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Comparison of "Learning," "Teaching," and "Teacher" Metaphors of Pre-Service and In-Service Science Teachers

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Abstract
The study aims to examine science teachers' and pre-service science teachers' metaphors about learning, teaching, and teacher concepts and compare their metaphors. The study is designed according to phenomenology research design. The study participants consisted of 62 in-service science teachers working in government schools and 45 pre-service science teachers attending a government university's science teaching department. The data was collected during the 2017-2018 academic year. The participants were requested to fill in the blanks of three statements: "Learning is like…..; because …….", "Teaching is like…..; because…….", "Teacher is like….; because……". The results displayed that teachers and pre-service teachers generally have different meaning categories. While teachers expressed the concept of "teacher," they took their own experiences and professional lives into consideration since they are actively working as teachers. On the other hand, pre-service teachers expressed their own teachers and their behaviors while defining the concept of "teacher." Similarly, when we take a look at the results related to the concept of "student," while teachers started off with the children they taught, pre-service teachers talked about their own experiences since they are students.

Keywords: Metaphor, Learning, Teaching, Teacher, Pre-Service Science Teacher, In-Service Science Teacher

1. Introduction

People interact with the world and create image schemas, and construct knowledge through their experiences (Amin, Jeppsson, &Haglund, 2015). Lakoff and Johnson (1980, 1999) developed conceptual metaphor theory to explain this construction. According to this theory, we create our conceptual system through our experiences with our environment. According to some researchers (Lakoff and Johnson, 1980; Martinez, Sauleda, &Guenter 2001), these schemas and knowledge constructs are structured through metaphorical relationships. With these schemas, people understand abstract concepts. With metaphorical relations, people can explain daily realities and experiences (Lancor, 2014). According to Wertsch (1985) and Lakoff and Johnson (1980), metaphors influence our understanding and relation with our environment. Metaphors can be considered mental constructs, and

everyone lives by their metaphors in daily life and reflect people's perceptions, thoughts, and actions (Saban, 2006). When we facea new situation, we try to understand this with the knowledge we have already acquired and try to conceptualize it by dividing it into pieces and selecting the important ones (Lancor, 2014). Shortly, metaphors underline certain aspects of abstract concepts and put them forward. According to Zhao, Coombs, and Zhou (2010), metaphors draw a frame around our experiences. With metaphors, abstract concepts became more familiar, understandable, and straightforward. It can be stated that metaphor is psychological modeling of the experience and helps us develop new conceptual knowledge forms (Zhao, Coombs, and Zhou, 2010). Metaphors reveal the underlying conceptions about our experiences. They are abstract ideas stated in concrete terms (Lancor, 2014).

When the literature is analyzed/reviewed, it is seen that various researchers describe metaphor in different ways. According to Gallagher (2004), metaphor is a phrase used for making a mental comparison between a well-known thing and a less well-known one. It is a linguistic representation of a real-life experience. Ibanez and Hernandez (2011) stated that a metaphor is a mapping system in which people connect the concepts they want to understand. Singh (2010) suggested that metaphors help to understand an abstract concept by concretizing it. A metaphor has the power to describe experiences that are novel, abstract, and difficult to explain (Fenech, Harrison, Press, & Sumsion, 2020). According to Thomas and McRobbie (2001), a metaphor helps conceptualize complex events with familiar concepts related to prior experiences and knowledge. Botha (2009) defines metaphor concerning education as explaining some unfamiliar educational concept, event, or action with a familiar term. She gives examples as "teachers are guides, learning is an uphill battle."

Metaphors have various roles both in daily life and in scientific research. In the field of education, the functions of metaphors have been expressed by multiple researchers. According to Botha (2009), some of the roles of metaphors are constructing the teaching process (e.g., teaching as orchestrating, conditioning, guiding, or training), functioning didactically to teaching, qualifying the teaching actions of the teacher (e.g., pottery, gardening, artistry, a sculptor, Gardener), reflecting the learning process (e.g., sponge, filter and strainer). Saban (2006) listed some of the functions of metaphors as "Metaphor as a blueprint of professional thinking," "Metaphor as an archetype of professional identity," "Metaphor as a medium of reflection."

According to Martinez, Sauleda, and Guenter (2001), the metaphors formulated for teaching concepts can be used to understand teachers' professional thinking. Similarly, Carter (1990) stated that metaphors help to know how the teachers perceive their work. Connelly, Clandinin, and He (1997) and Zhao (2009) see metaphors as sources that explain teachers' feelings and thoughts about their teaching. With the help of metaphors, teachers' opinions about their professional development can also be learned. For example, Tait-McCutcheon and Drake (2016) studiedteachers' relationship with professional learning and development through a jacket's metaphor. They stated that the use of the metaphor reflects teachers' general perceptions of PLD. The findings of the research reveal a disadvantageous relationship between teachers and their professional learning and development. Similarly, Pinnegar, Mangelson, Reed, and Groves (2011) studied how pre-service teachers position themselves in their future business life, theexpectations they hold for students, and the implications these have for teacher education.

Studies show a lot of information about students' demographic data in education faculties, but not many details on how pre-service teachers position themselves about their teaching profession (Lay, Pinnegar, Reed, Wheeler, & Wilkes, 2005). According to Holt-Reynolds (1992), obtaininginformation about how pre-service teachers position themselves while receiving teacher training can help predict their teaching behavior when entering their profession in the future. Pre-service teachers' personal stories and understanding of Learning and Teaching can influence their participation and pedagogical practice decisions during teacher education. Knowing these issues will help education faculties prepare courses for pre-service teachers in teacher training programs (Pinnegar, Mangelson, Reed, & Groves, 2011). Studies show that knowing how pre-service teachers position themselves in their professional careers as they enter a teacher training program will train them to be better teachers (Bullough& Stokes, 1994). According to Olsen (2008), determining pre-service teachers' metaphors about teaching, their beliefs about learning and the teacher, and their beliefs about their identity will help with the

subject. Marshall (1990) stated that determining and investigating metaphors can help us understand teachers' professional thinking. Through metaphors, teachers display their teaching approaches, understanding of learning, articulate their professional identity, roles in the classroom, and their relations with the students (Zhao 2009; Zhao and Huang 2008; Martinez, Sauleda, & Guenter 2001).

Additionally, Bullough and Stokes (1994) stated a strong connection between metaphors related to teaching and teachers' behaviors. The richer and conceptually complex teachers' metaphors about teaching, the more diverse learning environments they can prepare for their students (Pinnegar, Mangelson, Reed, & Groves, 2011). Tobin (1990) and Tobin and La Master (1995) stated that when the metaphors of newteachers are uncovered, it can lead to a radical change in teaching practices. By examining teachers' metaphors, what they think about their work can be learned, and their professional development can be analyzed.

When considered in this context, it is important to analyzeboth the metaphors of teachers and pre-service teachers about various learning concepts. Within the scope of the study, the metaphors of science teachers and pre-service science teachers about learning, teaching, and teacher concepts were examined. The metaphors of teachers about mentioned concepts werecompared with the metaphors of pre-service teachers. Teachers' metaphors about the concept of learning will reveal their thoughts on how learning takes place. Simultaneously, their metaphors about teaching will reflect their learning approaches and give information about the teaching methods they use. Their metaphors about the concept of teachers will reveal their perceptions about their professional identity.

On the other hand, before starting their professional life, pre-service teachers' metaphors about the mentioned concepts will reveal how they perceive themselves as teachers and their approaches to the learning process. Comparing the metaphors of teachers and pre-service teachers is essential in reaching the metaphors created due to experience with the ones made during the teacher education process and interpreting the differences. As a result of the comparison of the metaphors, the situation can be evaluated, and suggestions can be made to create teacher perception in teacher education.

2. The Aim of the Study

The study examines science teachers' and pre-service science teachers' metaphors about learning, teaching, and teacher concepts. It aims to understand how science teachers and pre-service science teachers perceive learning, teaching, and teacher concepts and compare the metaphors of in-service teachers and pre-service teachers. The study aims to contribute to existing research by analyzing and comparing pre-service and in-service teachers' metaphors about some essential concepts in education. The study is designed by considering the "Cognitive theory of metaphor" developed by Lakoff and Johnson (1980). The research questions are given below guided the research:

1. What metaphors do pre-service science teachers use to describe the concept of "learning"?
2. What metaphors do pre-service science teachers use to describe the concept of "teaching"?
3. What metaphors do pre-service science teachers use to describe the concept of "teacher"?
4. What metaphors do in-service science teachers use to describe the concept of "learning"?
5. What metaphors do in-service science teachers use to describe the concept of "teaching"?
6. What metaphors do in-service science teachers use to describe the concept of "teacher"?
7. What conceptual themes can be constructed through these metaphorical images?
8. What are the differences between the metaphorical themes of pre-service and in-service teachers.

3. Method

3.1. Design of the Study

A qualitative research approach is employed in this study. The study is designed according to phenomenology research design. Phenomenology investigates how people's minds work, understand and perceive the events, and

transfer their experiences to explore how people understand, sense, and transfer their experiences (Patton, 2014; Ekici, 2016). Through metaphors, we can understand the mental structure of individuals about abstract concepts. Therefore, in terms of exploring participants' metaphors about the concepts of learning, teaching and teacher, phenomenology research design suits the study's aim.

3.2. The Participants

The study participants consisted of62 in-service science teachers working in government schools and 45 pre-service science teachers attending a government university's science teaching department in Turkey.

Table 1: Distribution of the participants

	N	**f %**
In-service science teachers	62	57.94
Pre-service science teachers (senior year)	45	42.06
Total	**107**	**100**

Table 1 displays that in-service science teachers constituted 57.94 % of the sample group,whereas pre-service science teachers attending senioryear in science education constituted 42.06%. The data was collected during the 2017-2018 academic year using the data collection tool given below.

3.3. Data Collection Tool

The participants were provided with a form consisting of three statements. The first statement is "Learning is like…..; because …….", the second statement is "Teaching is like…..; because…….", the third statement is "Teacher is like….; because……". The participants were requested to fill in the blanks. The researchers prepared the statements through literature research and expert views.

3.4. Data Analysis

The forms administered to the participants are numbered, clearing invalid and inappropriate concepts. The data is analyzed with content analysis which consists of five stages.The analysis is conducted according to the stages followed in Saban, Koçbeker, and Saban's (2006) study. The steps of the data analysis are given below:

Stage 1: Naming/Labeling.
In the first stage, the names of the metaphors are coded, such as "gardener,""light,""water," etc. In-service science teachers formulated 176 metaphors, and pre-service science teachers developed 129 metaphors, making a total of 35 metaphors in the study.

Stage 2: Sorting (clarification and elimination) stage.
In the second stage, the raw data is examined. The metaphors are grouped according to their similarities and differences. At this stage, some of the statements producedby the participants are eliminated since they are poorly structured. The eliminated statements contain no metaphors or contain a metaphor but don't have any rationale. They contain nonsense metaphors or metaphors irrelevant to the selected concepts.

Stage 3: Categorization.
The metaphors formulated by the participants and their explanations to these metaphors are examined and categorized. The categories are determined according to the dominant features stated in these explanations (Güveli et al. l, 2011; Çağlar Karapınar, 2017). As a result of the inductive analysis, themes areidentified. The metaphors aregrouped under the themes in which they are best presented.

Stage 4: Establishing the inter-rater reliability rate.
The consistency of the coding system was assessed by inter-rater reliability. In this regard, the researchers, an outside expert, worked and grouped the metaphors into the themes. Miles and Huberman's (1994) formula (i.e., Reliability = Agreement / Agreement + Disagreement) was used to estimate the inter-rater reliability rate (Baltacı, 2017). The Miles-Huberman rate calculated is as 0.93. According to Miles and Huberman (1994), the final inter-coder agreement rate in qualitative data analysis should approach or exceed 90%. The places of the metaphors changed according to the final decisions.

Stage 5: Analyzing the data quantitatively.
The frequencies (*f*) and percentages (%) of the metaphors and the categories are calculated and displayed in the tables.

4. Findings

In this section, the metaphors of the participants related to the learning, reaching, and teacher concepts are displayed. The metaphors developed by the participants were categorized under the themes, and they are given as tables. The metaphors of the in-service science teachers and pre-service science teachers are shown separately.

4.1. The Findings Obtained From In-Service Science Teachers

Table 2: In-service science teachers' metaphor categories related to the "learning" concept

Category	Metaphors	N	f%
Learning as a beneficial action	Enlightenment (2), Water (1), Spring (1), Lungs clear the blood (1), Benefit (1), Computer (1), Nurture (1), Rain (1), Sun (1), Shaping (1), A treasure that broadens the horizon (1), Light (1)	13	2.03
Learning as a cumulative progress	Tree (2), Path (1), Construction (1), Earth (1), Extensive library (1), Treasure (1), Life (1), Snowslide (1), Fire (1)	10	6.95
Learning as a need	Eating (4), Wanting (1), Oxygen (1), Vital requirement (1), Thirst (1), Water (1)	9	5.25
Learning as a labor-intensive action	Science (1), Newly discovered invention (1), Reaction (1), Pickling(1), Equation (1), Surgery (1), Field (1), Factory (1)	8	3.56
Learning as a continuous action	Eternity (2), Life (2), Ocean (2), Socks (1), Rain (1)	8	3.56
Other	Game (2), A broken glass full of Water (1), Shopping (1), Fire (1), Sparkle (1), Sieve (1), Appetite (1)	8	3.56
Learning as a feeling	Serenity (1), Passion (1), Love (1)	3	5.09
Total		**59**	**100**

Table 2 displays the metaphors formulated by in-service science teachers about the "learning" concept. According to the meanings attributed by in-service science teachers, the formulated metaphors following the

analyses are grouped under seven categories according to the meanings attributed by in-service science teachers. The categories display that in-service science teachers developed positive metaphors about the "learning" concept. When Table 2 is reviewed, it is seen that some metaphors (such as water, rain, life, fire) are grouped under separate categories. For example,the "water" metaphor is both located under the "Learning as a beneficial action" and "Learning as a need" categories; the rain metaphor is both located under the "Learning as a beneficial action" and "Learning as a continuous action" categories. This is because while formulating, in-service science teachers attributed different meanings to the same metaphor.According to Table 2, the most mentioned category is "learning as a beneficial action";the least formulate done is the "learning as a feeling" category.Below are the explanations of teachers for the metaphors for each category are given.

1. *Learning as a beneficial action*

Some of the metaphors in this category are enlightenment, water, spring, nurture, and rain. Some of the metaphors and teachers' explanations are as follows: Enlightenment: "*It eliminates illiteracy and underdevelopment* (S_2)."Water: "*The first power that will crack the seed and reveal its potential comes from water* (S_3)."Spring: "*Spring is renewal (*S_7).Sun: "*A person with knowledge shines a light around him like the sun* (S_{44})."Shaping: "*As you learn, you change* (S_{51})."Light: " *The more you learn, the more you become enlightened* (S_{61})."

2. *Learning as a cumulative progress*

Some of the metaphors in this category arepath, Earth, treasure, and life. Some of the metaphors and teachers' explanations are as follows:Earth: "*You learn how to get the best yield by cultivating the earth over time (*T_8*)*."Extensive library: "*There are many different ways, and everyone learns on their own (*T_{10}*)*."Snowslide: " *Curiosity and willingness to learn increase as you learn (*T_{27}*)*."Tree: " *the number of the branches increases, it becomes more complex (*T_{53}*)* (S_{53})."Fire: "*The more information you give, gets bigger* (S_{55})."

3. *Learning as a need*

The most formulated metaphor in this category is "eating."Besides, some of the less mentioned metaphors are wanting, oxygen, thirst, and water. Some of the metaphors and teachers' explanations are as follows: Eating: "*Even if we are full up, it is still a requirement* (S_{17})." Oxygen: "*Even if we are full up, it is still a requirement* (S_{28})."Thirst: "*You want to drink water whenever you need; you want to learn whenever you need it* (S_{42})."

4. *Learning as a labor-intensive action*

Some of the metaphors in this category are science, reaction, pickling, equation, and surgery. Some of the metaphors and teachers' explanations are as follows: Science: "*Everything starts with curiosity* (S_9)"."Pickling: "*It requires a process* (S_{35})."Equation: "*If an item is missing, the result may be wrong* (S_{38})."Surgery: "*If you are not sensitive, it may harm the child* (S_{46})."Field: " *You get what you plant* (S_{48})."

5. *Learning as a continuous action*

The metaphors most mentioned in this category are eternity, life, and ocean. Besides, the less mentioned metaphors are socks and rain. Some of the metaphors and teachers' explanations are as follows: Eternity: "*It has neither beginning nor end* (S_1)."Rain: "*It never ends* (S_{37})."Life: "*It continues lifelong* (S_{40})."Ocean: "*We learn a new knowledge every day* (S_{50})."Sucks: "*The more you rip it out, the more it will come* (S_{56}).

6. *Other*

Some of the metaphors in this category are game, shopping, fire, sparkle, and filter. Some of the metaphors and teachers' explanations are as follows: Fire: "*One sparkle is enough for the student to learn* (S_{29})."Game: "*It is not*

important what you teach but how you teach (S_{41})."Sparkle: "*If the love of learning ignites, it will grow bigger and bigger* (S_{52})."

***7.** Learning as a feeling*

The metaphors in this category are peace, passion, and love. The metaphors and teachers' explanations areas follows: Serenity: "*The more you learn, the more peace fills you* (S_{25})."Passion: "*As the things learned increase, the desire to learn increases* (S_{33})."Love: "*It becomes easier and enjoyable when you love* (S_{34})."
The metaphors and teachers' explanations are as follows: Serenity: "*The more you learn, the more peace fills you* (T_{25})." Passion: "*As the things learned increase, the desire to learn increases* (T_{33})." Love: "It becomes easier and enjoyable when you love to learn (T_{34})."

Table 3: In-service science teachers' metaphor categories related to the "teaching" concept

Category		**Met.N**	**f%**
Teaching as a teacher's work of art	Shaping (2), Art (2), Computer environment (1), Smelling flower (1), Gardener (1), Dig a well with a needle (1), A secret weapon (1), Attention (1), Architecture (1), Earth (1), Film (1), Arboriculture (1), Theater (2), Writing a book (1), Imagine (1), Wave (1), Mother (1), Cake (1), Eggplant kebab (1), Agriculture (1), Patience (2), Flying of a bird (1), Sculpting (1), Tree (1)	28	47.46
Teaching as a beneficial action	Art (2), Seed (2), Watering the seeds (2), Virtue (1), Fruit (1), Capillaries (1), Love (1), Thunderbolt (1), Share (1), Technology (1), Public beach (1), Harvest(1), Happiness (1)	16	27.12
Teaching as a guiding action	Light (7), Guiding (2), Liberating the individual (1), Driving (1)	11	18.4
Other	Something that cannot be forced (1), Love (1), Game (1), Enthusiasm (1)	4	6.78
Total		**59**	**100**

Table 3 shows the categorical form of the metaphors formulated by in-service science teachers. The metaphors are collected under four categories. The categories display that in-service science teachers formulated positive metaphors about teaching. When Table 3 is examined, it is seen that the art metaphor falls under both the "Teaching as a teacher's work of art" category and the "Teaching as a beneficial action" category. This is because in-service science teachers attributed different meanings to the same metaphor. According to Table 3, most of the metaphors related to the "teaching" concept take part in the "Teaching as a teacher's work of art" category.Theexplanations of teachers for the metaphors for each category are given below.

1. *Teaching as a teacher's work of art*

The most frequently mentioned metaphors in this category are "shaping" and "art." Besides, some of the less mentioned metaphors are "attention," "architecture," "earth," and film. Some of the metaphors and teachers' explanations are as follows:"Tree": "*It is necessary to wait patiently for it to bear fruit* (S_{13})."Patience: "*There is nothing difficult like teaching* (S_{15})."Gardener: " *You will get outputs according to how you take care of the students and how you shape them* (S_{21})."Dig a well with a needle: "*the more you dig, the harder you get, but the deeper you go, the more you reach the goal* (S_{22})."Attention: " *If we are not careful, we can transfer misguided ideas and information* (S_{24})."Architecture: "*The more aesthetic is the act of teaching, the more conscious generation grows* (S_{28})."Sculpting: "*Putting the students in a nice shape is done by teaching* (S_{30})." Film: "*If it is done well in teaching like making a movie, a beautiful work will come out*(S_{32})."Arboriculture: "*It will be like how you cultivate it (S_{34})."*Art*: "Every art requires craft*(S_{37})." Theater: "*You applaud the achievements of the*

people you have raised (S_{40})."Writing a book: "*You reflect your life to the lives of your characters*(S_{41})."Imagine: "*We can teach as differently as we can imagine* (S_{42})."Wave: "*It provides earnings in every dimension like the waves produced by a stone thrown into the sea* (S_{43})."Mother: "*It requires sacrifice and volunteering against all kinds of difficulties* (S_{44})."

2. *Teaching as a beneficial action*

The most frequently mentioned metaphors in this category are art, seed, and watering the seeds. Besides, some of the less mentioned metaphors are virtue, fruit, capillaries, and love.Some of the metaphors and teachers' explanations are as follows: Art: "*The teacher should constantly improve himself/herself about his profession* (S_2)."Love: "*The more you raise, the more you become happy* (S_{16})."Seed: "*It shows its benefits when the time comes* (S_{27})."Thunderbolt: "*Where it falls matters. If it falls to a suitable place, it may work* (S_{36})."Sharing: "*It increases with sharing* (S_{39})." Technology: "*It always renews* (S_{45})."Public beach: "*Everyone should be able to benefit from it* (S_{49})."Watering the seeds."C*ompletely different flowers grow from seeds that we irrigate with the same water"* (S_{52}).

3. *Teaching as a guiding action*

The most mentioned metaphor in this category is "light." In addition, the less mentioned metaphors are "guiding,""liberating the individual," and "driving." Some of the metaphors and teachers' explanations are as follows: Light: "Life is unthinkable without light (T_3).", "It is like enlightenment, it dissipates the darkness (T_{10})." Guiding: "It is necessary to guide students who are willing to learn (T_{19})." Driving: "It is necessary to reach the destination in a healthy way (T_{35})."

4. *Other*

The metaphors in this category are "Something that cannot be forced"(1), "Love,""Game," and "Enthusiasm."Some of the metaphors and teachers' explanations are as follows: Game: "*It is repeated as it gets pleasure* (S_{56})."Enthusiasm: "*enthusiasm increases as you provide feedback*(S_{62})."

Table 4: In-service science teachers' metaphor categories related to the "teacher" concept

Category		Met.N.	f%
The teacher as a mentor	Candle (7), Lighthouse (6), Sun (2), Guide (2), Map (1), Shepherd (2), Mother (2), Unmarried parent (1), Miniaturist (1), Book (1), Love (2), Pole star (1), Signs on the road (1)	28	48.28
The teacher as a helpful person	Tree (3), Mother (2), Gardener (2), Meaning (1), Bee (1), Lifeless mannequin(1), Showman (1), Sand (1), Heart (1), Morality (1), Flag (1), Wind (1), Protector (1), Food (1), Mountain (1), Farmer (1), Mirror (1), Sculpture (1), Air (1), Well (1), Earth (1)	25	43.10
Other	Patience (1), Slave (1), Toy (1), Everything (1), Pierced bottle (1)	5	8.62
Total		**58**	**100**

Table 4 shows the categorical form of the metaphors produced by in-service science teachers. The metaphors are collected under three categories. When the categories are examined, it is seen that in-service science teachers developed positive metaphors about the "teacher" concept. When Table 4 is reviewed, it is seen that the metaphor of mother is under both the categories of "The teacher as a mentor" and "The teacher as a helpful person." This is due to the fact that science teachers attributed different meanings to the same metaphor while

formulating it. In addition, according to the table, the most mentioned category is "the teacher as a guide."The explanations of in-service science teachers for the metaphors for each category are given below.

1. *The teacher as a mentor*

The most frequently mentioned metaphors in this category are "candle" and "lighthouse" metaphors. Besides, some of the less mentioned metaphors are "guide", "map", "book", and "love". Some of the metaphors and teachers' explanations are as follows: Candle: "*He risks finishing himself for the sake of creating a brighter future* (S_{12})."Lighthouse: "*In the endless darkness, it guides the way* (S_{39})."Guide: "*It doesn't just show what to do, it guides* (S_{10})."Sun: "*It enlightens with its energy, gives life* (S_3)."Unmarried parent: "*From the moment you graduate, you have many children* (S_8)."Miniaturist"*shapes and works for his students* (S_{25})."Book: "*As books expand the horizons, the teacher widens the horizons* (S_{32})."Love: "*He continues to work even if he is not reciprocated* (S_{44})."

2.*The teacher as a helpful person*

The most frequently mentioned metaphors in this category are tree, mother, and gardener metaphors. Besides that, some of the less mentioned metaphors are bee, lifeless mannequin, showman, and sand. The metaphors and teachers' explanations are as follows: Tree: "*As a tree grows a fruit, a teacher grows a student* (S_{33})."Mother: "*She is endlessly compassionate and full of compassion like a mother* (S_9)."Gardener: "*he harvests what he plants* (S_{58})."Flag: "*As long as it lives, the generations grow well, the state will remain* (S_{27})."Air: "*It is needed in all areas of life* (S_{55})."Well: "*The bottom of the knowledge is invisible* (S_{57})."Earth: "*nourishes people throughout life* (S_{61})."

3. *Other*

The metaphors of this category are patience, slave, toy,everything,and pierced bottle. The metaphors and teachers' explanations are as follows: Patience: "*We must always be patient and sympathetic* (S_{14})."Slave: "*Everyone (parents, students, administrators) blames him* (S_{16})."Toy: "*He becomes a toy to everybody to have fun every day* (S_{17})."

4.2. The Findings Obtained From Pre-Service Science Teachers

Table 5: Pre-service science teachers' metaphor categories related to the "learning" concept

Category		N	f%
Learning as an endless action	Life (7), River (2), Ocean (2), Habit (1), Eternity (2), A new world (1), Universe (1), Technology (1)	17	39.53
Learning as a beneficial action	Accumulation (2), Medicine (1), Fruit tree (1), Conscious person (1), Exclusivity (1), Seed (1), Happiness (1), Shaping (1)	9	20.93
Learning as a labor-intensive action	Raising a child (1), Food (1), Load(1), Construction (1), Lego toys (1), Seed (1), Climbing the mountain (1), Flower (1)	8	18.60
Other	Furniture (1), Subconscious (1), Writing (1), Computer memory (1), Toy (1)	5	11.63
Learning as a basic need	Eating (3), Water (1)	4	9.30
Total		**43**	**100**

Table 5 shows the categorical form of the metaphors produced by pre-service science teachers. The metaphors are collected under five categories. When the categories are examined, it is seen that pre-service science teachers formulated positive metaphors about learning. When Table 5 is reviewed, it is seen that the seed metaphor is both under the "Learning as a beneficial action" and "Learning as a labor-intensive action" categories. This situation arises from the fact that pre-service science teachers attributed different meanings to the same metaphor while formulating it. In addition, the most mentioned category is "Learning as an endless action," and the least mentioned category is the "learning as a basic need" category. The explanations of pre-service science teachers for the metaphors for each category are given below.

1.*Learning as an endless action*

The most mentioned metaphor in this category is the metaphor of life.Besides that, some of the less mentioned metaphors are river, ocean, habit, and universe. The metaphors and teachers' explanations are as follows: River: "*As water flows, it flows, and its continuity never ends* (S_{340})." Ocean: "*It has an endless power* (S_{343})."Habit: "*People want to learn as they learn* (S_{345})."Eternity: "*learning continues lifelong* (S_{346})."Life: "*It is a process that continues throughout our life* (S_{351})."A new world: *"You want to discover, find and know new information as you learn* (S_{357})."Universe: "*it is an infinite loop* (S_{359})." Technology: "It constantly improves (S_{365})."

2. *Learning as a beneficial action*

The most mentioned metaphor in this category is the "accumulation" metaphor. Besides that, some of the less mentioned metaphors aremedicine, seed, happiness, and shaping. The metaphors and teachers' explanations are as follows: Medicine: "*People become happy as they learn true information* (S_{341})."Fruit tree: "*There is also a product in the fruit tree* (S_{348})."Accumulation: "*He accumulates what he learns in himself and applies it in situations encountered* (S_{349})."Conscious person: “The more learning there is, the more a person is knowledgeable (S_{370}).” Exclusivity: "*When you learn something, you make a difference to other people* (S_{371})."Seed: "*It adds something new to students and people*(S_{373})."Happiness: "*The more you learn, the happier you are* (S_{374})."Shaping: "*We are shaped through what we learn* (S_{378})."

3. *Learning as a labor-intensive action*

Some of the metaphors of this category are food, load, construction, and seed.The metaphors and teachers' explanations are as follows: Raising a child: "*It takes patience, curiosity, and attention* (S_{336})."Food: "*It doesn't come easily. It takes time to happen, and there is a process of digestion after eating* (S_{338})."Load: “You need to carry knowledge with you at all times? (S_{350}).” Construction: "*It is built on the existing knowledge* (S_{352})." Lego toys: "*You add something on top of the existing ones and create different things* (S_{361})."Seed: "*Learning sprouts when it is fully realized* (S_{364})."Climbing the mountain: "*each step is a little more difficult* (S_{369})." Flower: "*Everything will be better as you take to water like knowledge* (S_{375})."

4. *Other*

The metaphors of this category are furniture, subconscious, writing, computer memory, and toy.The metaphors and teachers' explanations are as follows: Furniture: "*If not used, it will not be useful* (S_{339})."Subconscious: "*unforgettable, it always comes out somewhere* (S_{356})."Writing: "*The writing is permanent and not forgotten. Learning is also permanent* (S_{366})."Computer memory: *Learning combines new information and old information. As a result, a brand new concept, knowledge, emerges* (S_{368})."Toy: "*You play whenever you want. Whenever you want, you are open to Learning* (S_{372})."

5. *Learning as a basic need*

The metaphors of this category are eating and water. The metaphors and teachers' explanations are as follows: Eating: "*Eating is a need in every moment of our lives* (S_{335})."Water: "*If we are not careful, it may drain away* (S_{342})."

Table 6: Pre-service science teachers' metaphor categories related to the "teaching" concept

Category		Met.N.	f%
Teaching as a labor-intensive action	A high-quality life (2), Bricks (1), Lace knitting (1), Music (1), Patience (1), Puzzle (1), Cooking a complicated meal (1), Baby care (1), Growing saplings (1), Being Dynamo (1)	11	25.58
Teaching as a teacher's work of Art	Tree (1), Oxygen (1), A shining piece of iron (1), Responsibility (1), A design (1), Navigation (1), Vehicle (1), Captain (1)	8	18.60
Teaching as a pleasurable action	Peace (2), Water (2), Watering Plants (1), Fan fair (1), Eating (1)	7	16.28
Teaching as a beneficial action	Guidance (1), Stack of knowledge (1), Vaccine (1), Documentary (1), Plant (1), Bee (1)	6	13.95
Teaching as an endless action	Life (2), Water (2), Eternity (1),Factory(1)	6	13.95
Other	Foreigner (2), Lego (2), Speaking to someone far away (1)	5	11.63
Total		**43**	**100**

Table 6 shows the categorical form of the metaphors produced by pre-service science teachers. The metaphors are collected under six categories. When the categories are examined, it is seen that pre-service science teachers have formulated positive metaphors about teaching. When Table 6 is reviewed, it is seen that the water metaphor is both under the "Teaching as a pleasurable action " and " Teaching as an endless action " categories. This situation arises from the fact that pre-service science teachers attributed different meanings to the same metaphor while formulating it. In addition, the most mentioned category is "Teaching as a labor-intensive action," and the least mentioned category is the "other" category. The explanations of pre-service science teachers for the metaphors for each category are given below.

1.*Teaching as a labor-intensive action*

The most mentioned metaphor in this category is the "ahigh-quality life" metaphor. Besides that, some of the less mentioned metaphors arebricks, music, patience, and puzzle. The metaphors and teachers' explanations are as follows: A high-quality life: "It is easy to desire this type of life, but it is as difficult to apply(S_{335})."Bricks: "A building is constructed by bringing them together (S_{338})."Lace knitting: "by knitting small pieces and you get a whole (S_{339})." Music: "We teach according to the notes (S_{340})."Patience: "Nothing happens without patience (S_{343})."Puzzle: "Mind, logic, and patience are needed to assemble each piece (S_{356})."Cooking a complicated meal: "Teaching takes patience and effort (S_{357})."Baby care: "It is done with care, compassion, and discipline (S_{359})."Growing saplings: "It takes patience, labor, and effort (S_{360})."Being a Dynamo: "You have to be self-powered and always make an effort for others to learn (S_{378})."

2.*Teaching as a teacher's work of Art*

Some of the metaphors of this category are tree, oxygen, responsibility, and vehicle. The metaphors and teachers' explanations are as follows:Tree: "How you cultivate it will go in that direction(S_{341})."Oxygen: "The teacher gives it to his students(S_{342})."A shining piece of iron: "It is teaching that shines iron(S_{344})."Responsibility: "It is

necessary to be comfortable in conscience while teaching to the student (S_{345})."A design: "It is the process of teaching the unknown from the very beginning (S_{347})." Navigation: "redirects (S_{352})."Vehicle: "You adjust the throttle and steering wheel(S_{363})."Captain: "You teach whatever you want to teach, how you want to teach (S_{367})."

3. *Teaching as a pleasurable action*

The most mentioned metaphor in this categoryispeace and water. Besides that, some of the less mentioned metaphors arewatering plants, fan fair, and eating.The metaphors and teachers' explanations are as follows: Watering Plants: "*Like watering plants, it gives people pleasure and happiness* (S_{353})." Peace: "*There is nothing better than teaching* (S_{358})." Water: "The student Drinks as you give it (S_{371})." Fan fair: "Children learn by having fun (S_{372})." Eating: "You get pleasure as you taste it (S_{379})."

4. *Teaching as a beneficial action*

The metaphors of this category areguidance, stack of knowledge, vaccine, documentary, plant, and bee. The metaphors and teachers' explanations are as follows: Guidance: "The more they learn, the more they move on the right path (S_{349})." Stack of knowledge: "He always seeks to give something to the student (T_{351})." Vaccine: "It is like teaching and vaccinating knowledge to someone (S_{354})." Documentary: "In them, people gain something in different ways (S_{370})." Plant: "Something is gained by teaching (S_{373})." Bee: "As a bee takes pollen from a flower, students get knowledge with teaching (T_{375})."

5. *Teaching as an endless action*

The metaphors of this category are life, water, eternity, and factory. The metaphors and teachers' explanations are as follows: Eternity: "One should always teach something (S_{337})." Life: "It lasts for a lifetime (S_{346})." Water: "It flows where it finds empty (S_{350})." Factory: Teaching is a process. It is a process in operations in the factory (S_{366}). "

6. *Other*

The metaphors and teachers' explanations are as follows: Foreigners: "In teaching, it is like telling a newborn baby about life and environment (S_{368})." Speaking to someone far away: "You never know whether it is fully understood (S_{369})." Legos: "One piece is nothing without the other one (S_{376})."

Table 7: In-service science teachers' metaphor categories related to the "teacher" concept

Category		Met.N.	f%
The teacher as a helpful person	Parents (3), Planetree (2), Water (1), Soul (1), Life (1), Master (1), Book (1), the Football team (1), Flower (1), Grape (1), Cinevision (1), house with 385 rooms (1)	15	34.88
The teacher as a mentor	Light (4), Leader (3), Guide (3), Parents (1), Wise man (1)	12	27.91
The teacher as a student molder	Gardener (2), Artifact Finder (1), Bee (1), Miner (1), Sculptor (1), Luck (1)	7	16.28
The teacher as an innovator	Actor (2), Factory (1), World (1), Technology (1), Computer (1)	6	13.95
Other	Equipped computer (2), World (1)	3	6.98
Total		**43**	**100**

Table 7 shows the categorical form of the metaphors produced by pre-service science teachers. The metaphors are collected under five categories. When the categories are examined, it is seen that pre-service science teachers have formulated positive metaphors about a teacher. When Table 7 is examined, it is seen that the parent metaphor is both under the "The teacher as a helpful person " and " The teacher as a mentor " categories. This situation arises from the fact that pre-service science teachers attributed different meanings to the same metaphor while formulating it. In addition, the most mentioned category is "The teacher as a helpful person," and the least mentioned category is the "other" category. The explanations of pre-service science teachers for the metaphors for each category are given below.

1.*The teacher as a helpful person*

The most mentioned metaphors in this category are parents and planetree. Besides that, some of the less mentioned metaphors arewater, soul, life, and master.The metaphors and teachers' explanations are as follows: Water: "Life is unthinkable without water (S_{336})."Soul: "If he teaches, children will come alive (S_{342})."Parents: "takes care of everything of the student (S_{343})."Life: "There is a teacher not only in the school but in every field (S_{347})."Master: "The master also teaches something (S_{348})."Book: "It brings something (S_{352})."Football team: "It contains sacrifice and loyalty. It is a set of values (S_{356})."Planetree: "Even Its' shadow is enough (S_{360})."Flower: "Students benefit from teachers as bees benefit flowers (S_{361})."Grape: "It gives knowledge to students in each of its' fruit (S_{362})."Cinevision: "shows everything that is meant to be told (S_{363})."House with 385 rooms: "All of these rooms have different beauties (S_{377})."

2. *The teacher as a mentor*

The most mentioned metaphor in this category is light. Besides that, some of the less mentioned metaphors are leader, guide, parents, and wise man. The metaphors and teachers' explanations are as follows: Leader: "It should always be respected and seen as superior (S_{337})."Parents: "Strives for the student to be a good individual towards himself and his social environment (S_{341})."Wise man: "The future of a country takes shape in his hands *(*S_{346})."Guide: "guides, teaches knowledge (S_{354})."Light: "it enlightens its surroundings (S_{379})."

3. *The teacher as a student molder*

The metaphors of this category aregardener, artifact finder, bee, miner, sculptor, luck. The metaphors and teachers' explanations are as follows: Artifact Finder: "Instead of infusing students with his ideas, he finds and reveals their abilities and self-confidence (S_{353})."Bee: "It processes students as a bee processes flowers (S_{358})."Gardener: "If he works hard, he will have a garden full of beautiful, colorful flowers (S_{364})." Miner: "He constantly works to find different abilities of the students (S_{367})."Sculptor: "By processing the student to the finest detail, he creates a magnificent sculpture and visual feast from him (S_{368})."Luck: "If you meet a good teacher, your future will be good; if you meet a bad teacher, your future will be bad (S_{376})."

4. *The teacher as an innovator*

The metaphors of this category areactor, factory, world, technology,and computer. The metaphors and teachers' explanations are as follows: Actor: "It plays his role differently according to each student, teaches differently (S_{340})." Factory: "Produces continuous innovation (S_{344})."World: "As there are many unexplored places in the world, there are many unexplored aspects of the teacher (S_{357})." Technology: "he is a human being who constantly innovates (S_{359})."Computer: "It renews itself, updates and transfers new information (S_{375})."

5. *Other*

The metaphors of this category are equipped computer and world.The metaphors and teachers' explanations are as follows: Equipped computer: "must know everything (S_{350})." World: "He can embrace all his students (S_{365})."

5. Results and Discussion

When Table 2 and Table 5 are reviewed, it can be seen that 22.3% of science teachers and 20.93% of pre-service science teachers define learning as a beneficial action for students. Another metaphor category related to the teacher's concept of learning which was mentioned highly in the rate of 16.95% that learning is a cumulative process. When pre-service teachers' categories are reviewed, it is seen that there is no other category similar to this. Since teachers observe how learning takes place in time through their occupational experience and how students progress in terms of learning year by year, they might be evaluating the learning process in this manner. However, since pre-service teachers' teaching experience is limited only with their internship, it is possible that they do not evaluate the learning process in this manner. When the other categories are reviewed, it is seen that teachers see learning as a need, a labor-intensive and continuous action. When pre-service teacher's metaphor categories related to the concept are reviewed, it is seen that they also see learning as a need, but the number of pre-service teachers who think in this direction is low (9.30%). In addition, pre-service teachers see learning as a labor-intensive process as well (18.60%). However, while 13.56% of teachers see learning as continuous action, 39.53% of pre-service teachers see learning as a life-long action. This may be a result of the fact that pre-service teachers evaluate the learning process through their own experiences since they still continue their education. While a small percentage of teachers define learning as a feeling, such a category was not formed by pre-service teachers. The reason for this can be that teachers might be approaching the process in an emotional manner contrary to pre-service teachers due to their occupational experience and responsibilities in the learning process.

When Table 3 and Table 6 are reviewed, science teachers and pre-service teachers formed similar metaphor categories about learning. When the metaphor categories are reviewed, it is seen that while teachers focused on two categories, pre-service teachers formed a higher number of categories. Since pre-service teachers' experience on teaching is much more limited, it can be stated that their ideas about the teaching process is more scattered. Experienced teachers were able to express the teaching process in a much clearer manner. While a majority of science teachers (47.46%) see teaching as a teacher's work of Art, this percentage is lower in pre-service teachers (18.60%). About half of the metaphors formulated by teachers fall under "Teaching as a teacher's work of art" category. Teachers' categories are about shaping and care such as moulding, gardener, agriculture. Metaphors such as gardener and moulding are metaphors which have been widely used historically (Mintz, 2018). Similarly, Visser-Wijnween, Van Driel, Van der Rijst, Verloop and Visser (2009) presented metaphors formulated for the concept of "teaching" as transport, demonstration, gardener etc. It can be stated that science teachers' teaching activities which they have been applying for a long time allows them to understand the role of teachers in teaching and express teaching as a product of teachers for that reason. It can be seen that both teachers and pre-service teachers evaluate the process of teaching as a beneficial action. However, it is seen that a higher number of teachers formulated metaphors in this category. While 28.68% of teachers define teaching as a guiding action, no metaphors were formulated by pre-service teachers in this category. Teachers might have evaluated the process in this manner since they know how they influence their students and experienced their roles in the teaching process. However, it is likely that pre-service teachers were not able to formulate any metaphors in this category since it is not possible for them to influence students through their short experiences. The findings show that pre-service teachers formulated metaphors in more categories about the teaching process. Although senior year science pre-service teachers have a limited period of application lessons, it is seen that these applications are sufficient in terms of formulating certain categories in their minds about the concept of teaching. In the light of these findings, it can be stated that the difference between the perceptions of teachers and pre-service teachers is related to the experience they have.

When Table 4 and Table 7 are reviewed, it is seen that the metaphors formulated by science teachers and senior year pre-service science teachers about the concept of teacher mostly fall under the same two categories. 48% of teachers and 27.91% of pre-service teachers evaluate teacher as a mentor. Similarly, Guerrero and Villamil (2002) asked a group of teachers to provide the metaphors related to the concept of teacher and grouped their metaphors. In their study, they formulated similar metaphors like this study such as "coach," "moon," "gardener,""Potter" which have similar associations.

In addition, 43% of teachers and 35% of pre-service teachers define teachers as a helpful person. The metaphors formulated by pre-service teachers on the concept of teacher are similar to the findings of in Koçbeker and Saban's studies (2006). Saban et al. (2006) grouped pre-service teachers' metaphors about the concept of teacher under 10 categories. Similar to the findings of the present study, pre-service teachers formulated similar metaphors on the concept of teachers under the "teacher as knowledge provider," "teacher as molder", "teacher as facilitator" categories. In Farrell's (2006) study, the pre-service teachers formulated to describe the concept of teacher as mother, mentor, facilitator etc. Additionally Wan, Low and Miao (2011) searched for the metaphors formulated for the concept of teacher and the metaphors formulated as provider, nurturer etc. In Duru's (2015) study, metaphors such as light, parent, gardener, tree, farmer were formulated by pre-service teachers on the concept of teacher. Starting from this point of view, it can be concluded that the concepts in the minds of science teachers and senior year pre-service science teachers on the concept of teachers do not display any differences. The reason why the perception of teachers and pre-service teachers on the concept of teacher points out that teachers are helpful and guiding individuals is the meaning attributed to teachers in society. When societies are evaluated in general, it is understood that teachers are respected in society and are valuable for individuals. Although there are some negative perceptions about teachers, it is seen that in general the positive perceptions are more in the foreground compared to negative perceptions. Additionally, despite the devaluation of teachers and the erroneous policies implemented against teachers in the recent times, teachers and pre-service teachers still have positive perceptions. It is seen that this situation does not negatively affect the perceptions of teachers and pre-service teachers in general. About 14% of pre-service teachers define teachers as innovative people. This metaphor category was not formulated by teachers. This shows how pre-service teachers evaluate themselves in the light of updated information and their perceptions about their responsibilities. It can be stated that pre-service teachers are aware of the fact that they constantly need to renew themselves.

When the results of the study are evaluated as a whole, it is seen that both teachers and pre-service teachers have more specific perceptions related to the concept of "teacher," whereas their perceptions related to the concepts of "learning" and "teaching" are more scattered. This is due to the concept of "teacher" being concrete and the concepts of "learning" and "teaching" being abstract. Teacher and pre-service teachers regard the concept of "teacher" as a concrete concept in their lives and interact with them. This allows the formation of more permanent and definite perceptions in their minds. Although teachers and pre-service teachers use the concepts of "learning" and "teaching" in their lives, the perceptions they have about these concepts are more scattered and various since they do not physically come across them and communicate. Teachers' perceptions about the concept of "teaching" is more specific and concrete since they have occupational experience about teaching. This is due to the fact that this perception is formed as a result of experiences.

When the perceptions of teacher and pre-service teachers are reviewed, it can be expressed that teachers' approach to concepts is more occupational, whereas as pre-service teachers' approach rather reflects student psychology since they are still students. Teachers view themselves as the person who teaches and students as individuals who learn. On the other hand, pre-service teachers view themselves as students who realize learning and teachers as individuals who implement the activity of teaching. While teachers evaluate concepts through their occupational experiences, per-service teachers form perceptions through the mental models which they develop both as students and as a result of their applied education on teaching.

In addition, it is seen that teachers and pre-service teachers have the same perceptions on certain concepts. Senior year pre-service teachers who are about to complete their educational life and have taken applied teaching courses have similar perceptions with teachers. In this respect, it can be stated that the applied teaching courses teachers have taken are influential on certain concepts. From this standpoint, the perceptions of teachers and pre-service teachers give information about the education pre-service teachers receive as well. Teaching activities experienced by pre-service teachers who develop positive perceptions are both beneficial in terms of students and the education needed by society. Pre-service teachers who develop positive perceptions will show that the education they received meets the needs of society. This shows the importance of identifying the perceptions of pre-service teachers. When the literature is reviewed, it is seen that there are studies which indicate that the

identification of pre-service teachers' perceptions is important. Saban (2004) has emphasized the importance of the identification of the perceptions of pre-service teachers in his study.

6. Conclusion and Suggestions

When the study is reviewed in general, it is seen that teachers and pre-service teachers generally have different meaning categories. For instance, while teachers expressed the concept of "teacher," they took their own experiences and professional lives into consideration since they are actively working as teachers. On the other hand, pre-service teachers expressed their own teachers and their behaviors while defining the concept of "teacher." Similarly, when we take a look at the results related to the concept of "student," while teachers started off with the children they taught, pre-service teachers talked about their own experiences since they are students. This shows that although pre-service teachers take applied courses, they are unable to see themselves as teachers prior to starting their professional lives. The pre-service teachers in this study are senior students are will be graduating in a few months. However, their metaphors indicate that they do not perceive themselves as "teachers." This creates doubt as to whether they are ready for their professional life or not. Similarly, Leavy, McSorley and Bote (2007) stated in their study that pre-service teachers have few opportunities to reflect on their course content and their teaching experiences in a meaningful way. In this context, metaphors related to these concept give us information about how pre service teachers understand themselves and their professional identity (Leavy, McSorley, &Bote´, 2007).

It is considered that giving more space to applied courses in the educational process of pre-service teachers will compensate for these deficiencies. Science pre-service teachers take a course titled school experience in the fall semester and a course titled teaching practice in the spring semester of their senior year. In the school experience course, pre-service teachers visit schools, attend courses with the teachers in charge and observe the process. In the teaching practice course, they carry out certain teaching activities and teach courses besides doing observation. However, teaching courses is limited to a few times during the semester. When all these aspects are taken into consideration, it is seen that pre-service teachers' experience related to teaching is limited prior to graduation. It is suggested to distribute the applied courses throughout the educational process to make it possible for pre-service teachers to develop similar perceptions with teachers. Leavy, McSorley and Bote (2007) stated that teacher training programs should offer more than basic training of practical skills.

Pre-service teachers' limited interaction with students causes the metaphors they formulated to be limited as well. In this respect, it is considered that more frequent interaction between pre-service teachers and their students before pre-service teachers start their professional lives may allow their perceptions to be more diversified. Activities such as visiting schools, interacting of students with pre-service teachers who are university students can be expressed as practices that can increase this diversity. The analysis of the metaphors of pre-service teachers in terms of identifying their perceptions about teaching will be helpful in the design process of programs. In addition, pre-service teachers already have some perceptions about teaching when they start teaching education programs. Farrell (2006) stated that pre-service teachers come to teacher training programs with prior experiences, knowledge and beliefs about learning and teaching. For this reason, analyzing how these perceptions change over time will be helpful in observing the effect of teaching education programs in forming teacher identity.

Additionally, it is seen from the results of the study that pre-service teachers are more innovative and open to development. The courses they take during their education process are beneficial to them in this light. The continuation of such courses by increasing their number will be helpful to pre-service teachers both in their education and professional life. It is considered that teachers who are actively teaching need be encouraged to be open to innovative ideas and be willing to develop themselves. It would be helpful to present teachers with various rewards or incentives in this area. The rearrangement of in-service trainings given within the framework of these needs is one of the suggestions that can be made as a result of the study. Teachers' continuing training throughout their professional life will make it possible for them to both adopt life-long learning and train their

own students in the same manner. The suggestions that can be made based on the results of the study can be listed as follows:

- The number of applied courses given to pre-service teachers can be increased,
- The content of applied courses given to pre-service teachers can be rearranged to allow them to interact more with students,
- Activities can be organized to make it possible for pre-service teachers interact with students more,
- Activities can be organized to make it possible for pre-service teachers interact with actively working teachers more,
- Incentives can be presented to actively working teachers to develop themselves,
- Activities can be organized to allow actively working teachers be open to innovative ideas,
- The content of in-service training programs provided to teachers to develop themselves can be rearranged as to make teachers willing in this area.

Notes

This study is adapted from Muhammed Pekbalcı's master thesis.

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