

Full Length Research Paper

Examining teaching of professional concepts in teacher training and investigating students' cognitive structures regarding professional concepts

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The study aims to determine education faculty students' cognitive structures regarding professional concepts, and to reveal the views of the students and faculty members about conceptual teaching. The participants of the study, which was designed as a case study, were determined using the criterion sampling method. In the study, which was carried out with a total of 69 education faculty second grade students and with one faculty member responsible for the course of Introduction to Educational Sciences, Word Association Test and semi-structured interview forms were used as the data collection tools. The results of descriptive analysis demonstrated that the concept in which the students had the lowest level of misconception was the concept of curriculum, and that the concept of education was the one with the highest level of misconception and with the most superficial knowledge. In addition, the data obtained by interviews were analyzed with inductive content analysis. It was found that the teaching-learning process carried out in relation to professional concepts contributed to professional competency; that factors like use of learning strategies and different information sources supported the process; and that the students' misconceptions and the faculty member's use of a single teaching method made the teaching process difficult. In the study, it was concluded that it is necessary to give examples related to concepts, and to use various teaching methods and techniques for the improvement of the process.

Key words: Cognitive structure, professional concept, teacher training.

INTRODUCTION

In learning, which has a spiral structure, preliminary learning could not only constitute the basis of subsequent learnings but also contribute to correct construction of these subsequent learnings. To speak generally, learnings regarding a certain subject area have a direct relationship with the learnings of concepts covered by that subject area.

According to Vygotsky (1986), concept is a part of the representation system which includes both the level of abstraction and the degree of the relationship for the formation of the real structure of other concepts. This multi-dimensional representation supports the development of an inter-connected hierarchy which relies on current concepts to make it easy to explain new

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concepts with examples (Wellings, 2003).

According to Merrill (1983), who defines concept as the building stone of human thought, concepts are regarded as the whole of symbols, phenomena and objects sharing common features and using the same name. Klausmeier (1992) defines concept as an intellectual structure which represents organized information about anything. In this respect, when the definitions of concept reported in related literature are examined, it is seen that concept refers to an abstract unit of thinking as well as to a kind of classification which involves the actions of separating in accordance with differences and combining in accordance with similarities.

Individuals form concepts from their own ideas that they use to understand natural phenomena which they observe from their environments during their daily life experiences (Alwan, 2011; Faiz and Ergin, 2014). Learning the concepts correctly and completely, which are fairly important for us to give meaning to everything including our world, the life, people, events and the universe is also essential for our current and future learnings. Concepts help the individuals form the basic cognitive structures in their minds and learn new information significantly (Faiz and Ergin, 2014). The fact that learning is a life-long continuous process for all ages and that educational environments are areas where the actions of learning and teaching are carried out in a planned and systematic manner increases the importance of conceptual teaching and learning in these environments.

In a study conducted by Erdener (2009), who compared the views of Vygotsky and Piaget about intellectual and linguistic development, Vygotsky defines daily concepts as those which occur spontaneously and scientific concepts as those which occur non-spontaneously and which are taught in school or family environment, and are subjected to conscious processing. According to Vygotsky, once the individual starts grasping the concept consciously, then previously formed concepts will be constructed accordingly again (Erdener, 2009). When viewed from this perspective, daily concepts provide basic aspects necessary for the evolvment of scientific concepts; preliminary learnings constitute the basis of subsequent learnings; and the cognitive structures formed by current knowledge are used in the process of giving meaning to new information.

The cognitive structures which have an important place in the process of learning, remembering and organizing the information are defined by Davidson (1977) as "inter-connected concepts used by the individual to discriminate between the messages received" (Uçak and Güzeldere, 2006). According to Shavelson (1974), cognitive structure is an presumptive structure indicating the organization of concepts in students' long-term memories, and the relationships between them.

The development of the cognitive structure influences the individual's pace of understanding whether the

message received is related or not. In addition, the number of categories in the cognitive structure has directly proportional influence on the number of relations between these categories and makes it easier or harder for the individual to perceive the information and to establish a relationship (Uçak and Güzeldere, 2006).

Students with weak cognitive structure have the ability to process weak knowledge and adapt knowledge to new conditions and daily events (Tsai and Huang, 2002). In this respect, an individual's cognitive structures related to concepts regarding a subject area directly or indirectly affect his or her learnings in relation to that subject area.

When studies reported in related literature are examined, it is seen that there are several difficulties experienced in relation to conceptual teaching/learning; that a number of concepts have been conceptualized wrongly or inefficiently; and that this situation raises an important problem (Baysen et al., 2012; Güneş et al., 2010; Duman, 2003; Turan, 2002; Yükselir, 2006).

Duman (2003) points out that certain professional concepts especially related to education are used in a way to cause misconception in related literature not only because of incorrect translations but also because of loading different meanings. When the importance of concepts is examined with respect to scientific thinking, discussion and productivity regarding a certain area, it is seen that learning basic concepts in education as a science in a way to help avoid any misconception is influential on pre-service teacher training and subsequently on teacher quality.

Laska (1984) points out that an important development achieved in terms of instructional theories primarily requires defining basic concepts well. Basic concepts not only constitute the basis of all education-related theories directly or indirectly but serve all the dimensions of education ranging from determining the objectives of education to the evaluation of the teaching-learning process in a formal structure. The quality of this service is thought to have positive or negative influence first on preservice teacher training and then on the quality of education and related activities at schools when the spiral structure of learning is taken into account.

Learning, which is a biological and psychological process, occurs as a result of experiences gained by individuals via their interactions with their environment, while teaching is regarded as an activity of planning and achieving learning (Ertürk, 1986). This activity requires the teacher, the learner and the elements being learned to be interaction with one another. It could be stated that the teacher is effective in the teaching process, in which the field expert (teacher) presents the information to the learner (student) and provides the environment and conditions necessary for learning, while it is both the student and the teacher who are effective in the learning process (Alkan, 1987).

It is more important to identify the misconceptions about basic concepts of teacher training and looking for

Table 1. Information about the students.

Participants*	Gender	Department	Doing preliminary preparation prior to lessons
Sinan	M	Social sciences teaching	Yes
Sevil	F	Social sciences teaching	Yes
Kaan	M	Social sciences teaching	No
Ceren	F	Social sciences teaching	No
Gizem	F	Science teaching	Yes
Burcu	F	Science teaching	Yes
Kerim	M	Science teaching	No
Hakan	M	Science teaching	No

* The names of the participants were coded.

the solutions in order to put away them because prerequisite knowledge and conceptions generates a step for later subjects (Mehmetlioğlu, 2014). In this respect, the purpose of this study was not only to determine the cognitive structures of education faculty students (who have the role of a learner) regarding professional concepts, and to examine their perceptions of the process of learning concepts but also to reveal the perceptions of faculty members (who have the role of a teacher) in relation to teaching professional concepts. In line with these purposes, the following research questions were directed in the study:

- (1) What are students' cognitive structures regarding professional concepts?
- (2) What are students' views about the process of learning professional concepts?
- (3) What are the faculty member's views about the process of teaching professional concepts?

METHODOLOGY

Research design

The study was carried out using the case study design, one of qualitative research methods. Yıldırım and Şimşek (2011) define case study as one which allows not only investigating one or more situations in an in-depth manner but also examining relational factors holistically and which tries to determine the effects of these factors on the related situation or the effects of the latter on the former. In this respect, in the present study, the cognitive structures regarding the professional concepts found in teacher training constitute the situation in question. Therefore, the study aimed to conduct in-depth examination of the views of the faculty member and of the students about the process of teaching and learning the concepts.

Participants

The study was carried out with 69 second grade students attending the departments of Science Teaching and Social Sciences Teaching at a state university located in Eastern Mediterranean Region in Turkey, and with a faculty member giving the course of Introduction to Educational Sciences in both departments.

In the study, the criterion sampling method, one of purposeful sampling methods, was used. According to the criterion taken into account to determine the participants, the students who had similar academic achievement and taken the course of Introduction to Educational Sciences, which introduced professional concepts to them, were included in the research sample, and a faculty member who gave this course in the two departments was asked to take part in the study.

In addition, interviews were conducted only with volunteer students. The faculty member (FM) participating in the study had a Phd degree with a teaching experience of 16 years in the profession. Table 1 presents information about the eight students interviewed in the research process.

When Table 1 is examined, it is seen that the students interviewed in the research process demonstrated an equal distribution in terms of their gender and their department, and that four of them did preliminary preparations before the lessons.

Research instruments and data collection process

According to Schmidt (1997), in order to determine and analyze misconceptions, interviews, multiple-choice tests, open-ended questions, concept maps, word-association tests and a combination of these methods can be used (Selvi and Yakışan, 2004). In this respect, for the first research question directed in the present study, the data were collected using the Word-Association Test, and two semi-structured interview forms were used for the second and third research questions.

The Word-Association Test (WAT) is defined as one of the oldest and most common methods which allows revealing students' cognitive structure and the connections between the concepts in this structure, which helps analyze the information network and which tries to determine whether there are efficient connections between the concepts found in the long-term memory (Bahar and Özatlı, 2003; Cardellini and Bahar, 2000).

In this method, students are asked to write down the concepts they remember in relation to a key concept regarding a certain subject in a certain period of time (appropriate to the students' level). In order to form the word-association test within the scope of the present study, six key words (education, instruction, learning, teaching, curriculum and course curriculum) were selected. In the application carried out with 69 students, each concept and the statement expected to be written down for each concept were to fit one page. Before the application, the students were provided with necessary explanations regarding WAT, and examples of different applications were given. The students were asked to fill in the statement part related to each key concept in a response time of 30 seconds.

Within the scope of the study, interviews were held with four

students from the department of Science Teaching (two female and two male), with four students from the department of Social Science Teaching (four female and four male) and with the faculty member giving the related course. During the interviews held with the students, a semi-structured interview form made up of seven open-ended questions was used. In addition, during the interviews, the focus was on thoughts about learning certain professional concepts, strategies favored in the process of learning these concepts, the problems experienced and related solutions suggested in relation to these problems, the concepts easiest and most difficult to learn, and on the professional benefits of conceptual learning.

As for the interview held with the faculty member, another semi-structured interview form including five open-ended questions was used, and the interview was audio-recorded. During this semi-structured interview, the faculty member was asked to report his views about whether he did any preparation for the course of Introduction to Educational Sciences in relation to teaching professional concepts, which concepts he found important to teach and what way he followed while teaching these concepts.

Data analysis

In order to analyze the data collected with WAT, descriptive analysis was conducted, and the words and statements written as response to the key concepts were examined in detail. First, a table of frequency demonstrating how many times the concepts or words for each key concept were repeated was formed. Based on this table of frequency, concept maps, which are graphical materials schematizing the connections between different concepts and ideas, were formed. While forming the concept maps, the Cut-off Point (COP) technique suggested by Bahar et al. (1999) was used.

According to this technique; five words deficient of the maximum number of words produced for any key concept involved in the WAT is used as cut-off points. The answers above this frequency are written into the first part of the concept network. Then, the cutting point is pulled down at regular intervals and the process continues until all key words appear in the concept network.

Another dimension analyzed in the Word-Association Test was the analysis of the statements written down in relation to each concept. The students were asked to write down a statement regarding each concept. In this respect, the statements written down by the students in the related part of the test were examined with respect to the information and the meanings provided.

According to the statement analysis classifications put forward by Ercan et al. (2010), statements including scientific information (SISI), statements including non-scientific and superficial information (SINSI) and statements including misconceptions (SIM) were analyzed. For the analysis of the interview data, the inductive content analysis method (Patton, 2002) was used.

In line with the strategies suggested regarding the credibility and transferability of the study (LeCompte and Goetz de, 1982; Yıldırım and Şimşek, 2011; Guba and Lincoln, 1982), the research findings were presented without doing any related interpretation, and the themes formed via the interviews and the statement categories formed via the Word-Association Test were supported with direct quotations. For triangulation, another precaution to be taken to increase credibility, different methods and sources were used to cross-check the information and results obtained (Johnson and Christensen, 2004; Patton, 2002).

In this respect, in the study, method and data triangulation was done, and the consistency of the data collected from the students and the faculty member via the Word-Association Test and Interviews was examined and compared. In addition, for the credibility of the study, another researcher was asked for cooperation and to provide related feedback and to do the necessary corrections throughout the whole process of preparing

Table 2. Frequencies of the words produced in relation to the key concepts.

Key concepts	Frequency (f)
Education	101
Teaching	74
Course curriculum	63
Curriculum	51
Learning	43
Instruction	27

Cut-off point: 25 and higher

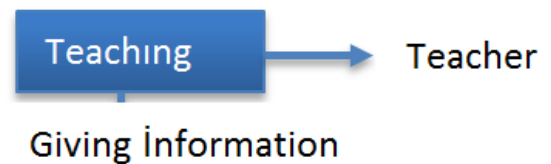


Figure 1. Concept map formed for the cut-off point of 25 and higher.

the data collection tools and interpreting and reporting the findings (Holloway and Wheeler, 1996; Houser, 2015; Streubert and Carpenter, 2011).

FINDINGS AND DISCUSSION

In line with the first sub-purpose of the study, the word-association test was used to let the students write down the words regarding the professional concepts and the statements related to these concepts. Table 2 presents the frequencies of the words produced for each concept.

When Table 2 is examined, it is seen that the highest number of associated words belonged to the concept of “education” and that the lowest number of associated words belonged to “instruction”. In order to reveal the students’ cognitive structures regarding the key concepts, the words associated with the concepts were examined in detail. Figure 1 demonstrates the concept maps obtained as a result of the analysis taking the cut-off points into consideration.

When Figure 1 is examined, it is seen that the concept with the highest frequency for the cut-off point of 25 and higher was teaching. The concepts which were associated with teaching and which had a frequency value higher than 25 were “teacher” and “giving information”.

When Figure 2 is examined, it is seen that for the cut-off point between 20 to 24, there was an increase both in the number of key concepts and in the words associated with the key concepts. It was found that the students

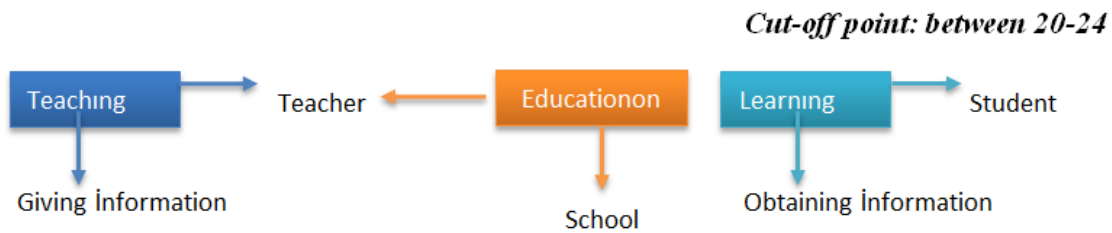


Figure 2. Concept map formed for the cut-off point between 20-24.

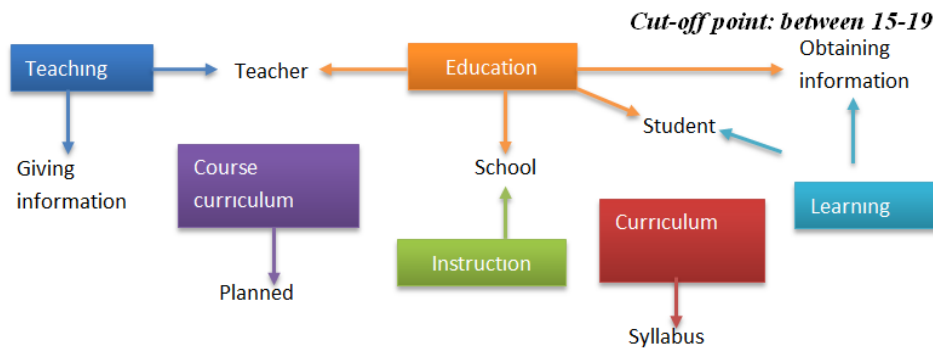


Figure 3. Concept map formed for the cut-off point between 15-19.

associated “education” with the concepts of school and teacher and that they associated “learning” with the concepts of student and obtaining information.

When Figure 3 is examined, it is seen that the words associated with “education” for the cut-off point between 15 to 19 were teacher, school, student and obtaining information and that the key concepts were “instruction, curriculum and course curriculum”. When Figure 4 is examined, it is seen that all the six key points in the study were revealed for the cut-off point between 10 to 14, and that a number of words were associated with these key concepts. Considering the range in question (10 to 14), it was found that the concept of “teaching” was associated with the concepts of *giving information, teacher and student*; the concept of “education” with *process, student, teacher, school and obtaining information*; the concept of “learning” with *obtaining information and student*; the concept of “course curriculum” with *teacher, student, school, content and planned*; the concept of “instruction” with *school and content*; and the concept of “curriculum” with *educational environment, syllabus, comprehensive and regulatory*.

Table 3 presents the frequencies of the statements found in the categories as a result of the analyses of the statements. When Table 3 is examined, it is seen that the students made a sentence for all categories of statements and the key concept with the highest

frequency was “education”. When the key concepts were examined with respect to the statement categories, it was seen that the statements which mostly included scientific information, non-scientific superficial information and misconception belonged to the concept of education; that the highest number of statements belonged to the concepts of education and learning; and that the lowest number of statements regarding the concepts belonged to instruction, teaching and course curriculum. Sample statements related to the categories were as follows:

It is a process of developing permanent good-quality intended behaviors in the process of individuals’ in-school and out-of-school lives (Education, SISI)

The teacher’s job is to teach beneficial information to children (Teaching, SINSI)

Education is given during lessons at school by the teacher via life experience (Education, SIM)

It is me who makes decisions related to education (Education, irrelevant)

Views of the faculty member and students about learning professional concepts

During the interviews held with the students in relation to

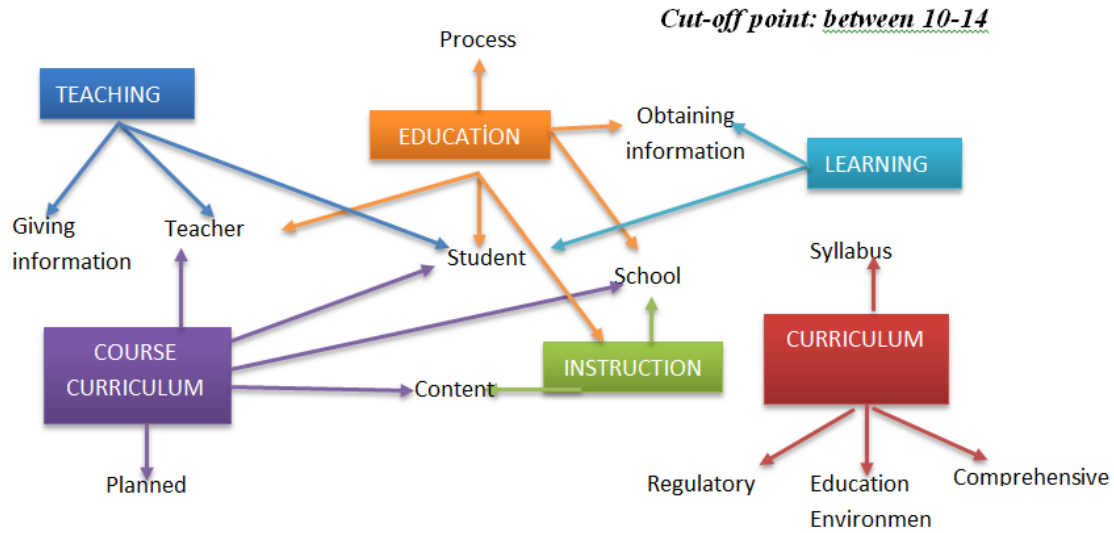


Figure 4. Concept map formed for the cut-off point between 10-14.

Table 3. Categories of statements regarding the professional concepts and the related frequencies.

Key words	SISI*	SINSI*	SIM*	Irrelevant	Total	Blank
Education	26	20	9	3	58	11
Curriculum	22	6	5	1	34	35
Learning	21	2	5	3	31	38
Course curriculum	19	2	4	-	25	44
Instruction	13	3	7	1	24	45
Teaching	13	6	5	1	25	44

*SISI: Statements including scientific information; SINSI: Statements including non-scientific and superficial information; SIM: Statements including misconceptions

learning the concepts regarding the profession of teaching, four of the eight students pointed out that it was necessary to learn these concepts. Table 4 presents the categories, the sub-categories, the codes and the frequencies revealed depending on the participants' views.

When the categories in Table 4 are examined, it is seen that the participants reported their views about learning professional concepts under the following four categories: contribution to professional competency, supportive implementations, complicating factors and suggestions for learning. Of all the participants reporting their views in relation to the category of contribution to professional competency, six of them emphasized contribution to professional knowledge, while three of them put emphasis on contribution to the dimension of planning instruction. Burcu, one of the participants, mentioned contribution to professional knowledge, said:

“If you learn these concepts, you will form the basis of professional knowledge as a teacher. You will consider certain factors in teaching and learning, and you will become aware of which factors to take into account. In

this respect, I think it is really important” (Burcu, pp. 2).

Another participant, Kaan, who mentioned the dimension of planning instruction within the scope of the same category, said:

“It is primarily essential for a teacher to learn these concepts because a teacher is supposed to conduct a course in line with a certain syllabus Planning instruction is possible especially when the meanings conveyed by concepts are understood well” (Kaan, pp.2).

When the faculty member's views about learning professional concepts were examined, it was found that he made explanations supporting the students' views. In general, the faculty member stated that it was important and necessary to learn professional concepts and that these concepts constitute the basis of having the necessary professional knowledge and keeping up with the field-related developments, said:

“In the end, all the students I teach in the department will become a teacher in future. Thus, they first have to learn correct use of the concepts required by their profession...

Table 4. The results of analysis relation to learning professional concepts.

Categories	Codes	Participants	Frequency	
Contribution to Professional Competency	Professional knowledge	Kerim, Hakan, Gizem, Burcu, Sinan, FM	6	
	Planning instruction	Ceren, Gizem, Kaan	3	
	Achievement of academic development	Sevil, FM	2	
Supportive implementations	Use of learning strategies	Ceren, Kerim, Hakan, Sevil, Kaan, Burcu	6	
	Use of different sources of information	Ceren, Sevil, Kaan, Sinan	4	
	Associating with daily life	FM	1	
	Use of questions at cognitive skill level	FM	1	
	Considering individual differences	FM	1	
	Student-based factors			
	Complicating factors	Misconceptions	Kerim, Hakan, Burcu	3
Giving importance to the course		Hakan, FM	2	
Lack of preliminary knowledge		Sevil	1	
Lack of motivation		FM	1	
Factors based on the faculty member				
Suggestions for learning	Use of a single teaching method	Kerim, Sevil, Burcu	3	
	Giving abstract examples	Sevil	1	
	Use of inefficient examples	Sevil	1	
	Giving examples related to concepts	Ceren, Kerim, Gizem, Sevil, Kaan, Sinan, FM	7	
	Use of different teaching methods and techniques	Kerim, Hakan, Burcu, FM	4	
	Use of visual materials	Hakan, Sinan	2	
	Meeting the course requirements	Kaan, Burcu	2	
	Presenting clear and comprehensible information	Sevil	1	
	Supporting teaching with different information sources	Burcu	1	
	Associating with thinking skills	Hakan	1	

because good teachers are those who have enough professional knowledge and who can follow the related professional developments to improve themselves in their job. In order for teachers to keep their professional knowledge up-to-date, they need to understand the related essential concepts well" (FM, pp.2).

Regarding the category of supportive implementations, it is seen that the students mostly used learning strategies (f:6), and benefitted from different sources of information (f:4). Kaan, one of the participants who stated that he used learning strategies, said:

"After the lesson, I do preparation by studying the subjects again" (Kaan, pp. 3).

While another participant, Sevil, reported her views said:

"For example, while studying myself on the definition of

education, I note down short definitive statements" (Sevil, pp.4).

Kaan, who stated that he made use of different sources of information to support learning, said:

"I prepare for these concepts via the course books of educational sciences and curriculum development and with the help of online videos related to the Government Staff Placement Exam" (Kaan, pp.4).

As a result of the interview held with the faculty member, who constitutes an important part of the process of conceptual learning, it was seen that the faculty member tried to motivate the students by focusing on the place and importance of the subjects in daily life and used sample events; that in relation to the dimension of assessment, he paid special attention to preparing good-

quality questions and favored questions mostly at cognitive skill level. In this respect, the faculty member reported his views as follows:

"I try to motivate my students with the help of sample cases by explaining how they will make use of them in their lives. In general, honestly, I cannot say that I use the holistic approach to assessment_I really think a lot about the quality of the questions. Rather than just using questions to measure the knowledge directly, I mostly try to prepare questions that will let students analyze a sample case and then find a related answer as a result of this analysis"(FM, pp.4)

Regarding the category of complicating factors, the participants' views were classified under two sub-categories: "student-based factors" and "factors based on the faculty member". For the sub-category of student-based factors, the students mostly stated that they had misconceptions (f:3), while the faculty member said the students did not give the necessary importance to the lessons. Burcu, one of the students who stated that she had misconception, said:

"In fact, those concepts were a bit ... I mean, for example, instruction, what I know about instruction was a lot different from the one in the course book, and this was also true for learning. I was really surprised to see that what I had known about it was wrong" (Burcu, pp.3)

The faculty member, who stated that the students did not give enough importance to the course said:

"(...) to tell the truth, it seems to me that students think the course is unnecessary, so I don't think they pay much attention to the course. But that's just my own belief" (FM, pp. 5).

In relation to the sub-category of the factors based on the faculty member, the problem most frequently reported was the use of a single teaching method (f:3). Regarding this problem, one of the participants, Sevil, said:

"Generally, our lessons are taught in the same way all the time. For this reason, we just develop our abstract knowledge, and when you cannot concretize your knowledge, it does not become permanent in your mind" (Sevil, pp. 4)

Regarding the category of suggestions for learning professional concepts, it was seen that the participants mostly reported views about increasing the use of examples related to the concepts (f:7). In relation to this, Gizem, Kerim and Ceren said:

"(...) giving examples from daily life increase permanency of what you have learned in class (Gizem, pp. 4)", "(...) it

would be better if examples from real life or from our own lives are provided (Kerim, pp. 4)"; "I generally understand definitions of concepts better via examples. Thus, I think frequent use of such examples in class would be of our benefit. Teaching concepts should not just involve writing down the definition of the concept. We can learn more easily if related examples are given (Ceren, pp. 6)". As for the faculty member, he reported his views about the subject as follows: "Sample events should be used more. Students could bring sample events into class as well. They can first discuss the correctness of those sample events together, and then, the lesson should be taught with the help of a correct event" (FM, pp. 5).

Another suggestion put forward by the participants in relation to conceptual learning was related to the use of different teaching methods and techniques (f:4). Regarding this subject, one of the participants, Burcu, said:

"As concepts are taught via presentations, students easily forget what they have learned in class. If a concept is first presented via a story or novel or a related discovery or invention, it will be more permanent in students' minds. For example, I myself don't know the real definitions of these concepts at the moment. Thus, I don't think students remember these concepts after a while if they learn these concepts in that way" (Burcu, pp.6).

CONCLUSION AND IMPLICATIONS

When the concept maps obtained in the study were examined, it was seen that the words produced for all the professional concepts except for curriculum were in association with each other. When the concepts were examined with respect to the words, it was found that the concept of education was associated with the words of "teacher, school, students, *instruction*, obtaining information and process"; the concept of course curriculum with the words of "planned, teacher, student, school and content"; the concept of teaching with the words of "giving information, teacher and student"; the concept of learning with the words of "obtaining information and student"; the concept of instruction with the words of "school and content"; and that the concept of curriculum was associated with the words of "syllabus, comprehensive, regulatory and educational environment".

Bahar et al. (2006) point out that the number and quality of words associated with a concept help determine whether the concept has been understood or not. In this respect, considering the numbers and the qualities of the words produced as response to the key concepts in the present study, it could be stated that the students defined most of the concepts correctly; that the concept of course curriculum was the one the students

learned best among all other concepts as the highest number of correct words belonged to that concept.

In addition, this finding is also supported with the fact that in the related statement analysis, the concept of course curriculum had the lowest frequency of statement including misconceptions (f:4). Another concept was education which was thought to involve misconception though almost the same number of words were produced for this concept as for the concept of course curriculum.

In addition, based on the fact that the students associated the concept of education mostly with the words of "school" and "teacher" (COP: 20-24), it could be stated that the students considered education to an action carried out only by the teacher at school. according to the analysis of the related statements, the fact that the statements which included the highest number of misconceptions were related to the concept of education and that the students defined education as "something *taken at school via experience with the help of the teacher*" could be regarded as an indicator of this misconception. When the students' responses were examined in terms of the concept of teaching, it was seen that the first concept of teaching in the concept map (COP: 25 and higher) was associated with the words of "teacher" and "giving information", which demonstrates that the students mostly defined this concept correctly.

According to Uçak and Güzeldere (2006), the number of categories in the cognitive structure has directly proportional influence on the number of relationships between these categories and makes it easy or difficult for the individual to understand the information. In literature, the concept of teaching is defined by Ertürk (1986) as an activity of guiding learning, while Glasser (1992) refers to it as a process of giving information to people who are willing to increase the quality of life by being a model. Therefore, the related findings obtained in the present study are consistent with those reported in related literature. When the analysis of the related statement is examined, the students could be said to have difficulty making statements including scientific information though they associated the concept with correct words as the concept of teaching had the lowest frequency in terms of the category of statements including scientific information (f:13).

The concept of learning which was found to have the same cut-off point with the concept of education in the concept map (COP: 20-24) was associated by the students only with the words of "obtaining information" and "student". In related literature, learning is defined as "a product of life experience and relatively permanent behavioral change" (Gagne and Driscoll, 1988) and as "the process of changing one's old behaviors or developing new behaviors as a result of one's interaction with the environment or via his or her life experiences depending on his or her level of maturation" (Binbaşıoğlu, 1983).

Considering the two definitions, students are expected

to associate the concept of learning with the words of experience, permanent behavior or process. On the other hand, based on associating the concept only with obtaining information and with student, it could be stated that students have superficial knowledge about the concept.

In the concept map, the cut-off point was between 15 to 19, and in this range, course curriculum was associated with "planned"; instruction with "school"; and curriculum was associated with "syllabus". In the last cut-off point (COP: 10-14), it is seen that the number of associated words increased (instruction: *school, content and education*; curriculum: *syllabus, comprehensive, educational environment, regulatory*) and all the concept except for curriculum had at least one common word shared with the other concepts.

In related literature, instruction is defined as "the process of doing the necessary preparations for the teaching-learning process appropriate to the course curriculum and conducting such a process effectively enough to end up with the desired product and with all the expected behaviors" (Özçelik, 2014) and as "applications carried out in a purposeful, planned, regular and controlled manner within the framework of a previously prepared curriculum in an educational institution" (Güneş, 2014).

In this respect, depending on the fact that the number of the words the students associated with the concept of instruction was limited and that this concept had the highest frequency of statements including misconception followed by the concept of education, it could be stated that the concept in question was not understood well.

The fact that the number of the words associated with the concept of curriculum, one of the most comprehensive concepts, and that this concept did not have any common word shared with the other concepts was the most striking finding obtained in the study. In related literature, the concept of curriculum is defined as "the whole of the life experiences gained by students under the guidance of their teachers" (Caswell and Campbell, 1935; Demirel, 2013), while Doll (1986) regards it as both process and content which allow changing students' values, attitudes and behaviors and developing their skills, knowledge and understanding.

In this respect, the response words associated by the students explained the concept of curriculum correctly but not efficiently. In addition, it could be stated that the concept in question was not understood well since the concept with its really broad meaning did not have any common word shared with the other key concepts (Uçak and Güzeldere, 2006).

According to the results obtained in relation to the second sub-purpose of the study, the participants stated that learning professional concepts contributed to professional competency in terms of professional knowledge, instructional planning and academic development. Laska (1984) points out that in order to

achieve an important development in instructional theories, basic concepts should primarily be defined well. These concepts are included in the content of the course of "Introduction to Educational Sciences" given to freshman students in all the departments of education faculties.

In relation to the course of Introduction to Educational Sciences, Erginer (2006) states that "thanks to this course, students will be able to adapt themselves to other profession-related courses in upper classes". Similarly, the views of the students and of the faculty member are supported by Erdem (2013), who consider introductory courses to be among the primary courses that allow achieving the outcomes in a specific field. In addition, the fact that professional concepts learned within the scope of the course in question constitute the basis of subsequent learning also supports the related views of the students and the faculty member.

Regarding the theme of supportive implementations, the students' views were found to be related to use of different sources of information and learning strategies. As for the faculty members' views, their views were about association with daily life, use of problems related to cognitive skill level and considering individual differences. In related literature, different methods and strategies are suggested regarding how to sequence and present the content elements of the concept and how to teach the concepts. As a strategy for concept teaching, Merrill and Tennyson (1977) suggest a deductive approach (Van Cleaf, 1991).

Tennyson and Cocchierella (1986) point out that concept teaching involves three phases. Martorella (1998) claims that concept analysis should be conducted for concept teaching. Malatyali and Yilmaz (2010) state that importance should be given not only to conceptual learning but to concept teaching as well for meaningful and permanent learning and that different teaching methods should be applied to allow students to learn the meanings of concepts without being dependent on a single teaching method.

Malatyali and Yilmaz (2010) who suggests use of a discovery-involved teaching strategy in learning environments which include students with higher level of thinking skills, point out that this strategy will allow students to discover conceptual learning via their own experiences, their background knowledge, their observations and their interactions with their environment. Ülgen (2001) who claims that conceptual learning involves two elements such as product and process, states that in relation to learning as a product, individuals develop observable behaviors regarding the concept and that these behaviors include expressing their knowledge about their concept, defining the concept together with its characteristics, stating the characteristics of the concept by comparing it with other similar concepts, defining the new concept by comparing it with a similar concept based on their background knowledge

about that concept, and making a related classification in line with appropriate criteria.

In this respect, the views reported in related literature in relation to the applications supporting concept teaching/learning could be said to be consistent with the views of the students and of the faculty member. Regarding the theme of complicating factors, the student-based factors were reported to include existence of misconceptions, lack of importance to be given to the course, lack of background knowledge and lack of motivation. Misconception is defined as knowledge that hinders learning or teaching the scientifically proven concepts (Çakır and Yürük, 1999), and in related literature, it is asserted that student-oriented teaching approaches (concept maps, analogy, metaphor and so on) should be adopted and applied to overcome misconceptions (Riche, 2000).

Another view reported in relation to the sub-category of student-based factors was related to lack of background knowledge and lack of importance to be given to the course. According to the National Research Council, students' attitudes towards the course and the subject determine their approaches to the course, their levels of knowledge about the subject, their performances, their desire to obtain information as well as their interests (National Research Council, 1996).

In this respect, as mentioned by Ekici (2008), preservice teachers, who have high levels of attitudes towards profession-related courses, could be said to be more inclined to and successful in learning. As for the category of the factors based on the faculty member, it included use of a single teaching method, use of abstract examples, and inefficient use of examples. As mentioned earlier, in the process of conceptual teaching, use of more than one student-centered teaching method rather than a single type of teaching method is suggested. Besides this, when the related literature is examined, it is seen that in conceptual teaching, use of visual materials to present distinct characteristics, definitions and examples related to the concept is quite effective in the teaching-learning process (Erden and Akman, 1997; Kaptan, 1998; Malatyali and Yilmaz, 2010).

Consequently, in the study, it was found that the students had the least misconception about course curriculum and the most misconception and superficial knowledge about the concept of education. In addition, it was revealed that the teaching-learning process carried out in relation to professional concepts contributed to professional competency and those factors like use of learning strategies and different sources of information support the process in question.

On the other hand, it was found that the students' misconceptions and the faculty member's use of a single teaching method made the teaching-learning process difficult. Moreover, it was concluded that improvement of the process requires giving examples related to concepts and diversifying various teaching methods and

techniques.

In this respect, in relation to teaching professional concepts in the process of teacher training, first of all, individuals' misconceptions could be determined by revealing their background knowledge about concepts; learning strategies could be applied considering individual differences; different sources of information could be used; and the teaching process could be carried out in a way to take students' needs into account.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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