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What are Their Beliefs? What is Their Approach in Practice? What is the Profile of Their Science Teachers and Professors?

Selda Bakır
Mehmet Akif Ersoy University, Faculty of Education, Burdur, TURKEY

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This qualitative study was conducted with six senior student teachers in the field of science to examine the beliefs of student science teachers, their classroom practices, and the profile of their junior high science teachers and the professors in the education department. The data from this study were collected through individual interviews and observations as well as DASST-C. According to the findings of the study, five of the student teachers held to a conceptual model, one held to an exploratory mental model. When the junior high science teachers of these student science teachers were examined, it was found that four employed an explicit approach, one used a conceptual approach and one had an exploratory approach. When the views of the student teachers' professors in the department of education were examined, most of the faculty members had a teacher-centered approach, but the most popular faculty members employed a student-centered approach. Therefore, we see that the beliefs of the student teachers about the learning-teaching process were passed on from their junior high science teachers and the professors in the education department.

Keywords: professors; science teachers; student science teachers, beliefs.

INTRODUCTION

Students in today's information society must have the skills necessary to access information sources, use information to solve the problems they encounter, think critically and communicate effectively rather than rely solely on the information shared by the teacher (Karagözoğlu 2009). According to Minor, Onwuegbuzie, Witcher and James (2002), the effective teacher that plays a primary role in developing students with these characteristics is defined as a person who can choose and organize appropriate topics, can use various teaching strategies depending on the needs and interests of the students, is creative, can actively engage students, asks good questions, supports critical and creative thinking, gives students enough time to answer and do research, provides feedback, uses both traditional

Correspondence: Selda Bakır,
Mehmet Akif Ersoy University, Faculty of Education, Istiklal Campus, 15100 Burdur, TURKEY
E-mail: seldacu@hotmail.com
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and alternative assessments when tracking student progress, in short a person who reflects what they have learned from their experiences. According to Baykal (2005) the qualifications that make a teacher are characteristics such as command of the subject matter, enthusiasm for teaching, ability to generate interest and curiosity, good time management, being open to criticism, being understanding and thoughtful and classroom management. Teachers must be flexible and willing to change, creative and cooperative, straightforward and open (Erçetin, 2005). The ideal teacher according to students is a person who works in cooperation with the students, has an excellent command of the subject matter, is aware of student needs and individual differences, can use various methods and techniques, is respectful and compassionate and whose behavior and attitudes reflect a scientific approach (Vural, 2004).

In its "Teacher Training and Departments of Education" report, the Board of Higher Education (YÖK) said that departments of education did not have adequate capacity to train the human resources required to make Turkey an information society in the 21st century, that this inability to raise up teachers had a negative effect on the quality of elementary and junior high school graduates and that the lower quality of high school graduates also affected the quality of the students entering university in all fields, and so the quality of students graduating with degrees in education is reflected in the outputs and processes of higher education. This vicious cycle must be broken as soon as possible (YÖK, 2007). The key to breaking this vicious cycle is the teachers. Teachers' beliefs about students, teaching and learning determine their teaching practices and the fate of education reforms (Wallace & Kang, 2004; Chai, 2010; Tsai, 2002; Pajares, 2002).

Literature review

Teacher beliefs are the ideas that teachers have conceptualized about teaching, and these ideas frame the questions of "What makes a teacher effective and how students should behave?" (Pajares, 1992). There are three major beliefs themes about learning and teaching process (Thomas, Pederson& Finson, 2001; Simmons et al., 1999). First is exploratory which refers to student-centered teachers. These teachers believe students are able to conduct their learning, are guide to their students for activities, use alternative assessments to measure students' learning. Maybe, the most important point, in these teachers' classroom, curriculum is directed with reference to students' interests. Second is explicit which refer to teacher-centered teachers who have responsibility to organize and transfer the concepts to students. In these teachers' classroom students' input is minimal and teachers are source of knowledge. Third is conceptual that means both student and teacher-centered. These teachers encourage their students with many activities but content is organized around the key concepts not students' interests (Thomas et al., 2001; Simmons et al., 1999).

Teacher beliefs are a complex concept because they encompass several factors such as attitude, confidence, motivation, self-efficacy, perception of nature, and the use of information in a particular discipline (Lumpe, Haney&Czerniak, 2000; Pajares, 1992). According to Pajares (1992), beliefs are not universal but are extremely personal and unaffected by argument. Beliefs are formed by chance, experience or a chain of events. While beliefs are based on assessment and judgment, knowledge is based on objective truth. When a teacher faces a complex situation, their cognitive and knowledge processing strategies do not work, and they are unable to access the appropriate schemata, resulting in doubt about which information is necessary and which behavior is appropriate. In situations like this where appropriate informational structures and cognitive strategies are inadequate, teachers employ their beliefs and belief systems (Pajares, 1992).

The beliefs of student teachers.

In recent years, teacher training researchers have placed a great deal of importance on the issue of how student teachers learn to teach, which includes several aspects ranging from how students learn to how an effective teacher is created (Minor et al., 2002). Student teachers arrive at the teacher training program with a series of beliefs about teaching, the classroom and students shaped by their own school experiences (elementary-junior high-high school-university) (Pajares, 1992; Doyle, 1997; Thomas, Pederson & Finson, 2001)

In human learning, it is harder for old beliefs to be renounced than for new beliefs to be formed (Bransford, Brown &Cocking, 2000). According to Pajares (1992), the beliefs of student teachers are different from candidates for other professions. For example, a law school student is introduced to the courtroom and law office while in school. Because these environments are new and foreign, the process of developing new beliefs and revising existing belief systems entails very little discussion or threat for the law student. However, the student teacher has always been in an educational environment, so his/her beliefs may continue largely unaffected during higher education. This is why conceptual change is difficult and causes anxiety for prospective teachers. As long as they are not judged unqualified and do not face contradictions, changing their beliefs is the last option (Pajares, 1992). The earlier one accepts a belief system, the hard it is to change it. This is why beliefs have such a powerful effect on subsequent perceptions and the processing of new information. Newly-acquired beliefs are the most defenseless. These beliefs become more resistant as they are used over time (Lumpe et al, 2000; Pajares, 1992; Kind, 2015) and individuals continue to hold beliefs that are incorrect and based on inaccuracies even if scientific explanations are later given (Pajares, 1992). At the conclusion of a semi-experimental study based on learner-centered learning theories and applications of learning theories, DiPietro and Walker (2005) found that pedagogical beliefs do not change. Aykaç (2012) said beliefs about the processes of teaching and learning are developed at a young age, are shaped by real life, and that student teachers still have traces of traditional teaching in schools because they experienced teacher-centered education during their years of school.

Significance of the research

Science teachers guide students in making sense of life in a changing world and facilitate the attempt by students to build bridges between the nature of science and research activity (Nuangchalerm & Prachagool, 2010). Science teachers play a critical role in the learning process because they have many responsibilities both inside and outside of the classroom, such as planning scientific activities, creating study groups and helping students acquire the necessary skills. These responsibilities are beliefs about the effectiveness of the learning-teaching processes. The information, beliefs and theories that a science teacher has about learning-teaching and the nature of science will affect to a large extent what science education will be for the child (Levitt, 2001). At the conclusion of studies, they conducted with school-age children and student teachers using DASTT-C, Thomas and Pederson (2001; as cited in Elmas, Demirdöğren&Geban, 2011) found that student teachers had mental models that were similar to those of elementary, junior high and high school students. This conclusion supports that idea that the a priori experiences of student teachers affect their beliefs about science teaching and learning.

Since elementary school programs in Turkey are prepared based on a constructivist approach, it is important to train student teachers who embrace their

role in the constructivist environment, know how to guide students, and can create a learning environment based on this theory (Yıldız Duban, 2013). If the beliefs held by student teachers regarding the process of learning-teaching can be identified, we can understand what they need during this process. This would be beneficial for those who train teachers. Literature in the field has numerous studies aimed at identifying the beliefs of student teachers regarding the learning-teaching process (Tatar, Feyzioğlu, Buldur & Akpınar, 2012; Ambusaidi& Al-Balushi, 2012; Decker&Rimm-Kaufman, 2008; DiPietro&Walker, 2005; Doyle, 1997; Levitt, 2001 etc). However, no study was found examining the beliefs of student science teachers, the profiles of their junior high science teachers, the profiles of faculty members in the education department and the approaches exhibited in classroom practices all together.

The purpose of this study, which was conducted to fill a gap in the literature, was to examine the beliefs that student science teachers held about the learning-teaching process, the approaches they exhibited in classroom practice, the profiles of their junior high science teachers and their professors at the department of education and how all of these relate to each other. The aim is to answer the following questions.

1) What are the beliefs of student science teachers in the field of science about the learning-teaching process?

2) What kind of approach do student science teachers in the field of science take regarding the learning-teaching process?

3) What kind of relationship exists between the beliefs that student science teachers hold about the learning-teaching process and the approach exhibited in classroom practice?

4) What is the profile of the student science teachers' junior high science teachers?

5) What is the profile of the professors in the education department who taught the student science teachers?

6) What kind of relationship exists between the beliefs of student science teachers about the learning-teaching process and the profiles of their junior high science teachers and professors in the education department?

METHODOLOGY

This study utilizes a qualitative research design and was conducted with 6 student science teachers (five women and one man) in their senior year during the 2014-2015 academic year. The data from this study were collected through individual interviews and observations as well as Draw-A-Science-Teacher –Test-Checklist (DASST-C). The researchers were first given the DASST-C. After this, classroom practices of each student teacher were observed for 40 minutes and finally the individual interviews were conducted.

Instruments

DASTT-C.

DASTT-C was developed by Thomas et al (2001) to identify the beliefs of student teachers in connection with teaching-learning science. The test consists two main parts. First, they draw pictures that indicate what kind of teacher they see themselves as being in the future, and then they explain the roles of the teacher and the students in this drawing. Subjects are given 30 minutes to complete the test. The test's internal consistency coefficient is .82 (Thomas et al., 2001).

Individual interviews.

The interview is one of the most common data collection techniques used in qualitative research (Yıldırım & Şimşek, 2005). The interview form approach was used in the individual interviews conducted in this study. The interview forms contain semi-structured questions about the teacher, the student, the teaching environment in teaching and learning process, and the characteristics of junior high teachers and faculty members in the education department. The interviews lasted approximately 30 minutes each. Audio recordings were made of the interviews with the consent of the subjects.

Observation.

Observation is a method used to make a detailed description of behavior that occurs in any environment or institution (Yıldırım & Şimşek, 2005). The observations each lasted 40 minutes (one class period) and were performed during classroom activities directed by the student teacher. Observations were conducted to reinforce judgments about the beliefs of the student teachers. According to Levitt (2001), beliefs cannot be observed directly, but are deduced from behavior.

Reliability and data analysis

Various precautions were taken to ensure the reliability of this study. One way to ensure reliability is plausibility. Therefore, the research process and results must be clear, consistent and verifiable by other researchers (Yıldırım & Şimşek, 2005). The research process and results have been clearly stated in order to ensure plausibility. One of the methods used to ensure plausibility was triangulation. Triangulation is examined in light of the diversity of data sources, methods and researchers (Yıldırım & Şimşek, 2005). Methodology triangulation (interview, observation, document analysis) was used in this study. Another precaution that was taken was participant confirmation. The results of the research were sent to the participants for them to verify. Another precaution taken to ensure reliability in this study was to provide direct quotes. Also to protect the identity of the participants, code names such as SST-1, SST-2 etc. (student science teacher-1, student science teacher-2, etc.) were used.

Content and descriptive analyses were conducted to analyze the data obtained from interviews and observations. The data obtained from DASTT-C was evaluated according to a scoring tool developed by Thomas et al.(2001). Therefore, the scoring tool consists of 13 subdimensions that include three main dimensions. The three main dimensions are “teacher”, “student” and “learning environment”. The highest score on the drawing test is 13 and the minimum score is 0. The scores of the student teachers are interpreted as follows: 0-4 points “exploratory”, 5-9 points “conceptual” and 10-13 points “explicit” (Thomas et al., 2001). The inter rater reliability between the two raters calculated by Pearson Correlation Coefficient was 0.97 in this study.

RESULTS

Findings regarding first question

The results of DASST-C conducted to determine the beliefs about the teaching-learning process of the student science teachers are provided in Table 1.

Table 1. DASST-C results of student science teachers

Student science teacher code	DASTT-C Score	Belief about teaching and learning
SST-1	9	conceptual
SST-2	9	conceptual
SST-3	5	conceptual
SST-4	6	conceptual
SST-5	6	conceptual
SST-6	3	exploratory

An examination of Table 1shows that five of the student teachers have a conceptual belief system, in other words both student- and teacher-centered and that one student teacher has an exploratory belief system, in other words is student-centered. Furthermore, SST-1 and SST-2 had a tendency to be more teacher-centered than the others.

Also, to determine the beliefs of student science teachers, individual interviews were used. The results of the analysis of the data obtained from individual interviews conducted to discover the beliefs of the student teachers regarding the teaching-learning process are provided in Table 2.

Table 2 shows the 3 subcomponents of the learning-teaching process. These subcomponents are the teacher, the student and the learning environment. The most often repeated code words associated with the teacher in the teaching-learning process are making the student active, guide, connecting with real life, constructive approach and experiments. These code words are followed by learning by doing-experiencing, making students think, effective communication, being democratic and being generally cultured. The least frequently repeated code words were taking account of individual differences, using visual aids, discovery strategy, lecturing, providing information, training people who are scientifically literate, use of technology, giving students responsibility and being enjoyable. Some of the quotes taken directly from the student teachers are:

Table 2. The results of the analysis of the data obtained from individual interviews of student science teachers

Teacher	Student	Learning environment
Making the student active (7)	Active participation (3)	Visuals (7)
Guide (7)	Memorization (3)	Orderly (5)
Connecting with real life (5)	Permanent learning (2)	Laboratory (2)
Constructivist approach (5)	Meeting expectations (2)	The student is active (2)
Experiment (5)	Research (2)	Outside of class (2)
Learning by doing-experiencing (4)	Applying what they learn to daily life (2)	Suitable for group work (1)
Making students think (4)	Taking responsibility (1)	Both the student and the teacher are active (1)
Effective communication (4)	Scientifically literate (1)	Varies according to subject (1)
Democratic (4)	Receive(1)	Democratic (1)
General culture (3)		Technology (1)
Taking individual differences into account (2)		Daylight (1)
Use of visual aids (2)		Optimal temperature (1)
Discovery strategy (2)		
Lecturing (2)		
Providing information (2)		
Training people who are scientifically literate (2)		
Use of technology (1)		
Giving students responsibility (1)		
Enjoyable (1)		

SST-1: The ideal science teacher should first of all use technology... Should possess general culture... Should appeal to all students... Our number one goal should definitely be to train individuals who are scientifically literate. They should also appeal to all students and take individual differences into account.

SST-3: The ideal science teacher should make the student think... He/she should choose such excellent questions that the student... should say "so that is also true." Because science is already related directly with life, it should definitely be connected so that the student (learning) is more permanent... If the student is learning new information, of course the teacher will lecture, but if they have previous knowledge and if they experience these things in real life, this should make the student think.

SST-5: He/she should do his/her best to give everything to the students. He/she should not give up on any of them... If he/she thinks they don't understand, he/she should not exclude them as if they don't have any aptitude... He/she should train them to be scientifically literate. A more constructive approach.... Or he/she should guide the students. The teacher should be more of a guide and the students should be more actively involved in the lesson. They will learn by doing and experiencing.

SST-6: I don't know if everyone can do it, but they should be knowledgeable of most subjects. They should be scientifically literate. When a question is asked, they should give satisfying answers. Or if they don't know the answer, they should be able to give good guidance and direction. I observe the student teachers. True, we are in a technological age. We really do need to use technology, but I don't think it is very logical to do the entire lesson like this. For example, if the topic is related to the environment and if we have a chance to see a living organism outside or bring one to class, this seems like a more reasonable way to do it. Or if there is a subject that requires an actual experiment, then that experiment should be performed and not do it with technology.

With regard to the student subcomponent, the most frequently repeated code words were "Active participation (3), Memorization (3), Permanent learning (2), Meeting expectations (2), Research (2), Applying what they learn to daily life (2)" and the least common codes were "Taking responsibility (1), scientifically literate (1) and receive (1)". Some of the direct quotes from student teacher answers regarding the ideal student are:

SST-1: The student must know how to receive... The student must understand that the teacher and family have put out effort... When they face a problem in their later life, they should feel that they received a science education.

SST-2: In light of the teacher's role, they should assume a role that corresponds to his/her demands.

SST-3: Being able to use the information they have received in real life. In real life, (they should be able to say) even to their family, "Look, this is how it works". For example, he/she should be able to explain to their mother how yogurt is made...

SST-4: They should participate actively, and perform tasks on projects.

SST-6: They should learn what needs to be learned and apply this to their lives.

The most frequently repeated code words regarding what student teachers believe about the learning environment were "Visuals (7), Being orderly (5)", followed by "Laboratory (2), Student's being active (2)", and the least frequent were "Both the student and the teacher being active (1), Varies according to the subject (1), Democratic (1), Technology (1), Daylight (1), Optimal temperature (1)". Direct quotes from some of the student teachers about these themes are:

SST-3: I cannot say that I would teach a lesson in such an environment because it would vary depending on the subject matter I was covering. There must definitely be order. The rows must be neat and tidy. Nothing should be disorderly...

SST-2: Of course, the visual element is very important. There should be pictures even in the classroom environment... For example, it could be much better if we were to cover the subject in a museum. The visual aspect is important.

SST-4: For me, I really like light... daylight. It shouldn't be too hot or too cold. If I'm really cold, I cannot concentrate on the lesson, and I get sleepy if it is too hot. I want the students to be in groups. I want them to talk to each other... Student's should not sit by themselves.

As a result of the individual interviews that were conducted with the science student teachers, we see that they evaluate the learning process in terms of the teacher, student and learning environment. When we look at Table 2, in general, student science teachers think the teacher as being student-centered, students as active learner in teaching-learning process. But also some codes draw attention such as lecturing, providing information, receive etc. Additionally, it is obvious that the student teachers touch on themes related to the teacher more frequently and with more depth than they do themes related to students and the learning environment. Consequently, it may seem that the teacher profile they have in their minds is student-centered, but the impact of the teacher in the learning-teaching process is higher than that of the student or learning environment (Figure 1). Furthermore, it is clear from the views of some of the student teachers (as seen in underlined part) that the constructivist approach has not been fully embraced. For example, one student teacher said, "if the student is learning new material, of course (the teacher) will give a lecture" while another expressed his opinion by saying, "He/she should try their best to give the students everything". This shows that the teacher is still, in their minds the information provider. In conclusion, we see both from the DASST-C results and the individual interview results that the student teachers who participated in this study have both student-centered and teacher-centered beliefs.

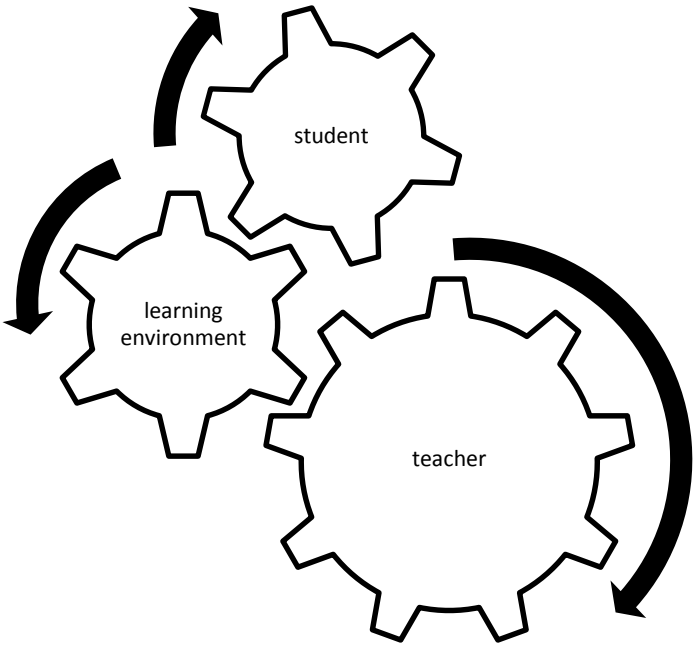

Figure 1. Learning-teaching process in student teachers' mind

Findings regarding second question

The classroom practices of six science student teachers were observed by the researcher to identify the approach they used in classroom applications, and the observation notes were recorded. All of the participating student teachers taught their lessons for the same grade. Because the chairs in the classrooms where they conducted their class were fixed to the ground, the seating arrangement did not change during the lessons. The classrooms contained a blackboard, teacher's desk and projector. The observations recorded by the researcher are provided below:

SST-1: The student passed out chocolates upon entering the class to get the students' attention, which wasted a lot of time before the lesson began. The teacher's hands and voice were shaky due to being nervous. The teacher asked what they had learned in previous years about electricity, but answered his/her own question. Although the teacher was very eager, he/she was also very nervous. The teacher got so involved in lecturing on the subject that connection with the class was almost lost. Someone in class even sang a song, but the teacher never intervened. Even though the teacher had considered active learning techniques for the subject, he/she was unable to effective employ these techniques. For example, the teacher had each student perform the very simple experiments that were to be done for the Predict-Observe-Explain (POE) forms that were passed out to the students as demonstration experiments. The teacher gave the answers to almost all of the sections that the students were supposed to fill out. The most important thing is that the teacher forgot the explanation section on the POE. The teacher had the students watch a video of the experiment about electrification that the student's did. The teacher did not say or discuss anything related to the second video. But, the teacher could have had the students do this very simple experiment. There was almost no eye contact during the lesson. In order to remember the lesson, the teacher was too dependent upon his/her notes. The teacher panicked in the face of the students' lack of interest and was really frustrated by the end of the lesson. The teacher passed out evaluation questions related to the subject matter and answered them with the students. The teacher connected it to the next lesson. The teacher did not leave the front of the class at any time during the lesson. The lesson ended before the allotted time.

SST-2: There was a lot of noise at the beginning of the lesson. First, the teacher wrote the topic on the board. A slide depicting erosion and mudslides was projected onto the wall. However, it was not used effectively. The teacher began the lesson by asking directly what erosion and mudslides are. He/she moved to the slide with the definition for erosion without waiting for an answer. The teacher read the definition. He/she drew a picture of a field on the board and tried to get students to talk a little. Meanwhile, the teacher moved to a slide that described what must be done to prevent erosion and asked the student what must be done to prevent erosion. He/she made almost no eye contact. The teacher's back was to the class while reading the slides. The questions that the students were asked were not questions that made students think but ones that contained the answer. The pictures that were selected were actually quite good but the teacher was unable to use them effectively. They were used not to make the student think but more as support for the concepts the teacher was explaining. Even though it was an excellent experiment related to erosion, it was not carried out correctly. The teacher answered the questions on the evaluation together with the students. No connection was made with the next lesson. The lesson ended long before the allotted time.

SST-3: The teacher began the lesson with a wonderful story about how we cannot be intimidated by the obstacles in life. After explaining that the lesson would be about flowers, the teacher read a long scenario about the subject. The scenario was well thought out, but because it was so long, murmuring began in the classroom. After reading the scenario, the teacher asked students questions but actually ended up answering them. Even though the video that the teacher chose about flowers was very good, it did not achieve the expected interest because the timing was poor. If the teacher had played the video at the beginning of the lesson, it might have been more interesting. The teacher explained the parts of the flower. The teacher brought various flowers to class so students could examine the structure. Even though it was a good idea for the beginning, the teacher was unable to achieve his/her objective because he/she did not have a good command of the subject. The interesting pictures of flowers presented through slides appealed to the students. The teacher

had the students make flowers with materials he/she passed out and a song about flowers played in the background. During this activity, each group received individual attention. The students were asked questions and those who wanted to speak were allowed to or the teacher answered the questions. No attempt was made to draw in those who were uninterested in the lesson. The teacher was very active throughout the lesson. He/she walked around the whole class. At the end of the lesson, the teacher answered the prepared evaluation questions with the students. At the very end, the teacher repeated the subject with a model flower. The lesson finished exactly on time.

SST-4: After summarizing the previous lesson, the teacher introduced the new subject. The animated video that he/she had prepared for the students to watch did not open for a long time. The teacher lost control of the class during this time. After the animation about circuit symbols opened, the teacher stopped the video at just the right time and asked the necessary questions. He/she did a good job at transitioning the subject. Later, the teacher had a student read what was written on the slide. There was almost no eye contact. The teacher only involved the students sitting at the front. The back of the class paid no attention to the lesson. The teacher had a very strained facial expression and almost never smiled. He/she did a very nice activity with envelopes. Even though he/she tried to engage the entire class in this activity, it did not succeed. An evaluation was conducted and the lesson finished early.

SST-5: The teacher asked questions to remind the students of the previous lesson, but ended up answering them. The teacher was nervous at the beginning but later relaxed and tried to get the students talking. The teacher selected students by drawing lots and had them do a drama. The teacher had the students do very simple demonstrative experiments about electrical circuits with materials that are very easy to obtain. He/she connected it with real life. This made it more interesting to the students. Eye contact was weak. The teacher had them play a very original game called electrical stairs. The teacher answered the evaluation questions projected on the wall together with the students. The lesson ended before the allotted time.

SST-6: At the beginning of the lesson, the teacher passed out a KWL table and asked the students to fill out the first two columns. Then, he/she got their attention with well-chosen pictures. The teacher asked excellent questions so that the students would discover the concepts. After this, he/she made an excellent connection with a video related to the subject. The teacher ensured that the students discovered the concepts of species and habitat completely on their own. The teacher's eye contact and tone of voice were used very effectively. Classroom management was quite impressive. The teacher had the students play a computer game that involved identifying and controlling variables associated with the concepts of species and habitat. Almost all of the students in the class were active. At the end of the lesson, the teacher had the last section of the KWL table filled out and read all of them. The teacher answered the prepared evaluation questions together with the students. The class went two minutes over time.

When the observation notes recorded by the researcher during the lessons given by the student teachers are examined, we see that all of them except for SST-6 thought about active learning techniques but had trouble applying them. For example, even though SST-1 included the POE technique in the lesson, the teacher made the predictions and observations the students were supposed to make, but failed to talk about the explanation section at all, which is probably the most important part. SST-1 also designed simple experiments related to the subject, but chose to do these experiments the students could easily have done as demonstrative experiments or to have them watch a video. SST-2 selected visual aids but did not use them effectively. Although the teacher brought excellent pictures, and wanted to make the students think by asking them questions, he/she failed to achieve this

objective because the explanations were projected onto the wall. SST-2 designed an excellent experiment related to the subject but did it incorrectly. Both SST-1 and SST-2 explained the key concepts in the entire lesson. SST-3, SST-4 and SST-5 achieved a learning environment that was more student-centered than SST-1 and SST-2 and were more successful in their activities. The most prominent problems seen in all five of these student teachers were inadequate eye contact, lack of participation by the entire class, answering most of their own questions, and key concepts being identified and provided by the teacher. SST-6, on the other hand, highlighted the importance he/she placed on the prior knowledge, interest and desires of the students with the KWL table he/she passed out at the beginning of the lesson. The teacher demonstrated a student-centered approach by using well-selected pictures and questions that ensured the students discovered the concepts. Another practice that supported this approach was the video game that required the students to use their scientific process skills. At the end of the lesson, the teacher gave the students an opportunity for self-assessment by having them fill out the last section on the KWL table.

Findings regarding third question

When Table 1 and the findings connected with the second sub-problem are examined; the student teachers coded as SST-1 and SST-2 scored 9 points each on the DASTT-C test, which is closer to the teacher-centered conceptual belief, and exhibited a more teacher-centered approach in their classroom practice than student teachers SST-3, SST-4 and SST-5, who scored 5, 6, and 6 respectively on the same test and whose beliefs were close to the student-centered approach while student teacher SST-6 held an exploratory belief, which was evidenced in classroom practice. In brief, the beliefs of the student teachers were consistent with their classroom practice.

Findings regarding fourth question

The findings related to the views of the student teachers' junior high science teachers are provided in Table 3.

As the Table 3 indicates, the junior high science teachers are divided into three subgroups: explicit, conceptual and exploratory. In the explicit sub-group, it was found the following codes: "Teacher-centered (6), Sours people on science (6), Unpopular (6), Does not take into account individual differences (5), Lecturing (4), Unproductive lesson (4), Does no activities (3), Homework (2), Encourages private lessons (2)". These code words are the themes that come out of the answers given

Table 3. The findings related to the views of the student teachers' junior high science teachers

Junior High Science Teachers		
Explicit	**Conceptual**	**Exploratory**
Teacher-centred (6)	Makes you love the class (1)	Makes you love the class (1)
Sours people on science (6)	Effective communication (1)	Effective communication (1)
Not popular (6)	Enjoyable (1)	Constructivist approach (2)
Failure to take individual differences	Connecting with real life (1)	Active student (1)
into account (5)	Moving (1)	Connecting with real life (1)
Lecturing (4)	Active students	Encourages research (1)
Unproductive class (4)	Using the laboratory effectively (1)	Doing Experiments
Does no activities (3)		Gives student-specific guidance (1)
Homework (2)		Role model (1)
Encourages private lessons (2)		

by SST-1, SST-2, SST-4 and SST-5. In the conceptual sub-group, it was found the following codes: "Makes you love the class (1), Effective communication (1), Enjoyable(1), Connecting with real life (1), Moving(1), Active students(1), Using the laboratory effectively (1)". The code words in these theme were obtained solely from the answers given by student teacher SST-3. In the exploratory subgroup, on the other hand, we see the following themes: "Makes you love the class (1), Effective communication (1), Constructivist approach (2), Active student (1), Doing Experiments(1), Makes connections with real life (1), Encourages research (1), Enjoyable (1), Gives student-specific guidance (1), Role model (1)". The code words in these theme were obtained solely from the answers given by student teacher SST-6. In this theme, especially "Encourages research and Gives student-specific guidance" codes attract notice.Some of the direct quotes from the views of student teachers about their teachers are given below:

SST-2: (My junior high science teacher) generally lectured, his class was boring, he did not include the students in the lesson... There were no decent activities. He/she would not use activities in the lectures. I didn't like science class back then.

SST-6: To be honest, that teacher was the reason I chose science. He told us to learn our blood type and come to class. I learned my blood type for the first time because of him/her. I really loved that. This was something that none of my other teachers had ever done... ...He/she put the student at the center. He/she would first of all direct the lesson according to us, our ideas and whether or not we knew the subject matter.... He/she tried to do every experiment.

Findings regarding fifth question

The findings related to the views of the student teachers' professors in the education department are provided in Table 4.

According to Table 4, two subthemes emerged from the opinions that the student teachers had of the professors in the education department. These are an overall general theme that includes "Lecturing (4), Failure to put theory into practice (2), Not taking into account individual differences (2), Unproductive lesson (1), No feedback (1), Teacher-centered (5), Reading from slides, and the "most popular teacher" theme that includes "Active student (6), Getting students to talk (4), Enjoyable (4), Productive lesson (2), Diligent (2), Both student and teacher being active (1), Role model (2), Taking individual differences into account (1), Connecting with real life (1), Providing student-specific guidance (1)" According to this, the student teachers' professors in the education department were generally teacher-centered, but the professors they liked the most used a student-centered approach. Some of the direct quotes from the views of student teachers about their professors in the education department are given below:

Table 4. The findings related to the views of the student teachers' professors in the education department

Professors in the education department	
General	**Most Popular**
Lecturing (4)	Active student (6)
Failure to put theory into practice (2)	Getting students to talk (4)
Failure to take individual differences into account (2)	Enjoyable (4)
Unproductive class (1)	Productive class (2)
No feedback (1)	Diligent (2)
Teacher-centered (5)	Both the student and the teacher are active (1)
Reading from the slide	Role model (2)
	Taking individual differences into account (1)
	Making connections with real life (1)
	Gives student-specific guidance (1)

SST-6: Generally, we were taught a structuralist approach, but it was not practiced very much. But, the teacher was very diligent... He/she worked very hard so that we would really learn. I made him/her my role model. In the future when I become a teacher, I will really strive so that my students learn... He/she definitely gave us the guidance we needed. For example, when we were not interested, he/she immediately knew what to do and took action. I mean, he/she was very nice. I view him/her as an example in this area.

SST-2: The professor at university generally just lectured or they tried to make us active with presentations. But I don't think we were active. But... The professor was was able to get down on the students' level in class, made lectures humorous, and was fun. I really enjoyed him/her while at university. I really enjoyed listening to his/her lesson because it was fun... I can say that we actively participated in the lessons because we wanted to say something and participate in the class since we enjoyed what he/she was teaching.

Findings regarding sixth question

When we look at Table 1, Table 3 and Table 4, we see that the science teacher of SST-3, whose conceptual belief is closer to the student-centered approach than the others, had a conceptual approach, that the science teacher of SST-6, who had an exploratory belief, employed this same approach, and that the science teachers of SST-1 and SST-2, whose conceptual beliefs were closer to a teacher-centered approach, and SST-4 and SST-5, whose conceptual beliefs were closer to student-centered approach, employed explicit approaches. All of the participating student teachers had professors at the department of education who were generally teacher-centered, but the most popular professors were student-centered. Therefore, the student teachers were somewhere between that of their past junior high science teachers and the profiles of their professors in the education department. However, SST-1, SST-2, SST-4 and SST-5 were moving towards a more student-centered belief than that of the science teachers they had had in the past. The science teachers of the other two student teachers SST-3 (conceptual) and SST-6 (exploratory) had the same beliefs as their teachers.

CONCLUSIONS

At the conclusion of this study conducted for the purpose of examining the beliefs of science student teachers, their classroom practices, the profile of their junior high teachers and the profiles of their professors in the education department, five of the student teachers (SST-1, SST-2, SST-3, SST-4 and SST-5) held to a conceptual model, in other words believed in something between the teacher-centered approach and the student-centered approach (two of these student teachers, SST-1 and SST-2, were very close to the boundary of the teacher-centered (explicit) approach) while one student teacher (SST-6) held to an exploratory model, in other words, believed in a totally student-centered approach. Therefore, most of the science student teachers had both a student- and teacher-centered belief system. There are some studies which support these findings. The results of a study conducted to examine the mental images of chemistry student teachers regarding what kind of science teaching they would do in their future classes showed that 37.9% were student-centered, 22.7% were teacher-centered and 39.4% were both student- and teacher-centered (Elmas et al., 2011). Yılmaz, Türkmen and Pendenson (2008) found that of fifty-five 4th grade students 18.2% thought science classes in Turkey were student-centered, 56.4% thought they were neither student- or teacher-centered and 25.4% viewed them as teacher-centered, and these results indicate the Turkey is undergoing a huge positive change and that the traditional approach to education is starting to be replaced by a constructivist approach. According to the results of a study conducted by Yıldız Duban (2013) with 107 student teachers, more than half of the student teachers (62.62%) were between a student-centered science education approach and a teacher-centered science education

approach, 24.3% had a teacher-centered approach and 13.08% had a student-centered approach.

When the classroom practices of the student teachers are examined, even though two of the six (SST-1 and SST-2) tried to support their lessons with activities, they were very close to a teacher-centered approach while SST-3, SST-4 and SST-5 held views between a student-centered and a teacher-centered approach and SST-6 had a completely student-centered approach. Also, when we compare the beliefs of the six student teachers participating in this study with the approaches they used in practice, we see that the beliefs of the student teachers were consistent with their classroom practice. In this study, the classroom practices of the student teachers were examined based on three beliefs (explicit-conceptual-exploratory), and no studies examining classroom practices were found in the literature. However, there are some studies that examine the classroom practices of student teachers in two areas, namely teacher-centered and student-centered and the traditional approach versus the constructivist approach. For example, as a result of a study conducted with student science teachers, Yurdatapan (2010) found that student teachers used new methods and techniques in all situations, but that they used more traditional methods when they were not encouraged or forced to use a constructivist approach. However, there are studies in the literature indicating that student teachers are more traditional in their practices. For example, Mertoğlu (2011) found that the views of teachers about constructivist learning environments was above average, but that there was no relationship between perceptions of constructivist learning environments and their ability to create such environments. The study found that participating teachers generally gave lessons with a traditional approach, and that the teachers' perceptions of constructivist learning environments did not affect their teaching practices. A similar study found that teachers were not as competent at using teaching methods as they were at understanding them and that they primarily used lecture and question-answer methods (Uysal, 2010). Markic and Eilks (2008) found that most of the 85 student teachers had a tendency to traditional learning (teacher-centered, subject-centered, transfer-oriented). Eilks, Al-Amoush and Markic (2011) concluded from their research that pre-service and inservice teachers had quite traditional beliefs regarding how to learn and teach chemistry. These traditional beliefs included a teacher-centric approach focused on the teacher's transfer of knowledge and learning the theory of the subject matter.

When the junior high science teachers of the science student teachers are examined, the science teachers of four of the student teachers employed an explicit (teacher-centered) approach, one teacher had conceptual (both teacher and student-centered) approach and one teacher took exploratory (student centered) approach. Furthermore, the teachers of four student teachers with a conceptual model (both student- and teacher-centered) had an explicit approach, the other student teacher with conceptual model had a teacher with conceptual model and the student teacher with the exploratory model had a teacher with exploratory model. When the views of the student teachers' professors in the department of education were examined, most of the faculty members have a teacher-centered approach, but the most popular professors had a student-centered approach. Therefore, we see that the beliefs of the student teachers about the learning-teaching process were passed on from their junior high science teachers and the professors in the education department. This situation gives us hope because it can be interpreted as evidence that very resistant beliefs can be changed given the right environment. According to Yıldız Duban (2013), the mental images of student teachers regarding teaching are connected with their experiences as students, and these experiences have an impact on their processing of information and design of teaching practices. Decker and Rimm-Kaufman (2008) claim that the beliefs of teachers during the teacher training program are more flexible than their beliefs when they are teaching, so change in teachers' beliefs could take place while they are in the education department. Doyle (1997), on the other hand, conducted a study of a new teacher training program with 310 elementary student teachers. They came to the teacher training program with the understanding that the teacher passively accepts the

curriculum and provides students with information, but during the program their views of what it means to be a teacher changed so that they viewed teaching as facilitating and guiding and learning as growing and changing. Minogue (2010) concluded that a 14-week applied science methodology class affected the beliefs of student teachers about science education. In other words, the beliefs and mental models of student teachers changed due to the use of special practices. These changes moved from teacher-centered to student- and research-centered teaching. In a study they conducted with student teachers, Ambusaidi and Al-Balushi (2012) witnessed how the teacher-centered approach of student teachers before and after the Science Methods 101 class moved to somewhere between teacher-centered and student-centered. The student teachers that participated in this study were found to have a conceptual teaching style that is quite close to an explanatory teaching style.

None of today's educators would argue for authoritarian and over-bearing educational practices based on memorization instead of multi-faceted educational practices based on interest and ability that encourage creativity and are as free as possible. However, the traditional molds that have dominated the educational approach for many years are not easily overcome (Vural, 2004). Even though many student teachers support different views about learning and teaching, they do not let go of the beliefs they bring with them. Time and experience are critical factors in helping student teachers develop their ideas and classroom practices (Doyle, 1997).

Markic and Eilks (2008) say that beliefs are shaped by the learning experiences of teachers in school, educational background, pre-service classroom experiences, opportunities for self-reflection in the pre-service period, and the influence of discipline-related and domain-specific subject matter training. Nuangcalerm and Prachagool (2010) argue that student teachers must be given opportunities to acquire professional experience in real schools after the theoretical information they learn in university and to implement their ideas about science teaching and learning in education classes. Implementation may contribute to conceptual change (DiPietro & Walker, 2005). Yıldız Duban (2013) also recommends that student teachers be given opportunities to create constructivist environments with micro-teaching applications in classes like special teaching methodology and that faculty members could be a role model by creating constructivist environments in their own classes.

Based on the results of this study, we can say that the beliefs of student teachers about the learning-teaching process are influenced by the profiles of the science teachers in their past and the profiles of their professors in the education department. Therefore, teacher training programs could provide constructivist learning environments to develop more exploratory-investigative science education. As a result, there would be more applied opportunities to develop constructivist philosophical concepts and real learning lifestyles in an environment where they express themselves freely and structure their knowledge.

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