develop and embrace an open-minded perspective for development was mentioned by ten participants of this study during the first phase. The participant teachers support the idea of having the ownership of the learning process. That is, they suggest that learning something new and participating in PD programs become more effective when the teacher shows personal interest in participating in the process. This can be seen as the autonomy of the teacher in terms of being the owner of learning process.

The majority of the teachers in the study complained about the traditional top-down approach of PD programs, which is the most commonly criticized type of PD approach (Garet *et al.*, 2001). Traditional PD approach, also called the Conventional Approach (Tanış and Dikilitaş, 2018) or Transmissive Approach (Kennedy, 2005), is a top-down method. Institutes, courses, conferences and workshops are some examples of a traditional form of PD activities, which are generally externally driven programs (Garet *et al.*, 2001; Wells, 2014). Therefore, teachers do not have a chance to decide on their learning process. Teachers state that they cannot reflect on or implement their learning in their classrooms because most PD programs do not address teachers' needs and show little relevance to teachers' previous classroom practices (Tanış and Dikilitaş, 2018; Elçiçek and Yaşar, 2016). When it comes to the participant science teachers' experiences, it was realized that teachers have been exposed to these traditional PD programs by school administrators or MONE, which is often met with lack of motivation, resistance and prejudice. Previous studies that were conducted among Turkish teachers show that top-down approach to PD causes teachers to develop negative attitudes against PD programs (Elçiçek and Yaşar, 2016; Tanış and Dikilitaş, 2018). Programs disregarding teachers' feedback are not only a waste of time but also a waste of resources. Teachers prefer a bottom-up approach, which makes them active, collaborative and reflective members of their own PD (Tanış and Dikilitaş, 2018). Although research studies show the positive influence of bottom-up approach, present system in private schools is not suitable for these type of PD activities. Except the

personal attempts for collaboration among the department members, there is no supporting mechanism or plan were expressed by participants. Reform type PD methods such as study groups, coaching, mentoring and peer observing were never mentioned by participants. School contexts with high workload, tight schedules and time restrictions prevent the development of these opportunities for teachers. The understanding of PD in Turkish education system still seems bounded with traditional methods.

The quality of the PD and IST programs in terms of content, instructor or trainer, timing, techniques and methods are the other factors that were mentioned by the participants. The comparison of data from the first and second phases shows a positive change on the implementation of different PD programs but no change on the IST programs, which are provided by MONE. However, there is a need for literature to be able to understand the current developments in teacher training and PD programs. The availability of these new programs is limited for all teachers because of the economical and regional factors, but the participants of this research study, who are teachers in reputable private schools in Istanbul, have a higher chance to attend these programs. Based on their experiences, these positive changes were recognized. However, when it comes to the national context, PD is mostly understood as the implementation of IST programs, which are the main programs to meet the needs of public-school teachers. Participant teachers' evaluations and the national literature also outline similar concerns about the IST of Turkish teachers. These common problems are (a) goal setting without consideration of teachers' PD needs, (b) insufficient content and context of PD to meet the needs of teachers, (c) lack of qualified instructors in the programs, (d) lack of budget to improve the quality of PD programs, (e) lack of motivational factors, and (f) lack of evaluation or follow-up systems (Seferoglu, 2004; Güven, 2010; Bümen, Ates, Cakar, Ural and Acar, 2012; Elcicek and Yasar, 2016; Özer, 2004; Uysal, 2012; Bayrakci, 2009). As a result, PD is still a new area open to research and development for Turkish teachers and researchers.

The second goal of this research study is to understand the change in science teachers' conceptions about their PD after eight years. It is realized that change of conceptions about PD is related to the identity of teacher, department and relationships

among the members of the department, school context and national context of the country. As a result, all of these factors will be discussed by creating links between the literature and findings of this study.

Teaching as a profession is a complex one which requires an understanding of multiple aspects to see the big picture. To be able to understand science teachers' perceptions about PD and the change in their perceptions, teachers' professional identity and the development of this identity must be addressed. Because their sense of self, decision-making and meaning-making processes determine their professional practices, beliefs, values and actions (Luehmann, 2007; Sutherland, Howard and Markauskaite, 2010), exploring identity provides a deeper understanding. Hong (2010) states that a teacher's perception of his/her classroom practices and school experiences, how he/she internalizes external conditions, how his/her teaching career changes his/her self-perception as a teacher cannot be explained by examining external factors. As a result, a teacher's definition of himself/herself as a teacher and teaching as a profession is important to investigate.

When participant science teachers were asked to define themselves as teachers, their answers led to two main findings. First, because of their science teacher identity, definitions such as 'being a researcher', 'being curious', 'being creative' and 'being universal' emerged from their expressions. Second, general definitions which can also be considered for different subject area teachers such as 'being good at content and pedagogical knowledge', 'being a good communicator', 'being open-minded', 'being hard worker' and 'being good at establishing authority' were found as common expressions. When students' science literacy and science identity are considered as two main concerns of the reform movement of science education, science teachers' identities, science teaching and learning practices are given importance along with their professional development (Parson and Bailey, 2019). Although 'being a researcher' was the most common definition which was stated by ten out of fourteen during the first phase, the other definitions which specifically show identity about science teaching were not significantly frequent. It is found that the content and pedagogical knowledge along with the feelings about profession were more common among the teachers. However, in the

second interviews, especially Nermin and Yağmur focused on the competencies of a science teacher by referring to the observation, investigation, thinking, inquiry skills and being scientifically literate and competent.

It is also found that identity is a dynamic process which changes and develops throughout the profession. Two phases of this study gave a chance to observe these changes in two different time period of teaching profession. According to Beijgaard *et al.*, (2000), teaching experience is one of the influencing factors in the development of teacher's professional identity. Thus, understanding the effect of the year of experience is only possible by comparing experienced and novice teachers. To be able to achieve this comparison, Berliner's (1998) five developmental stages, which are a novice, advanced beginner, competent teacher, proficient teacher and expert teacher, were noted in the selection of participants for the second phase. Berliner (1988) claims that there are differences between novice and expert teachers in terms of their interpretation of classroom experiences, perceptions of the importance of events, daily routines, predictions about classroom actions, judgments about typical and atypical events and evaluations about students' works and academic tasks. The findings of this study confirm Berliner's claims. While the first participant of the second phase, Nermin, showed a remarkable change in terms of her conceptions about professional identity development and PD, the second and third participant of the second phase did not go through such a big change. While Nermin, as a beginner teacher during the first phase, mostly concentrated on classroom management and content knowledge concerns, her expressions turned out to be a more in-depth and broad analysis of her profession. She expressed her change throughout the years by providing various examples from departmental factors, school context and national context. On the other hand, the change process for Yağmur and Zuhail was mostly related to the school context which includes the dynamics inside the working environment. Such things were not expressed by Yağmur and Zuhail, who were in their ninth and 15<sup>th</sup> years respectively. Since they did not go through this noteworthy period of teaching from early career to expertise, their self-definitions in the second interview were more consistent with the first ones. Both Yağmur and Zuhail addressed the importance of content knowledge, pedagogical knowledge and communication with students by developing rapport, during the first

and second interviews. They also focused on the need for professional development by outlining the ever-changing nature of science education. They pointed out the importance of scientific literacy and open-mindedness by referring to these PD attempts. However, Nermin's self-definition shows a significant difference. While she defined herself as a disciplined and responsible teacher who can talk the same language with students in the first interview, she described herself as a good observer, fast thinker, inquirer, life-long learner, passionate teacher who is competent at increasing students' curiosity to learn by establishing good relationships with students in the second interview. Nermin's case clearly shows how a beginner teacher survives and handles the multiple components of teaching by trying to create consistent classroom management responsibly. According to the review of literature by Kagan (1992) about the early career of teaching, it was concluded that early career teachers tend to be authoritarian and obsessed with classroom control to discourage misbehavior. Later it is seen how the professional identity of a teacher develops with the experience. The effect of years of experience on a teachers' competency in many areas can be seen in Zuhail's case. She describes this self-confidence and expertise in teaching with her phrase: 'If I was playing with my students before, now I am dancing with them'. She finds herself at the peak of her profession without disregarding the need for development. As a result, as Kagan (1992) stated, teachers' degree of how performance is guided by experience, how teachers come up with accurate predictions and how they concentrate on classroom practices and student learning differ depending on the developmental stages.

Besides the close relationship between perceptions about PD and professional identity, the influencing factors such as department, school context and national context are found to be highly influential. Therefore, these factors are intertwined by the participant teachers. According to the literature, another important point which is frequently expressed by teachers is the culture of development in the community (McMillan *et al.*, 2016; Wells, 2014). A collaborative culture that encourages teachers to provide feedback to colleagues, to receive constructive feedback from their colleagues and to involve in an active, sustainable learning community is highly effective on teachers' positive attitudes toward PD. In their research study, Simon *et al.* (2011) also stated that the opportunity to observe peers and be observed by them are highly val-

ued by teachers. They found that a school culture which supports peer observation and feedback is mostly successful in creating a collaborative community. These type of PD activities among the members of the community are called as reform type activities or transitional PD (Kennedy, 2005). Unlike traditional PD programs, these PD activities have a bottom-up structure and directly emerge from the needs of the teachers. However, these types of activities are found to be very rare in the case of the participants of this study. Although participants expressed a certain culture of the community, it is not more than planning the lessons for grade levels or sharing resources and materials. None of the participants, except Nermin, mentioned any example of peer observation, mentoring and coaching process. Nermin was the only teacher who mentioned this mutual collaboration during the first phase of the study. However, when it comes to the second interview, she also did not mention any type of transitional PD activities. According to results, it is noticed that private schools do not provide enough time for teachers to collaborate with colleagues for PD reasons because of the busy teaching schedules and extra duties.

Another reason for lack of peer observations, mentoring and coaching can be related to the identity of the Turkish teachers regarding self-criticism and openness to criticism. Only two teachers during the first phase addressed the importance of self-criticism for the teaching profession. However, they also claimed that Turkish teachers are not open-minded about being criticized by someone else and being able to self-criticize. On the other hand, Nermin shared her attempt for peer observation during the first interview. For example, she asked intern teachers who came to her school for observation to observe her classes and provide feedback for her. She also gave them chances to run laboratory classes to learn new strategies from them. Zuhale, the third case of the second phase, was one of those teachers who expressed her concerns about the self-criticism. She believes that teachers are the ones who claim to know everything and not flexible about criticism. However, she did not share any example from her experiences about self-criticism. Yağmur talked about criticism from a different perspective. Even though she did not refer to her self-criticism, she mentioned the criticism of her students when she planned an ordinary class hour. Since her students used to participate in her interactive and creative classes, she faced with their criticism

in case of an ordinary class hour.

On the other hand, the second reason for the lack of transitional PD activities among the Turkish teachers is related to the overwhelming working conditions of private schools. High expectations from teachers were frequently stated by the participants. It is also noticed that the seriousness of these concerns found to be increased in the second phase of the study. Even though teachers complained about the workload and insufficient time, these concerns seemed to significantly accelerate during the last eight years. It is also supported by the literature that one of the biggest barriers to PD of teachers is the limited time for self-development due to heavy curriculum, routine expectations of schools and lack of opportunities provided by schools (Altun and Cengiz, 2012; Özer, 2004). According to the results of a study designed by Altun and Cengiz (2012), teachers are aware of the connection between the school improvement and teachers' PD through strong collaboration among the teachers. However, teachers believe that limited improvement of schools, inadequate facilities, high expectations and workload prevent the development of collaborative school culture, which also negatively affects the PD of teachers. For example, Yağmur mentioned about a new attempt to apply a school-wide interdisciplinary planning system including all subject areas. She was very curious about the possibility of this but had reservations due to lack of collaboration. She also addressed time constraint, which negatively influences the time allocated for meetings. Nermin also shares the same concerns with Yağmur in terms of time constraints, stressful working conditions and workload. With the current changes in their system, Nermin talked about their responsibility to read and assess all student papers to provide feedback. She discussed how challenging it was to have enough time to live up to expectations. She worries about the fairness of her assessments because of her constantly busy mind. As a result, both Nermin and Yağmur state that it is the biggest barrier in front of their professional development and collaboration with colleagues. On the other hand, Zuhale did not specifically mention this time restrictions in the second interview. During the first interview, she shared her frustration about being a grade 12 teacher. Weekly class hours of biology subject is quite limited and high school biology teachers were teaching more than one grade level. At that time, she was teaching grade 10, 11, 12 and also two different sub-branches in grade 12. She

said that each grade level requires different preparation and particular attention, which forced them to work extra even after school. However, during the second interview, she did not mention any of these concerns. Even though the reason for the decrease in her concerns about workload and timing were not asked and identified in the second interview, since Zuhail started to work in another school after the first interview, there are some possible explanations. This might be related to various factors such as year of experience, the policy of the school about scheduling or dynamics in the department. Compared to her reactions about her previous school, her positive attitude towards the new school can explain the variance.

School, where teaching takes place, is an important context in which teachers' professional identity develops (Buchanan, 2015). According to the findings of this study, administrators have a great influence in the school context and can be a big source of motivation for teachers. During the first and second phases, administrators' role and how their attitude impact the motivation of the teachers were expressed by the teachers. Zuhail was one of the teachers who had a chance to observe two different administrative teams since she was employed in two different schools. While her expressions about administrators were highly pessimistic during the first interview, it was observed that she was optimistic in the second interview. It is also found that when teachers feel recognition of and appreciation from their administrators, they show a higher tendency to involve in PD programs and are more open to change. This culture of appreciation, collaboration and recognition is important to understand how teachers change. As Guskey (2002) mentioned, expectations and approach of the school to change have the power to shape teachers' perceptions about change. Moreover, Hamilton (2018) claims that teacher beliefs and identity interact with school context and national context, which lead to a change in teachers' pedagogical practices and belief systems.

Guskey (2002) states that PD programs are the organized efforts to cause a change in teachers' classroom practices, their attitudes and belief systems, which are all influential in student learning. However, he also claims that these change processes are not easy or rapid since trying on a new identity is not an easy and quick process.

It needs time and experience (Luehmann, 2007; Oruç, 2013). Change has the power to affect one's self-image and personal identity. Thus, a person can intrinsically develop some strategies to cope with these changes (Nias, 1989 as cited in Beijaard, Verloop and Vermunt, 2000). The reason why people negatively react to changes is that they do not readily perceive themselves in another way. This is found to be the reason for teachers' reactions when it comes to the national context of the Turkish education system. The participants evaluated the Turkish education system in various aspects such as teacher training options, curriculum development, equality among the schools and regions, budget and physical facilities.

Based on the data analysis, the theme national context led to the emergence of the sub-theme 'relation of education and politics'. Teachers are highly concerned about the power of politics over education. An education system which shows rapid and inconsistent changes in relation to the changes in politics and relies on insecurity and control adversely affects teachers' trust and belief in the system. Moreover, putting the blame on the teachers and students instead of the system itself is the biggest and the only barrier to a successful, equal and transparent education system (Çetin, 2017). According to the results of this study, teachers believe that there is continuous change but limited improvement in the Turkish education system. Eight teachers from the first phase of the study addressed frequent changes in central exams and curriculum as one of the biggest problems of their teaching and students' future. Unprofessional integration and adaptation of an international program from a different system without considering cultural and social components of the Turkish education system is noticed as the central issue of this concern.

Another sub-theme was about the gap between government and private schools. Even though the participants of this study had never experienced the conditions in a public school, they were able to compare based on their personal experiences in regional meetings or interactions with public school teachers. Only one teacher in the first phase of the study had a chance to start her profession in a state school. After transferring from a state school to a private school, she expressed her awareness about the change of the conditions in many ways. Teachers in private schools need to improve themselves

continuously to be able to survive in a highly competitive environment. Renewal of the contracts annually is a forcing mechanism for private school teachers. However, except for some unprofessional attempts of teacher evaluation in public schools, there is no consistent and constructive system of teacher evaluation in state schools. Moreover, with regard to high expectations of private schools, teachers employed there also try to provide various PD opportunities for their teachers. Unfortunately, there is still a need for further studies that will explore the gaps between public and private schools and teachers in Turkey.

### **7.1. Limitations and Implications for Future Research**

The goal of this research study is to explore the change in science teachers' conceptions about PD and IST. The qualitative case study that was designed for this aim includes two phases to understand the change during the period of eight years. Based on the limitations of the study which were outlined above, there are some recommendations for further studies which can provide additional input about the similar research topics.

This present study was designed with private school science teachers. When considering the lack of studies designed with private institutions, this study provides a contribution to the literature. As it was described in the results, there is a remarkable distinction between public and private school and public and private school teachers in many areas. As a result, trying to understand the perceptions of public-school teachers about PD would provide another perspective to explore the problem in the national context. In further research studies, a comparison between private and public-school teachers can demonstrate the distinctions in terms of opportunities, benefits and needs.

With the sharp increase in the number of private schools in Turkey after some political challenges, the situation in private schools started to show some inequities as well. Additionally, by considering the differences among the private schools, this study can include science teachers from different private schools which have inconsistent standards to meet the expectations of families from various economic status. While

the private schools with very high standards try to provide higher opportunities both for teachers and students, schools with limited opportunities have harder conditions for teachers by trying to keep the standards high just for the students and parents. This brings more challenges to teachers' life. It would be a valued contribution to see the big picture of teachers' working conditions in Turkey.

The present study is limited to provide details about the other subject areas and how their teachers experience PD in their profession. The participants in this research study were science teachers. Thus, the study only reflects science teachers' perceptions about PD. Additionally, conducting the interviews with 14 science teachers during the first phase and three science teachers for the second phase prevents the generalizations of findings for all science teachers in private schools. As a result, findings can be valid for this research study or for similar studies. Moreover, there was no other voice involve in this study such as students, colleagues of participant teachers, administrators or teacher trainers. A contribution to the literature can be made by designing this research study with teachers from different subject areas. The perception of mathematics, social studies or literature teachers about PD and IST can provide various perspectives about the current PD and IST programs in Turkish teacher training system.

Another limitation of the study was about data collection procedure. Data of this research study was collected by conducting semi-structured interviews with participants in two different time periods. Also, no observation was made in a school or class environment. Data collection procedure of this study is limited to two semi-structured interviews. Participants of the first phase were interviewed during the 2010-2011 educational year. For the second phase of the study, participants were interviewed during the 2018-2019 educational year. For this type of qualitative case study, data collection methods can be enriched by including classroom observations, reflective journals and multiple interviews in various periods. Spending more time with the participants can provide extensive information about the participants and the research area.

This study was designed with teachers from different private schools. Although this gives a chance to observe the changes among private schools, limits to study in

terms of gathering an in-depth understanding of the variety of teachers' conceptions and identity under the same school contexts. Thus, the researcher is able to gather information about the context of these schools and their impact on teachers' perception. However, designing the study with teachers from the same school can show us a different picture. Exploring teachers who work in the same national and school context would be a rich source about the identity of the teachers. As it was discussed in the review of literature, teachers react in a different way to the same situation because of their personal and professional identity. By considering the limited research about teachers' professional identity, investigating teachers from the same school would be valuable to gain in-depth information.

Finally, during the research, it was found that there is a limited number of research studies about private schools in Turkey. The studies which were designed to investigate the needs of teachers and schools or the problems in the educational system in Turkey were generally carried out in public schools with public school teachers and students. This provides limited information about the school and national context in private schools. For further research studies, exploring the various research topics in private schools can be a new area for the national literature.

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## APPENDIX A: THE CONSENT FORM-TURKISH VERSION

### KATILIMCI İZİN FORMU

**Araştırmacı:**

Ben Sezin Sağlam Karacal. Boğaziçi Üniversitesi Ortaöğretim Fen ve Matematik Alanları Eğitimi Bölümü'nde yüksek lisans çalışmamı yürütmekteyim.

**Araştırma Konusu:**

Katılımınızı beklediğim bu araştırma, tez çalışmam olup, "Türkiye'deki Fen Öğretmenlerinin, Profesyonel Gelişimlerine Bakışlarındaki Değişimi Keşfetmek" başlıklıdır.

**Görüşmenin Detayları:**

Araştırma için sizinle, yaklaşık yarım saat ile kırk beş dakika arasında sürecektir olan bir görüşme yapmak istiyorum.

**Araştırmanın Katılımcıya/Topluma Faydaları:**

Türkiye'de çalışan bir Fen Bilimleri öğretmeni olarak katılımınız, araştırmayı anlamlandırmak açısından çok önemlidir. Katılımınız Türkiye'deki hizmet içi eğitim programlarının etkisini, verimliliğini anlamak, bu programları geliştirmek için alternatif öneriler sunmak ve öğretmenlerin profesyonel gelişime bakış açılarını öğrenmek açısından değerlidir.

**Gönüllülük:**

Bu araştırmaya katılımınız tamamıyla gönüllülük esasına dayanmaktadır. Araştırmaya katılıp katılmamak tamamıyla sizin tercihinizdir. Öncesinde katılmayı tercih etmenize rağmen, ilerleyen dönemlerde katılmama kararı alabilirsiniz. Bu durumda beni bilgilendirebilir ve kararınızı paylaşabilirsiniz. Verdiğiniz karar doğrultusunda sizinle yapılan tüm görüşme ve bilgi paylaşımı araştırmanın dışında bırakılacaktır. Sormak istediğiniz tüm sorular ve diğer paylaşımlar için vereceğim iletişim bilgilerim yoluyla bana ulaşabilirsiniz. Araştırmayla ilgili detaylı bilgi almak istemeniz durumunda ulaşabileceğiniz, bu araştırmanın danışmanlığını yapmakta olan Doc. Dr. Fatih Çağlayan Mercan'ın iletişim bilgilerini de sizinle paylaşıyorum.

**Gizlilik ve Güvenlik:**

Görüşmeler sırasında kendinizle ilgili bazı kişisel bilgileri paylaşmanızı isteyeceğim. Verdiğiniz bu bilgiler tamamıyla gizli tutulacak, sadece bu araştırma için kullanılacak ve başka herhangi bir kurum ya da kuruluşla paylaşılmayacaktır. Araştırma tamamlandıktan sonra, sizden almış olduğum tüm bilgiler yok edilecektir.

### **Görüşme Sırasında Kullanılacak Yöntem ve Teknikler:**

Görüşme sırasında vereceğiniz her bilgi araştırma için büyük önem taşımaktadır. Bu sebeple, izin vermeniz durumunda, ses kayıt cihazı kullanmak istiyorum. Ses kayıt cihazı sizin izniniz olmadıkça kullanılmayacaktır. Ayrıca kaydedilen tüm görüşmeler başka bir amaçla kullanılmayacak, araştırmanın tamamlanması ile birlikte silinecektir. Yardımlarınız için şimdiden teşekkür ederim.

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### **KATILIMCI İZNİ**

Sürdürülmekte olan araştırma ile ilgili tüm bilgileri okudum. Araştırma ile ilgili, araştırma öncesinde sormak istediğim soruları sordum ve tatmin edici yanıtları aldım. Araştırmaya gönüllü olarak katılmak istiyorum. Röportajlar sırasında ses kayıt cihazı kullanılmasına izin veriyorum/vermiyorum.

Katılımcının Adı-Soyadı : .....

Katılımcının İmzası : .....

Tarih : ...../...../.....

## APPENDIX B: PHASE-1-INTERVIEW QUESTIONS-TURKISH VERSION

Görüşme saati(Başlangıç: / Bitiş: )

Tarih:

Table B.1. Röportaj 1.

|                                   |                    |
|-----------------------------------|--------------------|
| <b>Cinsiyet</b>                   | <b>KADIN ERKEK</b> |
| <b>Doğum Tarihi / Yaş</b>         |                    |
| <b>Mezun Olduğunuz Lise</b>       |                    |
| <b>Mezun Olduğunuz Üniversite</b> |                    |
| <b>Branşınız</b>                  |                    |
| <b>Deneyim Yılı</b>               |                    |
| <b>Çalıştığınız Okul</b>          | <b>ÖZEL DEVLET</b> |

### RÖPORTAJ SORULARI

- (i) Neden öğretmenlik? Öğretmen olmaya nasıl karar verdiniz?
- (ii) Şu ana kadarki deneyimlerinizden yola çıkarak, bir öğretmen olarak kendinizde güçlü gördüğünüz yanlardan bahseder misiniz?
- (iii) Yine deneyimlerinizden yola çıkarak, bir öğretmen olarak kendinizde gelişmeye açık bulduğunuz yanlardan bahseder misiniz?
- (iv) Gelişime açık olan yönlerinizi geliştirmek için planlarınız oldu mu?
  - Olduysa neler?
  - Bu planları uygulamaya geçirebildiniz mi? Evetse, şu ana kadar neler yaptınız?
  - Somut örnekler verebilir misiniz?
  - Gelecek planlarınızdan bahseder misiniz?
- (v) Sizce profesyonel gelişim ne demek?
- (vi) Şu ana kadar olan profesyonel gelişiminizi nasıl değerlendirirsiniz?
- (vii) Profesyonel gelişiminiz için en son yaptığınız çalışma nedir? Kısaca anlatabilir misiniz?

- (viii) Katıldığınız profesyonel gelişim çalışmalarının öğrencilerinizi etkilediğini düşünüyor musunuz? Öğrencilerle etkileşiminizde bir değişim oldu mu?
- (ix) Profesyonel gelişiminizde, hizmet içi eğitimlerin nasıl bir etkisi olduğunu düşünüyor musunuz?
- (x) Hizmet içi eğitimlerle ilgili ne düşünüyorsunuz?
- Neleri beğeniyorsunuz?
  - Neleri beğenmiyorsunuz?
  - Ne hissediyorsunuz?
  - Unutamadığınız bir eğitim var mı? Hangi özellikleri nedeni ile unutamadınız?
- Bu eğitimden öğrendiklerinizi uygulamaya aktardınız mı?
- (xi) Profesyonel gelişiminizi olumsuz etkileyen faktörler nelerdir?
- İç faktörler (isteksizlik, evli ve çocuklu olma vb.) dış faktörler (para, zaman).
- (xii) Eğitim sistemleri de gelişim içerisindeler. Sizce Türkiye’de ya da dünyada bu gelişimin devamı nasıl olabilir? Gelecekte nasıl bir eğitim şekli öngörüyorsunuz?

## APPENDIX C: PHASE-1-INTERVIEW

### QUESTIONS-ENGLISH VERSION

Interview Time (Start:     / End:     )                      Date:

Table C.1. Interview Questions.

|                            |                       |
|----------------------------|-----------------------|
| <b>Gender</b>              | <b>FEMALE MALE</b>    |
| <b>Date of Birth / Age</b> |                       |
| <b>High School</b>         |                       |
| <b>University</b>          |                       |
| <b>Subject</b>             |                       |
| <b>Year of Experience</b>  |                       |
| <b>School Type</b>         | <b>PRIVATE PUBLIC</b> |

### INTERVIEW QUESTIONS

- (i) Why being a teacher? How did you decide to be a teacher?
- (ii) By taking into consideration your experiences so far, could you please talk about your strengths as a teacher?
- (iii) By taking into consideration your experiences so far, could you please talk about the things that need improvement as a teacher?
- (iv) Did you have any plans to improve the things that need improvement? what do you think that you need to do?
  - If yes, what were your plans?
  - Did you achieve any of these plans? If yes, what did you do?
  - Can you provide examples?
  - What are your future plans?
- (v) What is professional development for you?
- (vi) How will you evaluate your own professional development?
- (vii) What was the last attempt that you did for your professional development? Can

you please explain briefly?

- (viii) Do you think that the professional development programs that you attend effect your students? Is there any change in your interaction with your students?
- (ix) How does in-service training affect your professional development?
- (x) What do you think about in-service training programs?
  - What do you like?
  - What don't you like?
  - What do you feel?
  - Is there any training that you cannot forget? What are the reasons which make it unforgettable? Did you apply the things that you learned from this training to your classes?
- (xi) What are the factors that affect your professional development in a negative way?
  - Internal factors (unwillingness, being married, having a child, etc.)
  - External factors (Cost, time, etc.)
- (xii) Educational systems have undergone through ongoing changes. What do you think about the future changes in Turkish educational system? What type of educational changes or reforms you expect / predict in the world or in Turkey?

## APPENDIX D: PHASE-2-INTERVIEW

### QUESTIONS-TURKISH VERSION

Görüşme saati(Başlangıç: / Bitiş: )

Tarih:

Table D.1. Röportaj 2.

|                                   |                    |
|-----------------------------------|--------------------|
| <b>Cinsiyet</b>                   | <b>KADIN ERKEK</b> |
| <b>Doğum Tarihi / Yaş</b>         |                    |
| <b>Mezun Olduğunuz Lise</b>       |                    |
| <b>Mezun Olduğunuz Üniversite</b> |                    |
| <b>Branşınız</b>                  |                    |
| <b>Deneyim Yılı</b>               |                    |
| <b>Çalıştığınız Okul</b>          | <b>ÖZEL DEVLET</b> |

- (i) Bir fen öğretmeni olarak kendinizi nasıl görüyorsunuz?
  - Bir fen öğretmenin yeterlilikleri neler olmalı?
- (ii) Bir fen öğretmeni olarak gelişiminizi desteklemek için şu ana kadar neler yaptınız?
  - İleride neler yapmayı planlıyorsunuz?
- (iii) Sizce, bir fen öğretmenin gelişimi için neler gereklidir?
- (iv) Bir fen öğretmeni olarak, aklınızda en çok kalan eğitimden bahsedebilir misiniz?
  - Katıldığınız profesyonel gelişim programlarının öğrencilerinizi etkilediğini düşünüyor musunuz? Öğrencilerin fene yönelik tutumlarında bir değişiklik oldu mu?
- (v) Profesyonel gelişiminizi etkileyen etmenler var mıdır? Varsa, nelerdir? (Örneğin iç etmenler, isteksizlik, evil olma, çocuk sahibi olma gibi. Dış etmenler, para, zaman, çalışma şartları gibi.)
  - (a) Çalışmakta olduğunuz okul, profesyonel gelişim için ne gibi olanaklar sağlıyor? Bu olanakları yeterli ve etkili buluyor musunuz?
  - (b) Zümre ile ilgili ne düşünüyorsunuz? Okulunuzda birlikte çalışma, yardımlaşma kültürü olduğuna inanıyor musunuz?

- (c) Türkiye’de fen eğitiminde, gelecekte olabilecek değişimlerle ilgili neler düşünüyorsunuz? Dünyada ya da Türkiye’de, fen eğitimi alanında, ne gibi değişim ve reform çalışmaları öngörüyorsunuz?
- (vi) Geçtiğimiz on yıla baktığınızda, fen öğretmenleri için planlanan profesyonel gelişim programlarında ve hizmet-içi eğitimlerde ne gibi değişimler gözlemliyorsunuz? Bu değişim ve gelişimi değerlendirebilir misiniz?
- (vii) Fen öğretmeni olarak, son 10 yılda siz nasıl değiştiniz?

## APPENDIX E: PHASE-2-INTERVIEW

### QUESTIONS-ENGLISH VERSION

Interview Time (Start:     / End:     )

Date:

Table E.1. Interview Questions 1.

|                            |                       |
|----------------------------|-----------------------|
| <b>Gender</b>              | <b>FEMALE MALE</b>    |
| <b>Date of Birth / Age</b> |                       |
| <b>High School</b>         |                       |
| <b>University</b>          |                       |
| <b>Subject</b>             |                       |
| <b>Year of Experience</b>  |                       |
| <b>School Type</b>         | <b>PRIVATE PUBLIC</b> |

- (i) How would you describe yourself as a science teacher?
  - What should be the competencies of a science teacher?
- (ii) What did you do so far to support your growth as a science teacher?
  - What are your future plans?
- (iii) What do you think that a science teacher should do to improve?
- (iv) As a science teacher, can you please talk about the training that you remember the most?
  - Do you think that the professional development programs that you attend has an impact on your students? Is there any change on their attitude toward science class?
- (v) Are there any factors that affect your professional development? If yes, what are they? (For example, internal factors such as unwillingness, being married, having a child, etc. External factors, such as money, time, working conditions, etc.)
  - (a) What type of opportunities does your school provide to teachers? Do you find these opportunities enough and sufficient?
  - (b) What do you think about department? Do you have a culture of collabora-

tion in your school?

- (c) What do you think about the possible changes in science education in Turkey in the near future? What type of changes or reform movements about science education do you predict in Turkey and in the world?
- (vi) When you look at the last decade, what kind of changes do you observe about the PD and IST programs that have been planned for teachers? Could you evaluate these changes?
- (vii) How do you change as a science teacher in the last ten years?